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Construct Validation of the Screening for Inflammatory Pain in the Lower Back Questionnaire: Data from the Screening in Axial Spondyloarthritis in Psoriasis, Iritis, and Colitis (SASPIC) Cohort

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Objectives: The 10-item SIMPLE screening questionnaire for axSpA is a patient self-report standardized questionnaire developed by rheumatologists from the Spondyloarthritis Research Consortium of Canada and patient consumers. It elicits responses to domains comprising inflammatory back pain (IBP). We aimed to test the construct validity of the items comprising this questionnaire by comparing responses with those elicited independently by rheumatologists and by evaluating their association with severity of back pain and diagnosis of axSpA.

Methods: The multicenter Screening for Axial Spondyloarthritis in Psoriasis, Iritis, and Colitis (SASPIC) Study is aimed at early detection of axial SpA in consecutive patients presenting with undiagnosed back pain to the rheumatologist. Consecutive patients ≤45 years of age with ≥3 months undiagnosed back pain referred with any one of psoriasis, acute anterior uveitis (AAU), or colitis undergo routine clinical evaluation by a rheumatologist for axSpA. Patients first complete the SIMPLE questionnaire and then the rheumatologist independently of any patient data determines the presence or absence of a diagnosis of axial SpA. Agreement between patient and physician reporting of questions reflecting IBP domains was analyzed using the kappa statistic. Proportions of patients reporting to the various IBP domain questions were compared according to back pain score ≥5 or <5 (0-10NRS) using the chi-square. Associations between patient responses for different IBP domain items and a diagnosis of axSpA were analyzed by regression.

Results: 234 patients (51.3% male, mean age 34.6 years, mean back pain duration 7.1 years, B27+ 36.3%) were referred with AAU (29.9%), psoriasis (18.8%), Crohn's colitis (32.1%), ulcerative colitis (19.2%). Patients responded to SIMPLE items reflecting stiffness, nocturnal awakening, improvement with exercise, and response to NSAID significantly more frequently when back pain score was ≥5. Agreement between patient and physician reporting for IBP domains was substantial for duration of stiffness (κ=0.57) and nocturnal awakening (κ=0.63), but less for effect of exercise (κ=0.30), effect of rest (κ=0.44), and response to NSAID (κ=0.31). Most of the SIMPLE items were significantly associated with diagnosis of axSpA, with the exception of items describing alleviation of symptoms by exercise and NSAID therapy.

Conclusion: Patient reporting to IBP domains of stiffness and nocturnal pain are congruent with physician reporting and associate strongly with final diagnosis of axSpA. Reporting of impact of exercise and response to NSAID therapy is less congruent with physician assessment, is dependent on level of back pain, and is not independently associated with diagnosis of axSpA.**2**

The Screening in Axial Spondyloarthritis in Psoriasis, Iritis, and Colitis (SASPIC)

Prospective Cohort: What is the Frequency of Axial Spondyloarthritis and Which Features are Discriminatory from Non-Specific Back Pain?

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Objectives: There is limited prospective data as to the frequency of axial spondyloarthritis (axSpA) from unselected patients with undiagnosed back pain presenting with acute anterior uveitis (AAU), psoriasis, or colitis. It is also unclear which clinical features discriminate between axSpA and non-specific causes of back pain that might inform the development of a screening strategy for early disease.

Methods: The multicenter Screening for Axial Spondyloarthritis in Psoriasis, Iritis, and Colitis (SASPIC) Prospective Study is aimed at early detection of axial SpA in patients presenting with undiagnosed back pain to the rheumatologist. Consecutive patients ≤45 years of age with ≥3 months undiagnosed back pain referred with any one of psoriasis, AAU, or colitis undergo routine clinical evaluation by a rheumatologist for axial SpA. In phase I MRI evaluation is ordered per rheumatologist decision and in phase 2 MRI assessment is mandatory. The rheumatologist determines the presence or absence of axial SpA and the degree of confidence in the diagnosis (-10 (definitely not SpA) to +10 (definite SpA) on a numerical rating scale (NRS)) at 3 consecutive stages: 1. After the clinical evaluation; 2. After the results of labs (B27, CRP) and radiography; 3. After the results of MRI evaluation. Differences in clinical characteristics between those who were diagnosed as axSpA or non-specific back pain were analyzed using chi-squared and t-tests.

Results: The completed phase 1 cohort included 244 patients (52.1% male, mean age 34.5 years, mean back pain duration 7.2 years, B27+ 35.7%) referred with AAU (29.5%), psoriasis (18.4%), Crohn's colitis (31.6%), ulcerative colitis (UC) (20.5%). Mean back pain was 5.5 (0-10 NRS) and 54.6% had back pain ≥ 6. 116(47.5%) were diagnosed with axSpA and these included 61.2% males, 61.1% of those who had AAU, 44.4% who had psoriasis, 37.7% who had Crohn's, and 46% who had UC. Significant discriminatory features in the history included morning stiffness of >60 min duration, nocturnal back pain, alternating buttock pain, improvement with exercise, and improvement with rest, but not response to NSAID. Physical exam features that included assessment of mobility, enthesitis, and swollen joints, were non-discriminatory. 50.9% with axSpA were B27 positive versus 21.9% of those without (p=0.000002). CRP was non-discriminatory.

Conclusion: Response to NSAID, physical exam, and CRP are not sufficiently discriminatory clinical features for diagnosis of axSpA in patients presenting with extra-articular manifestations of disease.**3**

Additional Outcomes from the First 52-Week Randomized Placebo-Controlled Study (NCT02552212) in Patients with Non-Radiographic Axial Spondyloarthritis Treated with Certolizumab Pegol

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Objectives: In Canada, certolizumab pegol (CZP) is approved for treatment of adults with active ankylosing spondylitis (AS) and not for non-radiographic axial spondyloarthritis (nr-axSpA). Concerns have been expressed that the natural history of nr-axSpA is poorly understood, with potential for spontaneous remission. C-axSpAnd (NCT02552212) was initiated to assess CZP efficacy vs non-biologic standard care (SC) treatment in patients with active nr-axSpA and objective signs of inflammation during a 52-week (wk) placebo (PBO)-controlled study. Primary results from C-axSpAnd were reported previously.

Methods: C-axSpAnd is a 52-wk, phase 3, multicenter, double-blind, PBO-controlled study. Patients were randomized 1:1 to PBO+SC or CZP+SC (400 mg at Weeks 0, 2, and 4, then 200 mg every 2 wks) and stratified by sacroiliitis on MRI and C-reactive protein (CRP) at baseline (BL) and region. Patients were ≥18 years with documented diagnosis of axSpA and meeting ASAS (but not modified New York) classification criteria, objective signs of inflammation (elevated CRP and/or positive MRI of the sacroiliac [SI] joint) despite previous use of NSAIDs, and symptom duration ≥12 months. Randomized patients could switch to open-label (OL) CZP treatment or alternative OL treatment at any time, and background medication could be adjusted at any point during the trial. For Canada, the primary efficacy variable was ASAS 40% response (ASAS40) at Wk12, with ASAS40 at Wk52 as a key secondary endpoint. Additional endpoints included ASAS20, ASAS 5/6 and Bath Ankylosing Spondylitis Disease Activity Index 50% improvement (BASDAI50).

Results: 317 patients were randomized (PBO+SC:158, CZP+SC:159). ASAS40 response was reached in 47.8% CZP+SC vs 11.4% PBO+SC patients at Wk12, and 56.6% CZP+SC vs 15.8% PBO+SC patients at Wk52, with a rapid response (defined as an ASAS40 Wk2 response) demonstrated in 18.9% CZP+SC patients vs 5.1% PBO+SC patients (non-responder imputation [NRI]). ASAS20 response was observed in 65.4% CZP+SC patients vs 20.9 PBO+SC patients at Wk52 (NRI). Similarly, 49.7% CZP+SC patients achieved ASAS 5/6 remission at Wk52 compared with 9.5% PBO+SC patients (NRI). BASDAI50 response was observed in 55.3% CZP+SC patients vs 12.0% PBO+SC patients at Wk52 (NRI). No new safety signal was identified.

Conclusion: C-axSpAnd is the first study to assess efficacy of an anti-TNF in nr-axSpA using a 52-wk, PBO-controlled period. Clinically relevant and statistically significant improvements were seen in CZP+SC vs PBO+SC patients and no new safety signals were observed. This study shows clear evidence for the limitations of current standard care to provide adequate disease control in nr-axSpA patients.**4**

What is the Impact of Imaging on Diagnostic Ascertainment of Patients Presenting with Undiagnosed Back Pain in Routine Practice and what is the Impact of Central Reading?

Data from the Screening in Axial Spondyloarthritis Cohort (SASPIC)

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Objectives: Although MRI of the sacroiliac joints (SIJ) is the most sensitive imaging modality for early diagnosis of axial spondyloarthritis (axSpA) it is costly and not readily available. Therefore, clinicians still rely primarily on radiography. The relative degree to which radiography and MRI changes diagnostic ascertainment of axSpA in patients presenting with undiagnosed back pain has not been formally studied. We aimed to assess the relative impact of radiography and MRI evaluation on diagnostic ascertainment of axial SpA in patients presenting with undiagnosed back pain to rheumatologists, and the impact of central reading on diagnostic ascertainment.

Methods: The multicenter Screening for Axial Spondyloarthritis in Psoriasis, Iritis, and Colitis (SASPIC) Study is aimed at early detection of axial SpA in consecutive patients presenting with undiagnosed back pain to the rheumatologist. Consecutive patients ≤45 years of age with ≥3 months undiagnosed back pain referred with any one of psoriasis, acute anterior uveitis (AAU), or colitis undergo routine clinical evaluation by a rheumatologist for axial SpA and MRI evaluation is ordered per rheumatologist decision. The rheumatologist determines the presence or absence of axial SpA and the degree of confidence in the diagnosis (-10 (definitely not SpA) to +10 (definite SpA) on a numerical rating scale) at 3 consecutive stages: 1. After the clinical evaluation; 2. After the results of labs (B27, CRP) and radiography; 3. After the results of MRI evaluation. We assessed diagnostic ascertainment at each step at the categorical level (axial SpA yes/no) and also according to the degree of confidence (mean (SD) confidence). Two central readers assessed radiographs and MRI scans.

Results: 234 patients (51.3% male, mean age 34.6 years, mean symptom duration 7.0 years, mean back pain duration 7.1 years, B27+ 36.3%) were referred with AAU (29.9%), psoriasis (18.8%), Crohn's colitis (32.1%), ulcerative colitis (19.2%). The number of patients diagnosed clinically with axSpA decreased after radiography and then decreased further after MRI while confidence in the diagnosis progressively increased. After central reader assessment of imaging, the number of patients diagnosed with axSpA decreased substantially compared to assessment by local readers.

Conclusion: In a setting of undiagnosed back pain and higher risk for axial SpA, imaging is primarily helpful in ruling out SpA and reducing false positives. Despite this, central reading of imaging raises substantial concerns regarding ascertainment of false positive SpA in routine practice.**5**

Uveitis Associated with Secukinumab in the Treatment of Ankylosing Spondylitis: A Case-Report and Review of Literature

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Case Report: Ankylosing Spondylitis (AS) is a chronic progressive inflammatory disease classically affecting the sacroiliac joints and axial skeleton but also presenting with a number of extra-articular manifestations. While targeted biologic therapies have shown promise in the treatment of AS, there remains a need to fully characterize their impact on the extra-articular manifestations of the disease. Herein we report a case of multiple recurrences of AS-associated anterior uveitis following the subcutaneous administration of Secukinumab.
A case report and literature review of the side effects of Secukinumab, with emphasis on ocular adverse events.
A 37-year-old HLA-B27(+) man with radiologically confirmed AS and a one-time history of AS-associated left anterior uveitis 7 years prior received a trial of therapy with the IL-17A inhibitor Secukinumab. He had previously failed treatment with NSAIDS and Adalimumab. Following five weekly 300 mg subcutaneous loading doses of Secukinumab the patient's axial symptoms subjectively improved. However, approximately one week after the final loading dose he developed anterior uveitis in the right eye. Symptoms were eventually controlled with Prednisolone eye drops and the Secukinumab dosing was decreased to the maintenance therapy of 150 mg monthly. Unfortunately, the patient's back pain was sub-optimally controlled at this dose and so Secukinumab was increased to 150 mg every two weeks. Within one week the right eye uveitis flared. Subsequently, the patient now remains on maintenance monthly therapy with suboptimal control of AS symptoms so as to avoid uveitis. Literature related to the occurrence and/or recurrence of uveitis in the context of AS treated with Secukinumab is limited.
To our knowledge, this is the seventh case of uveitis associated with Secukinumab in the treatment of AS. It is the first report of consistent recurrence of uveitis with increasing doses of Secukinumab, raising the question about a possible link between the biologic therapy and exacerbations of ocular inflammatory disease. Further research is warranted to better understand the implications of IL-17A inhibition on the extra-articular manifestations of AS such as uveitis.

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Exacerbation of Pustular Psoriasis with Secukinumab use in Psoriatic Arthritis: A Case Report

Peter van Stolk (University of British Columbia, Vancouver); David Collins (University of British Columbia, Vancouver)

Case Report: With the development of new targeted biologics for the treatment of psoriatic arthritis, we need to understand their effects and efficacy on extraarticular manifestations. Worsening of psoriasis with the use of TNF inhibitor therapy is well documented, however there is less real-world experience regarding the impact of IL-17 inhibition on psoriasis in those with psoriatic arthritis. IL-17 inhibitors have shown to have overall positive effects on PASI scores in phase III clinical trials and pooled analyses. Herein, we present a case of paradoxical worsening of plantar pustular psoriasis during Secukinumab use for psoriatic arthritis.
A case report and literature review of the side effects of Secukinumab, with emphasis on worsening psoriasis.
A 43 year old female with a prior history of palmar pustular psoriasis managed conservatively presented to a rheumatologist several years later with bilateral ankle discomfort and increased doppler signal surrounding her tibialis posterior tendons on ultrasound, all consistent with bilateral tenosynovitis. She was diagnosed with psoriatic arthritis. Her symptoms persisted despite the use of several DMARDs sequentially and in combination, and she was subsequently

treated with the IL17 inhibitor Secukinimab. She received weekly 150 mg subcutaneous injections, and during the third week she developed severe plantar erythematous painful plaques and pustules to both of her feet. She was evaluated by a dermatologist who agreed with the diagnosis of plantar pustular psoriasis. The Secukinumab was discontinued, and her psoriatic lesions persisted for over two months with improvement in her pain, treated only with topical steroid. Her tenosynovitis did not respond to the Secukinumab, and she continued to have symptoms and increased doppler flow signal at her tibialis posterior, peroneus longus and brevis tendons bilaterally along with involvement of her tibiotalar joints.
To our knowledge, there are very few case reports of paradoxical worsening of psoriasis while on the IL17 inhibitor, Secukinumab, with the bulk of literature suggesting an overall improvement in severity of psoriasis. More real-world experience needs to be gained to understand the implications of IL17 inhibition on extraarticular manifestations such as psoriasis in those with psoriatic arthritis.

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Utility of Obstructive Sleep Apnea Screening Questionnaires in Patients with Ankylosing Spondylitis

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Objectives: There has been increasing recognition of comorbidity association with ankylosing spondylitis (AS). It has been demonstrated that people with AS have respiratory manifestations such as apical fibrobullous disease, chest wall restriction and spontaneous pneumothorax. Obstructive sleep apnea (OSA) has also been reported to be higher prevalence in an AS population. The objective of this study is to determine the utility of specific obstructive sleep apnea (OSA) screening questionnaires in patients with ankylosing spondylitis (AS) with verification by overnight non-invasive home diagnostic studies (Embletta).

Methods: Participants were invited to take part in the study as long as they met the following inclusion criteria: 1) age 18 years and older, 2) diagnosed with AS by a rheumatologist. Exclusion Criteria for study participation included: 1) previous diagnosis of OSA, 2) use of home oxygen for any indication. Participants received one-hour appointment at the Saskatoon Sleep Disorders Centre that included completion of questionnaires, a physical exam and orientation on operation of the Embletta device. Questionnaires included demographic information and screening instruments used to identify people at increased risk for OSA. These instruments included the Berlin Questionnaire, a three-part survey that categorizes respondents into either high or low risk for sleep apnea. The Epworth Sleepiness Scale (ESS) is used to evaluate hypersomnolence or excessive daytime sleepiness. The STOP-BANG questionnaire is a rapid screening questionnaire to assess if a person is at high or low risk for OSA. An Embletta study is an overnight level III home diagnostic study for OSA.

Results: Results: Twenty-three people with AS participated in the study, 20 male and 3 female patients. The mean age of study participants was 44 years (SD=13.3). The mean duration of AS diagnosis was 11.8 (SD=12.7), and mean BMI in kg/m2 was 28.3 (SD=5.7). Twenty-six percent of the participants were current smokers. Thirteen (56.5%) of the participants were categorized as high risk for OSA by the Berlin Questionnaire. The results of the ESS determined that 8 participants (34.8%) achieved a score consistent with the presence of hypersomnolence. The STOP-BANG questionnaire found that 14 patients (60%) were high risk for OSA. Twelve or 52.2% of the study participants had an Embletta home diagnostic study pattern consistent with

OSA.
Conclusion: This study highlights that screening questionnaires for OSA can be helpful in the identification of patients with AS that are high risk for sleep disorders and whom would benefit from further diagnostic investigations.

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A Proteomics Approach for the Early Clinical Identification of Axial Spondyloarthritis: A Study of First Degree Relatives

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Objectives: Earlier identification of spondyloarthritis using diverse clinical measures presents an opportunity to initiate earlier therapy and reduce potential future disability. Ankylosing spondylitis (AS) is the prototypic form of spondyloarthritis with predominantly axial presentation and inflammation in the sacroiliac joints. The objectives of this study are: 1) to develop early diagnostic clinical screening protocol for people known to be at high risk of axSpA (first degree relatives of AS probands) and 2) to compare mass spectrometry-based proteomic blood profiles of AS patients to first degree relatives.

Methods: Blood samples were depleted of known high-abundance proteins (e.g. albumin and IgG) using MARS 14 spin cartridges. Protein concentrations were determined, and samples were digested in-solution with trypsin and analyzed on an Agilent 6550 Chip iFunnel QTOF. Data were analyzed by MassHunter Bioconfirm software and protein identification was done on Spectrum Mill searching against SwissProt Human database. Label-free quantitation based on addition of an internal standard and protein intensity normalization was done to validate and map protein profiles. Gene ontology analysis will be performed to characterize the cellular and functional processes of proteins using MPP and Pathways Architect software and cluster identified proteins according to two groups (AS patients versus first degree relatives).

Results: Twelve previously diagnosed male AS patients and seventeen male first degree relatives of known AS probands with no history of a previous diagnosis of spondyloarthritis were recruited. Demographic, clinical data and validated self-report symptom tools [BASDAI, ASDAS, spinal pain VAS] were gathered. An MRI scan was done on participating relatives, which provided evidence for the presence (or absence) of sacroiliac joints inflammation. Liquid chromatography – tandem mass spectrometry analysis revealed 306 proteins unique to AS patients, 595 unique proteins to first degree relatives and 438 proteins common to both groups. Based on the internal standard quantitation, 126 of the 438 proteins were found to be downregulated in AS patients, 68 were found to be upregulated in AS patients, and the remaining 244 were unchanged. Among the proteins we have identified, C-reactive protein and carbonic anhydrase 1 levels were found to clearly differentiate between groups. Both proteins have long been considered as marker compounds in assessing axial spondyloarthritis disease activity. Work is in progress to further compare identified proteins between the two groups, investigate their biological significance with respect to axial spondyloarthritis, and validate potential marker

proteins.
Conclusion: Proteomics studies together with clinical tests offer a powerful tool in early detection of ankylosing spondylitis.

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TNF Inhibitor Dose Tapering in Axial Spondyloarthritis: A Systematic Review and Meta-Analysis

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Objectives: Patients with axial spondyloarthritis (axSpA) who have achieved a stable disease state and are undergoing treatment with tumour necrosis factor inhibitor (TNFi) therapy may opt for a dose reduction. Lowering the standard dosing regimen presents several potential risks including disease relapse. We investigated the efficacy of adjusting (reducing or withdrawing) the standard TNFi dose for the treatment of axSpA.

Methods: CENTRAL, Embase, and MEDLINE databases were searched (up to February 2018) along with trial registries and reference lists of relevant articles (Edwards et al., 2017; Navarro-Compán et al., 2016). All randomized controlled trials (RCTs) evaluating a method of TNFi dose adjustment were assessed for eligibility. Data were pooled in RevMan 5.3 using a random-effects model for the following outcomes: Assessment of SpondyloArthritis international Society 40% (ASAS40) improvement criteria, Bath Ankylosing Spondylitis Disease Activity Index (BASDAI), C-reactive protein (CRP), remission, relapse, and quality of life (QoL). Risk of bias and the quality of evidence were assessed using the Cochrane Risk of Bias Tool and Grading of Recommendations Assessment, Development and Evaluation.

Results: 297 full-texts were reviewed for eligibility and 6 RCTs (737 participants) were included in the meta-analysis. There were higher ASAS40 rates with standard TNFi treatment as compared to an adjusted dose (risk ratio [RR] 0.63; 95% confidence interval [CI] 0.51 to 0.78; 3 studies; 538 participants; moderate quality evidence). There were no differences in the mean BASDAI (mean difference [MD] 0.40; 95% CI -0.11 to 0.91; 4 studies; 319 participants; moderate quality evidence) and mean CRP (MD 0.68; 95% CI -1.49 to 2.85; 4 studies; 319 participants; low quality evidence) between the standard and adjusted doses. There were higher rates of remission in the standard dose as compared to the adjusted dose (RR 0.63; 95% CI 0.39 to 1.03; 5 studies; 694 participants; low quality evidence). There were fewer events of disease relapse (i.e. BASDAI >4) in the standard versus adjusted dose (RR 1.23; 95% CI: 0.58 to 2.64; 2 studies; 156 participants; low quality evidence). QoL was not pooled due to clinical heterogeneity.

Conclusion: To our knowledge, this is the first review to incorporate a meta-analysis on TNFi dose adjustment in an axSpA population. Overall, this review found that axSpA patients who have achieved stable disease might experience little benefit or harm from TNFi withdrawal or reduction. The published data to date leave unclear the risk/benefit ratio of withdrawing treatment. Individualizing this decision is an important research question for future studies.

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Longitudinal Outcomes and Predictors of E-Learning Effectiveness in Patients with Axial Spondyloarthritis: A Randomized Controlled Trial

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Objectives: There is evidence that education programs are effective (e.g. improved disease activity and quality of life) for patients with arthritis, but little is known about the impact of education interventions in axial spondyloarthritis (axSpA). The purpose of this study was to determine the impact of an e-Learning education program on patients' disease knowledge and self-efficacy, as well as to determine the predictors associated with better self-management.
Methods: The Toronto Western Hospital Spondylitis Program developed an interactive, e-Learning education program for axSpA (We Got Your Back! Education Module for People with Ankylosing Spondylitis: https://www.uhnmodules.ca/Modules/Ankylosing-Spondylitis/story_html5.html). Patients were randomly allocated to either the intervention (e-Learning with usual care) or control (usual care) group. All patients completed the Bath Ankylosing Spondylitis Disease Activity Index (BASDAI), Ankylosing Spondylitis Knowledge (AS-Q) questionnaire, Stanford Exercise and Stanford Chronic Disease Self-Efficacy (CDSE) scales at baseline, first follow-up (FU1), and second follow-up (FU2) 6-12 months after FU1. A linear-based generalized estimating equation for continuous data was used to explore the associations between covariates including group, baseline sociodemographic characteristics, and risk factors for poor disease outcomes.
Results: 44 AS and 10 non-radiographic axSpA patients (N = 54) were included in the analyses. Of these, 23 received the intervention and 31 proceeded with usual care. 85.2% had completed college or university and the median number of education sources (i.e. # sources accessed such as internet, pamphlets, physician) prior to the study was 3 (IQR = [2,3]). The mean age was 41.9 years (12.9 SD) and 81.5% were HLA-B27+ with a mean of 17.8 (10.8 SD) years of symptoms. There was a significant increase in disease knowledge over time ($p = 0.043$), but no group differences for the above outcomes. Three or more education sources were significant predictors for an increase in AS-Q ($p = 0.014$). Allocation to the e-Learning group was a predictor of more confidence in getting help from family and friends as per the CDSE ($p = 0.015$). Female gender ($p = 0.05$) and symptoms >10 years ($p = 0.018$) were predictors of greater confidence in managing disease overall.
Conclusion: This e-Learning module shows promising efficacy in improving knowledge, health literacy behaviours, and also serves to benefit individuals with limited access to specialized, tertiary care. There is a need for trials to assess more effective education outcomes and future studies should include characteristics and risk factors (e.g. gender, previous education sources, symptom duration) that were shown to be meaningful in this analysis. Supported by a CIORA grant.

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A "Joint Clinic": Developing an Interdisciplinary Rheumatology and Gastroenterology Clinic for Patients with IBD Associated Arthropathy

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Objectives: Interdisciplinary clinics improve patient satisfaction and lead to earlier diagnosis and optimized treatment of autoimmune diseases when compared to visiting separate specialists. They decrease the time to optimal treatment for all organ systems involved. Articular problems affect many patients with inflammatory bowel disease (IBD) and are often difficult to control despite therapeutic strategies aimed at controlling autoimmune gut inflammation. Often, patients

float between the two specialties without a united approach to management. Our objectives were to assess the interest in, need for, and barriers to implementing an interdisciplinary rheumatology and gastroenterology clinic in Saskatchewan.
Methods: A literature review using PubMed was completed to explore the efficacy and previous models of combined rheumatology clinics. A needs assessment survey was subsequently created and sent to Saskatchewan rheumatologists and gastroenterologists. Anonymous responses were analyzed, and a follow-up survey was sent to specialists who expressed interest in the interdisciplinary clinic. This follow up survey assessed potential barriers and ideal clinic operation. After addressing these barriers, the clinic was implemented.
Results: Local specialists felt a combined clinic would benefit patients and physicians (mean 7.3/9 point scale). The vast majority were interested in participating (9/11). Gastroenterologists reported approximately 57% of their practice population was IBD and 25% of that population had associated arthropathy. Rheumatologists reported on average 15% of their practice population was IBD associated arthropathy. A significant proportion, 27%, of this population travels greater than 1 hour to attend appointments. On average, gastroenterologists were slightly more comfortable with changing treatment compared to rheumatologists (mean 6.4/9 vs. 6/9). Communication between the two specialties occurred on average once every 1-6 months. Barriers identified had common themes of scheduling, location, and remuneration.
Conclusion: The need for a combined clinic in Saskatchewan has been identified and the clinic implemented. We aim to facilitate improved patient outcomes and reduce financial and time burden especially for rural patients who already have limited access to medical care. During our first year we will evaluate patient, trainee, nurse, and consultants' perspectives on the value of the combined clinic. Objective assessment will occur by assessing time to control of arthritis and IBD symptoms. This will be done by comparing symptoms, BASDAI scores, colonoscopy results, fecal calprotectin and inflammatory markers of patients initially assessed and managed in interdisciplinary clinic, compared to those seen by independent specialists. We hope to publish our results to add to the growing body of literature pertaining to the efficacy of combined clinics.

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Supporting Improved Patient Care: Developing Educational Resources for Patients and by Patients

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Objectives: The Canadian Arthritis Patient Alliance is a grass-roots, patient-driven, independent, national organization that advocates for people living with arthritis on a range of health care and other policy issues. The CAPA Steering Committee lives with various forms of arthritis and collectively has over 150 years of lived experience with the disease(s). A key component of CAPA's mandate is to support people living with arthritis through education and awareness including the development of educational resources based on the identifying unmet patient needs. CAPA has developed a number of evidence-based educational resources on various topics ranging from medications, managing pain and fatigue, communicating with healthcare professionals, pregnancy and parenting, and workplace participation. Patient-centred educational resources and social support are required for living with the day-to-day realities of the disease

and may also improve the dialogue with rheumatologists and allied health care professionals.
Methods: Unmet patient needs are identified through the lived experiences of CAPA Steering Committee members and members at large. Typically, surveys are developed to further examine the topic and are promoted through CAPA newsletters, social media and partner networks. Survey results are analyzed and prioritized for content. CAPA works in partnership with rheumatologists and allied health care professionals to review the resource and ensure it reflects the most current, evidence-based knowledge. The final educational resources are made available in both English and French on CAPA's website and some educational resources are available in Spanish.
Results: CAPA developed a number of evidence-based educational resources, such as "Together Enhancing Arthritis Management (TEAM)", pregnancy and parenting with arthritis and methotrexate. These are developed by and for people living with arthritis, along with input from health care providers, to provide the necessary support to live with the disease. Empowering patients with easy to understand, accessible and patient-centred educational information supports informed decision-making and empowerment.
Conclusion: CAPA developed educational resources to address the unmet needs of people living with arthritis. The use of educational resources increases patient knowledge and encourages effective dialogue with rheumatologists and allied patient-centred professionals thereby improving decision-making and reducing stress for people living with arthritis and their families. Rheumatologists and allied health care professionals are encouraged to refer patients to CAPA's evidence-based resources in order to complement the advice provided in a clinical setting, or to suggest other needed resources to CAPA for development.

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#ArthritisParent: Evaluating Outcomes of a Twitter Chat on Issues Regarding Arthritis, Pregnancy, and Parenting

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Objectives: Improved therapies and management of rheumatic disease have led to more women with inflammatory arthritis considering pregnancy. With many issues to consider, patients often turn to social media as a means to connect with other patients, researchers, organizations, and healthcare providers. Following a recently completed Twitter chat on arthritis, pregnancy, and parenting, our objectives were to: 1) quantify the level of engagement between participants before, during, and after the Twitter chat; and 2) describe issues and concerns regarding arthritis, pregnancy, and parenting from the chat transcript.
Methods: As an educational and engagement campaign for "Arthritis Awareness Month" on September 26th, 2018, the Canadian Arthritis Patient Alliance (CAPA) hosted a one-hour Twitter chat on arthritis and pregnancy (#ArthritisParent) from 7:00 to 8:00 PM Eastern Standard Time (EST). The chat was promoted through a number of arthritis patient groups as well as organizations including Arthritis Research Canada, the Arthritis Society, and Mother to Baby. We used a social media analytics tool, Symplur, to obtain engagement analytics of this chat. Furthermore, we searched the hashtag, #ArthritisParent from 5:00 to 10:00 PM EST to obtain pertinent Tweets before, during, and after the chat. We conducted descriptive qualitative analysis to draw themes representing issues and questions discussed.
Results: Twenty-two users participated in the Twitter chat. From introductions, participants included women with arthritis who have been pregnant or considering pregnancy, trainees and

researchers. From 7:00 to 8:00 PM EST, 276 tweets were shared between participants with an average of 13 tweets per participant. From 5:00 to 10:00 PM EST, there were 163 retweets and the views by other Twitter users were quantified by over 730 000 impressions. Altogether, analytics show that the Twitter chat engaged users in 6 countries including Canada, the United States, Great Britain, Brazil, Sweden, and Australia. Themes emerging from the chat transcript were: 1) connecting with other women with arthritis who are pregnant or have had successful pregnancies; 2) learning about managing arthritis during pregnancy; 3) preparing for birth; and, 4) caring for children while living with arthritis.
Conclusion: Our experience with organizing and hosting a Twitter chat showed that it was an engaging medium for connecting individuals with shared interests in issues related to arthritis, pregnancy, and parenting. Overall, social media tools such as Twitter provide a potential tool for establishing social support and information sharing for women with arthritis who are planning healthcare pregnancy or have already started families.

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Patient Perspectives on the use of Disease Modifying Anti-rheumatic Drugs (DMARDs) and Biologic Therapy During Pregnancy

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Objectives: 1.Determine the percentage of women of childbearing age who would use DMARDs and biologics while pregnant 2.Identify reasons why patients may not wish to use DMARDs or biologics 3.Identify what resources patients may utilize to obtain medical information regarding drug safety during pregnancy
Methods: Participants were recruited from a single centre. The inclusion criteria include: Women of child-bearing age (18-45) with an established diagnosis of RA, AS, PsA, IBD-related inflammatory arthritis, or SLE who are contemplating future pregnancy or who are currently pregnant. A 12-item questionnaire exploring patient comfort level regarding the use of ARDs in pregnancy was administered.
Results: A total of 7 patients have been recruited thus far. The average age was 34.4 years. 57% of participants have been pregnant. 57% of the patients who have taken the survey are currently pregnant. 71.4% of patients stated they were willing to take ARDs while pregnant. The most frequently chosen ARDs was Hydroxychloroquine. No patient would take steroids. Only 1 patient was willing to take a biologic (Golimumab). Of the patients who would not take ARDs, one patient would not because of lack of information, concern regarding harm to their child as well as herself, while the other patient chose not to because of a lack of information. 71.4% of participants felt that their questions were addressed by various health care providers (HCPs), with Rheumatologists being the most frequently sought-after HCP at 85.7%. 43% of patients used websites dedicated to research and counselling on drug safety in pregnancy. The same amount visited websites about rheumatic diseases in general. Online searches were done by 28.6% of participants. 85.7% of participants felt that there was no conflicting information received about ARDs in pregnancy. Patients most frequently preferred to receive information about ARDs in person compared to handouts or electronically.
Conclusion: Although the results of this study are still very preliminary, there are several interesting findings from this data. Most participants stated they were willing to take ARDs during pregnancy, but most patients would take Hydroxychloroquine. This suggests that there is a discrepancy between Rheumatologists and patients' beliefs regarding safety of ARDs during pregnancy. Patients overwhelmingly relied on their Rheumatologist as the most frequent source

of obtaining information about ARDs highlighting the importance of counselling women of childbearing age. Future studies are needed to develop the best way to bridge the gap in comfort of ARDs between patients and Rheumatologists.

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A Rare Complication of Weight Loss in a Patient with Scleroderma

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Case Report: Gastrointestinal involvement (GI) in Scleroderma is very common occurring in up to 90% of affected individuals. The esophagus is the most frequently affected organ in the GI tract causing decreased lower esophageal sphincter tone and esophageal dysmotility. As a result, weight loss and malnutrition are a common issue encountered by individuals with Scleroderma. This case highlights a rare complication of weight loss in a patient with Scleroderma.

Mr. P is a 72-year-old with an overlap of Dermatomyositis and Scleroderma. He presented in 2013 with a facial rash, weakness and a muscle biopsy consistent with Dermatomyositis. In 2015 he developed dysphagia in the absence of weakness with new sclerodactyly and digital ulcerations. Mr. P had significant weight loss starting in 2016 losing over 50 pounds. He was seen by GI in September 2017 and was found to have a normal gastric emptying study but continued to have ongoing weight loss. In May 2018 he developed severe back pain, nausea and vomiting. A CT revealed a very dilated stomach with a transition point at D3, where the Duodenum passes between the aorta and the superior mesenteric artery (SMA) consistent with a diagnosis of SMA syndrome. Mr. P had an NG inserted, was started on enteral feeds and has been slowly improving.

The cardinal features of SMA syndrome are early satiety, epigastric pain, vomiting and weight loss. SMA syndrome occurs from narrowing of the angle between the SMA and the Aorta often due to rapid weight loss resulting in loss of the mesenteric fat pad. The normal angle between the SMA and the Aorta is between 38-650. With the loss of the mesenteric fat pad, the aortomesenteric distance can be as small as 2 mm with an angle of 60. An angle below 250 is considered to be the most sensitive diagnostic finding especially associated with an aortomesentic distance below 8 mm. Maneuvers that reduce tension of the mesentery such as lying prone, widen the aortomesenteric angle leading to a reduction in the obstruction. Treatment can be either conservative with nutritional support or surgical. Individuals who present acutely have a greater chance of success with conservative measures. Surgical treatment includes Strong's procedure, gastrojejunostomy or duodenojejunostomy. SMA syndrome has only once been described in associated with Scleroderma however if requires a high index of suspicion and patients with Scleroderma are at high risk for rapid weight loss.

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Radiosynoviothesis with Yttrium90: A Canadian Experience

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Objectives: 90Yttrium (90Y) has been approved as a radiosynoviothesis (RSO) agent in several countries for intra-articular (IA) treatment of synovitis, but currently no RSO radiopharmaceuticals are approved in Canada. Objectives: 1. Establish safety of Yttrium-90 citrate synovectomy in a Canadian cohort 2. Determine the therapeutic value of Yttrium-90 citrate in patients with refractory synovitis in a Canadian cohort.

Methods: Adult (≥18yo) patients with symptomatic, refractory inflammatory mono- or

oligoarthritis were referred for RSO with Yttrium-90 citrate as part of a phase-III, prospective, open-label non-controlled trial. All patients were required to have failed 6-months of medical therapy and 2 intraarticular injections in the affected joint and have minimal evidence of minimal cartilage or bone destruction on imaging. Only large and medium-sized joints were included in the study (i.e. knees, ankles, wrists and elbows). The dose of Yttrium was adjusted based on the size of joint. Follow-up evaluations were done at 3, 6 and 12 months after RSO, with clinical response measured by improvement in joint tenderness, effusion and range of motion. Bone scan was also performed immediately following injection and at 3,6 and 12months. Safety was assessed by patient and clinician reported adverse events.

Results: A total of 74 patients and 83 joints (88% knees) were treated with Ytrium-90 citrate between 2013 and 2017. The underlying diagnosis included 25.7% RA, 34% SpA, 11% JIA, and 30.3% other inflammatory arthritis. 58.1% of patients were on sDMARD therapy (synthetic DMARD, incl HCQ, MTX, leflunomide, sulfasalazine) and 17.6% were on biologic therapy at baseline. There were 6 adverse events noted, all non-life threatening and resolved, with no evidence of 90Y leakage either locally or regionally. There was a statistically significant improvement in joint tenderness and joint effusion achieved at 3-months ($p<0.001$), which was maintained at 6 and 12-months ($p<0.001$) (Figure 1). 73.9% of joints noting improvement in range of motion at 3mo, 55.9% at 6mo and 60.7% at 12mo. Per the treating physician, improvement in joint function at any point during the 12-month follow-up was reported in all joints. Joint destruction was noted in 57.5% of joints at baseline, of which 84.6% remained stable or improved over the 12-month period; among joints without destruction at baseline, 91.7% remained stable over 12 months.

Conclusion: Our results confirm the clinical efficacy and safety of Yttrium90-citrate RSO for refractory synovitis with a sustained benefit at 12 months. This is the first such study in a Canadian cohort.

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What are the Rheumatology Educational Needs of Family Medicine Residents?

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Objectives: In Canadian medicine faculties, an average of 2.3% of the medical curriculum is dedicated to musculoskeletal problems, the majority being in orthopedics. Therefore, offering a better training to future primary care physicians in order to improve their ability to evaluate and prescribe diagnostic tests to patients with rheumatic conditions represents a critical issue. The goal of this study was to assess the educational needs in rheumatology of family medicine residents and to determine their preferred methods of rheumatology skills learning.

Methods: From September 2017 to December 2017, two hundred and thirty-six first- and second-year family medicine residents from Université Laval were asked to complete an electronic anonymous survey assessing their confidence, according to visual analog scale, in performing different rheumatology tasks, such as anamnesis, physical exams, investigation, diagnosis and joint infiltrations. They were also consulted on their favorite's methods of learning among lecture classes, clinical cases, seminars, small capsules, simulated patients and memory aids, and their preferred periods throughout their medical courses (medical school, clerkship or residency) to learn the skills related to rheumatology. Descriptive statistics were performed for the quantitative and qualitative variables. Analyses were performed with SAS version 9.4.

Results: Eighty-four family medicine residents completed the survey: 57 females and 27 males with a median age of 25 and 29 years old, respectively. When questioned about their level of confidence to perform certain rheumatologic tasks, they have a relatively high level of confidence with anamnesis, physical exam, investigation and diagnosis of a monoarthritis (70% in average), but less confident with an oligo-polyarthritis (55%) and even less confident with connective tissue diseases (40%). When questioned about their favorite methods of learning, they preferred traditional lecture classes to clinical cases. They wanted to learn the majority of rheumatology training during medical school. As residents, they preferred small capsules, seminars or memory aids. Interestingly, the male students, who were slightly older than females, preferred learning rheumatology skills during the residency whereas the female students mentioned a preference for learning them in medical school.
Conclusion: The lack of confidence of family medicine residents when evaluating systemic inflammatory diseases compared to mechanical musculoskeletal problems reinforces the need for more dedicated time to rheumatology teaching through general medical training as well as during family medicine residency.

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Systematic Review of Studies Reporting on Cognitive Function in Rheumatoid Arthritis Compared to the General Population

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Objectives: To conduct a systematic review of studies reporting on cognitive function (CF) in rheumatoid arthritis (RA) patients compared to non-RA populations (based on comparison with a control group or age-based population norms).
Methods: We conducted a comprehensive literature search of MEDLINE, EMBASE, and PUBMED databases using the following search terms: rheumatoid arthritis or arthritis or inflammatory arthritis, and cognitive function or cognition. The search was conducted with no limit for years and confined to only articles in English or French. After title and abstract screen, relevant articles were selected for review. Only full-length articles were considered. Study selection criteria included: 1) must be presenting original data, 2) must contain RA group with confirmed diagnosis, 3) must be reporting on CF in RA, 4) must use a validated measure of CF (self-reported or from conducting CF tests), and 5) must contain a healthy control group or age-based populations norms. Selected articles were critically appraised using the SIGN Methodology Checklist and data extracted using a standardized form.
Results: Our initial literature search yielded 747 titles, and after screening for irrelevant titles and duplicates, 28 abstracts remained. Upon excluding non-full length articles and articles which did not report on CF, 13 abstracts remained. Of these 13 articles, 8 met our selection criteria. All studies were published after the year 2000, 3 were from the USA, 1 from Canada, 1 from the UK, 1 from Australia, 1 from Egypt, and 1 from Taiwan. Sample sizes for RA and control groups varied from 15 to 120. Of these 8 articles, 6 found a significant difference in cognitive function in the RA group compared to control group or age-based population norms in at least one domain of CF. All articles that found a significant difference in CF used standardized neuropsychological tests. Domains of CF that differed included fluency, attention, visual-spatial

learning, memory, decision making time, and simple reaction time. Domains of CF that were not found to differ from general population across all studies included reasoning, comprehension, and intelligence (IQ).
Conclusion: Overall, 75% of the articles reviewed found a significant difference in at least one domain of CF in RA patients compared to healthy controls or age-based population norms. The domains of CF most commonly affected are those related to processing and speed rather than intellectual ability. Further studies are needed to explore these differences in greater depth and to understand the underlying reasons for these differences.

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A Real Pain in the Neck: A Case of Crowned Dens Syndrome

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Case Report: In June of 2018, an 80-year-old female presented to our institution's emergency department with severe neck pain, neck stiffness and headache. The patient described worsening of her headache in a supine position with an element of dental pain. She was thought to have meningitis. Plain films of the cervical spine, computed tomography (CT) scan of the head and cervical spine and a lumbar puncture were performed in the emergency department and were reported as non-contributory. Her c-reactive protein was noted to be elevated at 99.2 mg/L. Her complete blood count revealed an elevated white blood cell count of 16.9 x 10^9/L with a neutrophil predominance. Given the findings of a normal lumbar puncture and a normal CT of the head and neck she was given a provisional diagnosis of giant cell arteritis (GCA). She was discharged home with rheumatology follow-up on 50 mg of daily prednisone. She never received a biopsy of her temporal artery. She did see an ophthalmologist, who did not see evidence of temporal arteritis. When we saw her in follow-up, her symptoms had completely resolved. We did not think that her presentation was in keeping with GCA. When we reviewed the imaging of her cervical spine in conjunction with our musculoskeletal radiologist, we were intrigued to see evidence of calcium pyrophosphate dihydrate (CPPD) deposition in the periodontoid ligaments on both the plain films and CT scan. The combination of her symptoms and imaging were consistent with crowned dens syndrome (CDS). On review of the patient's previous imaging, bilateral chondrocalcinosis was evident in both knees further supporting our diagnosis of CDS. CDS is a form of calcium pyrophosphate deposition disease that is localized to the periodontoid ligaments. On CT imaging these calcifications appear as a radiopaque density surrounding the superior aspect of the dens. CDS presents with neck pain and headache that is often accompanied by fever and elevated markers of inflammation. As with our patient, CDS is often overlooked in favour of other diagnoses including meningitis, polymyalgia rheumatica or GCA. Thus, its incidence is likely underestimated. Identification of CDS is important as it can save patients from long courses of corticosteroids and their associated side effects. When CDS is recognized, it is easily treated with a short course of glucocorticoids or non-steroidal anti-inflammatories.

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Proof-of-concept Study of a Culturally-sensitive, Community Based Self-management Program for First Nations People with Arthritis and Their Families

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Objectives: To assess the extent to which the Arthritis Wellness Program (AWP) improved health and well-being of people living with arthritis. The AWP is a self-management program for people with arthritis and family members, developed in partnership with First Nations communities, based on results of initial focus groups with patients and families and community consultations, incorporating a holistic approach consistent with First Nations' approach to health and wellness.

Methods: The AWP was delivered twice in two communities (Kwakiutl District; Old Masset Village) in 2016-2018. Inclusion criteria were: arthritis for > 6 months, age > 19, English speaking, residing on-reserve, and having an adult family member or close friend willing to participate. Six evening group sessions focused on improving understanding of arthritis and treatment options (traditional medicines, medications, nutrition, physical activity), supporting behaviour change for healthy lifestyle, learning strategies to cope with the impact of arthritis, improving communication, and optimizing social support. Data was collected from questionnaires assessing pain (VAS), fatigue (BRAF-NRS); RA disease activity (RADAI); arthritis self-efficacy (ASES); depression (PHQ-9); social support (MOS); Coping (CHIP); Patient Activation Measure (PAM); and Effective Consumers (EC-17). One tailed paired t-tests evaluated changes between pre- and six months post-program.

Results: Participants included 25 people with arthritis (18 female, mean age: 56.2 years; RA:55%, OA: 697%, AS: 10%, PsA: 3%, SLE: 3%, FM: 7%, unsure:10%; 28% had >1 diagnosis). Participants generally had high levels of pain, fatigue, and difficulty coping with arthritis at baseline. Significant improvements at 6 months were observed in: pain [Mean(SD): 7.43(2.13) to 6.57(2.76), p=0.04], depression [10.07(7.28) to 7.07(6.41), p=0.04], and use of distraction coping [27.81(5.52) to 23.26(6.48), p=0.02], health activation PAM level [2.68(1.20) to 3.11(1.12), p=0.05; level 2 = becoming aware but still struggling; level 3 = taking action]. Non-statistically significant trends towards improvement were also observed for Median (25Q;75Q) scores for arthritis self-efficacy [6.8 (4.89-8.22) to 7.5 (6.5 - 7.75)] and effective consumer (73.5 (66.1-80.8) to 79.4 (57.3-85.2)]. No significant changes were observed in the other measures.

Conclusion: Our proof of concept study revealed that our culturally-sensitive, community-based self-management program for First Nations people living with arthritis and family members, was effective at improving some health outcomes and patient attributes associated with successful self-management. Our previous process evaluation also showed that program delivery was feasible and participant satisfaction was very high. The Arthritis Wellness Program addresses an important need identified by the communities.

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Process Evaluation of a Culturally-sensitive, Community Based Self-management Program for First Nations People with Arthritis and Their Families

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Objectives: To perform a process evaluation of the Arthritis Wellness Program (AWP), a self-management program developed in partnership with First Nations communities to improve health and well-being of people living with arthritis, in collaboration with their families.

Methods: Pilot testing of the AWP was conducted twice in two on-reserve communities (Kwakiutl District; Old Masset Village) in 2016-2018. Inclusion criteria were: arthritis for > 6 months, age > 19, English speaking, residing on-reserve, and having an adult family member or friend willing to participate. Developed based on initial focus group with patients and families and community consultations, the AWP follows principles of self-management and holistic First Nations approaches to health and wellness. Process evaluation data was obtained from feedback questionnaires and post-program interviews. Six evening group sessions focused on improving understanding of arthritis and treatment options (traditional medicines, medications, nutrition, physical activity), supporting behaviour change for healthy lifestyle, learning strategies to cope with the impact of arthritis, improving communication, and optimizing social support.

Results: Participants included 25 people with arthritis and 12 family members (some pairs had two people with arthritis) (18 female; mean age: 56.2 years, range: 22-76 years; 55% had RA, OA:69%, AS:10%, PsA:3%, SLE:3.5%, FM:7%, unsure: 10%, 28% had > 1 diagnosis). Participants generally had high levels of pain, fatigue, and difficulty coping with arthritis. Group session attendance ranged from 51-81%, mean 67.5%. Overall feedback was very favourable. Median (Q25;Q75) ratings of usefulness (scale of 1-5, 1=not useful, 5=very useful) was 5(4;5) for all groups for overall value, information provided, group discussions, and sharing experiences. Ratings for hands-on activities and videos ranged from 4 - 5(3-4;5). Satisfaction with amount of information, group energy, and clarity of instructions was 5 (4;5) for all sessions. In post program interviews, participants appreciated learning about how to live with arthritis, highly valued the group interaction and information, and the ability to share and learn from others. Suggestions for enhanced interaction and more hands-on activities were noted. Participants also wished to continue to interact as a group.

Conclusion: Pilot testing of the AWP revealed it is feasible to deliver to people living with arthritis and family members, and participants were very satisfied with the program. Our research is an example of community-based research offering culturally sensitive programs supporting First Nations peoples and their families to live well with arthritis and fills a gap in the services currently available in indigenous communities.

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Physical Activity in People Living with Rheumatoid Arthritis Compared to General Population Controls

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Objectives: The health benefits of regular physical activity have been well established. The Canadian Physical Activity Guidelines (CPAG) specify that adults should accumulate at least

150 minutes of moderate-to-vigorous intensity physical activity (MVPA) per week. Our study objectives were to: 1) determine the proportion of RA patients in British Columbia (BC) who meet the CPAG, 2) identify the determinants of meeting the recommendations, and 3) compare the duration of time spent in MVPA relative to general population controls using self-reported data.

Methods: A cross-sectional study was conducted using 2015 data from an annual survey administered to an RA cohort derived from a population-based cohort for BC. Normative data on physical activity in the BC general population was obtained from the Canadian Community Health Survey. The proportion of RA patients meeting guidelines was compared to the general population after applying direct standardization to account for differences in age and sex. Multivariable logistic regression analysis was used to identify significant determinants of meeting guidelines in the RA sample. An ordinary least squares (OLS) model evaluated differences in average MVPA time between RA and controls. We then applied a two-part model where the first-part evaluates whether RA patients have a higher likelihood of having some MVPA (time>0) and the second-part evaluates whether RA relates to MVPA time, among those with some MVPA (i.e. time >0).

Results: The sample included 169 RA patients. Standardized rates for meeting guidelines were 43.8 and 55.7 per 100 for RA patients and controls, respectively, yielding a rate ratio of 0.79 (95% CI 0.63-0.98). Ethnicity, physical function, pain, and smoking status were the only significant predictors of meeting guidelines. Individuals who were Caucasian (OR 14.97, P=0.019), had better physical function (P=0.003), were an ex-smoker vs. non-smoker (OR 2.68, P=0.022), and had more pain (P=0.018) were more likely to meet guidelines. The OLS model revealed that overall RA patients spent significantly (P<0.001) less time in MVPA per week than controls. The two-part model indicated that 1) RA patients were less likely to have some MVPA and 2) among those with MVPA>0, there was no significant difference between RA patients and controls in amounts of MVPA.

Conclusion: RA patients were less likely to meet the CPAG than controls. Although overall, RA patients spent less time performing MVPA there was no difference between the two groups among those who exercised weekly. Ethnicity, physical function, pain and having stopped smoking were significant determinants of meeting the guidelines.

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Predictive Utility of Cardiovascular Risk Prediction Algorithms in Inflammatory Rheumatic Diseases: A Systematic Review of the Literature

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Objectives: The approach to cardiovascular risk stratification is unclear. The study aimed to systematically review the literature and describe current knowledge about cardiovascular risk prediction algorithms in rheumatic diseases.

Methods: Adhering to Cochrane guidelines, a systematic review of original publications retrieved by searching MEDLINE, EMBASE, and Cochrane Central databases (1946 to October 2017) was performed. Two reviewers independently selected studies and extracted data. To be selected, studies had to be in English language, include clinical cardiovascular events (CVE) as study outcomes, assess the predictive properties of at least one cardiovascular risk prediction

algorithm, and include patients with rheumatoid arthritis (RA), ankylosing spondylitis (AS), lupus, psoriatic arthritis (PsA) or psoriasis. By design, only cohort studies that followed participants for CVE were selected. Methodological quality was assessed using the Newcastle-Ottawa Scale.
Results: A total of nine studies met the inclusion criteria and had a mean Newcastle-Ottawa scale score of 7.2. Eight studies included RA patients, and one study included lupus patients. All studies evaluated discrimination of the following algorithms: Framingham Risk Score (FRS), QRISK2, Reynolds Risk Score, Systematic Coronary Risk Evaluation (SCORE), the Expanded cardiovascular Risk Score for RA (ERS-RA), and American College of Cardiology/American Heart Association Pooled Cohort Equation. In lupus patients, SCORE underestimated the risk for cardiovascular mortality, but not significantly. The best model predicting cardiovascular mortality in lupus included age, established arterial disease, cystatin C and smoking. In the remaining studies that assessed RA patients, the addition of C-reactive protein to the FRS and QRISK2 was not associated with a significant improvement in discrimination and worsened the reclassification of QRISK2. In recalibrated and adapted SCORE models, significant predictors were determined to be smoking, systolic blood pressure, TC:HDL ratio, BMI, diabetes mellitus, hypertension, and DAS28. However, these did not provide sufficient improvement in the calculation of risk. The best models added anti-lipoprotein A-1 to the FRS, which significantly enhanced the discrimination of the model. Furthermore, in a study that developed and internally validated the ERS-RA, the addition of composite disease activity measures, measure of physical function, prednisone use and disease duration to the FRS was found to significantly improve the model.
Conclusion: There are many challenges involved in the derivation of a risk prediction model. Only two studies in RA demonstrated an improvement in discrimination using the ERS-RA and cardiovascular biomarkers. We did not find studies that evaluated models for psoriasis, PsA or AS, which further demonstrates a need for research in these populations.

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Rural and Remote Patients Attending an Urban Academic Rheumatology Clinic: Patients' Perspectives on Repatriation to Local Rheumatology Services

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Objectives: Rheumatic diseases are chronic conditions often requiring multiple visits with a rheumatologist. Ontario faces rheumatology service shortages with the majority of practicing rheumatologists concentrated in urban centres. As a result, many patients travel long distances to receive rheumatology care. In addition, much work has been undertaken to investigate alternate models of care to improve access for patients with rheumatologic conditions. The aim of our study was to ascertain the perspectives of rural/remote patients (from a single urban rheumatology practice) traveling long distances (>100 km one way) for rheumatologic care, regarding barriers and facilitators to receiving care in their communities.
Methods: A qualitative research design was used. Patients were identified as being from a rural/remote area by the first three digits of their postal code. These patients were contacted by mail to request consent to participate in the study involving one-on-one semi-structured telephone interviews conducted by a medical student trained in qualitative interviewing. An interview guide was followed. Probes were used to encourage elaboration of responses. Interviews were recorded using an audio-recorder and then transcribed

verbatim. Transcripts were independently coded by two members of the research team. The research team then met to compare and contrast codes and reconcile a mutual understanding of emergent data. Agreed upon codes were categorized and grouped into themes.
Results: Twenty-one of 737 unique patients seen in the past year were identified as traveling over 100 km one way from a rural/remote community. Of these 21 patients, 14 (67%) consented for an interview. Upon completion of the last 3-5 of 14 interviews, the research team agreed that data saturation was achieved. Emergent themes included: Importance of patient-provider relationship; Access to care; and Valued clinical expertise. Embedded within these themes, patients expressed a push-pull phenomenon whereby they ultimately prefer care closer to home but not at the expense of limited access and clinical expertise.
Conclusion: The study results indicate that patients are willing to make sacrifices to access rheumatologic care and clinical expertise. However, they are also willing to explore alternate models of care such as integrated interprofessional teams in primary care, telemedicine, or outreach clinics, to allow for care closer to home and minimize travel. Opportunities exist to replicate this research in other single urban rheumatology practices.

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Using Physical Activity Wearables in Self-Management from the Perspectives of Persons Living with Arthritis: A Qualitative Evidence Synthesis

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Objectives: Although physical activity is a key component of arthritis self-management, physical activity levels typically fall below expert recommendations among persons with arthritis.[1] Wearables could support persons with arthritis to be physically active; however, questions remain about how persons with arthritis view or experience the use of wearables in their daily lives.[2] We aim to broaden understanding of the use of wearables to support physical activity from the perspectives of persons with arthritis.
Methods: An exhaustive search of 5 electronic databases (including Medline, CINAHL and Embase) from inception to Jan 2018 was carried out. We also performed hand-searching of reference lists of included studies. Title/abstract and full-text screening was conducted by 5 reviewers. Eligible studies qualitatively examined the use of wearables from the perspectives of persons with arthritis. They were appraised using the McMaster Critical Review Form. All relevant data were extracted from eligible articles and coded inductively with thematic analysis.
Results: From a search yield of 4765 records, 87 were read in full and 7 papers from 6 studies met inclusion criteria. Studies were conducted in Canada, Australia, UK and Ireland. Sample included 114 persons with arthritis (93 women, 21 men, aged 23-85). Seventy-five live with osteoarthritis, 32 live with inflammatory arthritis and 7 live with both. Eighty-four participants had some experience of using a wearable. Preliminary themes are: 1) Becoming a more proactive self-manager: Authors found that participants became more aware of their activity levels by

using a wearable, and felt more empowered in their ability to self-manage proactively; 2) Making wearables accessible: Authors reported that participants were seeking appropriate supports (e.g., written instructions) that could facilitate their early use of wearables, and commonly felt "limited" when these supports were not readily available; 3) Improving patient-doctor communication: Authors described how participants anticipated wearable data would better equip them to improve communication (e.g., by supporting shared decision-making during consultations) with health professionals.
Conclusion: Themes direct attention to situations within which autonomy is exercised in daily life.[3] For example, while greater awareness of activity may empower some persons with arthritis to be more active, others may feel a sense of underachievement if their use of wearables is unaccompanied by appropriate support. Findings also pose questions about how wearables may impact ways of respecting patients' autonomy in patient-doctor interactions. 1. Wallis J et al. Osteoarthritis Cartilage2013; (21): 1648-59. 2. Bravata DM et al. JAMA2007; (298): 2296-2304. 3. Austin et al. Approaches to Ethics 2003;45-52.

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Identifying Determinants of Presenteeism in Workers with Inflammatory Arthritis

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Objectives: Work disability (WD) and presenteeism (decreased at-work productivity) are often caused by arthritis, leading to major impact on individuals' quality of life and cost to society. Our study objective was to identify the determinants of presenteeism in workers with inflammatory arthritis.
Methods: Baseline data from the randomized controlled trial of an employment intervention, the Making-it-WorkTM program, were used. Participants were recruited from British Columbia, Alberta and Ontario. Inclusion criteria included: diagnosis of inflammatory arthritis, currently employed, age 19-59, and having concerns about arthritis affecting ability to work. The primary outcome, presenteeism, was assessed using the % impaired while at work subscale of the Work Productivity and Activity Impairment scale for Specific Health Problem (WPAI-SHP). First the association between potential explanatory variables and WPAI was assessed in bivariate analyses. Variables evaluated included: 1) sociodemographic variables: age, gender, ethnicity, marital status, education, children under age 19; 2) disease variables: IA diagnosis, disease duration, number of limiting comorbidities, global assessment of disease activity (VAS), joint pain (VAS), Disease activity [Rheumatoid Arthritis Disease Activity Index (RADAI)], physical function (HAQ II), Fatigue [VAS, Global Fatigue Index from the Multidimensional Assessment of Fatigue (MAF)], Sleep quality [Insomnia Severity Index(ISI), Depression (Patient Health Questionnaire – PHQ-9); 3) work variables: physical demand, job autonomy, difficulty commuting to/from work, job spillover, job strain, psycho-social work characteristics [Job Content Questionnaire (JCQ) decision latitude, physical and psychological job demands, social support at work], self-employment, family support of decision to work, importance of working. Variables correlated with WPAI-SHP at $p \leq 0.20$ were selected for inclusion in the multivariable linear regression analysis, using stepwise selection with alpha of 0.15.
Results: The sample included 469 participants [52% with RA, 14% PsA, 14% SLE, 20% AS]; with median (IQR) arthritis duration of 7(3-15) years; mean (SD) age 45.6 (9.9) years; 43% were

older than 50 years; 78% were females; 77% had completed post-secondary education; 17% were self-employed]. Multivariable linear regression analyses revealed that living alone ($p=0.033$), having more fatigue (GFI-MAF) ($p<0.001$), job strain ($p=0.004$), job spill over ($p=0.051$), disease activity (RADAI) ($p=0.005$), family support for working ($p=0.027$), poorer physical function (HAQ II) ($p=0.029$) and decision latitude ($p=0.032$) were associated with greater impairment in work productivity.

Conclusion: This study identified important sociodemographic, disease and work-related factors associated with reduced productivity at work in people with inflammatory arthritis. These results provide useful information to health professionals counselling patients on dealing with employment issues. Best Abstract by a Rheumatology Post-Graduate Research Trainee Award.

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No Anti-CCP, Check Hep C: Screening for Curable Arthritis

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Case Report: Non-cryoglobulin, hepatitis C (HCV)-related arthropathy is an extrahepatic presentation of an HCV infection, which mimics rheumatoid arthritis with high fidelity in both its presentation and seropositivity. Patients with risk factors for HCV or transaminitis are more easily identified and treated. However, those patients without clinical suspicion for HCV infection and normal liver enzymes, may be misdiagnosed as a seropositive rheumatoid arthritis (RA). A negative anti-CCP should raise suspicion of an HCV-related arthropathy. With the recent progress in hepatitis C treatment, HCV-related arthropathy is now curable, unlike RA. Here we present a case of HCV-related arthropathy diagnosed on routine HCV screening as part of a rheumatoid arthritis workup.

A 62-year-old woman presented with a 6-week history of symmetric small joint polyarthritis, in a RA distribution pattern, with positive rheumatoid factor of 28 kU/L, CRP 2.1 mg/L, ALP 112 U/L, ALT 39 U/L. She was referred to rheumatology as "query RA." The inflammatory arthritis was responsive to steroids and she was initiated on methotrexate with routine screening bloodwork including anti-CCP and HCV. Her anti-CCP was negative. However, she had an active HCV infection with an RNA viral load of 1195784 IU/mL. Cryoglobulins were subsequently found to be negative as well. The patient was promptly referred to Hepatology for urgent cure of her viral infection. Upon completing her antiviral treatment, her arthritis was also entirely cured.

The patient's only risk factor for HCV infection was a blood transfusion in 1972, 42 years prior to presenting with arthritis.

A patient presenting with a positive rheumatoid factor and RA-type arthritis, regardless of HCV risk factors or transaminitis, should be screened for HCV, as per the Canadian Rheumatology Association 2012 guidelines for RA (grade III B/D). In a patient with seropositive, anti-CCP negative arthritis, with or without morning stiffness, a non-cryoglobulin HCV-related arthropathy must be ruled out. This abstract serves to remind us that routine screening of HCV in this population provides a dual purpose: screening in anticipation of immunosuppressive management, and reassessing the differential diagnosis for seropositive RA.

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The Updated Hydroxychloroquine Dosing Tool – A Solution for Safe Dosing in All Body Habitus

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Objectives: There is much controversy around safe dosing of hydroxychloroquine (HCQ) with the release of 2016 American Academy of Ophthalmologists (AAO) recommendations on screening for hydroxychloroquine guidelines, which advises dosing with actual body weight (ABW) 5mg/kg/day for both men and women. Compared with previous AAO Guidelines using 6.5mg/kg/day IBW (or ABW if underweight), this new method reduces the dose for underweight persons while significantly increasing it for short obese women. To address this dosing dilemma, the HCQ IBW dosing tool we developed in 2007 was updated, with consideration of both dosing methods. The original chart, used in our practice since 2007, included gender, weight and height, and displayed weekly maintenance doses in number of 200mg tablets.
Methods: Review of literature showed one large study to support 5mg/kg of ABW/day dosing. More importantly, there were several abstracts indicating a lack of adherence to the 6.5mg/kg/day IBW dosing guidelines, leading to patients taking excessive dose. These findings were discussed at our rheumatology division, followed with a proposal by the rheumatology pharmacists to revise the HCQ Dosing Tool. Specifically, we recommended using lesser of the two doses, 5mg/kg/day ABW and 6.5mg/day IBW. The rheumatology division approved this practice update. Prior to dissemination of the new tool, all clinicians in our rheumatology program attended a workshop led by pharmacist on HCQ dosing.
Results: The updated HCQ dosing tool was launched Feb 2018. In June 2018, a published study of 565 patients validated our 2018 HCQ dosing tool. This study concluded that the 2011 AAO guidelines are safer for short, obese women while the 2016 AAO guidelines are safer for short, asthenic (underweight) patients. However, choosing daily dosing based on the lesser of the ABW and IBW guidelines is safer for all patients. Another reference found that excess dosing was more prominent among women and warned that HCQ 400mg daily exceeds the average US female's maximum daily dose according to both the 2011 IBW based and the 2016 ABW based guidelines.
Conclusion: HCQ is increasingly used in rheumatology and other diseases. Of all the risk factors for hydroxychloroquine retinopathy, the only one that is modifiable is daily dosing. While the true prevalence of HCQ retinopathy is still unknown, we updated our gender specific HCQ dosing tool to allow easy comparison of both 6.5mg/kg IBW and 5mg/kg ABW, so the lower of the two doses may be prescribed.

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Direct Referral from Emergency Department to Outpatient Interprofessional Arthritis Program Expedites Effective Inflammatory Arthritis Treatment

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Objectives: Inflammatory arthritis (IA) is a chronic disease characterized by insidious onset and unpredictable flare ups, leading, at times, to emergency department (ED) visits. Our outpatient arthritis program implemented a seamless care path where ED physicians make direct referrals to our interprofessional program with the goal to expedite diagnosis and effective treatment of IA. Our study objective is to review the effectiveness of this referral pathway by assessing the timeliness of the musculoskeletal examination (MSE) conducted by allied health practitioners and subsequent rheumatology consult, and if this intervention would reduce return visits to the ED.
Methods: A retrospective chart review was conducted on all patients referred to our outpatient arthritis program by ED between April 2016 to March 2018. Descriptive analysis was performed. Protocol for this quality assurance study was reviewed by our research ethics board.
Results: Between April 2016 and March 2018, 128 patients were referred by 16 ED physicians. Of the 128 patients, 100 patients (78%) attended their initial appointment in our arthritis program where they received a comprehensive MSE by an experienced arthritis allied health practitioner. Over 80% were seen within 2 weeks of their ED visit. The mean age of patients was 59 years (25-96, SD 17) and 53% were female. Following the initial MSE, 53 (53%) patients had an IA presentation, of which 11 (11%) were suggestive of gout. Of those 53 patients with IA, 44 (83%) received expedited rheumatology consultation coordinated by our program. Of the 128 referred cases, 15 (12%) had a return ED visit for the same MSK complaint within 6 months of the initial ED visit, however 7 of the 15 had not attended our program after the referral from the ED the first time. Only 3 (2 gout, 1 SLE) of the 15 were being actively followed by our program.
Conclusion: The direct referral pathway from the emergency department to our outpatient interprofessional arthritis care program was effective in providing timely triage for inflammatory arthritis. Expedited rheumatologist consultations were arranged and treatment initiated. In addition, this data indicated that care of the inflammatory patient in this timely manner may reduce return visits to the ED.

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User Experience with Methotrexate in Managing Inflammatory Arthritis Under the Support of an Interprofessional Arthritis Care Team (UMTX Study)

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Objectives: Methotrexate (MTX) is the cornerstone for the treatment of RA as monotherapy or in combination. While its cost effectiveness in halting the disease is inarguable, many obstacles hinder optimal usage. Myths about MTX use in rheumatology, for example, that it is dosed like a chemotherapy, often lead to fear of side effects and reluctance to accept treatment. While intolerance to MTX has been widely reported, it is known that the subcutaneous administration route is more efficacious than oral and usually better tolerated. Unfortunately, this preferred route is not routinely used based on the belief that self-administration is impractical and unsafe. In our interprofessional arthritis care program, we provide holistic education on disease, medication options and self-management strategies right from the time of diagnosis. Our pharmacists teach subcutaneous self-injection of both MTX and Vitamin B12. In this questionnaire study, we aim to explore patient experience with using MTX under the support of

an interprofessional arthritis care team.
Methods: We reviewed and modified, with permission, a survey developed by a national patient advocacy group, adding questions about patient attendance at the interprofessional arthritis care program and whether they have accessed the pharmacist consultation service. The questionnaire, asking for anonymous data only, was administered in hardcopy format to consecutive patients visiting our clinic and the four off-site rheumatologist offices. All patients who have ever used MTX for managing inflammatory arthritis were eligible to participate. Office staff and allied health providers identified eligible participants and provided a study envelope which contained the study participant information letter and the questionnaire. Participants were asked to return the completed questionnaire in a sealed envelope before they left.
Results: Over an 8-week period, a total of 228 completed surveys were received. Over 80% of survey respondents stated they feel MTX helps their arthritis. Only 13% of respondents reported they stopped MTX due to side effects, with nausea and fatigue being most common. It should be noted that 61% of respondents were taking Vitamin B12, with 52% of those using the subcutaneous injection route. Among those using Vitamin B12, 60% believe that it helped reduce the side effects of MTX.
Conclusion: Our survey results suggest long survival of subcutaneous MTX administration. Further study is warranted to explore possible benefits of Vitamin B12 co-prescription and the impact of interprofessional care model on patient experience with MTX use in inflammatory arthritis.

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Auto-Antibodies Lack Specificity for Early Autoimmune Disease and Remain Stable Over Short Term Follow-up

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Objectives: Antinuclear antibodies (ANA) serve an important role in the diagnosis of systemic autoimmune rheumatic diseases (SARD). Indirect immunofluorescence (IIF) remains the gold standard but is plagued by poor specificity, cost, and accessibility. Automated testing methods, such as BioPlex 2200, provide certain advantages and enable detection of specific auto-antibodies but correlate poorly with IIF. Here we sought to characterize the diagnostic utility of ANA by BioPlex in patients with early autoimmune disease and to identify clinical factors that may help differentiate them from otherwise healthy patients with a positive ANA by IIF.
Methods: This was a prospective cohort study of patients with positive ANA by IIF (titer ≥ 1:160) who were either asymptomatic (ANA+), met ≥1 criterion (UCTD), or met classification criteria for SARD. Demographic variables were collected at baseline and clinical and laboratory data were obtained at each visit. Additional data was acquired retrospectively where available prior to study entry. Univariate and multivariate logistic regression was used to identify baseline clinical and serological factors associated with presence of disease.
Results: Of 176 patients, 74 were asymptomatic ANA + and 102 had autoimmune disease (37 UCTD and 65 SARD). Overall, 120 (68.2%) patients had a positive ANA by BioPlex with a specificity of only 52.7% while the sensitivity was 83.3%. Univariate analysis identified that presenting complaints involving the head and neck (e.g. sicca or oral ulcers), skin, and vascular symptoms (e.g. suspected Raynaud's phenomenon) were associated with the presence of autoimmune disease. Associated serological factors included positive BioPlex, and positive anti-Ro, anti-La, and anti-centromere antibodies. However, in our multivariate analysis, only head

and neck symptoms (OR 19.5 95%CI 7.1-53.3 p=0.000), vascular symptoms (OR 49.8 95%CI 12.0-206.6 p=0.000), and positive anti-La antibody remained statistically significant (OR 3.4 95%CI 1.2-10.0 p=0.024). Follow up ANA testing was available for 72 patients (mean duration 1.6 ± 1.7 years). Only 8 patients subsequently developed a new auto-antibody with a mean time to development of 2 ± 1.3 years. During follow up, 4 ANA+ patients (5.4%) developed clinical disease with a mean time to development of 2.7 ± 1.4 years.
Conclusion: A negative ANA by BioPlex has good sensitivity when distinguishing asymptomatic patients from those with early autoimmune disease but has limited specificity. Clinical features associated with the presence of disease include vascular and head and neck symptoms as well as positive anti-La antibodies. Additionally, auto-antibodies remain relatively stable over time arguing against the need for serial testing.

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The Impact of Systemic Lupus Erythematosus on the Risk of Newly Diagnosed Hip Fracture. A Population-based Study

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Objectives: Hip fractures have serious long-term effects, including 1-year mortality rate of up to 30% and poor functional recovery. Patients with systemic lupus erythematosus (SLE) are at higher risk of fractures because of the disease or its treatment. Studies on the risk of hip fracture in SLE are limited due to the use of selected samples, failure to adjust for time-varying treatments and confounders. Our objective was to assess the risk of hip fracture in patients with newly diagnosed SLE compared to the general population.
Methods: Using physician billing data and a previously validated SLE case definition, we assembled an incident cohort of all patients with SLE who received health care between January 01 1997 and March 31 2015 in the province of British Columbia, Canada. Our main outcome was the first ever hip fracture during follow-up. Hip fractures (ICD-9-CM codes 820.0, 820.2; ICD-10-CM codes S72.0, S72.1, S72.2) were identified using hospitalization data. We excluded patients with previous hip fractures, pathological fractures or Paget's disease before SLE diagnosis. Non-SLE controls were randomly selected from the general population and matched (1:5) to SLE patients on birth year, sex and index year. We first used Kaplan-Meier estimates and log-rank test to compare time to first hip fracture between SLE and non-SLE controls. Marginal structure Cox models were then used to estimate the impact of having SLE on the risk of hip fracture, adjusting for time-dependent covariates, including glucocorticoid use, number of outpatient, inpatient and rheumatologist visits.
Results: We identified 4,773 patients with a new diagnosis of SLE and 23,865 non-SLE controls (mean age 48.3 yrs; 86.4% females for each cohort), yielding 52 and 172 hip fracture events after a mean follow-up time of 7 years, respectively. Kaplan-Meier curves showed that patients with SLE have a higher risk of hip fracture (P= 0.004 for log-rank test). The crude rate ratio (RR) was 3.54 (95% CI; 2.60, 4.83). After controlling for baseline covariates, the RR decreased to 2.72 (95% CI; 1.95, 3.80). Using the marginal structure Cox model to further adjust for time-dependent covariates including glucocorticoid use, number of outpatient, inpatient and rheumatologist visits, the RR was 2.09 (95% CI; 1.28, 3.42).
Conclusion: Patients with a new diagnosis of SLE have 2-fold increased risk of hip fracture than

the general population. Given the impact of hip fractures, this has important implications for mortality, functional status and quality of life of people with SLE.

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Non-IPF Progressive Fibrosing Interstitial Lung Disease (PF-ILD): The Patient Journey

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Objectives: Some patients with different clinical diagnoses of interstitial lung disease develop progressive lung fibrosis. Limited data are available on current practice in the diagnosis and management of progressive fibrosing ILD (PF-ILD). We used data from expert interviews, a physician survey, and US insurance claims to investigate the patient journey in non-IPF PF-ILD.

Methods: Twenty-two ILD experts from Germany, Japan, UK and the US participated in a 1-hour interview. Physicians who spend 275% of their professional time managing patients and had managed 210 non-IPF ILD patients in the past year, including patients with PF-ILD, were invited to complete an online survey. A total of 486 physicians (243 pulmonologists, 203 rheumatologists, 40 internists) from the US, Japan, Germany, France, Italy, Spain, and UK participated. Treatment patterns in the US were analyzed based on insurance claims or electronic heath records from 3823 patients with 21 claims for ILD in 2016.

Results: Interviews and real-world US claims data indicated that an ILD diagnosis is usually made by a pulmonologist. Physicians who participated in the survey estimated that ILD is typically diagnosed 8.6 to 11.5 months after symptoms develop. Non-autoimmune ILDs are typically managed by a pulmonologist, while autoimmune ILD patients may be managed by a pulmonologist and/or rheumatologist. Physicians estimated that 18-32% of patients diagnosed with non-IPF ILD develop progressive fibrosis, with idiopathic non-specific interstitial pneumonia (iNSIP), systemic sclerosis-associated ILD, unclassifiable idiopathic interstitial pneumonia and rheumatoid arthritis-associated ILD being the types of ILD regarded as most likely to lead to progressive fibrosis. Based on the physician survey, measurements of FVC, DLCO, and 6-minute walk test distance were the measures that physicians most relied on to determine whether a patient is progressing. Most physicians performed pulmonary function tests every 3-6 months in patients with ILD, while HRCT scans were performed every 6-12 months. Real-world US data suggested that 75% of patients with ILD visit a pulmonologist at least once a year; the average number of visits per year was 2.3. Surveyed physicians estimated that patients die approximately 30-45 months after the detection of progressive fibrosis.

Conclusion: Physicians who manage patients with non-IPF ILD estimate that 18-32% of patients diagnosed with ILD (depending on clinical diagnosis) develop a progressive fibrosing phenotype. Delayed referral to a pulmonologist is likely to delay diagnosis and management of PF-ILD. Life expectancy in patients with non-IPF PF-ILD is believed to be similar to that of patients with IPF.

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Current Treatment of Patients with Non-IPF Progressive Fibrosing Interstitial Lung Disease

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Denver)
Objectives: There are no approved treatments or established treatment paradigms for forms of progressive fibrosing interstitial lung disease (PF-ILD) other than idiopathic pulmonary fibrosis (IPF). We investigated how physicians currently manage patients with non-IPF ILD.
Methods: Physicians who spend;:75% of their professional time managing patients and had managed ;:10 non-IPF ILD patients in the past year, including patients with PF-ILD, were invited to complete an online survey. A total of 486 physicians (243 pulmonologists, 203 rheumatologists, 40 internists) from the US, Japan, Germany, France, Italy, Spain, and UK participated. In addition, treatment patterns in the US were analyzed based on insurance claims or electronic heath records from 3823 patients with at least one claim for ILD in 2016.
Results: The physician survey indicated that pulmonologists generally take the lead in treating patients with non-autoimmune ILD, while both rheumatologists and pulmonologists are key decision-makers in the treatment of autoimmune ILD. Both the physician survey and real-world US data indicated that 50-75% of patients with non-IPF ILD receive drug treatment; this was generally similar across countries and types of ILD. Corticosteroids were the preferred first-line treatment for all types of ILD. There was considerable heterogeneity in preferences for second- and third-line treatments, which included azathioprine, cyclophosphamide, methotrexate and mycophenolate mofetil. The physician survey indicated that the main reasons for physicians not treating patients with PF-ILD were that they considered patients to have mild or slowly progressing disease or end-stage lung disease, or did not believe that currently available treatments are effective or well tolerated.
Conclusion: Corticosteroids are the most commonly used treatment for non-IPF PF-ILD, but there is considerable heterogeneity in the treatments used. Over one-third of patients are not receiving any drug therapy. There is an unmet need for effective treatments for PF-ILD with an acceptable side- effect profile.

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Liquid Chromatography Tandem Mass Spectrometry for IgG4-related Disease

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Objectives: We compared a new method, liquid chromatography tandem mass spectrometry (LC-MS/MS) versus the Binding Site immunonephelometry (BSIN) with regard to the respective clinical test characteristics for the diagnosis of IgG4-related disease (IgG4-RD).
Methods: IgG subclass results were retrieved from the laboratory for the period from December 2011 to December 2017 and there were 908 IgG4 subclasses measured. A retrospective chart review was performed to determine the presence or absence of biopsy proven IgG4-related disease. The two different test methods' results were then compared to determine sensitivity, specificity, positive and negative predictive values as well as IgG subclass ratios.
Results: For BSIN, there were 43 IgG4-RD positive cases and 161 disease negative cases. For LC-MS/MS, there were 33 IgG4-RD positive cases and 105 disease negative cases. The specificity of BSIN was 84 % while the specificity of LC-MS/MS was 85%. Sensitivity was 74% for BSIN and 76% for LC-MS/MS. Positive and negative predictive values, respectively, were

53% and 96% for BSIN and 54% and 92% for LC-MS/MS. The sensitivity and specificity of BSIN versus LC-MS/MS were equivalent (p=1.0, p=1.0).
Conclusion: Not surprisingly, since the two methods are calibrated to the same standard for IgG4, they have similar sensitivity and specificity for the diagnosis of IgG4-RD. Given the potential advantages, a lower incidence of measurement errors, and a lower cost, LC-MS/MS could be considered instead of BSIN where possible.

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Caregiving Intensity and Perceived Burden Among Informal Caregivers of Persons with Systemic Sclerosis Compared to Other Chronic Medical Conditions

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Objectives: Informal caregivers provide assistance to loved ones with a health condition, typically without receiving financial compensation or formal training. Systemic sclerosis (SSc), or scleroderma, is a rare autoimmune connective tissue disease characterized by vascular injury, immune dysfunction and an abnormal fibrotic process that can affect multiple organ systems including the skin, lungs, gastrointestinal tract and cardiovascular system. People living with SSc often rely on informal caregivers to assist with daily tasks. The current study aimed to compare caregiving intensity and perceived burden of informal caregivers of people living with SSc to informal caregivers of patients with other chronic medical conditions.
Methods: An online survey was completed by informal caregivers of people with SSc from December 2016 to June 2017. The survey included measures of caregiver intensity (Level of Care Index) and perceived burden (12-item Zarit Burden Interview [ZBI-12]). In addition, a systematic search of Cochrane Central, CINAHL, EMBASE, MEDLINE, and PsycINFO databases was conducted from inception through October 11, 2017 to identify original studies that included the Level of Care Index or the ZBI-12 or -22 among caregivers for people with chronic diseases.
Results: 202 informal caregivers of people with SSc completed the survey. The Level of Care Index was categorized as low burden in 55%, medium burden in 14%, and high burden in 31% of SSc caregivers. The mean ZBI-12 score among caregivers was 13.5 (standard deviation [SD] = 9.8). There were 2611 unique title/abstracts identified from the database search. Of these title/abstracts, 2304 citations were excluded, and 307 full-texts were reviewed for eligibility. A total of 53 eligible articles were included in the review. The Level of Care Index was not reported in any included study. Seven articles reported ZBI-12 scores and included amyotrophic lateral sclerosis (n = 1; mean = 12.4; SD = 7.9), cirrhosis (n = 1; mean = 11.5; SD = 8.4), essential tremor (n = 1; mean = 6.0; SD = 8.0), heart failure (n = 2; mean = 12.6; I^2 = 86.0%), and spinal cord injury (n = 2; mean = 9.6; I^2 = 95.6%).
Conclusion: Perceived burden was higher among SSc caregivers than caregivers of people living with more common diseases, including amyotrophic lateral sclerosis, cirrhosis, essential tremor, heart failure, and spinal cord injury. Interventions designed to reduce caregiver burden in SSc should be developed and tested. Best Abstract for Research by an Undergraduate Student Award.

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Differential Expression of Human Endogenous Retroviruses in Psoriatic Disease

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Laila Zaman (Psoriatic Arthritis Program, Centre for Prognosis Studies in the Rheumatic Diseases, Krembil Research Institute, University Health Network, Toronto); Dafna Gladman (Toronto Western Hospital and University of Toronto, Toronto); Vinod Chandran (University of Toronto and University Health Network, Toronto)

Objectives: Differential expression of human endogenous retroviruses (HERVs) has been associated with several autoimmune conditions, however there have been no studies of HERV expression in immune cells such as T cells or monocytes, and no studies in psoriatic arthritis (PsA). This study aimed to compare the expression of 4 HERVs previously associated with autoimmune disorders (HERV-K, HERV-K10, HERV-W, and HERV-H) in CD3+ T cells and CD14+ monocytes of patients with cutaneous psoriasis without arthritis (PsC), PsA, and healthy controls, and determine association with disease activity.

Methods: Heparinized whole blood samples were obtained from patients with PsC (n = 13), PsA satisfying the CASPAR criteria (n = 19), and healthy controls (n = 8). Skin disease activity was measured using the Psoriasis Area and Severity Index (PASI). CD3+ T cells and CD14+ monocytes were isolated by magnetic activated cell sorting. Following total RNA extraction, HERV expression was measured by quantitative real time PCR (qRT-PCR) with normalization to GAPDH.

Results: In CD3+ T cells, there was higher expression of HERV-K10 (fold change, fc=6.87, $p<0.0001$), HERV-W (fc=4.12, $p<0.0001$), and HERV-H (fc=3.19, $p<0.0001$) in PsA compared to healthy controls. There was higher expression of HERV-K (fc=2.18, p=0.02), HERV-W (fc=3.24, p=0.002), and HERV-H (fc=2.67, p=0.003) in PsC compared to healthy controls. There was higher expression of HERV-K10 (fc=2.94, p=0.02) and HERV-W (fc=1.27, p=0.04), but lower expression of HERV-K (fc=0.43, p=0.02) in PsA compared to PsC. In CD14+ monocytes, there was higher expression of HERV-K10 (fc=2.60, p=0.04) and lower expression of HERV-K (fc=0.17, p=0.0002) and HERV-H (fc=0.36, p=0.02) in PsA compared to healthy controls. There was higher expression of HERV-K10 but lower expression of HERV-W (fc=0.47, p=0.04) and HERV-H (fc=0.27, p=0.005) in PsC compared to healthy controls. Lastly, there was lower expression of HERV-K (fc=0.30, p=0.002) in PsA compared to PsC. PASI score was negatively correlated with normalized dCt values of HERV-K (rho=-0.72, p=0.009) and HERV-H (r=-0.81, p=0.002) in PsC CD3+ T cells, and positively correlated with HERV-K (rho=0.54, =0.04) in PsA CD3+ T cells.

Conclusion: HERV-K, HERV-K10, HERV-W, and HERV-H are differentially expressed between PsC, PsA and healthy controls in CD3+ T cells and CD14+ monocytes and expression in CD3+ T cells is associated with skin disease activity. The role of HERVs in the pathogenesis of psoriatic disease needs to be determined. Best Abstract on Basic Science Research by a Trainee Award.

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Improving Hydroxychloroquine Dosing and Toxicity Screening at a Tertiary Care Ambulatory Centre: A Quality Improvement Study

Sahil Koppikar (University of Toronto, Toronto); Natasha Gakhal (Women's College Hospital, Toronto)

Objectives: Hydroxychloroquine (HCQ) is a commonly used, weight based medication that is frequently prescribed at inappropriately high doses, significantly increasing the risk of retinopathy. Furthermore, retinal toxicity screening is often not documented. Improving HCQ dosing and toxicity screening practices is one strategy to promote patient safety in rheumatology. The objectives of our study were: (1) To characterize the frequency of

inappropriate HCQ dosing and retinopathy screening and (2) to implement a quality improvement strategy aimed at improving these practices to promote guideline-based management and patient safety at a tertiary care ambulatory hospital.
Methods: A retrospective baseline analysis of HCQ prescription dosing, patient weight documentation, retinal toxicity screening, and risk factor assessment was first performed to characterize current practices. The main outcome measure was to increase the percentage of patients being appropriately dosed from 32.5% to 90% by September 30th, 2018 (nine-month period). The secondary aim was to increase the percentage of patients receiving retinal screening from 60% to 80%. Process measures included the number of patients with a documented weight in the chart in the last 12 months, number of patients with HCQ dosing based on documented weight, and those with a documented retinal screen in the past 24 months. Our balancing measure was the physician's perceived increase in time spent with each patient due to implemented interventions. Quality improvement tools were used to create sequential change ideas: (1) HCQ weight-based dosing charts to facilitate prescription regimens, (2) addition of scales to patient rooms to promote weighing patients at each clinical encounter, and (3) HCQ auto-dosing prescription in the EMR based on documented weight.
Results: The percentage of patients being weighed has increased from 42.5% to 95% after three PDSA cycles. Subsequently, the number of patients being appropriately dosed on HCQ has also improved from 32.5% to 90% over that time. The awareness and education around this project have also improved our retinal screening practices by 32%.
Conclusion: Inappropriate dosing and retinal screening of HCQ occurs frequently. The addition of dosing charts in clinic rooms, weight scales, and EMR auto-dosing prescriptions has significantly improved our outcomes. It will be important to continue to follow the data over time to truly understand if the improvement is sustained.

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Improving Rheumatology Patient Centered Care by Human Factor Analysis: A Quality Improvement Study

Sanhita Shrivastava (University of Alberta, Edmonton); Elaine Yacyshyn (Division of Rheumatology, University of Alberta, Edmonton)

Objectives: Human factor analysis in the health care setting aims at identifying the steps and causal factors underlying a medical error. In this quality improvement study, we looked at a 'near miss' incident in an outpatient rheumatology clinic setting that centered on missed collection of medication data from a patient and the factors involved in this process.
Methods: We utilized the Human Factors Conceptual Framework to Map-Assess-Recognize-Conclude (HF-MARC) developed by Parush et al, 2017. The patient was identified as a "near miss", as she did not provide her correct medication list to health care providers. From the patient's central perspective, further analysis was undertaken. The framework enabled us to identify influential factors, emergent factors, and possible mitigations to improve patient care.
Results: The mapping stage revealed the current state of patient management, with the patient at the center of the encounter. Assessment of fit lead to defining the summary of problems such as the complexity of documentation in the EMR, difficulty of patient navigation within the clinic, the variability of the location/time stamping of data storage within the EMR and presence of ineffective communication between team members especially at busy clinic times. Stress, multitasking and increased workload were identified as emergent factors that influenced clinical staff performance and outcomes. A severity grading was developed for frequency of occurrence and the potential for impact. This led to the most influential factors being the complexity of the

EMR software and documentation within it as well as the inefficiency of the patient healthcare team due to lack of collaboration and communication. Several focused mitigation strategies were then stipulated to address these issues.
Conclusion: There has been limited assessment of human factors analysis in Rheumatology. Human factors framework focuses on changing the processes and technologies to support people in their environment. It is via a human factor analysis of incidents or processes in our daily patient interactions that we can ascertain where the interactions occur, which factors impact them and what would be their implications and outcomes, without changing the human condition. In this preliminary study, using human factors analysis allowed us to identify key influencing factors for an adverse event and develop mitigation strategies to address them. A sustained effort to incorporate this process in our practice may eventually lead to improved patient safety and care, a step towards optimal patient centred care.

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Improving the Shingles Vaccination Rate for Patients with Rheumatic Diseases

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Objectives: Immunocompromised patients are at an increased risk of shingles reactivation. Vaccination rates are low, and few Rheumatology clinics have mechanisms to ensure that vaccination is offered and received prior to starting biologic therapy. Aim: To increase the shingles vaccination rate by 20% among patients with inflammatory arthritis over age 50 who started biologic medications between January and June, 2018.
Methods: Outcome Measures: (1) Percentage of patients over age 50 who received the shingles vaccine prior to biologic start, as measured by documentation in the chart or patient report, pre- and post-intervention; (2) Percentage of documented shingles infection, pre- and post-intervention. Process Measures: (1) Percentage of patients with documentation of both recommendation for shingles vaccination and of vaccine administration. Balancing Measures: (1) Percentage of documented vaccine-related side effects; (2) Percentage of patients paying out of pocket for vaccination; (3) Percentage of patients with documented delay to biologic administration due to vaccination. Stakeholders: Project reviewed with a sample of patients, families, Infectious Diseases and Family Physicians, and administrative staff, prior to, partway through, and at the study period's end. Intervention was modified accordingly. Problem Characterization: Chart review revealed that the shingles vaccination rate in eligible patients at Sunnybrook Health Sciences Centre (SHSC) and Women's College Hospital (WCH) was only 35%.
Results: Intervention and Implementation/PDSA cycles—Plan: We improved patient education and communication between Rheumatologists and Family Physicians. Do: Existing forms for pre-biologic TB skin test results were modified to include a recommendation for shingles vaccination. A patient information pamphlet was developed. Feedback from Rheumatologists and Family Physicians led to modifications. Study: Data collected 3 weeks after start date at WCH indicated that 5 patients met eligibility criteria. Of these, 1 had documented vaccination and 2 had documented discussions. Only 2 patient pamphlets were distributed, suggesting poor uptake of patient information intervention. Act: The patient information pamphlet and electronic

communication tool between Rheumatology and Family Medicine were combined to improve distribution. The next PDSA showed that, of 4 eligible patients, 2 had documented vaccination, and all 4 had documented discussions. At SHSC, after the first PDSA cycle, 5 of 10 eligible patients had vaccination documented.
Conclusion: The overall vaccination rate at WCH and SHSC improved to 50% post-intervention. All 4 patients reviewed in the last PDSA cycle at WCH had a documented discussion, suggesting increased awareness. Low sample size limits the reliability of results. Further follow-up and refinements are required to assess the intervention.

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Bioethics for the Rheumatologist: A Needs-Assessment, Curriculum Development, and Knowledge Assessment of Bioethical Topics for Rheumatology Trainees

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Objectives: An understanding of bioethics and an ability to apply ethical principles in clinical practice should be key components of postgraduate medical training. However, there is no formal bioethics curriculum for Rheumatology residents. The purpose of this study was to determine whether implementation of a curriculum tailored to the needs of Rheumatology residents, and delivered centrally at the National Rheumatology Residents' Weekend (NRRW), would increase residents' self-perceived knowledge of, and competency in, bioethical issues in clinical practice.
Methods: A literature review was performed to identify bioethical issues relevant to Rheumatology trainees. Interactive cases developed based on three of these issues were piloted at the NRRW in Toronto in December 2017. A clinician with bioethics expertise delivered a lecture on a framework for evaluating ethical dilemmas. Rheumatology faculty physicians then facilitated the case-based discussions on medical assisted in dying (MAID), resource allocation, and relationships with industry, using group role-play as a tool for examining different perspectives on these ethical controversies. Residents were given access to all study materials following the sessions. Pre- and post-knowledge surveys were distributed to residents to assess their comfort and knowledge with bioethical topics before and after session participation. Survey results were analyzed using descriptive statistics.
Results: 41% of attendees completed the needs assessment. 46% were PGY4s; 54% were PGY5s. Most residents agreed that formal training in bioethics was very important (29%) or somewhat important (51%) to Rheumatology training, but the majority rated their knowledge as low in core bioethical topics. Residents identified: end of life care and MAID (41%), assessing capacity and substitute decision-makers (34%), doctor-patient relationships and boundaries (32%), caring for the non-adherent patient (59%), medical resource allocation (51%), and cross-cultural issues (51%) as topics for further learning. 22% of attendees completed the post-rounds survey. The majority (91%) felt that the case-based sessions improved their knowledge of a core bioethical topic, and that they would feel more comfortable addressing this topic in clinical practice (86%). There were statistically significant improvements in self-perceived knowledge of, and comfort with, a number of core topics, including those not explicitly covered by the case-based sessions.
Conclusion: The design and implementation of a bioethics curriculum relevant to Rheumatology trainees is an effective means of increasing residents' self-perceived understanding of, and engagement with, bioethical issues central to the practice of Rheumatology. Further study is

required to assess whether or not residents retain knowledge of an ethical framework and can apply its principles to clinical practice.

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Secular Trends in the Incident Risk of Acute Myocardial Infarction in Rheumatoid Arthritis Relative to the General Population

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Objectives: Recent studies have demonstrated a declining trend in RA mortality relative to the general population. This improvement in mortality could be due to improvement in incident risk of cardiovascular events that are the leading cause of excess deaths in RA. Our objective was to assess secular trends in ten-year incident risk of acute myocardial infarction (AMI) in incident cohorts of RA versus general population controls, using administrative health data.

Methods: We conducted a retrospective study of a population-based cohort of incident RA cases who first met previously published RA criteria between 01/01/1997 and 31/12/2004 in British Columbia, with general population controls matched 2:1 on gender, age, and index year. Individuals were excluded if they had a diagnosis of MI prior to index date. Incident AMI was defined as first AMI during follow-up using ICD codes (ICD-9 code 410 / ICD-10 code I21) in Hospital Discharge data or death certificate in Vital Statistics data. RA and general population cohorts were stratified according to year of RA incidence, defined according to first RA visit, using a 7-year wash-out period. Incident rates (IRs) of AMI for RA and general population cohorts, as well as incident rate ratios (IRRs), with 95% confidence intervals (CI) were calculated per calendar years of incidence. Multivariable Cox Proportional Hazard models with left truncation were used to estimate risk of AMI in RA relative to general population while controlling for potential confounders, with contribution of person time of follow-up starting from index date (second RA visit) to avoid immortal time bias and censoring at ten years from incident year, or last health care utilization. To examine whether secular trends differed in RA relative to general population, an interaction term was tested between the RA indicator and year of RA incidence.

Results: 23,237 RA individuals (66.4% female; mean [SD] age 58 [16.88] years) and 46,474 controls experienced 1,133 and 1,646 incident AMI, respectively. Risk of AMI was significantly higher in RA vs. general population [aHR (95% CI): 1.21(1.10,1.32); $p<0.001$]. A significant decline was observed in risk of AMI over calendar year of incidence in both RA [0.94(0.92, 0.97); $p<.0001$] and controls [0.93(0.91,0.95); $p<.0001$]. The decline in AMI risk did not differ significantly in RA and general population [interaction $p=0.555$].

Conclusion: Our finding suggests that the risk of AMI has significantly decreased over time in RA and general population cohorts. However, the declining trend was not significantly different in RA and the general population.

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The Correlation Between Ultrasound Examination of the Joints, Physicians' and Patients' Assessment of Disease Activity in Psoriatic Disease

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(Women's College Hospital, Toronto); Lihi Eder (Women's College Hospital and University of Toronto, Toronto)
Objectives: There is a need for a strategy to identify psoriasis patients that have psoriatic arthritis (PsA) at an earlier stage to improve long term outcomes. This study aimed to compare the agreement between findings on examination of the joints by the following modalities: rheumatologist, advanced practice physiotherapist, patient reported and ultrasound
Methods: This study evaluated patients with psoriasis and musculoskeletal complaints who did not have a prior diagnosis of PsA. These patients were evaluated in a rapid access clinic that included a central triage system using the following modalities: 1) screening questionnaires that included homunculus where patients marked the location of the affected joints, 2) assessment by an advanced practice physiotherapist, 3) musculoskeletal ultrasound (MSK-US) of joints and entheses. All patients were then assessed by a rheumatologist who classified each patients to: "Not PsA", "Possibly PsA" of "PsA". Agreement between modalities was assessed, as well as the correlation between each modality and PsA status.
Results: 203 patients with psoriasis and arthralgia were enrolled in the study. 137 (67.5%) were classified as "Not PsA", 48 (23.6%) were "Possible PsA" and 18 (8.9%) were "PsA". Patients who were classified as "PsA" were more likely to use systemic non-biologic and biologic medications for psoriasis ($p=0.02$, $p=0.006$), have severe psoriasis ($p=0.02$) and nail lesions ($p=0.02$) and have synovitis/enthesitis by MSK-US ($p=0.01$). Patients with positive MSK-US findings were older ($p<0.001$), reported more joint stiffness ($p=0.02$) and physical dysfunction (by HAQ, $p=0.02$). Analysis of agreement between modalities in regard to evaluation of all hand, foot, ankle, knee, elbow and shoulder joints (50 joints total) for tenderness and swelling, revealed the strongest agreement between the rheumatologist and physiotherapist ($k=0.28$, 95% CI 0.21, 0.35). The lowest levels of agreement were found between ultrasound and patient ($k=0.08$, 95% CI 0.04, 0.12) and physiotherapist and ultrasound ($k=0.08$, 95% CI 0.03, 0.12).
Conclusion: The correlation in joint examination findings between various modalities is relatively poor. This study highlights the potential for MSK US to provide additional information to the clinical assessment and aid in diagnosing PsA patients at earlier stages for their disease to improve outcomes of their treatment.

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Efficacy and Safety of Subcutaneous Tanezumab for the Treatment of Osteoarthritis of the Hip or Knee

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Objectives: Tanezumab is a humanized mAb that blocks nerve growth factor (NGF) and is in clinical development for chronic pain treatment. Tanezumab administered intravenously has proven efficacy in previous studies of osteoarthritis (OA) pain. A randomized, double-blind, placebo-controlled, multicenter, parallel-group, 40-week study (16-week treatment period; 24-week safety follow-up) was conducted to examine the efficacy and safety of subcutaneous (SC) tanezumab administered in two treatment regimens over 16 weeks: fixed-dosing (2.5 mg administered at Baseline and Week 8) and step-up dosing (2.5 mg administered at Baseline and 5 mg at Week 8).

Methods: This study enrolled OA patients who had not responded to or could not tolerate standard pain treatments. Patients (N = 696) had: OA of the hip or knee based on clinical and radiographic ACR criteria, baseline WOMAC Pain and Physical Function scores of ≥5 (11-point numerical rating scale), baseline Patient's Global Assessment of OA (PGA-OA) of "fair," "poor," or "very poor", and a history of insufficient pain relief or intolerance to acetaminophen, NSAIDs, and either tramadol or opioids (or were unwilling to take opioids). Co-primary endpoints were change from Baseline to Week 16 in WOMAC Pain subscale, WOMAC Physical Function subscale, and PGA-OA. Safety assessments included adverse event (AE) reporting, physical and neurological examinations, joint x-rays, electrocardiogram, and laboratory tests.
Results: At Week 16, patients treated with tanezumab 2.5 mg or 2.5/5 mg experienced statistically significant improvement in WOMAC Pain, WOMAC Physical Function, and PGA-OA compared with patients receiving placebo. Both tanezumab dosing regimens met the study co-primary endpoints. The most common AEs (≥3% in any treatment group and more frequent in each tanezumab treatment group than in the placebo treatment group) were nasopharyngitis, pain in extremity, and paresthesia. The incidence of serious AEs or withdrawals due to AEs was similar between treatment groups. Adjudicated rapidly progressive OA occurred in 1.3% of tanezumab-treated subjects during the 40-week study.
Conclusion: Tanezumab 2.5 mg SC provided significant pain relief and improved both function and PGA-OA versus placebo in OA patients. Increasing the dose to 5 mg at Week 8 was associated with modest additional benefit versus continuation on tanezumab 2.5 mg. This study demonstrates that SC tanezumab may be an effective option for patients who have demonstrated intolerance or incomplete response to standard treatments for OA.|

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Long-Term Effectiveness and Safety of Infliximab in Rheumatoid Arthritis Patients: Real-World Data from the Biologic Treatment Registry Across Canada (BioTRAC)

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Objectives: To describe the patient profile of rheumatoid arthritis (RA) patients selected over time for treatment with infliximab (IFX) in Canadian routine clinical care, and to assess the long-term effectiveness and safety of IFX in real-world.
Methods: Data from the Biologic Treatment Registry Across Canada (BioTRAC), which enrolled patients with ≤1 prior biologic agent exposure and followed them for up to 14 years, was used to evaluate patients that initiated IFX treatment between 2002 and 2015. Drug survival was analyzed using Kaplan-Meier analysis. Summary statistics were used to describe clinical and patient-reported outcomes over time.
Results: A total of 890 RA patients were enrolled. The enrolment over time was as follow: 2002-2004 (n=354; 39.8%), 2005-2008 (n=324; 36.4%), 2009-2012 (n=150; 16.9%), 2013-2015 (n=62; 7.0%). At IFX initiation, patients enrolled in more recent years had significantly shorter disease duration ($p<0.001$), were less likely to be unemployed ($p=0.001$), and had lower disease

activity, as indicated by significantly ($p<0.001$) lower DAS28-ESR, TJC28, SJC28, HAQ-DI, AM stiffness, MDGA, PtGA, pain, ESR, and CRP. In terms of treatment history, an increase in the proportion of patients having been previously treated with a DMARD ($p<0.001$) was observed across enrollment periods. Furthermore, less frequent concomitant use of corticosteroids ($p=0.007$), but more frequent MTX use ($p=0.006$) was observed at IFX initiation. Significant improvements were observed in all clinical and patient-reported outcomes examined ($p<0.001$). Median drug survival was 24.9 months with 1-, 5-, and 10-year survival probabilities of 66%, 30%, and 14%, respectively. Incidence rates for AEs, SAEs, serious infections, and malignancies were 105, 11.7, 2.67, and 1.63 events per 100 PYs, respectively.
Conclusion: In a real-world setting, long-term treatment with IFX was associated with significant reduction in disease activity and good tolerability. A trend toward earlier biologic switching was observed over time, possibly reflecting changes in clinical practice.

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Constructing a Frailty Index as a Novel Health Measure in Systemic Lupus Erythematosus

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Objectives: Predicting clinical outcomes in SLE is challenging. In other populations, susceptibility to adverse outcomes has been measured using a frailty index (FI), which quantifies vulnerability via the accumulation of health deficits. Using data from the Systemic Lupus International Collaborating Clinics (SLICC) inception cohort, we constructed a frailty index for patients with SLE.
Methods: Patients fulfilling ≥ 4 ACR classification criteria for SLE were recruited within 15 months of diagnosis. They were assessed annually for medication use, comorbidities, disease activity (SLEDAI-2K), organ damage [SLICC/ACR Damage Index (SDI)], health-related quality of life [Short-Form 36 (SF-36)] and other measures. We defined the baseline visit as the first at which both SDI and SF-36 data were available. From this baseline dataset, variables were identified for inclusion in the SLICC frailty index (SLICC-FI) if they satisfied the standard criteria for health deficits. Once selected, the deficits were used to calculate a baseline SLICC-FI score for each patient. We estimated correlations of the SLICC-FI with existing instruments, including the SDI and the SLEDAI-2K. Multivariable Cox regression was used to estimate associations between baseline SLICC-FI values and mortality risk, adjusting for relevant demographic and clinical variables.
Results: 1682 SLE patients were eligible for inclusion and were predominantly female (89%) with mean (SD) age 35.7 (13.4) years and mean (SD) disease duration 18.8 (15.7) months at baseline. Of 222 candidate variables, 48 met the required criteria for inclusion as health deficits in the SLICC-FI. These included items related to organ damage, disease activity, comorbidities, and functional status. The mean (SD) baseline SLICC-FI score was 0.17 (0.08) with a range from 0 to 0.51. At baseline, SLICC-FI values demonstrated weak, positive correlations with both SDI ($r=0.26$; $p<0.001$) and SLEDAI-2K ($r=0.23$; $p<0.001$) scores. Sixty-six deaths occurred during a mean (SD) follow-up of 6.7 (4.0) years. Each 0.05 increment in the baseline SLICC-FI score was associated with an increase in mortality risk (Hazard Ratio [HR] 1.59; 95% CI 1.35-1.87), after adjusting for age, sex, baseline steroid use, ethnicity/region, and baseline SDI scores. This association persisted when damage items were omitted from the frailty index (HR 1.37; 95% CI

1.22-1.53) and when only patients without baseline organ damage (SDI=0) were considered (HR 1.47; 95% CI 1.18-1.83).
Conclusion: The SLICC-FI is a relevant health measure in SLE. It predicts future mortality risk independent of the SDI. For this reason, the SLICC-FI could be useful for identifying those SLE patients who are most vulnerable to adverse outcomes. Best Abstract on SLE Research by a Trainee – Ian Watson Award.

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Polypharmacy in Older Adults with Systemic Lupus Erythematosus

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Objectives: Polypharmacy is a strong risk factor for adverse clinical outcomes particularly in older adults. Individuals with Systemic Lupus Erythematosus (SLE) may be particularly at risk for polypharmacy. However, the scope, risk factors, and impact of polypharmacy in older adults with SLE is not known. Our aim was to evaluate in older adults with SLE: (1) the prevalence of polypharmacy (two definitions used: ≥5 and ≥ 10 prescription medications), (2) whether polypharmacy is associated with age, sex, SLE disease activity (SLEDAI-2K), SLE duration ≤3 years, Charlson Co-morbidity Index (CCI), and rural residence, (3) and if polypharmacy is associated with prescribing of potentially inappropriate medications (PIMs): benzodiazepines and non-benzodiazepine sedative-hypnotics (Z-drugs), and opioids.
Methods: Population: Adults aged ≥50 years meeting the ACR/SLICC classification for SLE and seen at the Health Sciences Center (HSC) Rheumatology Clinic in the last 2 years. Patient lacking data in the Manitoba Drug Program Information Network (DPIN) (e.g. out-of-province patients) were excluded. Procedures: The number and class of prescription medications filled within a 4-month period was gathered from DPIN. All demographic and clinical variables were determined using data from electronic medical records. Multivariable logistic regression analyses were performed.
Results: 206 patients were included: mean age 62 (standard deviation 8) years; 187(91%) female; 148(72%) filled ≥5 prescription medications and 71(35%) ≥10 medications; 63(31%) used benzodiazepines/Z-drugs and 50(24%) used opioids. Of the 77 patients aged ≥65 years, 57(74%) filled ≥5 medications and 26(34%) filled ≥10 medications. In comparison, the rate of polypharmacy reported for adults ≥65 years of age in the province of Manitoba in 2016 as per NPDUIS was 58% for >5 medications and 18% for >10 medications. In multivariable logistic regression analyses, filling prescription for ≥ 5 medications was associated with CCI (odds ratio 1.7; 95% confidence interval 1.3 – 2.3) and rural residence (2.0; 1.0 – 4.0), while use of ≥ 10 medications was associated with CCI (1.5; 1.2 – 1.8). Polypharmacy was significantly associated with use of both benzodiazepines/Z-drugs and opioids (p-value ≤0.05).
Conclusion: This is the first study to evaluate the extent of polpharmacy in older adults with SLE. The prevalence of polypharmacy in this SLE cohort is higher than the reported rates for the general population in Manitoba. The use of benzodiazepines/Z-drugs and opioids was also highly prevalent and more likely in those with polypharmacy. While the extent of comorbidities as per CCI was associated with polypharmacy, age and SLE-specific parameters were not.

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Recurrence of Progressive Skin Involvement Following Discontinuation or Dose Reduction of Mycophenolate Mofetil Treatment in Patients with Diffuse Systemic Sclerosis

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Objectives: Rapidly progressive diffuse cutaneous Systemic Sclerosis (rp-dcSSc) is associated with severe internal organ involvement and high mortality. Mycophenolate Mofetil (MMF) treatment halts the progression of cutaneous and pulmonary involvement in rp-dcSSc. However, the optimal duration of MMF therapy has not been established. Here, we describe the clinical evolution of rp-dcSSc patients successfully treated with MMF following MMF therapy discontinuation.
Methods: Twenty-five previously untreated patients with recent onset (< 24 months) rp-dcSSc received MMF as the only SSc disease-modifying therapy in a prospective open trial. Following MMF discontinuation or dose reduction to or below 1000 mg/day, the Modified Rodnan Skin Score (mRSS) and Pulmonary Function Tests (PFT's) were serially evaluated for additional 5 years. MMF therapy was re-instituted if the mRSS increased by greater than 20% or if restrictive lung disease developed.
Results: From nineteen patients followed up after MMF discontinuation or dose reduction, five patients (26.3%) developed rapid recurrence of skin involvement. Two of these patients presented worsening respiratory symptoms and reduction of lung volumes in PFT's. In relapsing patients, mRSS increased 35.9% from 7.8 to 10.6 points requiring MMF re-institution. Presence of digital ulcers were more frequently observed in the relapsing group (80% vs 21.05%) with a statistically significant p value of 0.038. Following resumption of MMF, mRSS returned to baseline or stabilized and PFT's also improved or stabilized. All these patients were maintained on long term MMF immunosuppression.
Conclusion: Recurrence of severe skin involvement occurred in 26.3% of patients with rp-dcSSc following discontinuation or dose reduction of MMF requiring resumption of MMF therapy. These findings confirm the therapeutic benefit of MMF in rp-dcSSc and suggest that MMF treatment should be maintained for longer than 2 years in these patients. The potent MMF therapeutic benefit for rp-dcSSc patients should be considered in SSc clinical trials that include SSc patients previously treated with MMF.

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Severe Ischemic Events in Takayasu Arteritis: A Canadian Retrospective Cohort

Richard Yu (Schulich School of Medicine and Dentistry , London); Roaa Al-Solimani (University of Jeddah, Jeddah); Nader Khalidi (McMaster University, St Joseph's Healthcare Hamilton, Hamilton); Christian Pagnoux (University of Toronto, Toronto); Lillian Barra (The University of Western Ontario, London)
Objectives: Takayasu arteritis (TAK) is a rare form of granulomatous vasculitis and has a high risk of developing severe ischemic events (SIE) leading to high morbidity and increased mortality relative to the general population. In this study, we investigated a Canadian cohort of TAK patients and compared patients with and without SIE.
Methods: All TAK patients with a baseline and at least one follow-up visit seen between 1988 and 2015 were included from 3 academic centres in Ontario (Toronto, Hamilton and London). Diagnosis was based on American College of Rheumatology (ACR) criteria, expert opinion and vascular imaging. Disease activity was measured with the Indian Takayasu Activity Score 2010 (ITAS). SIE were defined as stroke, transient ischemic attack, myocardial infarction, ischemic cardiomyopathy, ischemic blindness, ischemic limb requiring intervention and ischemic bowel. The following variables were collected and compared for patients with and without SIE using descriptive statistics (T-test or Fisher’s exact test): demographics, co-morbidities, clinical

manifestations, investigations, disease activity scores and medications.
Results: Of the 52 TAK patients included in the study, 51 (98%) were female and 22 (42%) were Caucasian. The mean followed-up time was 6 years. 15/52 (29%) of patients had a SIE, of which, 33% had a cerebrovascular SIE, 40% had a cardiovascular SIE and 27% had end-stage limb ischemia. Most of SIE (87%) occurred at or before diagnosis. SIE patients were significantly more likely to have lesions of the carotid arteries (p=0.03), subclavian arteries (p=0.04) and coronary arteries (p=0.0002). Over the course of follow-up, there were no differences in traditional cardiovascular risk factors, disease activity by ITAS or corticosteroid dosage between patients with SIE and those without. At baseline, SIE patients were more likely to be on immunosuppressant drugs in addition to corticosteroids (p=0.03) and anti-platelet therapy with either aspirin (p=0.003) or Plavix (p=0.008). Immunosuppression use was not significantly different between groups at follow-up.
Conclusion: TAK patients with SIE were more likely to present with arterial lesions in the carotid, subclavian and coronary arteries and were more likely to be on immunosuppressant and antiplatelet therapy at baseline. Further research, with larger cohorts, is needed to identify risk factors for SIE.

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Does the Bath Ankylosing Spondyloarthritis Metrology Index Accurately Discriminate Axial Spondyloarthritis from Other Rheumatic Diseases?

Donald Cheng (Western University, London); Trimadhu Sharma (Lawson Research Institute, London); Tristan Boyd (Western University, London); Sherry Rohekar (Western University, London)

Objectives: Limitation of spinal mobility is recognized as a critical physical finding used to diagnose and monitor progression in axial spondyloarthitis (axSpA). Spinal metrology, including the components of the Bath Ankylosing Spondylitis Metrology Index (BASMI), are frequently used in both clinical trials and routine rheumatology practice. However, it is unclear what comprises “abnormal” metrology; recent assessments of the general population have found that healthy individuals will often have “abnormal” metrology results. It is also not known if restriction in spinal mobility accurately differentiates patients with axSpA from other rheumatologic conditions. Our objective is to explore the accuracy of spinal measurements performed in the BASMI in differentiating axSpA from other rheumatologic conditions.
Methods: An observational cohort study comparing patients attending an outpatient rheumatology clinic with axSpA to those without. Patients completed a questionnaire assessing for the presence of inflammatory back pain and underwent physical examination to collect the spinal measurement components of the BASMI. Three other commonly reported measurements were also assessed. Statistical analysis compared both groups using ANOVA and adjusting for significant demographic differences between groups via general linear model.
Results: A total of 185 patients were recruited (34.1% axSpA, 54.6% female). Significantly more patients with axSpA met ASAS inflammatory back pain criteria (60% vs. 7%). Mean BASMI score in the axSpA group was not significantly different from the non-axSpA group (2.64 vs. 2.94, p=0.24). However, the axSpA group was significantly younger than the non-axSpA group (45 vs 59 years). There was no difference between groups for body mass index or the presence of secondary fibromyalgia. After adjusting for age, a significant reduction in BASMI was seen in the axSpA group (3.3 vs. 2.4, p=0.001). After adjusting for age, four components of the BASMI (lumbar side flexion, tragus-wall distance, modified Schober’s, cervical rotation) were significantly more restricted in axSpA. Maximal intermalleolar distance

was not different between groups. Interestingly, though there was a statistically significant difference in modified Schober's, the absolute differences between groups were quite small (0.6 cm) and of questionable clinical significance.
Conclusion: Spinal metrology accurately differentiates axSpA from non-axSpA in the general rheumatology clinic, after taking the younger age of the axSpA patients into account. Despite the time-consuming nature of obtaining spinal metrology, it warrants inclusion in the physical examination of axial spondyloarthritis.

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Work Status and Work Productivity in Patients with Early Inflammatory Arthritis

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Objectives: Patients with long standing inflammatory arthritis can experience significant functional impairment due to disabling joint pain and deformities. The resulting impact on societal roles including employment leads to significant economic burden both from absenteeism (time away from work) and presenteeism (reduced productivity at work). Aims: 1) To assess the change of work status over time and 2) To identify predictors of work status in early inflammatory arthritis (EIA) patients.
Methods: Manitoban EIA cohort patients (symptom duration under 12 months) had disease activity measures, treatment data collected at every visit. Education and work-related information (work status (employed, retired, homemaker, disabled, student), work productivity measured using the Work Productivity and Activity Index (WPAI) which informs on absenteeism and presenteeism, and occupation categorized by National Occupation Category (NOC) were assessed annually. Associations with baseline work status and last visit WPAI were assessed in multivariable models. Maintenance of work was visualized by Kaplan Meir curves. Cox proportional hazards models assessed the contribution of arthritis activity, functional impairment and occupational category to time to unemployment (controlling for age, gender). Median (25th, 75th percentiles), mean (SD) and odds ratios (95% confidence intervals) are reported.
Results: Baseline work status was available for 356 EIA patients (73% female, mean age 46 (SD); 74% high school completers; employed 58%, disabled 8%, homemaker 12%, retired 16%). After excluding retirees and individuals over 65 years, 190/301(63%) of subjects eligible for work were employed. Male gender (2.2 (1.1-4.3)) older age (1.03 (1.0-1.1)) and high school completion (2.9 (1.6, 5.6)) associated with baseline employment. At last visit for 157 working EIA, the proportion of work time with reduced productivity due to absenteeism was 0% (0,0)), and due to presenteeism was 20% (0,50), for an overall degree of work impairment of 20%(10,52). Function (mHAQ) was the main modifiable factor associated with reduced work productivity (B 39 (95% CI 24-53 $p<0.0001$). Fifty-one initially employed subjects (78% female, median age 56 (42, 63) years) stopped working after 54 (19,84) months. In time-varying cox regression models controlling for age, gender, DAS28CRP and level of NOC physical demand, worse physical function (OR 3.1 (1.5-6.2) for each increase in mHAQ score) had the greatest association with time to work cessation.
Conclusion: Presenteeism contributes significantly to reduced work productivity in EIA. Impaired functional status contributes the most to reduced work productivity and to work cessation. Occupational counselling and implementing strategies to maintain physical function in

individuals with EIA may improve work outcomes.

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Methotrexate for Giant Cell Arteritis

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Objectives: The mainstay treatment for giant cell arteritis (GCA), the most common type of primary systemic vasculitis worldwide, is glucocorticoids. The required high doses and lengthy therapy exposes patients to side effects including but not limited to neuropsychiatric and metabolic disturbances, hypertension, and osteoporosis. Methotrexate, a tetrahydrofolate dehydrogenase inhibitor, is used in low doses as a disease-modifying drug for rheumatoid arthritis and as a glucocorticoid-sparing agent in various rheumatologic conditions including a number of other systemic vasculitides. The purpose of this review is to clarify the role of methotrexate in treatment of patients with GCA.

Methods: We conducted a Cochrane review of randomized control trials (RCT) within the Cochrane Central Register of Controlled Studies, MEDLINE and EMBASE databases. Seven major outcomes assessed at 52 weeks or closest reported time point were: proportion of patients who experienced at least one relapse, cumulative dose of glucocorticoids, proportion of patients with cranial ischemic complications, health-related quality of life, short-term serious adverse events (AE), withdrawals due to AE, and glucocorticoid-related AE. Minor outcomes assessed included mortality, duration of prednisone treatment, and proportion of participants with more than one relapse.

Results: Three RCTs were included totaling 161 participants. There were no significant differences between the methotrexate and the placebo groups in any of the major outcomes: the proportion of patients who experienced at least one relapse (RR 0.85 [0.66-1.10]), moderate quality of evidence; the cumulative dose of glucocorticoids (MD: -0.29 [-0.81 to 0.23]), withdrawals due to AE (RR 2.88 [0.89-9.36]), and glucocorticoid-related AE (for osteoporosis and fracture Peto OR 1.08[0.35-3.33]; for cataracts Peto OR 1.81[0.18-18.08]; for hyperglycaemia and diabetes RR 0.58[0.24-1.37]), low quality of evidence; short-term serious AE (RR 0.92 [0.37-2.29]) and cranial ischemic complications (Peto OR 0.91[0.22-3.77]), very low quality of evidence. Similarly, there were no significant differences between methotrexate and placebo groups in minor outcomes: mortality (Peto OR 1.8 [0.18-17.59]), proportion of participants with more than one relapse (RR 0.69 [0.41-1.16]), low quality of evidence; and duration of prednisone treatment (MD: -0.20[-1.74 to 1.34]), very low quality of evidence. Health-related quality of life was not measured within included studies.

Conclusion: In contrast to results of an earlier individual case meta-analysis, this Cochrane systematic review failed to show a benefit to using methotrexate in individuals with GCA. Best Abstract by a Medical Student Award.

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Hypogammaglobulinemia and Rheumatic Diseases

Leonardo Calderon (University of Ottawa, Ottawa); Catherine Ivory (University of Ottawa, Department of Medicine, Division of Rheumatology, Ottawa); Ronald Booth (The Ottawa Hospital, Ottawa)

Objectives: Combined variable immunodeficiency (CVID), the most common primary immune

deficiency disease. Patients with CVID can, in 20-25% of cases, be diagnosed with a concurrent autoimmune disease. Furthermore, there are patients with autoimmune diseases who may have undiagnosed CVID and that are predisposed to an increased risk of infections with routine antirheumatic treatment. The association between autoimmune diseases and CVID suggests screening should be done in these patients. The purpose of our research project is to explore the Ottawa hospital's (TOH) electronic health records of patients with hypogammaglobulinemia and document screening patterns for rheumatic disease occurring within this patient populations. Ultimately, we aimed to explore the screening practices and rheumatologic diagnoses in CVID patients.

Methods: We collected and analyzed 671 patient charts from the Ottawa hospital (TOH) laboratory information system to identify individuals with hypogammaglobulinemia between January 2015 and January 2018. Our inclusion criteria entailed: 1) Patients older than 18 2) Testing for hypogammaglobulinemia performed at TOH 3) Treating physician present at TOH with available documentation 4) IgG levels of 3.0 g/L or lower 5) Evidence of impaired B cell function if available. Patients with hematologic cancers or B cell depleting therapies were excluded. We extracted data pertaining to indication for antibody testing, ordering physician specialty, antibodies tested, clinical manifestation of patient, and final diagnosis.

Results: 31 patients with hypogammaglobulinemia were included in our chart review. Recurrent infections were the most common clinical presentation (45%). The specialty most involved was infectious disease (29%). The most common panel of tests ordered together was RF, ANA, and ANCA (19%). The most common indication for antibody testing was excluding the presence of a primary inflammatory process (52%). Furthermore, in only 10% cases was the indication for antibody testing to rule out the presence of a concurrent autoimmune disease in a patient with CVID.

Conclusion: There is a lack of uniformity regarding the screening for autoimmune diseases in patients with hypogammaglobulinemia. Further study is required to determine the best practice in assessing for rheumatic disease and inversely to screen for immunodeficiency in rheumatic patients.

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Anti-NT5c1A Autoantibodies in Systemic Lupus Erythematosus

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Objectives: Autoantibodies to the 44 kDa cytosolic 5'-nucleotidase 1A (NT5c1A/Mup44) are a biomarker for differentiating sporadic inclusion body myositis (sIBM) from other autoimmune myopathies. These antibodies have also been detected in 10-20% of SLE patients but the clinical significance has not been reported. The goals of this study were to determine the frequency of anti-NT5c1A autoantibodies in a SLE cohort and then identify demographic, clinical, and serologic correlations.

Methods: Patients fulfilling the American College of Rheumatology (ACR) or Systemic Lupus International Collaborating Clinics (SLICC) Classification Criteria for SLE were enrolled in a local cohort. Demographic, clinical information (disease activity – SLEDAI-2K; damage – SLICC/ACR Damage Index (SDI)), and sera were collected at time of enrollment. Antibodies to anti-NT5c1A were determined by an addressable laser bead immunoassay using a full-length

human recombinant protein (Origene, Rockville, MD: Cat. #TP324617). The cutoff, established at 400 median fluorescence units (MFU), was two standard deviations above the mean of apparently healthy control sera. Univariable and multivariable analysis were performed to determine associations between the prevalence of high positive anti-NT5c1A and demographic (age, sex, race/ethnicity), clinical features (SLICC/ACR classification criteria, SLEDAI-2K and SDI total scores and subscales including myositis from SLEDAI-2K), medications, and other autoantibodies (anti-dsDNA, extractable nuclear antigens, and anti-phospholipid antibodies).
Results: 138 SLE patients were included; 89.1% were female with a mean age of 46.1 years (SD 18.1) and disease duration of 13.7 years (SD 11.6). The prevalence of positive anti-NT5c1A was 15.2% (21/138). Univariable analysis demonstrated that patients who had a positive anti-dsDNA (Odds Ratio (OR) 6.59 [95%CI: 2.21, 19.65]) or anti-nucleosome (OR 8.96 [95%CI: 2.43, 32.99]) were more likely to be positive for anti-NT5c1A. Patients with longer disease duration (OR 0.93 [95%:CI 0.88, 0.98]), proteinuria (24-hour urine protein greater than 500mg on the SLICC criteria) (OR 0.20 [95%CI: 0.04, 0.88]), acute cutaneous SLE (OR 0.38 [95%CI: 0.15, 0.97] on the SLICC criteria), in particular malar rash (OR 0.25 [95%CI: 0.07, 0.89]) or photosensitivity (OR 0.27 [95%CI: 0.08, 0.84]) were less likely to be anti-NT5c1A positive. Multivariable analysis demonstrated that patients with proteinuria (OR 0.16 [95%CI: 0.03, 0.87]) were less likely to be anti-NT5c1A positive.
Conclusion: Anti-NT5c1A antibodies, a novel biomarker for sIBM, were found in 15.2% of SLE patients in keeping with previous reports. The patients were less likely to have a history of proteinuria and there was no association with myositis (on SLEDAI-2K). Further studies are needed to confirm these findings in larger SLE cohorts. Best Abstract on Research by a Rheumatology Resident Award.

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Threatening Thrombocytopenias in Lupus Pregnancies

May Choi (University of Calgary, Calgary); Erin Butler (University of Calgary, Calgary); Ann Clarke (University of Calgary, Calgary); Leslie Skeith (University of Calgary, Calgary); Jeffrey Ma (University of Calgary, Calgary)

Systemic lupus erythematosus (SLE)-related thrombocytopenia during pregnancy and the postpartum period have been associated with adverse pregnancy outcomes and perinatal complications. In this case report, we present two SLE patients with thrombocytopenia emergencies secondary to HELLP (hemolysis, elevated liver enzymes, and low platelet) syndrome and thrombotic thrombocytopenic purpura (TTP). The first case involved a 26-year-old woman, G1P0 at 26 weeks gestation (GA), with high-risk anti-phospholipid antibodies (positive lupus anticoagulant, high-titre anti-beta 2 glycoprotein antibodies, high-titre anti-cardiolipin antibodies, and non-criteria antiphospholipid antibodies to phosphatidylserine/prothrombin complex and anti-domain 1 beta-2 glycoprotein). The patient was started on aspirin 81 mg daily at 15 weeks GA, hydroxychloroquine, and prophylactic-dose low-molecular-weight heparin at 27 weeks GA. The patient developed pre-eclampsia at 32 weeks GA and due to evidence of intrauterine growth restriction from placental insufficiency, the patient delivered by cesarean delivery. There was evidence of placental infarction on placental pathology. Two days later, she developed post-partum HELLP syndrome with platelets of 51x10^9/L, which resolved spontaneously over time. This case highlights the risks associated with antiphospholipid antibodies in pregnancy, considers management issues relating to anti-coagulation during pregnancy and highlights the importance of maintaining high index of suspicion for diagnosis of HELLP in SLE patients. The second case was a 36-year-old female,

G3P2 at 32 weeks GA, with class III lupus nephritis (LN) who developed severe pre-eclampsia which included mild thrombocytopenia (114x10^9/L, baseline was 200x10^9/L). She was initially treated as a flare of LN with prednisone because of a rise in creatinine, presence of dysmorphic red blood cells in the urine, and proteinuria (3.1 g/day). An emergent caesarean delivery was performed after an abnormal non-fetal stress test. Post-partum, her hypertension, kidney function, and thrombocytopenia (50x10^9/L) worsened. There were schistocytes on peripheral blood smear and her ADAMTS-13 activity was low at 0.46% (cut-off > 10%) with elevated ADAMTS-13 antibodies/inhibitor (36.51 units/mL, cut-off >15 units/mL), hence, confirming the diagnosis of TTP. She quickly improved after seven days of plasma exchange and 1 gram (375 mg per m^2) of Rituximab over 2 doses. This case illustrates the challenges in identifying and differentiating between three pregnancy emergencies that can be seen in SLE patients (pre-eclampsia, LN, and TTP) and presents the management of TTP in peripartum SLE. These two cases are examples of life-threatening thrombocytopenia-associated emergencies in SLE pregnancies that remind us of the importance of timely diagnosis and management of thrombocytopenia in this population.

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Anti-Neutrophil Cytoplasmic Antibodies in Lupus Nephritis

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Objectives: Anti-myeloperoxidase (MPO) antibodies have been shown to predict the development of proliferative lupus nephritis (LN) suggesting anti-neutrophil cytoplasmic antibodies (ANCA) may have a pathogenic and prognostic role in LN. This study compared the type of LN, renal function, and systemic lupus erythematosus (SLE)-related and antiphospholipid autoantibodies between LN patients who were ANCA (anti-proteinase 3 (PR3) and anti-MPO antibodies) positive and negative.

Methods: Patients fulfilling the American College of Rheumatology or Systemic Lupus International Collaborating Clinics Classification Criteria for SLE were enrolled in a local cohort. We retrospectively identified patients with Class 2, 3, 4, or 5 LN on renal biopsy who also had an ANCA, plasma creatinine, and urine protein creatinine ratio (UPCR) at time of biopsy. ANCA by IIF was performed on ethanol and formalin-fixed polymorphonuclear leukocytes and a HEp-2 cell biochip (EuroPattern, Euroimmun GmbH, Luebeck, Germany) while antibodies to MPO and PR3 were determined by multiplex immunoassay (Bio-Rad, Hercules, CA: BioPlex 2200, cutoff >=2 KEU/L). Using sera collected at enrollment, SLE-related autoantibodies (dsDNA, Sm, U1RNP, Sm, Ro52/TRIM21, Ro60/SSA, SS-B/LA, Scl-70, Jo-1, RiboP, PCNA, PM/Scl) were performed by laser bead immunoassay (Euroimmune), lupus anticoagulant by tissue thromboplastin inhibition test and dilute Russell viper venom time, and anti-cardiolipin IgG and anti-β2 glycoprotein-1 IgG by ELISA. Comparisons were performed with Fisher's exact or Mann-Whitney U tests.

Results: 23 SLE patients with LN were included; 82.6% were female. Most patients (20/23, 87.0%) were ANCA positive by IIF while only 5/23 (21.7%) had antibodies to MPO (3/23, 13.0%) or both MPO and PR3 (2/23, 8.7%). Anti-MPO/PR3 positive patients had p-ANCA (2/5, 40%) or an atypical pattern (3/5, 60%) on ANCA IIF. When comparing anti-MPO/PR3 positive (5) to negative (18) patients, there was no difference in LN class, creatinine, UPCR, or the presence of SLE-related autoantibodies. Anti-cardiolipin IgG antibodies were more common in

anti-MPO/PR3 positive patients (60.0% vs 5.6%, p=0.021), while a nuclear pattern on ANCA IIF was more common in anti-MPO/PR3 negative patients (55.6% vs. 0%, p=0.046). Of note, three of the five LN patients with cerebrovascular accidents or venous thrombosis were anti-MPO/PR3 positive.
Conclusion: Positive ANCA by IIF was common in LN patients, however, only a fifth of LN patients had anti-MPO/PR3 antibodies which were associated with anti-cardiolipin IgG antibodies. Anti-MPO/PR3 negative patients were more likely to have a positive ANCA IIF with nuclear staining. We are currently comparing ANCA positivity between SLE patients with and without LN.

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The Frequency of Repeat ANA Testing in Ontario: A Population-based Study

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Objectives: Duplicate antinuclear antibody (ANA) testing can be unnecessary, potentially harmful, and costly. Our aim was to assess the frequency of repeat ANA testing in Ontario, and evaluate factors associated with repeat testing.
Methods: We identified all ANA tests performed over 2008-2016 among adults within the Ontario Laboratories Information System (OLIS), a nearly population-wide laboratory database. Patients were linked with health administrative data (for hospital and physician services). We identified all ANA tests performed, as well as repeat testing for individual patients within 12 months of a previous test. To assess patient and provider-level factors associated with the odds of repeat testing within 12 months of a previous test, as well as any repeat test in which the previous test was positive, we fit two separate marginal logistic regression models by means of generalized estimating equations, both models accounting for physician and patient demographic and clinical characteristics.
Results: In total, 587,297 ANA tests were performed between 2008 and 2016, and 22% of all tests were positive and 25% were repeats. Among 149,310 repeat tests, 19% were re-ordered within 3 months, and 54% within 12 months. Among 81,066 tests repeated within 12 months, 41% had a preceding positive result. In total, 437,987 patients received ANA testing (67% were female and of a mean (±SD) age of (52 ± 16) years). Among these individuals, 346,296 patients (79%) had only one test, and 91,691 patients (21%) had multiple tests. Comparing individuals with multiple to single testing, we observed a higher percentage of females (75% vs 64%), and diagnosis codes for connective tissue diseases (24% vs 13%) among patients with multiple ANA testing. In total, family physicians ordered the most tests (N=358,378; 60%) and rheumatologists ordered 65,058 tests (11%). Comparing rheumatologists to other specialties, rheumatologists performed more repeat tests within 12 months (36% vs 11%). After adjusting for patient and physician characteristics, the odds ratio (OR) of repeat testing within 12 months for a patient treated by rheumatologists was 1.67 (95% CI 1.29, 2.17) and 1.27 (1.03,1.56) for family physicians (relative to internal medicine). Adjusted ORs for repeat testing on patients with prior positive test results was 2.51 (95% CI 1.87, 3.39) for rheumatologists, and 1.31 (95%CI 1.02, 1.69) for family physicians.
Conclusion: We observed a high frequency of repeat ANA testing in Ontario overall, many of which were performed on patients with prior positive tests. Rheumatologists were most likely to perform repeat testing.

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Improving Influenza Vaccination Rates in Patients seen in Rheumatology Outpatient Clinics

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Objectives: The risk of influenza virus and its complications are high among patients with autoimmune rheumatic diseases (AIRD). Our aim was to increase the number of patients with AIRD that obtain the flu shot to 80% in the outpatient rheumatology clinics at Sunnybrook (SB) and Women's College Hospital (WCH) by May 2016.

Methods: A quality improvement approach using gap analysis, root cause analysis and plan-do-study-act (PDSA) cycles was used to implement interventions and access for change. An audit at two Toronto rheumatology clinics found that only 40% of patients were receiving the influenza vaccine. An ishikawa diagram and survey of patients was completed to identify the most common reasons for patients not obtaining the flu vaccine which included: physician forgetfulness, lack of time and knowledge, and patient factors included lack of time and knowledge.

Results: Our first PDSA cycle targeted physician forgetfulness, and both physician and patient lack of awareness and time. The intervention was development and dissemination of a flu pamphlet, with directions to the hospital pharmacy where the vaccine was available. Forty-two pamphlets were distributed from January to April 2015. We were only able to increase the number of patients who got the flu vaccine to 50%. The second PDSA cycle involved disseminating a revised flu pamphlet that was enlarged, and flu stickers were developed to put on prescriptions. To streamline physician workflow, it was decided that the patient pamphlet and flu stickers would be disseminated to all patients attending the rheumatology clinics, not only to those with AIRD. From January to April 2016, a total of 175 stickers and 95 pamphlets were handed out at WCH and 51 stickers and 83 pamphlets were handed out at SB. Survey data revealed that 21 of 33 (63%) WCH patients received the flu vaccine and 53 of 81 (65%) SB patients received the flu vaccine. The likelihood of patients receiving the vaccine correlated to whether they were informed to get the vaccination.

Conclusion: We had a relative improvement of 60% of AIRD patients receiving the flu vaccine. Educating patients on the importance of the flu vaccination improved patient care. The main obstacle was to have staff involvement in handing out pamphlets and stickers during busy clinics.

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A Quality Improvement Project Assessing the Impact of a Pharmacist Led, Pre-initiation Patient Consultation for Advanced Therapy in Inflammatory Arthritis

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Objectives: Patients delay the initiation of biologic/targeted synthetic DMARDs (Advanced Therapies (AT)) for inflammatory arthritis for several reasons including: lack of knowledge about disease and treatment effectiveness and fear of adverse effects. The objectives of this quality improvement project were: * to improve patient confidence and understanding of their disease and treatment options * to assess the physician's global impression of a pharmacist led consultation, before AT treatment choice. * to evaluate the impact of a pharmacist led consultation, prior to selection of an AT, in reducing time to AT initiation.

Methods: 75 patients were referred for the pre-AT visit with the pharmacist which included: · Tour of an infusion clinic, demonstration of all devices, education on all treatments, vaccination

recommendations, smoking cessation counselling, complete medication review, and insurance assessment * A regulated pharmacy technician administered a pre-visit, immediate post-visit and 6 month post-visit questionnaire to assess: patient concerns, understanding and confidence of both their disease and advanced therapies * 75 additional, randomly selected, patients with inflammatory arthritis were used as a comparator group for time to AT from diagnosis
Results: Pre-Visit vs Post-visit Questionnaires * 33% increase in understanding of diagnosis * 187% increase in understanding of how advanced therapies work * 128% increase in the modified S.U.R.E score with the average score jumping from 1.66 to 3.88 Time to Treatment * The average # of days between date of diagnosis and advanced therapy start day was the same for both referred and non-referred patients Does Patient choice affect advanced therapy prescription? * 56% patients were prescribed their first choice of AT, 11% their second choice and 7% their third
Conclusion: This quality improvement project demonstrated that earlier intervention with a pharmacist prior to selection of an AT significantly improved both patient understanding and confidence of their disease and treatments. Evaluation of the time to AT, was affected by the fact that patients were not randomized into the referral group and therefore physician bias resulted in patients resistant to treatment being preferentially referred. Therefore, the time to treatment initiation being the same for both groups is a positive finding in that resistant patients moved forward to treatment at the same rate as non-resistant patients based on the pharmacist led visit. The physician's global impression of the program was that for the patients referred, time to treatment was reduced and patient willingness to initiate directed therapy was greatly improved after the pharmacist visit.

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Creation of an Immunology Series Video Library in Facilitating Basic Immunology Knowledge Acquisition and Retention Amongst Adult Rheumatology Trainees

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Objectives: A foundational knowledge in immunology is key to understanding complex rheumatologic disease processes. Indeed, an immunology curriculum delivered by Rheumatology training programs across Canada is required to meet the core competencies outlined by the regulatory college. With initial work completed by Mahendira et. al (2015), a need for improving current immunology curricula was identified and high yield immunology teaching topics to be included in a national curriculum were established. In order to meet these needs, video illustration was chosen as a method of communicating complex immunological content to a geographically dispersed audience. Three short video clips were developed to highlight important immunology topics. The effectiveness of these videos in facilitating comprehension and knowledge acquisition amongst rheumatology trainees was assessed.
Methods: Immunology topics including "T cells", "Cytokines", and "Cytokine Receptors" were previously identified as essential to an immunology curriculum for Rheumatology trainees. Video content related to these topics was generated with the assistance of immunology, rheumatology, and medical education experts as well as a Biomedical Illustrator. The videos were piloted on adult rheumatology trainees, with pre- and post- video quizzes based on video content administered. To evaluate duration of knowledge retention, post-video quizzes were

administered immediately after and six weeks following each video clip. The statistical significance of improvements in quiz performance was evaluated using paired t-testing. Qualitative feedback was also gathered to assess video content and design.
Results: Eight adult rheumatology trainees participated in video testing. The average pre-test score for "T cells", "Cytokines" and "Cytokine Receptors" was 58.3% (+/- 36.5), 61.1% (+/- 19.7), and 38.9% (+/- 16.8), respectively. Immediate post-test scores were significantly improved ($p<0.05$) for "T cells" and "Cytokines" with averages of 90.3% (+/- 20.1) and 91.7% (+/- 15.4), respectively. Immediate post-test scores for "Cytokine Receptors" were not significantly improved however scores did improve to meet departmental pass standards (>60%), with average post-test scores being 62.5% (+/- 16.7). Six-week post-test scores continued to be above departmental pass standards for "T cells" and "Cytokines", with scores of 76.4% (+/- 16.2), 81.9% (+/- 10.2), respectively. Overall, video modules for "T cells" and "Cytokines" were well received with comments suggesting content was "helpful" and a "great teaching resource."
Conclusion: Immunology video content is an effective tool for improving short-term comprehension and knowledge retention amongst rheumatology trainees. We hope to continue to develop these educational deliverables, building an Immunology Video Series library to facilitate immunology knowledge acquisition amongst Rheumatology trainees on a national level.

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Checking in with Immune Checkpoint Inhibitors: Results from a Needs Assessment Survey of Canadian Rheumatologists

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Objectives: Immune checkpoint inhibitors (ICI) have revolutionized the treatment of cancer. However, enhanced immune activation from ICI has been associated with immune-related adverse events (irAE), including autoimmune rheumatologic diseases. This emerging field represents a challenge given that experience with these conditions is limited and evidence-based recommendations do not yet exist. The Canadian Research Group of Rheumatology in Immuno-Oncology (CanRIO) is an emerging network of rheumatologists interested in rheumatic irAE (rh-irAE). CanRIO undertook a needs assessment survey to understand the need for education and recommendations for the management of rh-irAE in the rheumatology community.
Methods: A 25-item electronic survey was developed by the CanRIO investigators. The survey, which was available in both French and English, was distributed via electronic mail to 574 members of the Canadian Rheumatology Association (CRA). Responses were collected over a period of 14 days. Results were summarized using descriptive statistics.
Results: Of the 574 CRA members who were invited to participate, 83 responded (response rate of 14.5%). Half of the respondents were adult rheumatologists from academic centres and 25% from the community. Over 25% of the respondents were not familiar with ICI and irAE. Half of the respondents had not seen or managed patients with irAE, and among the remaining, the majority had seen less than 5 patients with irAE. Inflammatory arthritis was the most common rh-irAE encountered. Other rh-irAE included sicca, myositis, sarcoid and vasculitis. Prednisone and methotrexate were the most common treatment strategies. Almost half of the respondents (43.6%) had been asked for advice from oncologists regarding discontinuation of ICI for irAE, and of these, almost half (48.7%) reported that they were either 'slightly confident' or 'not

confident at all' in providing advice. Over half of the respondents had not yet been asked to provide advice concerning ICI for patients with pre-existing auto-immune diseases. The vast majority (87.2%) agreed that there was a need for clinical practice guidelines for the management of rh-irAE.
Conclusion: The survey highlighted the important knowledge gaps in the emerging field of rh-irAE. Given the increasing use of ICI in a growing number of cancer types and stages, referrals for rh-irAE are likely to increase. There is strong rationale to develop educational programs and clinical practice guidelines to support Canadian rheumatologists who will be increasingly responsible for managing rh-irAE.

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Methotrexate-Induced Epidermal Necrosis

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Case Report: Methotrexate is a medication used widely in medicine. Though low doses are typically used to treat rheumatic conditions, higher doses may unintentionally be used whether through patient- or prescriber-related error. We present a case of Methotrexate-Induced Epidermal Necrosis (MEN) - a rare, life-threatening cutaneous toxicity.
A 65-year-old woman with a past medical history of psoriasis, stage 3B chronic kidney disease, type 2 diabetes, and COPD presented with a two-week history of a progressively worsening generalized, desquamating rash in the context of a recent methotrexate start to treat her psoriatic disease. She had been prescribed methotrexate 12.5 mg orally once weekly as well as folate supplementation. She was admitted to ICU secondary to worsening renal function and hemodynamic instability related to her extensive cutaneous lesions. Initially, the patient was felt to have Toxic Epidermal Necrolysis (TEN) due to the severity of her condition. Dermatology was consulted and a skin biopsy was performed. The pathology was consistent with a diagnosis of MEN. It was later determined the patient was taking her dose of methotrexate inappropriately - daily instead of weekly. A methotrexate level was performed and treatment with leucovorin was initiated. She continued to deteriorate despite treatment, developing polymicrobial sepsis and cardiac instability. She was transitioned to comfort care after a discussion with her family and passed away.
A case series by Chen et al. in 2017 reviewed 24 patients with MEN. They found that risk factors for MEN included age greater than 60, poor renal function (eGFR <60 mL/min), high doses of methotrexate (>10 mg/week initial dose), and lack of folic acid supplementation. Our patient fulfilled three out of four high-risk characteristics that increase the likelihood of MEN. In addition, methotrexate medication error has been associated with fatal outcomes and occurs during all steps of the prescription process, most often involving misinterpretation of weekly dosing schedule.
Methotrexate is extensively used in the treatment of rheumatic conditions and is considered to be a relatively benign therapy. However, MEN is a rare cutaneous toxicity that should be discussed with patients as it is life-threatening. Risk factors include age over 60, eGFR <60 mL/min, high doses of methotrexate, and lack of folate supplementation. This case illustrates the importance of considering patient demographics and medication error in order to prevent serious adverse outcomes of methotrexate therapy.

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Participant-Reported Effect of an Indigenous Health Continuous Professional Development Education Initiative

Cheryl Barnabe (University of Calgary, Calgary); Raheem Kherani (University of British Columbia, Richmond); Tom Appleton (Western University, London); Rita Henderson (University of Calgary, Calgary); Lynden Crowshoe (University of Calgary, Calgary)
Objectives: Arthritis conditions are highly prevalent in Indigenous populations in Canada and patients experience severe outcomes. Patients avoid specialty care health systems due to experiences of racism, stereotyping and culturally unsafe environments. The 'Educating for Equity' program was designed as a continuing medical education (CME) intervention to incorporate skill-based teaching to re-center relationships and engage patient social realities, and was adapted as an educational intervention for rheumatologists.
Methods: Following introductory exposure to Indigenous health competency training, a half-day interactive workshop was delivered to 9 rheumatologists who were recruited through the Canadian Rheumatology Association membership. This half-day workshop provided content knowledge and skill practice through role playing case studies with instantaneous feedback on performance. Participants completed a pre-workshop survey which was repeated 3 months following the workshop to identify the strategies they used to address social issues and enhance therapeutic relationships, as well as a 15 question Likert-scaled Social Cultural Confidence in Care Survey (SCCCS). They were asked about the perceived impact of the intervention on their practice.
Results: Prior to the workshop, strategies to address social issues were primarily to involve allied health staff or local primary care providers, with few offering they would ask patients about social situations themselves. Strategies they used to enhance the therapeutic relationship were being open, available, and flexible, encouraging family participation in decision making, and sharing expectations for treatment effects while working to reach common ground and earn trust. Following the workshop, they were more likely to focus on relationship building with patients and their families, had enhanced awareness and confidence to explore the context of patient social reality in decision making, were serving as advocates for access to treatment, enquired about residential school experiences and patient cultural practices, and had changed their practices to be more patient-centered, with attention paid to space and time in the care environment. They valued the developing community of practice and were motivated to learn more about Indigenous health. There was no statistical improvement in the SCCCS ratings, but trends to improvement in rankings were noted in this small group. Interactive group discussion and role playing were reported as the most effective part of the intervention.
Conclusion: This CME intervention had beneficial impact on self-reported confidence and enhanced practice strategies to engage with Indigenous patients. The next phase will incorporate reinforcement of principles and skills while providing training in facilitation to expand the community of practice. Best Abstract on Quality Care Initiatives in Rheumatology Award.
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Incorporating Indigenous Healing Practices in Patient Care Plans: Views of Canadian Rheumatologists

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Objectives: The Truth and Reconciliation Commission of Canada's Calls to Action #22 (2015) asks that the Canadian health-care system recognize the value of Indigenous healing practices and use them, when requested, in the treatment of Indigenous patients. To inform strategies to respond to this Call to Action, we surveyed Canadian rheumatologists to elicit perspectives on

the integration of Indigenous healing practices into patient care plans.
Methods: An online survey was distributed to members of the Canadian Rheumatology Association (CRA) to determine: 1) awareness or experience with Indigenous healing practices; 2) discussions on the use of Indigenous healing practices with patients; and 3) willingness to accept and include Indigenous healing practices as part of patient care plans. The survey used a combination of multiple choice, Likert scale responses, and free-text fields for additional information. Descriptive statistics were used to summarize responses.
Results: The response rate was 15% (n=78/514), with representation from all regions across Canada and from both adult (82%) and pediatric (17%) specialties. The majority of respondents (73%) indicated they were unaware of what Indigenous healing practices were, although half (49%) were aware of patients in their practice using such strategies and most were comfortable (48%) or neutral (39%) with inquiring about the use of Indigenous healing practices. The majority of respondents (93%) were open to integrating Indigenous healing practices into rheumatology care plans and considered holistic health maintenance (88%) and symptom management (55%) to be the most important benefits. Concerns around the use of herbal and spiritual/ceremonial healing practices for disease activity management were raised, related to insufficient information on the efficacy and safety of Indigenous healing practices (100%), and potential health risks associated with integrating Indigenous healing practices into care plans (58%). Various approaches to integrating Indigenous healing practices were supported, including having the patient liaise directly between the rheumatologist and Elder/healer (43%), having an Elder or healer as a consultant to the rheumatologist (23%) or as a team member (25%). One-fifth supported that Indigenous healing practices should be fully recognized, regulated and funded by provincial health care systems, whereas 51% thought these should only be partially integrated into public health care programs.
Conclusion: Canadian rheumatologists are open to the idea of integrating Indigenous healing practices into their patients' care plans and were interested in learning more about Indigenous healing practices. The major concern was around western-based evidence for the efficacy and safety of these practices.

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Joint Repair While Initiating Biologic Therapy in Rheumatoid Arthritis

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Objectives: Functional decline and reduced quality of life for patients with rheumatoid arthritis (RA) results from chronic changes to joints in patients, including bone erosions and joint space narrowing. Advanced biologic therapies can prevent joint damage progression, and it has been suggested that they can repair bone damage. High resolution peripheral quantitative computed tomography (HR-pQCT) provides measurement of joint space and bone microstructure with high sensitivity and precision. The purpose of this study was to investigate whether HR-pQCT can detect joint damage repair in patients initiating biologic therapies, and whether changes in joint damage are associated with changes in clinical outcomes.
Methods: We recruited 88 participants who met the ACR/EULAR 2010 Classification Criteria for RA and were starting on a new biologic agent due to moderate or high disease activity. The 2ndand 3rdMCP joints of the dominant hand were scanned with a HR-pQCT scanner (XtremeCTII, Scanco Medical, 61mm) at 3 and 12 months after initiating the new agent. Participants also underwent a rheumatologist examination for disease activity and self-reported

measures of physical (Health Assessment Questionnaire) and hand (DASH Questionnaire) function were collected at these visits, along with the Jebsen hand function test. Joint space volume (JSV) was measured in 3D using an algorithm developed by the SPECTRA collaboration. Bone erosion quantification will be completed using a 3D segmentation technique using MIAF-Finger. Individual changes in JSV were classified as increased or decreased if the absolute changes were greater than detection limits based on least significant change.
Results: The cohort was 72.7% female with an average disease activity score (DAS28) of 2.58 at baseline and 2.60 at follow-up. The average DASH score was decreased to 27.6 from 29.3, while the average HAQ score increased to 0.89 from 0.86. There were no statistically significant changes in clinical results. When compared to detection limits, 73 of the 84 analyzable joints showed no change in joint space volume, 5 showed an increase and 6 showed a decrease. We found no significant relationships between joint space outcome and disease activity, physical function, or hand function.
Conclusion: In most patients there were no significant changes in joint space as they initiate or change biologic therapies. This may be due to a large detection limit making it difficult to detect changes over 9 months. Future erosion analysis will provide further insight on the potential benefits of biologic therapy with regards to the reversibility of bone damage as seen on HR-pQCT.

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Environmental Exposures Associated with the Requirement for Biologic Therapy in Rheumatoid Arthritis

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Objectives: Environmental exposures, such as smoking, have been shown to modulate the risk of developing rheumatoid arthritis (RA). Environmental exposures may also impact disease trajectory. Our objective was to assess for environmental exposures associated with progression to biologic therapy use in RA.
Methods: RA patients were recruited from a single academic rheumatology centre to a cross-sectional study. Inclusion criteria for Cohort 1 was < 3 years of disease duration, and for Cohort 2 was primary or secondary inefficacy with at least 2 biologic agents from different classes. Disease characteristics, disease activity measures at the time of survey and disease modifying anti-rheumatic drug (DMARD) medication exposures were extracted from the medical record. Patients completed a suite of environmental questionnaires from the PhenX toolkit, with exposures of interest including: birth (gestational age and birthweight, delivery method, breastfeeding exposure, birth order) and early childhood (daycare, sibling exposure) characteristics; socioeconomic status; other medication exposures (vitamin supplements, hormonal therapy, and antibiotics); history of varicella, zoster and measles infections; ultraviolet light exposure; alcohol intake and detailed passive/active smoking history. Logistic regression was applied to determine the odds of the environmental exposure of interest, for the outcome of biologic requirement, in Cohort 1 only. In sensitivity analysis, all patients from cohort 2 were included. Age and sex were included in all models, and covariates from univariate analyses with p-value < 0.40 were included initially, with subsequent removal of insignificant covariates, and model fit reassessed, until a final model was determined.
Results: There were 151 patients in Cohort 1 and 30 patients in Cohort 2 with complete environmental and clinical data for analysis. In Cohort 1, the mean age was 55 years and 69% were female. The majority were seropositive (72%) and 32% had erosive disease. At intake 43%

were in DAS28 remission and an additional 8% were in low disease activity. During the first 3 years of disease, 29% of patients progressed to using a biologic. Environmental exposures significantly associated with biologic use was limited to the use of antibiotics for infection in the prior year (OR 3.0, 95%CI 1.1-8.2, p=0.03). This was consistent in the sensitivity analysis when patients in cohort 2 with multiple biologic exposures were included (OR 2.9; 95%CI 1.1-7.7, p=0.03).

Conclusion: We propose a potential environmental exposure associated with the need for biologic therapy in RA. Epigenetic analysis and characterization of infection exposure necessitating antibiotic use and the relationship to RA progression is required.

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The Challenges of Genetic Testing in Children with Suspected Periodic Fever Syndromes

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Objectives: Establishing a genetic diagnosis in children with periodic fever syndromes can be challenging. Availability of genetic testing is variable, different testing panels are used, and majority of patients have negative testing or a variant of unclear significance (VUS). We describe genetic testing results of a prospective cohort of children with suspected periodic fever syndromes seen in a provincial pediatric Auto-Inflammatory Diseases clinic in British Columbia (BC).

Methods: Auto-Inflammatory Diseases clinic was established in 2016 in Rheumatology, BC Children's Hospital (BCCH), Vancouver, BC. Until September 2018, 94 patients have been evaluated and enrolled in a longitudinal registry, collecting clinical and laboratory data. Gene screening for MEFV, MVK, and TNFRSP1A was available at BCCH Molecular Genetics Laboratory (MGL); more extensive gene testing was limited, out of-province and funding dependent, done at GeneDX, MNG labs and Hospital for Sick Children (HSC). Summary results of genetic testing performed in BCCH MGL is reported here.

Results: Genetic testing was performed in three quarter of patients (71/94). Mean age of tested patients was 8.2 years (IQR 4.9-11.9 years) and 67.6% were female. Out-of-province testing, including whole exome sequencing and gene panels, was performed in 10 patients, while three patients came to the clinic with out-of-country results of the single gene sequencing. Total of 66 patients were tested in BCCH MGL; MEFV was sequenced in 61, TNFSR1 in 48 and MVK in 45 patients. In those patients, sequencing of MEFV revealed one homozygous (p.Met694Val) and four heterozygous (p.Met694Val, p.Lys695Arg, p.Glu148Gln, p.Val726Ala) pathogenic or likely pathogenic variants in nine patients, two compound heterozygous VUS

(Pro369Ser/Arg408Gln and p.Glu148Gln/p.Leu110Pro) in four patients and two heterozygous VUS (p.Val469Ala and p.Glu248Gln) in two patients. The most common pathogenic variants in MEFV gene were p.Glu148Gln and p.Met694Val seen in three patients each. Sequencing of TNFSR1 revealed one heterozygous pathogenic variant (p.Cys72Tyr) in one patient, three heterozygous VUS (p.Arg121Gln, pThr276Ser and p.Leu359=) in five patients and one heterozygous likely benign variant (p.Pro75Leu) in one patient. Finally, sequencing of MVK revealed two compound heterozygous pathogenic variants (p.Trp188/p.val377Ile and p.Val377Ile/p.Arg215Ter) in one patient each and heterozygous VUS (p.Leu308=) in two patients.

Conclusion: Pathogenic variants causing three most common autoinflammatory diseases (FMF, MKD and TRAPS) were discovered in 18.2% of tested patients. Additionally, 19.7% of patients had VUS in associated genes. The majority of patients did not have an identified pathologic variant, although they had clinical symptoms of a periodic fever syndrome.

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National Surveillance of Arthritis in Canada: Results from the Canadian Chronic Disease Surveillance System

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Objectives: To showcase new national surveillance estimates and trends over time for osteoarthritis (OA), gout/crystal arthropathies (gout), rheumatoid arthritis (RA), and juvenile idiopathic (JIA) from the Canadian Chronic Disease Surveillance System (CCDSS).

Methods: The CCDSS is a collaborative network of provincial and territorial (PT) surveillance systems supported by the Public Health Agency of Canada (PHAC). It relies on linked health insurance registration files, physician billing claims, and hospital discharge abstracts to generate national estimates and trends over time for 20+ chronic diseases. Its coverage is near universal (97%). Case definitions (based on diagnostic codes) are applied to these linked databases by each PT and aggregate data are shared with PHAC. Using CCDSS data up to fiscal year 2015–2016 (2013–2014 for JIA), we estimated prevalence and incidence rates for OA (age 20+), gout (age 20+), RA (age 16+) and JIA (age 0-15) overall and by sex, age group and fiscal year. Annual average percent changes (AAPC) were estimated using log-linear regression models to detect changes over time.

Results: In 2015–2016, approximately 3.4 million (14%) were living with OA and 873 new cases per 100,000 were diagnosed; 557,900 (2%) had received care for gout with 183 new cases per 100,000 and; 321,800 (1%) were living with RA with 79 new cases per 100,000. In 2013–2014, 5,650 (0.1%) were living with JIA and 15 new cases per 100,000 were diagnosed. Females had higher OA, RA and JIA prevalence and incidence while gout estimates were higher in males. OA, gout and RA estimates increased significantly from younger to older age groups and sex differences tended to widen with age. From 2007–2008 to 2015–2016, age-standardized prevalence rates increased slightly for OA [AAPC (95% CI): 1.2% (0.3-2.0%)] and gout [2.0% (0.5-3.5%)] however in absolute terms, these increases were less than one percent. While over the same time period, age-standardized incidence rates decreased slightly for OA [1.6% (0.7-2.6%)] and RA [3.9% (0.7-7.0%)] but in absolute terms, these decreases were less 200 and 20 new cases per 100,000, respectively. We were unable to detect any other differences over time.

Conclusion: CCDSS data can be used to monitor the epidemiological burden of arthritis in Canada in order to support public health action. As a potential limitation, our estimates may

reflect changes in disease coding/classification systems and clinical/billing practices over time. Additional work is needed to fully explore the contribution of actual epidemiological variations versus potential data artifacts.

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Myositis in Systemic Lupus Erythematosus (SLE)

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Objectives: Our objective was to assess the prevalence of myositis in SLE, and to evaluate demographic and clinical characteristics potentially associated with this manifestation.

Methods: SLE patients at our center are invited to participate in a longitudinal outcomes study with yearly assessments. Patients contributing data from Jan 1st 2000 to June 30th 2018 were screened for myositis using the SLICC damage index (SDI) for muscle weakness or atrophy and the SLEDAI-2k for the variable myositis. These were confirmed through chart review, based on expert rheumatology and neurology assessments, EMGs, and histopathological findings when available. Multivariate survival analyses were performed to assess baseline demographic factors and time-dependent clinical variables (categorized dichotomously as ever/never and updated at each risk set).

Results: We screened 566 SLE patients and confirmed 11 (1.94%) myositis cases. In the myositis group, 2 patients had rashes consistent with dermatomyositis and 6 patients had evidence of ILD on chest imaging. In multivariate analyses, multiple factors were independently associated with myositis. SLE-myositis patients were more likely to be older (HR 1.03, 95% CI 1.00, 1.05) and male, and to have arthritis (HR 3.03, 95% CI 1.75, 5.25), nephritis (HR 1.87, 95% CI 1.17, 3.00), Raynaud's phenomenon (HR 2.29, 95% CI 1.44, 3.66) and anti-Smith antibodies (HR 14.8, 95% CI 6.59, 33.3) were positively associated with myositis.

Conclusion: Myositis occurs infrequently in SLE. In the context of SLE, this manifestation is often associated with male sex, arthritis, nephritis, Raynaud's, and anti-Smith antibodies, and may occur in the presence of ILD. Further work is in progress to assess additional features of myositis cases in SLE.

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Interstitial Lung Disease (ILD) in Systemic Lupus Erythematosus (SLE)

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Objectives: A significant portion of SLE patients will develop pleuropulmonary manifestations, but only a small portion have ILD. Our objective was to assess the prevalence of ILD in SLE, and to evaluate clinical characteristics.

Methods: SLE patients at our center are invited to participate in a longitudinal outcomes study with yearly assessments. Patients contributing data from Jan 1st 2000 to June 30th 2018 were screened for ILD using the SLICC Damage Index (SDI) pulmonary fibrosis item. These were

confirmed through chart review, based on expert pulmonology assessments, imaging, and histopathological findings when available. Multivariate survival analyses were performed to assess baseline demographic factors and time-dependent clinical variables (categorized dichotomously as ever/never and updated at each risk set).
Results: We screened 566 SLE patients and confirmed 12 (2.1%) ILD cases. In the ILD group, the most commonly reported radiographic abnormalities were bibasilar subpleural ground glass opacities and interstitial fibrotic changes consistent with fibrotic nonspecific interstitial pneumonia. One patient had changes clearly consistent with usual interstitial pneumonia and 2 patients had histologically diagnosed bronchiolitis obliterans organizing pneumonia. In multivariate analyses, multiple factors were independently associated with ILD. These included older age at SLE diagnosis (HR 0.98, 95% CI 0.96, 0.99), white race/ethnicity (HR 0.50, 95% CI 0.31, 0.80), past smoking (HR 0.13, 95% CI 0.07, 0.22), nephritis (HR 0.07, 95% CI 0.03, 0.15), and antibodies to dsDNA (HR 2.10, 95% CI 1.38, 3.21), Smith (HR 3.93, 95% CI 2.35, 6.56), and RNP (HR 2.62, 95% CI 1.51, 4.53). The majority of ILD cases in SLE (58%) had features of mixed connective tissue disease (MCTD) or another overlap syndrome.
Conclusion: ILD occurs infrequently in SLE. In the context of SLE, this manifestation is often associated with antibodies to dsDNA, Smith, and RNP, with many patients having features overlapping with other systemic autoimmune rheumatic diseases such as MCTD. Further work is in progress to assess additional serological and clinical features of the ILD cases in SLE.

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Specialist Link Advice Cost Effectively Enhances Rheumatology Patient Care in Alberta, Canada

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Objectives: Background The Calgary zone of Alberta Health Services serves a population of almost 2million Canadians over a wide geographical area and is underserved in terms of rheumatology specialists. Furthermore, the quality of referral information is variable, and wait are times prolonged, especially for routine appointments. Thus, there is a high rate of inappropriate use of acute services for patients with rheumatic conditions. Rationale The Division of Rheumatology at the University of Calgary chose to partner with the Primary Care Network Specialist Link telephone advice service (operating 8am to 5pm Monday to Friday) to provide real time telephone non-urgent advice to improve efficiency and enhance the co-ordination of patient care delivery.
Methods: The rheumatologists were asked to complete a survey after each phone consult in the initial launch period for the first year. Similarly, Primary Care doctors who had used the service were invited for their feedback. Direct costs, and direct savings were calculated based on the fee for service billing schedule, and a conservative cost-effective analysis was performed based on the avoidance of relevant and known direct variable costs only.
Results: Data from a period of 13months were collected. A total of 209 out of a potential 615 (34%) surveys were received from n=12 rheumatologists. Feedback forms from n=49 individual family physicians were also analyzed. 68% of the phone calls avoided an emergency room visit and 46% avoided a consult altogether. Further diagnostic imaging and laboratory testing was avoided after 16% and 15% of calls, respectively. Both specialist and family physicians expressed a satisfaction rating of greater than 90% with mutual collegial support (89%), education (87%) and enhanced patient care (77%) identified as subjective benefits on qualitative analysis, while 29% of calls resulted in management being initiated in the primary care setting

before seeing the rheumatologist. Opportunity cost analyses revealed an average net savings of CAN$191 per phone call.
Conclusion: Empowering primary care doctors to provide care for non-urgent rheumatology patients with the specialist support of real time telephone advice is both efficient and cost effective. Furthermore, improved doctor to doctor communication enhances patient care, improves collegiality and prevents unnecessary use of acute services for patients identified as having a real or potential rheumatic disease.

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Rheumatology Nursing Care: Transforming the Model of Care in British Columbia

Jason Kur (University of British Columbia, Vancouver); James Connell (Vancouver); John Gurmin (Vancouver)

Objectives: In 2010, rheumatologists in the Province of British Columbia proposed a new set of patient care approaches. These approaches focused on improving quality of care and increasing access for patients with inflammatory diseases. This was done as a response to a province-wide shortage of rheumatologists. One of the approaches witnessed the introduction of a rheumatology nursing billing code. This code has allowed rheumatologists to work in multidisciplinary healthcare teams permitting for the integration of nursing care in the management of patients with inflammatory diseases. Here we describe; the trends in nursing integration in the province, capacity for nursing support for rheumatologists in BC, and review the role that nurses are playing in outpatient care.
Methods: The British Columbia Society of Rheumatologists conducted an online survey in the spring of 2018. The survey was sent to all RCPSC-certified and practicing rheumatologists in BC (n=85). The overall response rate for the online survey was 91% (n=77). The results were compared to similar surveys conducted in 2010 and 2015. Billing data was obtained from the Doctors of BC.
Results: In 2010, before the implementation of the nursing code, only 23% (11) of practicing rheumatologists in BC had access to nursing support as part of their practice, whereas in 2018 the proportion increased to 71% (51). As of 2018, there are 27.3 fulltime equivalent (FTE) nurses employed in rheumatology outpatient clinics. The greatest physician reported advantage of nursing support was “educating patients about medication and disease”, followed by “increased physician renumeration”, “assisting with administrative work”, and “assisting with patient assessments”. Since the inception of the rheumatology nursing billing code in 2010, there has been an average increase of 23% per year in the number of times the code was used per rheumatologist (140 times/rheumatologist in 2011/12, 467 times/rheumatologist in 2017/2018). Some areas for improvement were identified with 62% (29) of rheumatologists suggesting the diagnostic code could have broader inclusion criteria and 55% (26) suggesting the criteria should be extended past two nursing visits/patient/year.
Conclusion: Nursing support has become an integral part of rheumatology care in BC. Patients with inflammatory diseases have greater access to rheumatology nursing care. Billing data suggest that rheumatologists will continue to take advantage of this key resource. Certain aspects of the code could be improved in order to maximize its benefits for patient care, such as broadening the use of nursing care beyond inflammatory conditions.

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The Metrics of Rheumatology Outpatient Encounters: Before and After the Implementation of a Nursing Model of Care

Jason Kur (University of British Columbia, Vancouver); James Connell (Vancouver); John

Gurmin (Vancouver)

Objectives: In 2010, rheumatologists in the Province of British Columbia proposed a new set of patient care approaches. These approaches focused on improving the quality of care and increasing access for patients with inflammatory diseases in response to province wide rheumatology shortages. The number of outpatient rheumatology encounters is a vital metric to determine the access to care for rheumatology patients in BC. Changes in the frequency of encounters for patients with inflammatory diseases were measured in three urban rheumatology practices before and after the implementation of a rheumatology nursing multidisciplinary care model. The aim of the study was to measure the potential increase in overall patient encounters, as well as the impact of the nursing model on the number of patient visits as characterized by particular diagnosis.

Methods: A retrospective review of Electronic Medical Records (EMR) was conducted in the summer of 2018. A sample of three rheumatology clinics in Vancouver, BC were chosen based on their established practice both before and after the implementation of the nursing model of care, and on their use of the same EMR system. The number of patient visits for specific inflammatory diseases, and days rheumatologists worked were investigated in 2009, before the implementation of the LMAs, and in 2016, after the implementation, allowing for a five-year period of adjustment.

Results: In 2009, 1493 discrete patients were seen, and 2761 were seen in 2016, across all three clinics. There was an 84% average increase in the number of inflammatory disease patients in 2016, as compared to metrics from 2009, controlled for number of days worked. The average increases in patients seen for specific diseases were: 81% for rheumatoid arthritis and other inflammatory polyarthropathies, 119% for ankylosing spondylitis and other inflammatory spondylopathies, 81% for diffuse diseases of connective tissue, and 78% for psoriasis and similar disorders. On average, the number of rheumatology patients seen in a week by a single rheumatologist increased by 18 patients in 2016 as compared to 2009, controlled for days worked.

Conclusion: The data suggest that the implementation of the nursing model of care made in 2010 has resulted in a dramatic increase in encounters for patients with inflammatory diseases in the sampled rheumatology practices in Vancouver. The results suggest that incorporating a nursing model of care can considerably increase the capacity of outpatient clinics to care for patients with inflammatory diseases.

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Meeting the Need for Rheumatology Care in British Columbia: A Review of Physician Labour Capacity

Jason Kur (University of British Columbia, Vancouver); James Connell (Vancouver); John Gurmin (Vancouver)

Objectives: In 2010, Labour Market Adjustments (LMAs) were initiated in BC to alleviate specialist recruitment and retention pressures in the field of rheumatology. We attempt to characterize the current demographics, practice patterns, and distribution of BC rheumatologists in order to determine if the adjustments have achieved their intended outcomes.

Methods: The British Columbia Society of Rheumatologists conducted an online survey in the spring of 2018. The survey was sent to all RCPSC-certified and practicing rheumatologists in BC (n=85). The overall response rate for the online survey was 91% (n=77), but after directed-inquiry, increased to 100% for measures of labour capacity only. The results were compared to a similar survey conducted in May 2010.

Results: In the spring of 2018, BC was serviced by 58 Fulltime Equivalent (FTE) rheumatologists or 1:83,000 residents, which represents an 81% increase in capacity from 2010 (32 FTE). An increase in labour capacity was measured throughout urban (31% for regions >500,000), mid-sized (152% for regions 300,000-499,000, and 145% for regions 100,000-299,000), and rural regions (56% for regions <100,000). Over the following ten years (2018-2028) there will be an anticipated 30% loss in labour capacity due to retirement.
Conclusion: There has been a significant increase in rheumatology labour capacity since 2010 in BC, approaching recommended levels per population. The data suggests that the increase in labour capacity has been distributed throughout regions of varying population size, though regional disparities still exist. In this respect, the LMAs made in 2010 have been successful, but recruitment of specialists into the field of rheumatology must continue in order to meet anticipated retirements and address disparities with regard to regional access to rheumatology care.

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The Effect of Physician Sex on Practice Sizes, Volumes, and Physician Remuneration: A Population-based Longitudinal Evaluation of Male versus Female Rheumatologists in Ontario

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Objectives: To compare differences in clinical activity and income between male and female rheumatologists and to evaluate the effects of physician sex on clinical activity (practice size and volume), accounting for rheumatologists' age, and calendar year effects.
Methods: We analyzed billing data of Ontario rheumatologists from 2000 to 2015. We used a validated physician registry to study rheumatologists with a clinical practice volume of > 1.0 full time equivalent (FTE). We assessed practice size (number of unique patients), volume (number of patient assessments), and income (derived from fee-for-service and alternative payments) in terms of annual median and interquartile ranges (IQR) and stratified by rheumatologists' sex. Two separate multivariate linear regressions assessed the effects of physician sex, age, and year on practice size and volume.
Results: The number of rheumatologists with an FTE clinical practice increased from 89 to 120 from 2000 to 2015. The percentage of females among all FTE rheumatologists increased significantly over time, from 27% (n=24) in 2000 to 42% (n=50) in 2015 (15% increase). In 2000, females saw a median (IQR) of 1,606 (1276-2228) patients versus 2,242 (1606-2936) patients for males, for a median difference of 508 patients (95% CI 104-975). Practice sizes declined over time for both sexes. By 2015, females saw a median of 1,469 patients versus 1,949 for males (median difference of 405, 95% CI 144, 682). Annual patient volumes (number of assessments) were significantly higher for males each year. In 2015, females provided a median of 4,253 assessments compared to 5,014 for males (median difference 925, 95% CI 193, 1717). Overall median (IQR) income increased over time from $251,596 ($199,367-$333,164) in 2000 to $388,733 ($311,924-$491,599) in 2015. Incomes were significantly higher for males (ranging

from >$50K-100K for males each year). Our multivariate adjusted analyses estimated that males saw a mean of 606 (95% CI 107-1105) more patients annually than females and provided 1,059 (95% CI 345-1773) more assessments. Over time, there was a small but statistically significant increase in mean patient assessments and middle-aged (45-64y) rheumatologists had greater practice sizes and volumes than their younger/older counterparts. A significant interaction between calendar year and physician sex was seen.
Conclusion: On average, female rheumatologists provided fewer assessments and saw fewer patients annually relative to males, which resulted in lower earnings. This effect appears to become more pronounced with time. Our findings provide novel perspectives for workforce planning with an ever-increasing number of females in the workforce. Supported by a CIORA grant.

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Patient Satisfaction with a Nurse-Led Stable Arthritis Clinic in Canada

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Objectives: Patients with rheumatoid arthritis (RA) represent the largest group of patients cared for by rheumatologists. Most patients will require lifelong monitoring to maintain optimal control of their disease. Therefore, the number of patients accrues over time and it is difficult for individual rheumatologists to continue to care for new patients affected with rheumatic diseases as their practice fills. In response to this, new models of care have been developed. We present the results of patient satisfaction questionnaires from patients in a nurse-led clinic who have stable inflammatory arthritis.
Methods: A non-randomized group of 219 patients from one academic center in Calgary, Alberta were offered the opportunity to participate in a nurse-led clinic. Their diagnoses included RA, psoriatic arthritis, reactive arthritis or other stable inflammatory arthritis. All patients were in remission or low disease activity (by DAS28 criteria) with no changes to their medications, both for at least one year. All patients were greater than 18 years old and participants were excluded if their disease was active, they were pregnant, or had mental illness. Patient satisfaction was assessed using a mailed questionnaire, the Leeds Satisfaction Questionnaire (LSQ), which was developed to assess rheumatology patient satisfaction with their care providers (Hill et al., 1992). It has been validated and used previously for similar studies. It assesses the patient satisfaction with their care in six domains including general satisfaction, giving of information, empathy with the patient, technical quality and competence, attitude toward the patient and access and continuity.
Results: Of the 219 eligible participants, 149 returned the survey, with 4 being blank, indicating a lack of consent. Fourteen other participants did not complete the survey correctly leaving 131 responses. The overall satisfaction score was 4.15, information giving was 3.94, empathy 3.97, quality was 4.42, attitude toward the patient was 4.24 with access and continuity of care was 3.45 (all out of 5).
Conclusion: Overall, our survey reveals that most patients are satisfied with their care in the nurse led model. Our results are similar to previous data from other countries (Koksvik et al., 2013) although a direct comparison is not possible. Data on the increased volume of patients seen by nurses in this new role is still ongoing.

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System Evaluation of Arthritis Central Intake for Referral of Patients with Arthritis to

Specialist

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Objectives: This paper describes a systems-level baseline evaluation of central intake (CI) and triage systems in arthritis care within Alberta. Specific objectives are to: 1) describe a process for high-level systems evaluation with multiple stakeholder groups (patients and healthcare providers) for the provision of arthritis care; 2) report the findings of the baseline evaluation; and 3) identify opportunities for improving appropriate and timely access based on the evaluation.

Methods: Key performance indicators (KPIs) of OA and RA service delivery were first developed using a modified Delphi method involving patients, referring physicians, specialists, and clinic staff. Surveys and interviews were created from these KPIs in a co-design process to evaluate stakeholder experiences of arthritis care services. Three established clinic sites with CI were identified for evaluation: one providing OA care and two clinics providing rheumatology care. Participating clinics recruited high-volume referring primary care physicians on behalf of the researchers. Clinic staff and specialists were approached by the researchers while patients were recruited by physicians and clinic staff to complete the survey and participate in a recorded semi-structured interview either in-person or by phone. Primary care physicians and specialists were contacted via email and mail to complete the survey through an online link via RedCap or by filling out a hard-copy survey. We explored similarities, challenges, and opportunities for improvement across all three CI sites. Using a convergent mixed methods design, quantitative and qualitative data were simultaneously collected and analyzed to understand local CI processes in arthritis care.

Results: A total of 237 surveys were completed by patients (n=169), referring physicians (n=50), and specialists (n=18) alongside 25 interviews with patients (n=14) and CI clinic staff (n=11) across the three sites. Both specialist and referring physician groups appeared to be satisfied about the quality of care and services provided by CI. More than 70% of specialists and 80% of referring physicians agreed the current process of CI was satisfactory. A key issue for specialists was incomplete referrals by referring physicians. Referring physicians were dissatisfied with the referral process (52%), patient access to specialists (36%), and perceived specialist support for patients waiting to be seen. Approximately 80% of patients agreed they were treated respectfully and well-cared for by healthcare providers. Patients reported concerns around communication, wait times, and support for self-management.

Conclusion: Engaging stakeholders to provide a systems perspective can form a unique, in-depth understanding of healthcare services and identify quality improvement opportunities.

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Co-Design of a Patient Experience Survey for Arthritis Central Intake: An Example of Meaningful Patient Engagement in Healthcare Design

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Objectives: To describe the process of patient engagement to co-design a patient experience survey for people with arthritis referred to arthritis central intake. The aim of developing the survey was to create an evaluation tool of patient experiences surrounding central intake and triage services for arthritis care - specifically for referral to an orthopedic surgeon for assessment for joint replacement for patients with osteoarthritis and referral to a rheumatologist for assessment of patients with suspected rheumatoid arthritis.
Methods: Patient engagement in co-design comprised three connected phases: 1) identifying the needs of patients with arthritis, 2) developing a set of key performance indicators, and 3) determining the survey items for the patient experience survey. We report on the third phase of this co-design process to develop the patient experience survey. Two Patient and Community Engagement Researchers (PaCERs) led this co-design research. The PaCER method is a peer-to-peer inductive research approach using qualitative methods designed to create a robust collective patient voice and maximize patient engagement throughout the research process. We determined which recommendations from phase 1 and 2 should be reflected in the patient experience survey with our multidisciplinary stakeholder team, including PaCERs. The stakeholder team sorted recommendations into four themes (right knowledge, right professional support, right professional relationships and timeliness of care and communication) and rate each recommendation as “yes”, “no”, or “maybe” for inclusion. The task was completed individually, and then as a group, by comparing ratings and discussing items. Secondly, we created a pool of survey items from four validated instruments to generate an initial patient experience survey item pool. This item pool was the basis for a mapping exercise to determine which items would be included and identify gaps using the same rating process described above. The draft survey was piloted with clinic patients (n=4) for feedback on clarity, length, and changes before finalization.
Results: A total of 13 priorities for quality arthritis care were included from the original 25 recommendations from phase 1 and 2. Through a process of theming, mapping, and rating with our stakeholder group, a total of 18 items were excluded from the patient experience survey item pool of 41 items. After this iterative mapping and rating process, the final patient experience survey included 23 items.
Conclusion: The process of patient engagement in co-designing a survey identified aspects of arthritis care that were not included in previously validated patient experience surveys.

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Determination of Rheumatoid Arthritis (RA) Incidence and Prevalence in Alberta to Measure System Performance and Plan Health Services

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Objectives: The incidence and prevalence of rheumatoid arthritis (RA) is expected to increase, placing increased demands on health resources, particularly access to rheumatologists for diagnosis and ongoing care. We determined incidence and prevalence of RA in Alberta using population-based databases and a validated case definition. This is a baseline estimate to plan health services and track patterns over time, as well as to inform key system performance

measures in the care of patients living with RA.
Methods: We identified RA cases 16 years and older using linked administrative health data (population registry, Physician Claims, Discharge Abstract Database, National Ambulatory Care Reporting System) between 2002 and 2016. We used the Public Health Agency of Canada validated case definition for RA: at least one RA-related hospitalization (ICD-10-CA: M05.x-M06.x) or two RA-related physician visits at least eight weeks apart within two years (ICD-9: 714.x). We assigned the year of the first visit or hospitalization date as the incident year of a new RA case. Age-standardized incidence rate and prevalence proportion were calculated using the 2011 Canadian census population. The 95% confidence intervals (CIs) were calculated based on the gamma distribution. Results are reported for the 2015 fiscal year.
Results: We estimated 2,704 incident cases and 39,348 prevalent cases of RA in the 2015 fiscal year, with a crude incidence rate of 0.74 (95%CI: 0.71-0.77) per 1,000 and prevalence of 1.08% (95%CI: 1.07-1.09), respectively. Age standardized incidence and prevalence were estimated to be 0.79 (95%CI: 0.76-0.82) per 1,000 and 1.18% (95%CI: 1.17-1.19), respectively. Consistent with the known disease distribution, age standardized incidence and prevalence were higher in females than males and were estimated to be 1.05 (95% CI: 1.00-1.10) per 1,000 and 1.58% (95%CI: 1.56-1.60), respectively, for females and 0.53 (95%CI: 0.50-0.57) per 1,000 and 0.77% (95%CI: 0.76-0.78), respectively, for males.
Conclusion: Linked administrative data are an important source for estimating the incidence and prevalence of chronic diseases including RA. These estimates, combined with clinical data, will be used to measure system performance and for planning the expected demand for health services for patients living with RA to contribute to ongoing quality improvement initiatives in the province.

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Impact of an Interdisciplinary Intervention on RA Patients

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Objectives: The primary objective is to compare the DAS28 response (ΔDAS28>0.6) between patients receiving an interdisciplinary intervention (Intervention group) and patients followed under standard rheumatologic practice (Control group). Secondary objectives are to compare patient-reported outcomes such as pain, fatigue, general health, and patient empowerment between the two groups.
Methods: Prospective quasi-experimental, matched cohort (age, gender) study. Adult patients with a diagnosis of RA and DAS28 (CRP)> 2.6 are eligible for the study. The Intervention group (n=28) benefits from interdisciplinary team intervention with the following professionals: rheumatologist, nurse, physiotherapist, social worker, kinesiologist, occupational therapist, and nutritionist. The Control group (n=32) receives a conventional rheumatologist-nurse intervention. Both groups see the rheumatologist approximately three times over 12 months. Interdisciplinary meetings take place in the hospital setting with the patients at Month 0 and Month 12 and without them at Month 6. The following outcome measures are used at each visit

to the rheumatologist: patient pain, fatigue (Multidimensional Assessment of Fatigue; MAF), disability (HAQ), quality of life (SF-36), patient empowerment (Patient Activation Measure; PAM13), and patient satisfaction (QSC-F; only in Intervention group at Month 12).
Results: A total of 28 patients were enrolled in the Intervention group and 32 in the Control group without any significant differences in demographics or disease parameters with the exception of disease duration which was significantly higher in the Intervention group (10.9 vs. 5.8 years; p=0.021). Within 6 months of treatment, clinically important and statistically significant (p<0.01) improvements in DAS28 were observed in both groups which were maintained until 12 months. Overall, at 12 months, DAS28 response was comparable between groups (68% vs. 63%; p=0.140). However, when looking at patients with established RA (75% vs. 66.7%; p=0.039) and patients with low to moderate disease activity at baseline (73.9% vs. 56.5%; p=0.035), a higher response rate was observed in the Intervention group. No statistical differences were observed in the remaining outcomes between groups. A high level of satisfaction regarding the interdisciplinary intervention dispensed was reported in the Intervention group.
Conclusion: The results of the current study suggest that interdisciplinary interventions may be useful in conferring benefits on patient well-being and disease control that are above and beyond those resulting from medications. This seems to be particularly true among patients with more established disease. Additional analyses looking into the exact mechanism of action of such interventions are required.

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Mental Health Care Use is Increased Following a Diagnosis of Rheumatoid Arthritis

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Objectives: Mental illness is highly prevalent in rheumatoid arthritis (RA). However, data are limited on whether access to mental health care is similarly increased following a diagnosis of RA. Our objective was to estimate the rates of outpatient mental health care use and determine if mental health visits are increased in RA compared with the general population.
Methods: We evaluated a population-based cohort of RA (N=53,240) matched 1:4 by age, sex, and calendar year with a non-RA control cohort in Ontario between April 1, 2002 and March 31, 2016. Individuals with a prior history of mental illness were excluded. Mental health care use was defined by outpatient visits to a primary care provider or psychiatrist, using a validated combination of service and diagnostic codes for psychotic disorders, non-psychotic disorders (including anxiety and depression), substance abuse and social problems. We estimated rates per 1,000 person-years (PY) and crude rate ratios (RR) with 95% confidence intervals (95% CI). Cox regression models generated hazard ratios (HR) and 95% CI for mental health care use in RA versus the comparator group, adjusting for demographic, clinical and non-mental health care use variables.
Results: Individuals with RA had significantly higher rates of mental health care visits across all psychiatric diagnoses (378/1,000 PY) versus comparators (270/1,000 PY). Overall, RA was associated with a 40% increase in the rate of outpatient mental health visits (RR=1.40, 95% CI 1.39-1.41) and the rate was highest for substance abuse disorders (RR=2.14, 95% CI 2.09-2.17). RA was significantly associated with an increased risk of mental health care use in unadjusted

analysis (HR 1.49, 95% CI 1.46-1.51) and the risk was attenuated, but remained significant, after adjustment for clinically important covariates including comorbidity, ethnicity and previous non-mental health care use (HR 1.10, 95% CI 1.08-1.12).
Conclusion: RA is associated with an increased rate of outpatient mental health care use. Further research is needed to examine if these differences translate to improved RA outcomes, as well as reduction in serious mental illness sequelae (hospitalizations, self-harm) and costs of care.

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The Scleroderma Research Topics Survey for Patients and Health Care Professionals: A Scleroderma Patient-centered Intervention Network (SPIN) Project

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Objectives: The Scleroderma Patient-centered Intervention Network (SPIN) is an international collaboration that maintains an ongoing cohort of almost 2,000 patients from 45 sites in 7 countries and develops, tests, and disseminates self-care programs to improve the quality of life of individuals with scleroderma. The objective was to identify research topics important to members of the scleroderma community that could be addressed via the SPIN Cohort, to identify potentially understudied groups, and get input on online interventions that SPIN could develop.
Methods: Eligible participants were individuals living with scleroderma and their caregivers, healthcare professionals, and patient organization representatives. Participants were recruited through email, SPIN website newsletters, and online announcements to participants in the SPIN Cohort. A survey with forced-choice and open-response questions was developed. Questions were designed based on examples of similar surveys and input from team members, including patients. The survey was available in English, French, and Spanish via the online survey tool Qualtrics from April to August 2018. French and Spanish survey responses were translated into English by a SPIN team member and validated by another team member. Within each category (possible research questions, understudied groups, and program suggestions), thematic analysis was used to group responses into themes.
Results: A total of 124 respondents (100 patients; 24 health care professionals) completed the survey. There were 65 suggestions (44 patients; 21 health care professionals) for possible research questions, with the most common topics relating to calcinosis, accessing health care, and quality of life. There were 40 suggestions (18 patients; 22 health care professionals) for understudied groups. Several patients suggested the need for more research on young persons diagnosed with scleroderma. The most common suggestions by health care providers were minority patients and patients with calcinosis. There were 136 suggestions (107 patients; 29 health care professionals) for online intervention programs. Of these, 13 suggested interactive platforms to facilitate communication between patients. The other 123 recommended intervention targets, with physical activity as the most commonly suggested target from patients and emotions and stress the most common from health care professionals.
Conclusion: Patients and health care professionals have different but overlapping suggestions for research questions and programs that are currently unaddressed in scleroderma research.

Feasible suggestions for research topics, understudied groups, and interventions programs provided in the survey will be addressed by SPIN, and should be considered by other researchers.

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A Patient-Centered Balanced Scorecard for Rheumatoid Arthritis: Selecting the Performance Measures

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Objectives: The objective of this study was to develop a patient-centered balanced scorecard (BSC) to address a pre-defined vision and 6 strategic objectives for quality improvement in rheumatoid arthritis (RA) care.

Methods: A total of 147 performance measures (PMs) were identified from a systematic review and excluded if they were considered to be: not concordant with current guidelines or benchmarks, supplanted by newer measures, unclear in wording, duplicate measures, or only applicable to allied health providers. The final list of 26 PMs was assessed using a 3-Round (R) Modified-Delphi exercise. Seventeen panelists were selected based on their expertise in RA, quality measurement and/or lived experience with RA. Panelists were provided a background document describing the methods, strategic objectives and vision for quality improvement, PM specifications and supporting guideline statements. During R1 and R3, panelists rated each PM on a 1-9 Likert scale on the following criteria: i) does the measure target an important gap in RA care, ii) how likely is it that the information required will be available in the healthcare system, and iii) overall priority of including the item in the scorecard? During R2, panelists were provided with the results of R1 voting and participated in a moderated discussion. In R3 panelists finalized their ratings. PMs with median scores ≥ 7 on all 3 questions without disagreement were included in the final set.

Results: All panelists completed R1 rating and 82% completed R3 rating. Thirteen PMs met criteria for inclusion after R3. One PM addressed the "access" strategic objective (number of referrals received). Six PMs addressed processes important to ongoing care and comorbidity management including: tuberculosis, obesity and hypertension screening; fracture and cardiovascular risk assessments; pneumococcal vaccination; and 2 PMs addressing RA treat-to-target processes. Four PMs addressed RA outcomes including measurement of disease activity, pain assessment, and remission or low disease activity rates. None of the PMs included addressed the strategic objectives in the domains of multidisciplinary care, patient self-management tools/educational materials, or patient experience. This was largely due to concerns about data availability for the PMs in these domains.

Conclusion: The proposed BSC builds upon existing measures capturing early access to care and treatment in RA. The present work adds important PMs to the BSC to promote high quality RA care and outcome measurement. The BSC will be tested in clinical practice and additional

work will be done to address the strategic objectives of the BSC where no appropriate measures were identified.

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Key Performance Indicators Help Track Centralized Intake Processes to Optimize Early Inflammatory Arthritis Care

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Objectives: In partnership with healthcare providers, provincial healthcare leaders, and people living with arthritis, a set of key performance indicators (KPIs) was defined to measure and optimize centralized intake processes (CI) for arthritis care. We measure and report on the KPIs at 2 CI sites in Alberta.

Methods: A prevalent cohort was first defined using provincial administrative health datasets and included all RA cases ≥ 16 years of age between 2002/03 and 2016/17 defined using ≥ 2 physician billing codes ≥ 8 weeks apart and within a 2-year period, or ≥1 hospitalization code for RA in health administrative data. The cohort was linked to clinic specific CI datasets in 2 sites (S1 and S2) to estimate the KPIs for fiscal years 2012/13-2015/16. The KPIs measured included: KPI-1: number of RA referrals received through CI; KPI-2: the number of referrals received with complete information; KPI-3 time from referral receipt to referral completion; KPI-4: number of referrals rejected or redirected; KPI-5 wait times for new RA and percent meeting 28 day (d) benchmark; KPI-6: percent of appointments completed as scheduled.

Results: KPI-1: Number of referrals received through CI for RA yearly at S1 varied between 700-1161 and at S2 between 137-264. KPIs-2 and 3 were only reportable for S1, as S2 did not track incomplete referrals as they were rejected. At S1 only 33% of referrals were received with complete information initially and 56% were complete by a later date after requesting more information (KPI-2). The median wait time for receipt of complete first referrals at S1 was 15d, with 90th percentile wait of 95d (KPI-3). At both sites, 11% of referrals were either redirected or rejected (KPI-4). The median wait time for new RA referrals at S1 ranged between 79-218d with 9-28% meeting the 28d benchmark and between 42-62d with between 21-37% meeting the benchmark at S2 (KPI-5). The percent of appointments completed as scheduled increased over time and was 90% at S1 and 74% at S2 in 2015/16 (KPI-6).

Conclusion: Data availability and process differences at 2 rheumatology CI sites contributed to observed differences in KPI reporting. Additionally, important changes in CI referral rates for RA were observed over time corresponding to known regional rheumatologist workforce changes highlighting the value of longitudinal tracking. These results will be used to inform CI improvements and ongoing measurement at both sites.

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Regional Variation in System-Level Performance Measures for Rheumatoid Arthritis in Alberta

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Objectives: Performance measures (PMs) for rheumatoid arthritis (RA) care in Alberta were defined to harmonize with existing Arthritis Alliance of Canada (AAC) system-level PMs to capture early access to care and treatment. The objective of the present study was to examine regional variation in performance within the province.
Methods: Provincial health administrative data from Alberta was used to define a prevalent RA cohort including all cases ≥16 years of age between 2002/03 and 2016/17 defined using ≥ 2 physician billing codes ≥ 8 weeks apart and within a 2-year period, or ≥ 1 hospitalization code for RA. Patient residential postal codes were used to assign them to either Calgary Zone (CZ), Edmonton Zone (EZ) or other (OZ). Four PMs were evaluated by zone between 2012/13-2015/16 fiscal years: PM1) Percentage of RA patients with at least one visit to a rheumatologist in the first year of diagnosis; PM2) Percentage of RA patients dispensed a disease modifying anti-rheumatic drug (DMARD); PM3) Time to DMARD initiation; and PM4) Percentage of patients under the care of a rheumatologist seen in yearly follow-up.
Results: The percentage of patients seen within 1 year by a rheumatologist increased over time in all zones, with higher rates seen in the CZ during all years investigated (PM1: CZ 59-70%; EZ 53-59%; OZ 53-60%). Percentage of patients on a DMARD increased marginally over time but was lowest in the OZ (PM2: CZ 43-45%; EZ 44-45%; OZ 40-41%). Median time to DMARD treatment was the lowest for EZ patients with further improvement seen over time (PM3: 39d to 14d); in contrast the OZ wait time improved from 39d to 31d and in the CZ, while an initial trend of declining waiting times was observed (38d to 29d), the last year of measurement had an increase to 46d. The percentage of patients meeting the 14d benchmark in the 2015/16 fiscal year was highest in the EZ at 52% and lowest in the CZ at 32% (OZ 42%). The percentage of patients seen in yearly follow-up increased over time and by 2015/16 was 85% for CZ, 81% for EZ and 77% for OZ (PM4).
Conclusion: Evaluating performance measures by patient residential zone reveals differences in quality of care between zones in Alberta that could be explained by regional practice differences, the population served and/or regional workforce shortages. Further research is planned to evaluate whether the observed variation impacts patient outcomes.
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Reporting of Arthritis Alliance of Canada (AAC) System-Level Performance Measures for Patients with Rheumatoid Arthritis (RA) in Alberta
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Objectives: The Arthritis Alliance of Canada (AAC) developed System-Level Performance Measures (PMs) to monitor early diagnosis, treatment and ongoing care of rheumatoid arthritis (RA) using a standardized approach. We aimed to evaluate 4 AAC PMs in Alberta, Canada: PM1) Percentage of RA patients with at least one visit to a rheumatologist in the first year of diagnosis; PM2) Percentage of RA patients dispensed a disease modifying anti-rheumatic drug (DMARD); PM3) Time to DMARD initiation; and PM4) Percentage of patients under the care of a rheumatologist seen in yearly follow-up.
Methods: All prevalent RA cases ≥ 16 years of age between 2002/03 and 2016/17 in AB were defined using 2 or more physician billing codes at least 8 weeks apart and within a 2-year period, or 1 or more hospitalization codes for RA in health administrative data. PMs were estimated through linked datasets for fiscal years 2012/13-2015/16. PM1: The percentage of incident RA cases with at least one visit to a rheumatologist within one year of their first RA code. PM2: The percentage of prevalent RA patients dispensed a DMARD (including conventional DMARDs, biologic agents and small molecule inhibitors) was calculated through linkage to a pharmacy database. PM3: Time from RA first visit to DMARD dispensation was reported in the fiscal year of RA incidence and percent within the 14-day (d) benchmark was calculated. PM4: Percentage of patients seen in yearly follow-up was reported using a denominator including patients with a minimum of 2 rheumatologist visits.
Results: Between 2012/13-2015/16 the percentage of RA incident cases seen by a rheumatologist within 1 year of onset (PM1) increased from 55 to 63%; however, during this time period the percentage of patients dispensed DMARD therapy (PM2) remained sub-optimal at approximately 42%. While median time to DMARD from first visit date improved over time from 39d to 28d, only 38-41% of patients received treatment within the 14d benchmark (PM3). The percentage of patients seen in yearly follow-up was stable over time at 81% (PM4).
Conclusion: This work contributes to a growing body of literature reporting on the AAC System-Level PMs in different provinces and using different data sources. Provincial analysis for Alberta demonstrates that patients continue to experience long waiting times to care and treatment, with suboptimal RA treatment rates despite high follow-up rates for those under rheumatologist care. This work highlights important areas for planned quality improvement initiatives within the province. Supported by a CIORA grant.

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The Epidemiology of Psoriatic Arthritis in The Era of Biologics Given for Psoriasis

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Objectives: The use of biologics in psoriasis may have an impact on the epidemiology of psoriatic arthritis (PsA) as skin manifestations usually occur earlier and biologics may alter the disease course and characteristics, if given for the skin findings before any joint symptoms. We aimed to investigate the frequency of PsA for patients treated with biologics for their psoriasis and compare the frequency and disease features with patients treated with other medications.
Methods: A retrospective chart review was performed for psoriasis patients referred to two rheumatologists between 2015 and 2018. The demographics, clinical characteristics, and treatments were reviewed and final PsA diagnosis was recorded. The frequency of PsA and disease features were compared for biologics vs non-biologic systemic or none/local treatments.

Results: Two hundred and three patients with psoriasis and musculoskeletal symptoms have been seen in rheumatology, 75 (36.9%) of whom were diagnosed with PsA as the final diagnosis (89 non-PsA, 39 not clear). PsA patients were more frequently men (43% vs 31.5, p:0.001), younger (46.6 vs 53.9, p:0.001), had more frequent nail disease (67.5% vs 45.0%, p: 0.037), dactylitis (38.7% vs 7.2%, p<0.001) and uveitis (20.4% vs 4.4%, p:0.027). The majority of PsA patients (45/75, 60%) developed a peripheral arthritis whereas 6/75 subjects (8.0%) manifested with axial disease only. 25/203 of the patients were on biologic therapies (8 tumor necrosis inhibitors [TNFi], 8 secukinumab and 9 ustekinumab) for their psoriasis. Thirty-one patients received non- biologic systemic therapy (methotrexate, apremilast or vitamin A analogs) while the remaining 147 patients received none or local therapies. Final diagnosis of PsA was in a similar rate in all treatment groups (biologics: 36%; non-biologic systemic treatment: 35.4%; none/local treatment: 37.4%). Within PsA, none of the patients on biologics developed dactylitis compared to 28.6% of other systemic treatments and 48.6% of none/local treatment (p=0.046). The frequency of PsA was 5/8 with secukinumab, 3/8 with TNFi and 1/9 with ustekinumab. For patients on biologics, the onset of musculoskeletal symptoms was before biologic therapies in almost all patients on TNFi (6/8) and ustekinumab (7/9), whereas half of the patients on secukinumab (4/8) started to have symptoms after biologics.
Conclusion: The frequency of PsA in patients treated with biologic drugs for psoriasis is as high as those who are on other systemic or none/local treatments. There may be differences in disease features in the era of biologics such as dactylitis being suppressed with biologics.

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The Evaluation of the Small Enthesis of the Hands by Ultrasound: A Study on Healthy Subjects

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Objectives: Ultrasonography (US) has been shown to have good face and construct validity for assessing enthesitis. However, most of the literature on enthesitis focuses on the large entheses, ignoring the involvement of the small entheses such as the hands. In this study, we aimed to determine the prevalence of entheseal abnormalities in small entheses of the hands in healthy subjects and explore factors that are contributing to the occurrence and severity of these findings.
Methods: Healthy subjects who had no joint pain, recent joint trauma or surgery had US scans for the flexor and extensor tendon insertions to the distal phalanx (DIP) and extensor tendon insertions to the middle phalanx at the level of the proximal interphalangeal joint (PIP), on the 3rd digits, on both hands (160 digits in total). The entheses were scored for elementary lesions of enthesitis (hypoechogenicity, thickening, Doppler signals, enthesophytes, erosions and calcifications) and osteophytes were also recorded.
Results: Within 80 healthy subjects (mean age: 45.0 ± 16.1; 62.5% female) 8 had OA. Only three of the participants had diabetes mellitus and more than half were overweight (35.4%) or obese (17.7%). The enthesophytes were the most frequent elementary lesion of enthesitis that could also be seen in the absence of other inflammatory lesions and were detected in 15% of the DIP extensor tendon insertions, 3.75% of the DIP flexor tendon insertions and 3.75% of the PIP extensor tendon insertions. 41% of the patients with enthesophytes at the DIP extensor tendon insertion also had osteophytes at the same site, which was significantly higher than people

without any enthesophytes (5/12 vs 1/68 p<0.001). Patients with enthesophytes were older (67.5 ± 12.6 vs 41.3 ± 13.3; p<0.001) and more frequently men (8/12 vs 22/68; p: 0.048). The other elementary lesions were seen in the minority of the digits.
Conclusion: Enthesophytes of the small enthesis are frequent in healthy people and these lesions can be seen in the absence of other elementary lesions. It can be challenging to differentiate enthesophytes from osteophytes at the level of the DIP joints. Therefore, the definition of enthesitis for the small enthesis may exclude enthesophytes not to overcall patients with enthesitis. The other features of enthesitis were not common in healthy people, suggesting a good specificity to reflect pathology when detected, however studies on disease groups are needed to clarify.

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Chart Review: An Analysis of Patients Referred to a Tertiary Care Clinical Sonography Clinic

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Objectives: Over the past ten years, clinical sonography has been increasingly incorporated into rheumatology practices. Many studies have documented that sonography can improve the anatomical precision of diagnosing many different structural abnormalities in rheumatic patients including but not limited to synovitis, tenosynovitis, enthesitis and crystal deposition. Often, when facing an anatomical diagnostic question, rheumatologists favour clinical sonography because it is fast, can look at many structures in a short time and has no associated radiation. That said, there is limited data available on the impact of sonography and sonography clinics on rheumatology practice Objectives: To review patient demographics including diagnosis, reason for sonography and the effect of the sonography findings on patients referred to a clinical sonography clinic in a tertiary care hospital over 6 months.
Methods: A retrospective chart review was undertaken on all consults between January 1 to July 1 2017 referred to the clinical sonography clinic at the Montreal General Hospital. The chart review included patient's age, sex, referring rheumatologist place of practice, primary and secondary diagnoses, reason for referral, number of joints imaged, joints injected/aspirated, sonography outcome and if diagnosis had changed.
Results: Over this 6-month period, 207 patients were referred to the clinical sonography clinic. On average, 13 patients were seen per clinic and the referrals were from community rheumatologists (46%), university rheumatologists (48%) and other specialties (6%).Patient demographics included average age 52.9 years, female to male ratio 2.3:1 The most common referring diagnoses included rheumatoid arthritis 29%, undifferentiated arthritis 24%, psoriatic arthritis 12 %, osteoarthritis 6% and vasculitis 6%, tendinopathy 5%, lupus/connective tissue disease 4% JIA 3% and crystal arthritis 3%. The most frequent reason for referral was to rule out active synovitis but other reasons included confirming diagnosis of vasculitis, carpal tunnel syndrome, tendonitis/bursitis and crystal arthritis. The average number of joints imaged was 11.8 per patient (median 11) and 36 patients (17%) received an ultrasound guided injection. The clinical sonography exam answered the referring question in 72% of exams.
Conclusion: Clinical sonography clinics provide a valuable service for rheumatologists by clarifying activity of disease, demonstrating precision in anatomical diagnoses and performing guided injections.

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The Trajectory of Grade 1 Erosions in the Feet of Patients with Early RA

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Objectives: Identification of erosions is critical in managing RA, as their presence denotes more aggressive disease requiring more intensive treatment. MRI can visualize and monitor erosion progression in RA. While the clinical significance of grade 1 erosions remains unknown, so too does the trajectory of these erosions over time. This study examined the course of grade 1 erosions (involving 1-10% of bone on MRI) in the feet of newly diagnosed RA patients after ≥ two years of treatment.
Methods: Patients newly diagnosed with RA (treatment-naïve, ACR criteria) were recruited. Participants were assessed at baseline, 1-year, and ≥2 years (24-49 months) after diagnosis. The most clinically symptomatic foot at baseline was scanned using a 1.0T peripheral MRI at each visit. A radiologist, blinded to clinical results, semi-quantitatively scored erosions in the metatarsal head and the base of the phalanges of each of MTPs 2-4 (grade 0-10) according to OMERACT-RAMRIS criteria. All patients were treated as per standard of care, and therapy received after baseline was noted. The location of each erosion was noted to ensure that changes over time corresponded to the original erosion. Erosions were compared after one year and ≥2 years and categorized as unchanged, worsened or improved. New erosions were also noted.
Results: This study included 41 patients [n=33 females, mean (SD) age 51.9 (10.3) years]. The baseline MRI found at least one grade ≥1 erosion in 35 of 41 patients (85%), in 103 of 234 MTP joint bones. The majority of baseline erosions were grade 1 [n=89 (86%)]. One year later, 20 (19%) grade 1 erosions had resolved, 77 remained unchanged (75%), 6 (6%) had progressed, and there were 20 new grade 1 erosions. At ≥2 years later, 16 (16%) of baseline erosions had resolved, 87 (84%) remained stable, 0 had progressed, and there were 10 new grade 1 erosions. In terms of treatment, by their final assessment, 2 patients had received no DMARDs/biologics, 14 were on single DMARD, 7 on combination DMARDs, and 13 on biologic or biologic/DMARD combination. There was no consistent relationship identified between the type of therapy and the improvement, stability, or progression of erosions.
Conclusion: Grade 1 erosions on MRI are common in the MTP joints of early RA patients. The majority of erosions appear to resolve or remain stable following ≥ two years of treatment, suggesting that early standard treatment may be sufficient to manage small erosions. The clinical relevance of these erosions remains unknown.

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Video-based Exercise Instruction Tool for JIA Patients is Preferred by Canadian Paediatric Rheumatology Health Care Teams

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Objectives: Following JIA flares, regular exercise helps increase joint range of motion (ROM) & reduce pain. Typically, JIA patients receive one OT/PT rehabilitation exercise instruction session during a comprehensive clinic visit & are discharged with a home exercise program (HEP). We hypothesized sharing online access to video exercise programs (VEP) specifically tailored to JIA patient needs would benefit other paediatric rheumatology clinicians. Our pilot study (PARES I) compared acceptability & use of English / French VEP with sketch diagrams

on selected outcomes. In PARES II, exit interviews were conducted with these families to determine if VEP could increase proper technique & adherence to a HEP. Here we present results of interviews with paediatric rheumatology health care teams across Canada (PARES III).
Methods: We developed 50 VEP for 5 commonly affected joints in PARES I. Patients (1-17.9 yrs) undergoing standard OT/PT rehabilitation training were randomized to videos posted on hospital website or paper sketches for home use. Upon completion of PARES I, families were invited to participate in an optional exit interview (PARES II) to compare VPE to sketch diagrams. In PARES III, paediatric rheumatologists and allied health workers were asked to review 2 sketch diagrams (wrist + knee flexion) and the equivalent videos before the interview. We explored perceptions of VEP vs. sketches regarding proper technique, regional patient interest, and predicted adherence to HEP. We also looked into the feasibility of site-specific VEP implementation. Interviews were audio recorded & responses summarized.
Results: 5 of 14-paediatric rheumatology centers (36%) took part in interviews. Participants included 5 rheumatologists, 4 PT, 1 OT, 1 RN (10 F, 1 M). All centers provide patients with a HEP (5 paper; 3 personalized VEP). Videos were judged the right length, with clear, easy to follow and age-appropriate instructions. VEP was predicted to be the preferred tool by patients in all centers. Accurate exercise technique was more likely to be achieved using VEP (100%) than sketches (60%) especially with initial OT/PT instruction. Neither VPE nor sketches were expected to increase adherence. While implementation strategies require further study, all (100%) sites requested access to our VPE for their patients.
Conclusion: Short video-based exercises were deemed acceptable by many rheumatology health care professionals to facilitate proper technique & potentially improve JIA patient-outcomes. Next steps involve the development of a universally accepted mode of distribution across all Canadian paediatric rheumatology centers so these may become standard of care.

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Patient-Reported Causes of Arthritis in Adults with Rheumatoid Arthritis and Juvenile Idiopathic Arthritis

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Objectives: Patients' attributed causes of illness reflect the level of comprehension regarding their condition and can affect coping strategies and outcomes. Adults with Juvenile Idiopathic Arthritis (JIA) cope with illness differently than age matched rheumatoid arthritis (RA) patients. It is unknown whether there are differences in the causes of disease reported by adults living with JIA and those with RA. We performed a comparative analysis of perceived causes of arthritis reported by RA and JIA adults using the Illness Perception Questionnaire-Revised version (IPQ-R).
Methods: Between 2013 and 2015, 121 RA and 29 JIA patients over 18 years old completed the IPQ-R during a rheumatology clinic visit at the McGill University Health Center, Montreal - Canada. Sociodemographic and RA clinical data were also collected. Summary statistics, T-tests and chi-square were used to compare the causes reported by the two diagnostic groups and their relation to sociodemographic and clinical data.
Results: Most JIA and RA were women (>80%), with established disease, in remission/low disease activity, with low levels of functional disability, and were well educated. JIA patients were younger and 86% of them were between 18 and 29 years old, whereas 78% of RA patients were between 30 and 69 years old. The most frequently reported causes of arthritis were similar

in both disease groups: (i) 'Hereditary-it runs in my family' (RA versus JIA, 48.8 vs 34.5%), (ii) 'Stress or worry' (34 vs 31%), and (iii) 'Altered immunity' (25.6 vs 24%). These causes did not differ by sex, age strata, RA duration or HAQ scores. 'Altered immunity' was reported as a cause of arthritis by JIA patients with higher number of years of education (JIA reporting altered immunity: 18.2±2.5, JIA not reporting altered immunity: 13.6±4.3 years of education, p=.01). A higher number of JIA than RA patients agreed or strongly agreed that 'Chance or bad luck' might have caused their illness (44 vs 18%, p=.02). A higher number of RA patients agreed or strongly agreed that 'Emotional state' (21 versus 3%, p=.02), and 'Ageing' (32 vs 7%, p=.003) were causes of their arthritis.

Conclusion: Both RA and JIA adults report hereditary factors, stress and altered immunity as the three most common causes of arthritis. Differences exist in the rate of RA and JIA patients who agree in that chance, emotions and aging might have played a causal role in their disease. Assessing patient's beliefs could provide rheumatologists an educational opportunity to dispel disease related misconceptions.

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Inflammatory Arthritis DMARD Adverse Effects are Pervasive and Can Greatly Impact QoL and Work and Social Roles: Initial Results from the OMERACT Safety Working Group

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Objectives: Adverse events (AE) are sub optimally reported in trials. The OMERACT Safety Group is developing a patient-centered AE collection and reporting approach to complement existing methods. We asked inflammatory arthritis (IA) patients for their perspectives on the benefits-harm balance of DMARDs.

Methods: Using an interview schedule, experienced interviewers conducted focus groups with patients in the US (n=14), Canada (n=10), and Australia (n=15) that were recorded, transcribed, and analyzed using pragmatic thematic analysis based in grounded theory.

Results: Almost all patients reported AE ranging from mild to severe. The majority learn to live with AE, but some lives were completely changed. "It was like I was domiciled on the toilet…I couldn't go anywhere because you never knew when you needed a toilet." (M 60s, CA) "I'm on MTX and I'm finally friends with it. It took 2 years…I feel normal…except med day…But I'm happy to give up half a day…to have my life." (F 20s, USA) Many patients reported making adjustments to diet, sleep, and lifestyle to address AEs. Patients used different complementary and alternative approaches to self-manage their AEs but continued to live with ongoing disruption of function, self-confidence, work, and social roles due to AE. "I feel like I can't think anymore, and that really affects my work. And that's my biggest problem. I can push through the pain and… fatigue, but I can't think clearly. I just can't do my job." (F 30s USA) The cumulative burden of AEs often led to patient-initiated discontinuation. "I would open the fridge and look at the little brown envelope that the syringes were in. The nausea would start just looking…I took it for a few more years, but just couldn't stand it anymore. It's just like, get me off of this stuff." (M 70s CA) Underreporting was common due to embarrassment and

uncertainty whether and how to discuss AEs. Providers were often perceived to react with disinterest, minimization, or irritation. Long-term safety was less concerning to patients with longer IA duration, more symptoms, and decreased function but greater treatment benefits despite repeated drug failures and serious AEs.
Conclusion: The prevalence and importance of AEs, especially "nuisance SEs" is viewed differently by patients and clinicians. AEs negatively impacted function, participation, and QOL. Acceptability, tolerability, and self-management of SEs varied among patients, by drug type and life stage, and in response to disrupted social and work roles. Patients underreport SE when they perceived disinterest/minimization by clinicians.

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Pamidronate Treatment in Children with Chronic Non-bacterial Osteomyelitis/ Chronic Recurrent Multifocal Osteomyelitis (CNO/CRMO)

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Objectives: CNO/CRMO is a rare disease characterized by recurrent episodes of sterile bone inflammation. Patients with CNO who adequate response to non-steroidal anti-inflammatory drugs (NSAIDs) do not have may be treated with pamidronate, a bisphosphonate medication. Dosing regimens are variable in literature reports, and factors predicting good response are not known. We report a single centre experience of patients with NSAID-nonresponsive CNO treated with pamidronate using a standard protocol, and describe factors associated with good response.
Methods: We conducted a retrospective chart review of patients with CNO followed in the Pediatric Rheumatology Clinic at BC Children's Hospital, who received pamidronate between 2012-2017. Eligible participants were patients (<18 years of age) with CNO who had inadequate clinical response to NSAIDs and received pamidronate. Patients were given a single course of 3 days of pamidronate and followed clinically; treatment was repeated if needed, as determined by the treating physician. On average, patients were evaluated every 3 months. Variables collected were: CNO symptoms and signs, inflammatory markers, timing of pamidronate relative to disease onset and diagnosis, disease sites, age and gender. Complete treatment response was defined as resolution of symptoms and normalization of inflammatory markers; partial responders had improvement but not normalization. P-values were calculated using Fisher-Exact test for proportions and Mann Whitney U test for medians, comparing treatment responders to patients who did not respond.
Results: 17 patients (mean age 11 years; 35% female, 65% male) were treated with pamidronate during the study period. Median time from symptom onset to first pamidronate treatment was 3 years, and from diagnosis to treatment was 1 year. Median follow up was 13 months post initial pamidronate. Eight patients (47%) had a complete response, 6 (35%) had a partial response and 3

(17%) had no response. Three patients with a complete response required no repeat treatments after a median of 5 months of follow-up. The median time to flare after treatment in 5 patients with initial complete response was 17 months. Normal inflammatory markers at diagnosis were associated with good response to pamidronate at 3 months (p-value: 0.011). Complete response to pamidronate at 3 months predicted remission at last follow up (p-value: 0.041).
Conclusion: A majority of our NSAID-unresponsive CNO patients had complete or partial response to a single 3-day course of pamidronate therapy. Complete clinical response at 3 months after pamidronate was predictive of a long-term clinical response.

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Pustular Psoriasis Gone Wild: An Integrated, Collaborative Approach Utilizing Auto-Inflammatory Diseases Activity Index (AIDAI) to Document Treatment Efficacy with Etanercept in Severe Juvenile Generalized Pustular Psoriasis with IL36RN

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Case Report: Generalized Pustular Psoriasis (GPP) is rare in children and consists of a skin rash and extra-cutaneous findings. There is no standardized or approved course of treatment.
Objectives: To describe the clinical course of a pediatric patient with GPP; the use of Auto-Inflammatory Diseases Activity Index (AIDAI) in GPP disease assessment, and the genetic mutation involved.
A 4-year old Caucasian boy with severe GPP was prospectively followed from 2014 to 2017. He had been healthy until age 2 years, when he developed plaque psoriasis of the scalp. The lesions responded to topical corticosteroids (Hydroval 0.2%). When topical corticosteroids were discontinued after 2 months, he developed severe flares. Each episode started with sudden onset of fever (Tmax=41.5 degree of Celsius), followed by wide-spread pustular skin lesions that involved >80% of body surface, severe leg myalgia, conjunctival erythema, headache, abdominal pain, “geographic tongue” and decreased appetite and energy. Because of the toxic appearance with each flare, he required frequent hospitalizations, but septic workup remained negative. The flares continued despite addition of narrow-band ultraviolet and oral methotrexate (0.5 mg/kg once weekly). The symptom complex with rapid onset of high fever, followed by skin and extra-cutaneous manifestations was suggestive of periodic fever/auto-inflammatory syndromes, and he was referred to rheumatology.
Clinical findings at baseline were document by a 12-item AIDAI score: (1) fever >38.5°C; (2) overall symptoms; (3) abdominal pain; (4) nausea/vomiting; (5) diarrhea; (6) headaches; (7) chest pain; (8) painful nodes; (9) arthralgia or myalgia; (10) swelling of the joints; (11) eye manifestations; (12) skin rash. Each item was scored for “no (0) = absence of symptoms” or “yes (1) = presence of symptoms” (maximum score “12”). Genetic screening was done.
At baseline, 80% of his skin surface area was involved with severe pustular psoriasis lesions with AIDAI score of 7/12. The following medications were ineffective: topical and oral corticosteroids, UVB phototherapy, oral methotrexate and colchicine. Oral cyclosporine resulted in some skin improvement, but systemic flares persisted with AIDAI score unchanged at 7/12. Within 2 weeks from addition of Etanercept (0.8 mg/kg subcutaneously once weekly) the patient achieved remission with AIDAI score of 0/12. He remains in remission with Etanercept monotherapy at 20-month follow-up. Genetic result revealed a mutation in IL36RN. GPP is now classified as an auto-inflammatory syndrome.

We recommend genetic testing in GPP and utilization of AIDAI. Etanercept may be helpful in IL36RN positive GPP patients.

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Safety Profile of Baricitinib for the Treatment of Rheumatoid Arthritis up to 6 Years: An Updated Integrated Safety Analysis

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Objectives: Baricitinib (bari), an oral, selective inhibitor of Janus kinase (JAK) 1 and JAK 2, is approved for the treatment of moderately to severely active rheumatoid arthritis (RA) in adults in over 50 countries including European countries, US, and Japan. We further describe the drug's safety profile with updated data from an ongoing long-term extension (LTE) study.

Methods: Long-term safety of once-daily bari was evaluated in the "all-bari-RA" dataset, which includes all patients (pts) with active RA exposed to any bari dose from 8 randomized trials (4 Phase 3, 3 Phase 2, 1 Phase 1b) and 1 LTE study (data up to 01-April-2017). Previous all-bari-RA analyses are provided for comparison (data up to 10-Aug-2015 and 01-Sept-2016). Dose responses were evaluated based on the 4 Phase 2/3 trials in which pts were randomized to 2 or 4mg including data from the LTE (the "2mg-4mg-extended" dataset). Data were censored at rescue or dose change (as-treated analysis). Because of the latent period for malignancy, 2mg-4mg-extended was also analyzed without censoring for rescue or dose change (as-randomized analysis). Incidence rates (IR) per 100 patient-years (PY) were calculated.

Results: In the current analysis, 3492 pts received bari for 7860 total PY of exposure (an increase in over 1200 PY; 18% from 01-Sept-2016) for up to 6 years. Of these, 2723 (78.0%) were treated for at least 52 weeks and 1788 (51.2%) were treated for at least 130 weeks. Adverse events (AEs) IRs did not increase with prolonged exposure. Malignancy (excluding non-melanoma skin cancer (NMSC)) IR were 0.5 and 1.2 for 2mg and 4mg, respectively, with as-treated analysis and 0.8 and 0.8 with as-randomized analysis. For the above events, the current IRs in all-bari-RA are similar to those previously reported. The following IRs were observed in the current all-bari-RA: major adverse cardiovascular events (0.5), gastrointestinal perforation (0.04), herpes zoster (3.3), tuberculosis (0.14), lymphoma (0.08), and all-cause mortality (0.35). Fewer than 1% of pts discontinued due to abnormal lab results.

Conclusion: In this updated integrated analysis of patients with moderately to severely active RA, including patients exposed for up to 6 years, baricitinib maintained a safety profile that was similar to that previously reported acceptable in the context of demonstrated efficacy.

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Cardiovascular Safety - Update from up to 6 Years of Treatment with Baricitinib in Rheumatoid Arthritis Clinical Trials

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Objectives: Baricitinib (BARI), a selective inhibitor of Janus kinases, is approved in >50 countries for the treatment of adult patients with moderately to severely active rheumatoid arthritis (RA). Patients with RA have increased cardiovascular (CV) risk, including for arterial and venous occlusive events. This analysis provides an update to CV safety in patients treated with BARI for up to 6 years.
Methods: Data were pooled from 8 Phase 1-3 studies, including a long-term extension study (LTE) up to April 1, 2017, and analyzed in 3 sets: 1) All BARI RA (all patients exposed to any BARI dose); 2) Placebo (PBO)-controlled (6 studies comparing BARI 4-mg once daily [QD] to PBO, 0-24 weeks); and 3) Extended 2- vs 4-mg (4 studies with BARI 2- and 4-mg QD, including LTE data). Major adverse cardiovascular events (MACE) were adjudicated in Phase 3 by a blinded, independent panel. Study database preferred term searches identified arterial thrombotic events (ATE; adjudicated where applicable) and events of deep vein thrombosis and/or pulmonary embolism (DVT/PE; analyzed without adjudication). Risk factors were analyzed between patients with and without events in All BARI RA set using Cox regression. Incidence rates (IRs) are per 100 pt-years (PY) of exposure.
Results: 3492 patients were exposed to BARI (7860 PY; median 933 days; max 2230 days), 2723 (78.0%) for ≥1 year; 1788 (51.2%) for ≥2.5 years. The frequency of reported events and IR were low for ATE (PBO: 0.2%, Extended [BARI 2mg and 4mg: 0.6% each]) and MACE (PBO: 0.2%, Extended [BARI 2mg and 4mg: 0.6% each]), which was comparable across treatments and analysis sets, and did not increase with prolonged exposure. For DVT/PE, events (n=6) were reported for BARI 4-mg but not PBO during the 24-week PBO-controlled period. This imbalance was not replicated during 24 weeks after switch to BARI 4mg from PBO (N=928, 1 event) or active comparator (N=451, 0 events). At longer exposure, DVT/PE IRs were comparable between BARI 2- and 4-mg doses. Within the All BARI RA set, IRs were stable over time (overall IR 0.53), the frequency of permanent discontinuation following a DVT/PE event was low (n=5; 0.1%; IR=0.06), and factors (age, BMI, COX2 inhibitor use, and prior history of DVT/PE) were identified that may contribute to increased risk of DVT/PE.
Conclusion: MACE and ATE IRs were low and did not increase with prolonged exposure. For DVT/PE, IRs were similar between BARI doses and in line with published rates in RA.
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Patient Perspectives on Tapering Treatment in Rheumatoid Arthritis: A Qualitative Study
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Objectives: Optimal approaches to reducing treatment in people with rheumatoid arthritis (RA) whose disease is in remission is of interest to clinicians and researchers. The goal of this study was to understand patient perspectives and experiences around treatment tapering in RA with an aim to inform clinical practice and a planned pragmatic randomized controlled trial (RCT).
Methods: We conducted focus groups that included 28 adults with RA at two rheumatology

clinics in Calgary and Montreal, Canada. Study participants were adults (age>18) receiving care by a rheumatologist. One-to-one interviews and focus groups that lasted between 1.5 and 2 hours were held. Using a semi-structured interview guide, participants were asked to discuss their experiences, preferences and priorities for reducing RA treatments and their thoughts and attitudes towards a planned RCT. Sessions were audiotaped and transcribed. A pragmatic thematic analysis was conducted to identify major themes and to describe the different aspects of tapering considerations.
Results: Twenty-eight adult patients (68% female) were recruited to participate in either one-to-one interviews (n=6) or focus groups (n=12 in Calgary, n=10 in Montreal). Patients reactions to the proposal of conducting trials to taper treatments ranged from wary to enthusiastic. Almost all expressed a preference for shared decision-making and working with their own rheumatologist when deciding if, when, and how to taper treatments. Factors such as disease severity at onset, time needed to achieve remission, durability of remission, general concerns about medications, cost considerations, and previous tapering experiences also influenced interest in tapering treatments. Several expressed concern about how closely disease activity would be monitored, having timely access to their rheumatologist in the event of a flare, and whether disease control could be regained if a major flare occurred. A few patients indicated that while they had reservations about reducing treatment when their disease was well controlled, they would be willing to participate in tapering research to help advance science and help others. Many expressed interests in learning about how diet, exercise and self-management strategies could potentially increase the chance of tapering success.
Conclusion: Patients perspectives on treatment tapering vary widely and are influenced by many factors including their disease and medication experiences, safety concerns, timely access to their rheumatology team, and regaining control of their disease in case of a flare. Opportunities for shared decision-making, timely access to the clinical team and an individualized approach were expressed by patients for decision-making in practice and when considering participation in tapering trials.

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Mortality Associations in Rheumatoid Arthritis Patients in Saskatchewan

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Objectives: Rheumatoid Arthritis (RA) is a chronic inflammatory musculoskeletal disease with a prevalence of approximately 1%. Previous studies indicate that mortality rates in patients with RA may be higher than in the general population. The goal of this study is to review the primary causes of death for patients with RA who have died in hospital in Saskatchewan between April 1, 2008 and March 31, 2018.
Methods: A chart review of in-hospital mortality cases was conducted to identify charts that contain RA as a diagnosis (ICD-9 code -714 and ICD-10 codes M05 and M06) and the disposition indicator for death in hospital. Information collected includes demographics, cause of death, comorbidities, and medications. Causes of death were reviewed and major categories identified. These were: respiratory, infection, cardiac, and other.
Results: 101 charts met the search criteria, containing RA either as the cause of death or a contributing factor in hospital stay. Preliminary analysis of 68 case charts in Saskatoon and Regina indicate that 62% (42) were female, and the mean age of death was 69.7 years (SD=12.7). Respiratory causes accounted for 42.6% of deaths, infections for 22.1%, and cardiac causes for 19.1%. 16.4% of deaths were due to a variety of other causes. Variation was found in

coding across the province in the inclusion of RA as a contributing diagnosis on the hospital discharge/death certification.
Conclusion: The limited number of charts meeting the search criteria would suggest there is under-capture of RA in hospital charts. Of the charts reviewed, respiratory causes account for the largest proportion of deaths in RA patients who died in hospital, followed by infectious causes. Determining the profile of RA mortality in the Saskatchewan population will help inform short and long-term planning focused on primary prevention, treatment, and monitoring. This will support development of improved care models for the province.

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Assessment of Pain Reduction with Baricitinib in Patients with Conventional Synthetic DMARD-Refractory Rheumatoid Arthritis

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Objectives: Patients with rheumatoid arthritis (RA) often experience pain, a key symptom influencing quality of life and other patient-reported outcomes. Baricitinib (BARI) 2 mg and 4 mg once daily demonstrated significant clinical improvements compared to placebo (PBO) in the phase 3 study of RA patients with inadequate response (IR) or intolerance to conventional synthetic disease-modifying antirheumatic drugs (csDMARDs), including methotrexate (MTX), and who have not previously been treated with a biologic DMARD (RA-BUILD; NCT01721057). The objective of this post hoc analysis of RA-BUILD was to evaluate effects of BARI on pain reduction overall and in subgroups delineated by severity of baseline pain and csDMARD use.
Methods: 684 patients were randomized to PBO (n=228), BARI 2 mg (n=229), or 4 mg (n=227) once daily for 24 weeks, with the primary endpoint being ACR 20 response at Week 12. Pain was assessed using a visual analog scale (VAS, 0-100 mm) at each study visit. The proportion of patients achieving ≥30%, ≥50%, and ≥70% pain reduction from baseline at Weeks 12 and 24 of treatment was compared between BARI 2 mg or 4 mg vs PBO using logistic regression models. Pain reduction was compared within each subgroup category (baseline pain <median [60 mm] vs ≥median; concomitant use of MTX, non-MTX and 2 csDMARDs). Missing pain values were imputed using modified last observation carried forward.
Results: Among all the patients at baseline, 7% of patients were not receiving a csDMARD; 49% were on MTX monotherapy, 16% on a non-MTX csDMARD, 25% on double and 3% on triple csDMARDs. Mean baseline pain scores were 57, 60, and 57 mm for PBO, BARI 2 mg, and BARI 4 mg, respectively. At Weeks 12 and 24, significantly more patients achieved ≥30%, ≥50%, and ≥70% pain reduction with BARI 2 mg or 4 mg vs PBO ($P<0.05$, for all comparisons). The proportion of patients achieving ≥50% pain reduction for PBO, BARI 2 mg, and BARI 4 mg, respectively, was 27%, 50%, and 41% at Week 12 and 37%, 48%, and 52% at Week 24. Similar trends were observed in subgroup analyses based on baseline pain category and use of MTX, non-MTX, and 2 csDMARDs.
Conclusion: At Weeks 12 and 24, BARI 2 mg or 4 mg provided greater pain reduction in csDMARD-IR patients with RA compared with PBO, in all patients and in patients differing in

baseline pain severity and concomitant csDMARD use.

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Reduction in Fatigue and Pain are Associated with Improved Work Productivity in Patients with Rheumatoid Arthritis

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Objectives: In this post hoc analysis of RA-BEAM, the relationship between fatigue and pain with work productivity was assessed.

Methods: Fatigue was measured with the Functional Assessment of Chronic Illness Therapy-Fatigue (FACIT-F, range 0-52, higher scores represent less fatigue) and pain with the patient's assessment of pain (0-100 mm VAS, higher scores represent greater pain). The Work Productivity and Activity Impairment Questionnaire-RA (WPAI-RA) instrument evaluated the percentages of activity impairment due to RA (impairment in regular daily activities), work-time missed due to RA (absenteeism), impairment while working due to RA (presenteeism), and overall work impairment due to RA (work productivity loss). Analyses were based on pooled data from randomized patients who received ≥1 dose of study drug. Analyses for impairment in regular daily activities included all patients and for absenteeism, presenteeism, and work productivity loss, patients employed both at baseline and at Weeks 12 or 24 were included. Pain was divided into pain reduction groups (<30%, 30%–<50%, ≥50%) and actual pain score (≤10 mm, >10–≤20, >20–≤40, >40 mm); fatigue was divided into fatigue improvement groups (<3.56, ≥3.56) and actual FACIT-F normative value score (<40, ≥40). Pairwise comparisons on improvement in WPAI-RA scores between pain/fatigue reduction groups at Weeks 12 and 24 were assessed by ANCOVA.

Results: At baseline across treatment groups, patients reported impairment in all of the WPAI-RA domain scores (absenteeism: 12-13%, presenteeism: 42-46%, work productivity loss: 45-49%, and activity impairment: 56-58%). Patients who reported lower levels of pain and fatigue tended to experience greater improvement in presenteeism, work productivity, and regular daily activities compared to patients with higher levels of pain or fatigue. When patients reached a minimal pain level (pain VAS≤10 mm), no significant differences were observed in presenteeism and work productivity between patients with different levels of fatigue whereas regular daily activity continued to improve as fatigue improved (p≤0.001). No trends were observed with absenteeism. Similar results were observed by treatment group. Among patients reporting pain VAS>40 mm, improvement in WPAI domain scores were greater in those with FACIT-F scores≥40.

Conclusion: Reductions in pain and fatigue were associated with improved regular daily activity, presenteeism, and work productivity in RA, with larger reductions related to more improvement. When patients achieved minimal levels of pain, similar improvements in presenteeism and work productivity were observed regardless of fatigue level.

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Assessment of Pain Relief with Baricitinib in Patients with Refractory Rheumatoid Arthritis

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Objectives: Baricitinib (BARI) 2 mg and 4 mg once daily demonstrated significant clinical improvements compared to placebo in the phase 3 study of rheumatoid arthritis (RA) patients on 1 or 2 cDMARDs with an inadequate response or intolerance to ≥1 tumor necrosis factor (TNF) inhibitors (bDMARD-IR) (RA-BEACON). In this RA population, patients often experience pain, a key factor influencing quality of life. The objective of this post hoc analysis was to characterize the effects of BARI on pain relief by baseline pain and RA treatment history.

Methods: 527 patients were randomized to placebo (n=176), BARI 2 mg (n=174), or 4 mg (n=177) once daily for 24 weeks. The time of the primary endpoint was Week 12. Pain was assessed using a visual analog scale (VAS, 0-100 mm) at each study visit. The proportion of patients achieving ≥30/50/70% pain relief at Week 12 was compared between BARI 2 mg or 4 mg vs placebo using logistic models. The treatment comparisons within each subgroup category (pain < median [68] vs ≥median, number of prior TNF inhibitors [1 vs >1] and prior bDMARDs [<3 vs ≥3]) on pain relief were performed. Missing pain values were imputed using modified last observation-carried-forward (mLOCF).

Results: Mean baseline pain scores were 65, 62, and 66 mm for placebo, BARI 2 mg, and BARI 4 mg, respectively. Approximately 40% of patients had received >1 TNF inhibitor and a quarter of patients had received ≥3 bDMARDs, representing patients with highly refractory disease. At Week 12, more patients achieved ≥30%, ≥50%, and ≥70% pain relief with BARI 2 mg or 4 mg vs placebo regardless of baseline pain. Prior TNF inhibitor history appeared to influence the achievement of ≥70% pain relief but had limited effect on the ≥30% and ≥50% pain thresholds. Variability in response for the 3 treatment groups was observed at the different pain relief thresholds for patients with <3 vs ≥3 bDMARDs. Regardless of treatment history, patients receiving BARI 2 mg or 4 mg were more likely to reach all pain relief thresholds than placebo.

Conclusion: BARI 2 mg or 4 mg provided greater pain relief in bDMARD-IR patients with RA compared with placebo in all patients and in patients with different baseline pain severity and prior treatment history.

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Effects of Strength Training on Participation and Health Related Quality of Life in Rheumatoid Arthritis

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Objectives: The physical, emotional, and social burden associated with RA often limits participation in social roles and activities and results in poor health-related quality of life (HRQL). The goal of this pilot RCT was to compare the impact of two exercise programs (progressive resistance training + flexibility [PRT+FLEX] vs. flexibility [FLEX; range of motion]) on physical function, participation and HRQL in individuals with RA, and assess the feasibility of methods and measures to prepared for a fully powered study.

Methods: Participants were adults with RA who were sedentary and received clearance to exercise. Participants provided sociodemographic information and completed validated questionnaires assessing physical function, participation, HRQL, exercise confidence, and

enjoyment. The 400m walk was used to assess performance. Next, participants were randomized to 12 weeks of either: 1) progressive resistance training and flexibility exercises (PRT+FLEX); or 2) FLEX exercise only. PRT+FLEX included two supervised sessions using strength training equipment and one home-based session using elastic resistance bands each week. The FLEX group completed the same FLEX exercises at home. Change between groups over time was compared using repeated measures ANOVA.
Results: Participants were mostly female (94%) and white (78%) with a mean (SD) age of 38 (19) years and RA duration of 8 (5) years. Adherence to the training sessions was 88%. Significant group X time interactions reflecting greater improvements for PRT+FLEX vs. FLEX were evident in 400 m walk time ($p = 0.05$), participation ($p = 0.02$), fatigue ($p = 0.03$), pain ($p = 0.02$), patient global ($p = 0.01$),physical activity enjoyment ($p = 0.03$), anxiety (trend; $p = .08$), and patient-reported disease activity ($p = 0.02$). Both groups improved significantly in physical function (PROMIS PF 4a, $p = 0.002$; MDHAQ, $p = 0.005$), sleep ($p = 0.006$) though the magnitude of improvement was much greater in the PRT+FLEX group, the interaction was not statistically significant. There was also a trend for less pain interference ($p = 0.07$) in all over time. Depressive symptoms were low at baseline and 12 weeks in both groups.
Conclusion: As compared to those who completed FLEX, 12-weeks of PRT+FLEX was associated with significantly improved 400 m walk times, perceived well-being, fatigue, and pain. Attendance at supervised classes was high, exercise enjoyment increased, and disease activity decreased significantly more in the PRT+FLEX group. There were no injuries or adverse outcomes in either group. These preliminary results suggest that resistance training RA and may offer new opportunities to improve participation and HRQL in people with RA.

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Dose Reduction of Baricitinib in Patients with Rheumatoid Arthritis Achieving Sustained Disease Control: Results of a Prospective Study

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Objectives: In patients (pts) with RA and inadequate response (IR) to DMARDs, phase 3 studies demonstrated efficacy of baricitinib 2-mg and 4-mg. The objective of this study was to investigate the effects of baricitinib dose step-down in patients who achieved sustained disease control with baricitinib 4-mg.
Methods: Patients with RA participating in the Bari ph3 long-term extension study who received Bari 4-mg for ≥15 months and who achieved sustained low disease activity ([LDA] - CDAI score ≤10) or remission ([REM] - CDAI ≤2.8) ≥3 months apart were re-randomized in a blinded manner to continue Bari 4-mg or step down to 2-mg. Patients could rescue to Bari 4-mg. Efficacy and safety were assessed through 48 weeks following re-randomization.
Results: The majority of patients in both groups maintained the state of LDA or REM over the 48 weeks. However, dose reduction to 2-mg resulted in small statistically significant increases in disease activity at 12, 24, and 48 weeks. Dose reduction also resulted in a shorter time to relapse (defined as loss of step-down eligibility criteria); significantly more patients relapsed over 48

weeks compared to the 4-mg group (p=0.001). Higher proportion of the patients reported LDA (80.2% vs 67.6%) and remission (38.8% vs 32.2%) with baricitinib 4-mg compared to 2-mg at Week 48, respectively. Rescue rates were 8.3% for baricitinib 4-mg, and 16.6% for baricitinib 2-mg. Most rescued patients could regain LDA or REM. Dose reduction was associated with a numerically lower rate of non-serious infections; rates of serious adverse events and adverse events leading to discontinuation were similar across groups.
Conclusion: These data indicate that disease control was better maintained with baricitinib 4-mg than 2-mg. However, most stepped-down patients could maintain LDA or REM, or recapture control with re-introduction of the 4-mg dose. Stepping down to a dose of 2-mg daily may be a viable option for many patients who have achieved sustained LDA or REM on the 4-mg dose.

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Relationship between Fatigue and Sleep in Rheumatoid Arthritis

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Objectives: Objectives: To evaluate relationships between fatigue and sleep in a rheumatoid arthritis (RA) outpatient clinic population.
Methods: Methods: Consecutive RA patients were invited to participate in a self-administered questionnaire study that included 10-centimeter (cm) visual analogue scales (VAS) for fatigue, pain, global functioning, and sleep assessment instruments including the Berlin Questionnaire for categorization of risk for obstructive sleep apnea (OSA), the Epworth Sleepiness Scale (ESS) and the Pittsburgh Sleep Quality Index (PSQI). Other instruments included were the modified Health Assessment Questionnaire, stress scores, the Center for Epidemiologic Studies—Depression score, the 36-item short form quality of life measure, and the Rheumatoid Arthritis Disease Activity Index.
Results: Results: The mean fatigue score for the 134 RA participants was 4.77 cm (SD: 3.00) and correlated significantly with multiple variables including pain and the sleep assessment instrument scores. Multiple regression modeling identified pain (coefficient 0.502), the ESS (coefficient 0.164) and PSQI (coefficient 0.197) scores to provide a predictive model ($p<0.001$) for fatigue in this study population. Dividing the population into low and high fatigue severity groups based on the mean VAS score, revealed the odds ratio for having higher fatigue severity for those at high risk of OSA (Berlin Questionnaire) was 3.14, and for those with an abnormal ESS was 4.81.
Conclusion: Conclusions: Although pain exhibited the strongest relationship with fatigue, sleep related questionnaire scores were also predictive of fatigue severity. Screening for sleep disorders in RA patients with persistently high levels of fatigue is suggested.

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Seasonal Variations in Physical Activity in Patients with Rheumatoid Arthritis

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Objectives: The aim of this study was to investigate the levels of physical activity engagement between winter and summer seasons for Rheumatoid Arthritis (RA) patients living in Saskatchewan.
Methods: Using paper questionnaires, survey packages containing a study invitation letter, information booklet, consent form, survey questionnaire, and a pre-stamped return address

envelope were mailed out to RA patients identified from an outpatient rheumatology clinic database. Survey packages were mailed out during the winter season (November 2017 to February 2017) and during the spring/summer seasons (April 2017 to July 2017). Survey questionnaires contained questions requesting demographic information as well as self-assessment measurement questionnaires validated within RA population. These measurement instruments included: Rheumatoid Arthritis Disease Activity Index (RADAI), Global Health Scale (GHS), Modified Health Assessment Questionnaire (mHAQ) and the Godin-Shephard Leisure-Time Physical Activity questionnaire (LTPAQ). Paired sample t-test was done to identify seasonal variations between seasons for the self-assessment questionnaires and Pearson correlation studies were carried out to determine possible linear relationships between RA disease activity and self-reported physical activity between seasons.
Results: Sixty patients completed the survey package during the winter season while sixty-four participated for the summer season survey. Responses indicated that overall most participants reported a sedentary level of physical activity regardless of the season, though a proportion stated that physical activity engagement was higher in the summer than in the winter season. Paired sample t test showed no statistically significant differences in outcome measures between both seasons (p-values > 0.05), except with the GHS (p-value = 0.03). mHAQ and LTPAQ showed a weak correlation for both winter and summer seasons (winter: r=-0.381, p-value = 0.003; summer: r=-0.252, p-value = 0.046).
Conclusion: In this study, levels of self-reported physical activity by RA patients in Saskatchewan were generally sedentary though there was some increase in the summer than in the winter season.

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A Comparison of Patient Versus Physician Reported Symptom Onset Dates in Early Rheumatoid Arthritis

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Objectives: To compare patient versus physician reported timing of early rheumatoid arthritis (ERA) onset in a large multi- centre incident RA cohort.
Methods: Data were from 2,683 patients with early classifiable and/or suspected RA (persistent symptoms <1 year; 76% met 2010 ACR RA criteria) enrolled in the Canadian Early ArThritis CoHort (CATCH) from January 2007 to March 2017. Patients completed self- report questionnaires including timing of RA symptom onset. Date of onset of persistent synovitis was also recorded by the treating rheumatologist during clinical assessment. Descriptive statistics were used to summarize distributions of MD vs. patient-reported RA symptom duration. We compared baseline characteristics across groups with less than vs. greater than 30 days difference in MD vs. patient reported symptom duration using ANOVA. The 30-day cut-off was chosen to account for differences in reporting of a month. Simple, and multivariable linear regression with stepwise selection ($p<0.1$) was used to identify age and sex-adjusted predictors of greater

discrepancies in reported onset timing among baseline ERA characteristics.
Results: Median (IQR) patient-reported symptom duration was 178 days (163), physician-reported duration was 166 (138), and median (Q1, Q3) difference was 0 (0, 0). 281 (10%) patients reported symptom duration >1 year. 743 (27%) of patient-physician reported symptom durations differed by 30 days or more [497 (18%) patients-reported symptom onset preceded physician-reported onset date, and 246 (9%) physician-reported onset preceded patient-reported onset date]. 393 (15%) of patient-physician reported symptom durations differed by 90 days (3 months) or more, and 255 (10%) differed by 180 days (6 months) or more. Patients who reported symptom onset 30 days or more before their rheumatologist were more often younger with lower baseline DAS28, swollen joint counts, and ESR. Patients reporting onset 30 days or more after their rheumatologist were more likely RF positive with higher ACPA titres ($p<0.05$). Univariate predictors of greater differences in onset dates included ethnicity, income, steroid use, OA, fibromyalgia, and smoking ($p<0.1$). In multivariable regression adjusted for age and sex, OA, fibromyalgia, and current smoking remained significant predictors ($p<0.05$).
Conclusion: More than 1⁄4 of ERA patients reported differences of 30 days or more in symptom onset from their rheumatologist. Differences in patient vs. physician reported symptom onset dates could have important implications for defining "the window of opportunity" for initiating RA treatment and the likelihood of achieving treat-to-target outcomes.

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Characterizing Palindromic Symptoms in Early Rheumatoid Arthritis: Results from the Canadian Early Arthritis Cohort Study

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Objectives: Palindromic rheumatism (PR) (transient acute attacks of articular and/or periarticular inflammation) may progress to rheumatoid arthritis (RA). How often early RA (ERA) patients report joint symptoms that come and go prior to diagnosis and how RA presentation may differ in this patient subset is uncharacterized. This study compared ERA patients who did versus did not report a history of transient episodes of joint inflammation preceding RA diagnosis.
Methods: Data were from patients with early classifiable or suspected RA according to their rheumatologist (symptoms <1 year; 83% met 2010 ACR/EULAR criteria) enrolled in the Canadian Early ArThritis CoHort (CATCH) in 2017 to 2018 who completed a new baseline questionnaire on prior inflammatory joint symptoms that "come and go". Chi-square and t-tests were used to compare baseline sociodemographic and RA characteristics in ERA patients with versus without a reported history of prior palindromic symptoms. Simple, and multivariable logistic regression with backward selection ($p<0.1$) were used to identify age and sex-adjusted predictors of palindromic symptoms among baseline ERA characteristics.
Results: 154 ERA patients were included; 66% were female and mean (sd) age was 54 (15) years. 83 (54%) patients reported having any previous joint pain and swelling prior to current episode; 65 (42%) endorsed prior episodic joint pain and swelling, of whom 31 (48%) reported

transient joint symptoms for over six months. Patients reporting previous palindromic symptoms were more often female, RF positive, ACPA positive, had more comorbidities, and lower CRP, swollen joints, and baseline DAS28 ($p<0.05$). Univariate predictors of palindromic symptoms included female sex, RF positivity, higher income, comorbid OA, back/spine problems, and depression, higher rheumatic disease comorbidity index, and lower swollen joint count, CRP, DAS28, and physician global assessment of disease activity ($p<0.1$). In multivariable regression, RF positivity, depression, and higher income remained significant predictors of prior palindromic symptoms ($p<0.05$). Smoking was potentially associated with an average 3-fold increase in prior palindromic symptoms, though the relationship was not statistically significant in adjusted models.

Conclusion: ERA patients commonly self-reported experiencing transient episodes of inflammatory arthritis prior to being diagnosed with RA; however, whether these symptoms were actual PR cannot be confirmed. ERA patients who endorsed having joint symptoms that come and go prior to RA diagnosis were more likely RF positive with higher income and more comorbidities at ERA cohort entry, but median time to RA onset was not different.

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Trajectory Analysis of Combined Disease Activity and Physical Component Summary Scale in an Inception Cohort of Adults with Systemic Lupus Erythematosus: Latent Classes Inform Different Patterns

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Objectives: Patients with SLE have decreased health-related quality of life (HR-QoL) compared to both the general population and other common chronic diseases. The relationship between disease activity and the physical functioning aspects of HR-QoL is complex. This study aims to: 1) explore if there is latent joint evolution of physical functioning and disease activity trajectories; and 2) identify membership predictors of these latent classes.

Methods: This retrospective longitudinal study used single-centre inception adult patient with data over 10 years. Physical HR-QoL was measured using patient-reported annual Medical Outcomes Study Short Form 36 (SF-36). The physical component summary (PCS) scale was used and patients with ≥2 SF-36 questionnaires, within the first 2 years of diagnosis, were studied. Disease activity was measured by adjusted mean SLEDAI-2K (AMS) for each year. Latent class trajectory modelling was used to combine PCS and AMS trajectories. Models with 2 to 6 classes were examined. The best model was determined by a combination of clinical and statistical interpretability. Class membership characteristics were explored by examining for distribution of clinical features, damage (SDI), cumulative glucocorticoid dose, and fibromyalgia presence.

Results: Of 826 inception patients, 222 were analyzed. Mean age at SLE diagnosis was 35.5 + 13.2 years. 5 distinct classes of joint PCS and AMS trajectories were identified: 1) low PCS, very low AMS (18.9%); 2) high PCS, very low AMS (17.1%); 3) very low PCS, moderate AMS (25.3%); 4) high PCS, moderate AMS (29.7%); and 5) low PCS, high AMS (9%). More patients in classes 1 and 3 had fibromyalgia than other classes, suggesting this affected their physical HR-

QoL more than disease activity. Fewer class 5 patients had fibromyalgia, though more compared to class 2 and 4. Class 1 had more activity in CNS and skin systems, more damage, and higher cumulative glucocorticoid dose (30.2±8.2 vs 20.7±8.7 grams) compared to class 2. Class 3 had more activity in skin and musculoskeletal systems, more damage, and more glucocorticoids (38.0 ± 17.9 vs 29.2 ± 11.5 grams) compared to class 4. Class 5 had significant vasculitis and renal involvement, damage, and the highest cumulative dose of glucocorticoids.
Conclusion: There are 5 distinct joint classes of physical HR-QoL (PCS) and disease activity (AMS). PCS trajectories appear to be more related to the presence of fibromyalgia than disease activity. Identification and support of fibromyalgia may be able to improve the physical HR-QoL of close to 50% of adult SLE patients.

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Needs and Barriers to Pregnancy Counselling in Women with SLE

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Objectives: Published data suggest barriers to pregnancy counselling exist among women with SLE; however the specific needs of this population are not well known. Using focus groups, we assessed the needs for pregnancy counselling in SLE women and identified potential clinical and psychosocial barriers and facilitators to enhance peripartum care.
Methods: Our focus group study included: 1) SLE women contemplating pregnancy or trying to conceive, 2) SLE women who were pregnant or had recently been pregnant (≤2 years), and 3) healthcare professionals (HCP) such as rheumatologists, obstetrician-gynecologists, and nurses. Participants were recruited through purposive sampling from a single tertiary healthcare centre. We analyzed the data thematically using grounded theory.
Results: Twenty-four SLE women and 14 HCP participated in 11 unique focus groups that lasted 60 minutes each. The following themes emerged: SLE women groups- 1) Anxiety: Participants feared their disease would affect the health of offspring, prevent breastfeeding and/or impair their ability to care for a newborn. They also anticipated extra stress and fatigue associated with pregnancy. The knowledge that their pregnancy was considered “high risk” also generated anxiety. 2) Confusion: Information on SLE pregnancy was limited and vague, and rarely volunteered by the physician without a woman explicitly voicing her desire to conceive. 3) Frustration: Participants felt their concerns were not taken seriously by family/friends/other members of their support system since few understand SLE and lupus-related pregnancy concerns. Planning a pregnancy at a time of disease quiescence was also frustrating. Not remembering some of their questions or time limitations during medical encounters was a common source of frustration. HCP groups- 1) Timing: All HCPs agreed that pre-conception counselling is critical to determine disease activity, assess the safety of pregnancy, and manage patient anxieties. 2) Communication: Ongoing discussions about pregnancy planning at regular intervals can help with the management of medications, including contraceptives. Patients often receive conflicting information from different specialists, as well as pharmacists. 3) Resources: Limited access to care (appointment availability, time with patient, family doctor shortage) and limited educational materials specifically for SLE pregnancies. Potential strategies to address these barriers might include facilitating access to psychosocial support during pregnancy,

developing educational tools, providing a checklist of questions for medical encounters, and designing prenatal classes dedicated to SLE women and their partners.
Conclusion: Our qualitative study provides important insights into the needs and barriers to effective pregnancy counselling in SLE women, and suggests strategies that could be tested in future studies. Supported by a CIORA grant.

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The Lupus Severity Index Accurately Identifies Patients with Severe SLE in a Multi-Ethnic Cohort

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Objectives: The Lupus Severity Index (LSI)* was recently proposed to stratify patients by disease severity for clinical research. The LSI ranges from 0-10, is calculated using ACR classification criteria (ACRc) and demonstrated high predictive accuracy for severity anchored to major immunosuppressive drug use. We investigated the performance and characteristics of the LSI in a large multiethnic lupus cohort.
Methods: Patients from a single academic center were followed from 1990-2016 using a custom database. Records of all SLE patients were abstracted. Variables included birthdate, diagnosis date, self-reported ethnicity, ACRc, SLICC Damage Index (SDI), treatment and date of death. Ethnicity was categorized into White (WHI), Asian (ASN), Indigenous (IND), and Other. The LSI was calculated from ACRc, and compared between ethnic groups and demographic variables known to be associated with severe SLE using t-tests, ANOVA, Pearson correlation coefficient and logistic regression.
Results: Records of 832 SLE patients were abstracted: 497 (60%) WHI; 220 (26%) IND; 91 (11%) ASN; 24(3%) Other. Mean age was 49±16 years, mean disease duration 15±11 years, 90% female, mean age at diagnosis 35±15; 163 (20%) of patients had died. The mean LSI was 6.9±1.7, range 3.2-9.7. The distribution of the LSI was similar to that in the original dataset. The area under the ROC curve, measured against prescription of major immunosuppressive drugs, was 0.69 (95%CI 0.65-0.73). LSI was higher in males compared to females (7.3±1.6 vs. 6.9±1.7; p-0.019), and was negatively associated with onset age (Onset<18yrs LSI=7.8±1.3; 18-50yrs LSI= 6.8±1.7; >50yrs LSI= 6.6±1.6; p<0.001)> LSI correlated with SDI(Pearson 0.28, p<0.001), and was a predictor of accruing any damage (SDI>1) (OR1.2 95% CI 1.1-1.3).LSI was higher in non-whites compared to whites: WHI LSI=6.6±1.7; IND LSI=7.2±1.6;Other LSI=7.3±1.3; ASN LSI 8.1±1.1; p<0.001). LSI was a predictor of early mortality (Death at age<50, or disease duration<10 years): OR 1.2; 95%CI 1.0-1.3). The distribution of the LSI varied by ethnic group with more uniformly severe disease in ASN patients compared to WHI and IND.
Conclusion: Similar to the original publication, a higher LSI correlated with male sex, younger onset age, and non-white ethnicity; all groups shown to have more severe SLE. LSI was also a predictor of damage and early mortality and we found the distribution of LSI to differ between ethnicities. These findings confirm the utility of the LSI in stratifying patients by severity and supports further exploration of the LSI to investigate contributors to severe SLE. *Bello GA et al. Lupus Science & Medicine 2016.

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Systemic Lupus Erythematosus in a Patient with Epidermolytic Ichthyosis

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Case Report: Epidermolytic Ichthyosis (EI) is a rare genetic skin condition featuring hyperkeratosis and scaling of the skin over the palm, soles, and joint areas. Although there is no established association with autoimmune disease, the skin manifestations of this disease can make examination for synovitis difficult when assessing for rheumatologic disease. To date there has been only one described case of systemic lupus erythematosus (SLE) in the setting of EI.
A 52-year old female with EI was referred for rheumatologic consultation after experiencing 10 months of worsening inflammatory joint pain in her hands, knees, and shoulders. She characterized the pain as worst in the morning, lasting up to an hour, and improving with activity. Although she denied many symptoms of connective tissue disease, she did indicate photosensitivity, including worsening of her ichthyosis rash with sun exposure. She also denied any family history of autoimmune disease. Examination revealed several tender large joints; however, assessment of her smaller joints was difficult as the hyperkeratotic nature of her active skin condition made it difficult to differentiate from synovitis. An inflammatory arthritis workup showed ANA positivity along with an anti-dsDNA titre of 362 and anti-RNP titre of 403. A subsequent skin biopsy confirmed a diagnosis of epidermolytic ichthyosis without signs of lupus. There were no abnormalities to suggest renal, hematologic, or pulmonary involvement. Given her serology as well as her ongoing joint pain and photosensitivity, she was diagnosed with systemic lupus and started on hydroxychloroquine for the management of joint disease. She was also started on soriatane for the management of her cutaneous disease with marked improvement noted in her rash. She has had moderate improvement of her joint symptoms since starting hydroxychloroquine.
This case highlights an unusual case of SLE in the setting of EI. It presents a diagnostic dilemma in terms of differentiating the hyperkeratotic nature of the skin condition from the arthritis and photosensitivity that can be seen in lupus. Thorough serologic testing is important in assessing for potential connective tissue disease in patients with this genetic disease, and close follow-up is required to manage with antirheumatic drugs alongside the treatments for EI.

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"When is it Time to Cry Wolf?" Atypical Presentations of Systemic Lupus Erythematosus: A Case Report

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Case Report: A 31-year-old G2P2 female of African descent presented to hospital after a syncopal episode with visual blurring but without presyncope. Witnesses reported no seizure/post-ictal activity. Preceding admission, she had three days of isolated, progressive, throbbing, left-sided headaches, without nausea/vomiting, nor photophobia/phonophobia. She had no complaints of arthralgias, myalgias, rashes, ulcers, serositis, nor constitutional symptoms. There was no history of pulmonary, cardiac, nor gastrointestinal involvement. She is otherwise

healthy with only a history of iron deficiency anemia on ferrous fumarate. Last pregnancy was over two years ago. She has never used oral contraceptives (OCP). Family history is unremarkable.

On exam, she was alert and oriented. On presentation, she was afebrile, blood pressure 117/98, heart rate 80, breathing comfortably on room air. Pupils were equal/reactive without extra-ocular movements nor visual field defects/diplopia. Neurological exam revealed no cranial nerve deficits, weakness, paresthesia, nor cerebellar/gait abnormalities. Plantar response down-going. She had generalized lymphadenopathy with multiple axillary and inguinal nodes measuring > 3cm. Rest of the exam was unremarkable.

Initial investigations revealed a low hemoglobin (89g/L), WBC (3.2x10^9/L), RBC (3.35x10^12/L), and neutrophil (1.7x10^9/L) counts, with elevated ESR (61mm/hr) and normal platelets (155x10^9/L). Unenhanced head CT showed no acute ischemia/hemorrhage but a small hyperdense region by the left transverse sinus. CT venogram confirmed a cerebral venous sinus thrombosis (CVST) of the left distal transverse sinus. While in hospital, she experienced a partial seizure that was attributed to the CVST after a negative workup for acute pathology. Thrombophilia workup was negative for APLA, protein C/S deficiency (0.73Uml), anti-thrombin III (0.89U/ml), and undetectable factor V leiden/prothrombin 20210G levels. Workup revealed strongly positive ANA (>1:640, speckled), anti-dsDNA (13IU/mL), anti-Sm (>8.0AI), and low C3 (0.85g/L). She was diagnosed with SLE by first presentation of CVST and generalized lymphadenopathy.

SLE is a chronic inflammatory condition that can affect any organ, manifesting in a myriad of clinical presentations. Distinguishing SLE from other likely diagnoses is challenging, especially when presenting complaints fall outside validated Systemic Lupus International Collaborating Clinics criteria. CVST and SLE associations are rare (particularly on initial presentation) but highlight this diagnostic challenge. Given the low prevalence and variable presentation of CVST (1.32/100,000/year), it can be difficult to diagnose and evidence behind optimal CVST anticoagulation is limited. SLE treatment depends on disease manifestation and is targeted to the presenting/active complaints. This patient's CVST was initially treated with enoxaparin and bridged to apixaban, was started on levetiracetam for seizure prophylaxis, and hydroxychloroquine.

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Evolution of Cognitive Function Over Time in Systemic Lupus Erythematosus – Cognitive Impairment Persists at 1 Year

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Objectives: Cognitive impairment (CI) is a common neurobehavioral manifestation of systemic lupus erythematosus (SLE). The objective was to determine the prevalence of CI and the change

over time in an SLE cohort employing a comprehensive battery (CB) of neuropsychological tests.
Methods: Consecutive SLE patients, aged 18-65 years, who attended a single centre (July 2016-October 2018) were included. Patients were administered the CB at baseline (T0), 6 months (T1) and 12 months (T2). Patients' scores were compared to a normative sample of age- and gender-matched healthy controls to obtain z-scores. CI was operationalized on the CB as a z-score of ≤-1.5 (as compared to the respective control stratification) on ≥2 domains. The following domains were studied: simple attention and processing speed, visual-spatial construction, verbal fluency, learning and memory, executive functioning and manual motor speed and dexterity.
Results: Two-hundred-forty-six patients (89.4% female) were enrolled, with mean age at SLE diagnosis of 27.6 ± 10.4 years and disease duration at enrolment of 14.34 ± 10.3 years. The prevalence of CI at T0 was 44.3% (109/246), at T1 29.2% (42/144) and at T2 41.1% (44/107). Of the 143 patients who had both T0 and T1 assessments, 75 (52.5%) remained stable with no-CI, and 35 (24.5%) had persistent CI. Thirty-three patients (23.1%) changed cognitive status from CI to no-CI or vice versa (18.2% and 4.9%, respectively). Of the 90 patients who had 3 assessments at T0, T1 and T2, 42 (46.7%) remained stable with no-CI and 16 (17.8%) had persistent CI across all three time points. Thirty-two patients (35.6%) changed cognitive status from CI to no-CI or vice versa (21.1% and 14.4%, respectively). Most affected domains in patients with persistent CI over 12 months were visual-spatial construction and learning and memory. Comparison of baseline characteristics between 16 patients with persistent CI and 42 patients with stable no-CI over 12 months revealed higher proportion of male patients among the persistent CI group (5/16 (31.3%) vs. 4/42 (9.5%), p=0.041). The proportions of glucocorticosteroid use and immunosuppressants were also higher in patients with persistent CI compared to patients with stable no-CI (62.5% vs. 38.1% and 75.0% vs. 57.1%, respectively); however, it was not statistically significant.
Conclusion: While cognitive function fluctuates over time in some SLE patients, 20% of patients experience persistent CI over 12 months. Our results advocate for close monitoring of cognition in patients with SLE and further research into the causes and nature of CI in SLE patients.

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Validity and Reliability of Patient Reported Outcomes Measurement Information System (PROMIS) Computerized Adaptive Tests (CAT) in a Canadian Cohort of Patients with Systemic Lupus Erythematosus

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Objectives: Patient-reported outcomes are an invaluable tool in clinical practice and are central in providing patient-centered care. There has been minimal research on the use of The Patient Reported Outcomes Measurement Information System (PROMIS) computerized adaptive test (CAT) in adults with systemic lupus erythematous (SLE). The present study aims to examine the

construct validity and test-retest reliability of the PROMIS CAT in a Canadian cohort of patients with adult SLE.
Methods: All consecutive adult (≥18 years old) patients with lupus and visiting a Canadian Lupus Clinic between July-September 2018 were approached to participate. Patients completed PROMIS CAT during their clinical visit assessing 14 domains of health, specifically: physical function, mobility, pain behaviour, pain interference, ability to participate in social roles, satisfaction with social roles and activities, fatigue, sleep disturbance, sleep-related impairment, applied cognition-abilities, applied cognition-general concerns, anger, anxiety, and depression. The construct validity (using spearman correlation, r) of the PROMIS CAT was evaluated against the commonly used legacy instruments, specifically: SF-36, LupusQoL, The Perceived Deficits Questionnaire (PDQ-20), Beck Depression Scale - 2nd edition (BDI-II), Beck Anxiety Inventory (BAI), the Assessment of Chronic Illness Therapy Fatigue Scale (FACIT), and the Epworth Sleepiness Scale. For intra-rater test-retest reliability (Intraclass Correlation Coefficient (ICC [2;1]) PROMIS was completed 7-10 days after baseline.
Results: Ninety-four patients (93.5% females) were enrolled with a mean age of 49.7± 14.3 years and mean disease duration of 19.7 ±12.8 years. A moderate-high correlation (r= 0.59-0.87) between PROMIS domains and the corresponding legacy instruments was demonstrated confirming PROMIS construct validity [e.g. r=0.80 for SF-36 Physical Functioning and PROMIS Physical Functioning domain and r=0.86 for FACIT-F and PROMIS Fatigue domain]. This was also applicable for depression, anxiety, and pain. Reliability: In 92 patients, good agreement was found for the majority of domains [ICC (2;1) range 0.64-0.93]. The lowest ICC [2;1] were identified for sleep disturbance (ICC 0.37, 95% CI:0.13-0.63) and fatigue (ICC 0.45, 95% CI:0.23-0.69) and pain domains. This may be explained by the daily variation in these domains.
Conclusion: This is the first study to confirm the construct validity and the reliability of PROMIS CAT in a Canadian adults SLE cohort. Compared to legacy instruments (such as SF-36), PROMIS CAT has moderate-high correlation and good-excellent reliability. PROMIS can assess an expanded number of content domains with lower patient burden, compared to legacy measures improving the participation of patients in their medical care.

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Does Renin Angiotensin System Blockade in Addition to Immunosuppressive Therapy Improve Proteinuria in Acute Lupus Nephritis?

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Objectives: Angiotensin converting enzyme inhibitors (ACEIs) and angiotensin receptor blockers (ARBs) are currently recommended for patients with lupus nephritis (LN) as an adjunctive therapy for proteinuria. However, that recommendation is mainly extrapolated from studies in diabetes, hypertension and IgA nephropathy. The aim of this study was to assess the impact of such treatment on proteinuria in active LN.
Methods: Patients from the Toronto Lupus Clinic who were treated with glucocorticosteroids (GCS) and mycophenolate mofetil (MMF, 2-3g/day) or azathioprine (AZA, 2mg/kg) for active LN since 2000 were included. Minimum follow-up was 12 months. Individuals with end-stage renal disease (eGFR≤15ml/min/1.73m2) or LN class VI at baseline were excluded. Patients were divided according to the concurrent treatment with ACEIs/ARBs or not. Demographic, clinical, immunological and therapeutic variables were compared at baseline; cumulative GCS dose and

blood pressure at baseline, 6 and 12 months were also assessed. Proteinuria (24h) and eGFR were compared at 6 and 12 months after therapy initiation. Complete renal response was defined as proteinuria<500mg/day. Statistical analysis was performed with SAS 9.4; $p<0.05$ was considered significant.

Results: One hundred forty patients were included (76 with concomitant ACEI/ARB treatment and 64 without). There were no differences regarding age, sex, disease duration and global disease activity at presentation. The initial serum creatinine was higher in the ACEIs/ARBs group (85.6±42 vs. 71.5±22.3mmol/L, p=0.018). There were no differences regarding the histopathologic class of LN and the activity/chronicity indices. Initial therapeutic approach was similar for both groups concerning glucocorticosteroids (at baseline and cumulatively over 12 months), immunosuppressives and antimalarials. Severity of proteinuria (2.2±1.5 vs. 2.2±1.8g/day, p=0.79) and nephrotic syndrome (proteinuria>3g/day) were also similar (15.6% vs. 20.3%, p=0.49). At 6 months, more patients in the non-ACEIs/ARBs group achieved complete remission [46.9% (n=30) vs. 35.5% (27), p=0.181]. Similar results were observed at 12 months [60.9% (n=39) vs. 50% (38), p=0.256]. Regarding proteinuria, there was a reduction of 63% in the non-ACEIs/ARBs treated group versus 59% in the ACEIs/ARBs treated group at 12 months. Estimated GFR was reduced by 3.5% in the ACEIs/ARBs group whereas it was increased by 2% in the untreated group.

Conclusion: Therapy with ACEIs/ARBs did not offer any significant benefit regarding proteinuria in patients with new-onset LN in the first 12 months after diagnosis. Patients on ACEIs/ARBs treatment showed a slight reduction of the eGFR over 12 months. Renin angiotensin system blockade may not be necessary in the acute phase of LN.

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Impact of Disease Course on Atherosclerotic Vascular Events, Osteoporosis and Osteonecrosis in Systemic Lupus Erythematosus

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Objectives: Disease course in systemic lupus erythematosus (SLE) follows three distinct patterns (prolonged remission, relapsing remitting and persistently active). The impact of these patterns on the development of specific co-morbidities, such as atherosclerotic vascular events (AVEs), osteoporosis and osteonecrosis are not known. The aim of the present study was to assess the incidence of such co-morbidities in the different courses of SLE in the long term.

Methods: The inception patients of the Toronto Lupus Clinic (enrolled within 18 months of diagnosis), with at least 10 years of follow-up were investigated. Prolonged remission (PR) was defined as a clinical SLEDAI-2K=0 [serology (anti-dsDNA antibodies and C3/C4 levels) excluded], achieved within five years since enrolment and maintained for ≥10 years. Relapsing-remitting (RR) pattern was defined based on ≥2 remission periods (one remission period equals two consecutive visits with a clinical SLEDAI-2K=0), while patients with no remission were categorized as persistently active (PA). Incidence rates for AVEs (cardiac, cerebrovascular and peripheral vascular disease), osteoporosis (according to the WHO definition) and osteonecrosis (confirmed radiologically) were calculated at 10 years and at the end of follow-up (median 17.5 years, maximum 35 years). Statistical analysis was performed with SAS 9.4 and Cochran-

Armitage trend test; $p<0.05$ was considered significant.
Results: Of 267 patients who fulfilled the inclusion criteria, 27 (10.1%) achieved PR, 180 (67.4%) were RR and 25 (9.4%) PA. At enrollment, there were no significant differences in demographic, clinical, immunological and therapeutic characteristics among groups. The cumulative incidence of AVEs at 10 years was 0, 2.7 and 4.3 events/100 patient-years ($p=0.002$) and 0.75, 6.4 and 8 events/100 patient-years at the end of follow-up ($p<0.001$) for the PR, RR and PA patients respectively. The rates of osteoporosis were 0.4, 7.6 and 8.5 events/100 patient-years at 10 years ($p<0.001$) and 6.6, 14.1 and 12.3 events/100 patient-years at a median of 17.5 years ($p=0.004$) for the PR, RR and PA patients respectively. Osteonecrosis cumulative incidence was 8.5, 10.3 and 12.4 events/100 patient-years at 10 years ($p=0.142$) and 10.7, 16.5 and 18 events/100 patient-years at 17.5 years (median), ($p=0.001$) for the PR, RR and PA patients respectively. No significant differences were observed between the RR and PA groups.
Conclusion: Disease course has a significant impact on the rates of AVEs, osteoporosis and osteonecrosis over time. Patients who achieved prolonged remission developed significantly fewer such co-morbidities whereas the differences between the RR and PA patients were not statistically significant.

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Predictors of End-Stage Renal Disease in Lupus Nephritis

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Objectives: End-stage renal disease (ESRD) is the most important complication of lupus nephritis (LN) and greatly affects mortality. Its incidence has been estimated at 17% at 10 years after LN diagnosis. The identification of predictive factors facilitates risk stratification and proper management. The aim of the present study was to define the predictors associated with ESRD development in a defined LN cohort.
Methods: Patients with LN (class II-V according to the International Society of Nephrology/Renal Pathology Society classification) were identified from Toronto Lupus Clinic. Individuals with ESRD (estimated glomerular filtration rate, eGFR≤15 ml/min/1.73m2) at the first two clinic visits were excluded. Patients were followed until the occurrence of ESRD (defined as two consecutive visits with an eGFR≤15 ml/min/1.73m2 or initiation of dialysis) or last visit. They were divided in two groups (ESRD or not) and compared as per the demographic, histopathological, clinical and therapeutic variables. Statistical analysis was performed with SAS 9.0; $p<0.05$ was considered significant. Time-dependent Cox regression analysis was performed for the identification of predictors.
Results: LN was diagnosed in 560 patients, 43 of whom developed ESRD (7.7%) after 7.5±6.4 years. There were no differences in demographic variables at baseline. Concerning the histopathologic class, diffuse proliferative LN (class IV) was more frequent in the ESRD than the non-ESRD patients (51.2% vs. 28.4%, $p=0.033$). Baseline serum creatinine was higher in the ESRD patients (152±94 vs. 85±41mmol/L, $p<0.001$); consequently, eGFR was lower (61±37 vs. 93±37ml/min/1.73m2 respectively, $p<0.001$). Baseline hypertension was more frequent in the ESRD patients (58.1 vs. 38.3%, $p=0.015$). Concerning laboratory values, initial proteinuria was more severe in the ESRD patients (3.2±2.5 vs. 1.9±2.8g/day, $p=0.027$) whereas hemoglobin was lower (113±18 vs. 120±20g/L, $p=0.02$). There were no differences in therapeutic variables (dose of glucocorticosteroids, type and dose of immunosuppressives and antimalarials). Patients with ESRD were using angiotensin converting enzyme inhibitors or angiotensin receptor blockers

more frequently (34.9 vs. 21.3%, p=0.04). Multivariable Cox regression analysis revealed that baseline hypertension (HR=10.1, 95%CI=4.34-23.8, p<0.001), baseline serum creatinine (HR=1.009, 85%CI=1.008-1.01, p<0.001) and initial prednisone dose (HR=1.016, 95%CI=1.001-1.031, p=0.03) were predictive for ESRD development. Normal hemoglobin at baseline was protective (HR=0.97, 95%CI=0.95-0.99, p<0.001).
Conclusion: Initial serum creatinine and hypertension were the most important predictors for the development of ESRD in patients with LN. These findings reinforce the importance of regular monitoring of serum creatinine even in asymptomatic patients as well as the need for strict control of hypertension in LN.

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All-cause, Cause-Specific and Age-specific Standardized Mortality Ratio of Systemic Lupus Erythematosus Patients in Ontario, Canada Over 43 Years (1971-2013)

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Objectives: The major causes of early death in systemic lupus erythematosus (SLE) include active disease and infections, while cardiovascular complications and malignancies dominate the late stages. In recent years, there has been a significant decrease in all-cause mortality. The aim of the present study was to assess the all cause, age and cause-specific standardized mortality ratios (SMR) of lupus patients from 1971 to 2013.
Methods: Our long-term longitudinal cohort followed 1732 patients between 1971-2013. Causes of death were retrieved from death certificates, autopsy reports, hospital records or the records of the family physicians for each patient. They were categorized as atherosclerotic (acute coronary syndrome, ischemic cardiomyopathy, cerebrovascular accident), infection (sepsis), malignancy, active lupus and others. Patients were also categorized according to the age at death in 10-year intervals (15-24, 25-34 etc.). For the calculation of the SMR, data from the general population of Ontario, Canada were used (retrieved from Statistics Canada for the same time period). Statistical analysis was performed with SAS 9.4.
Results: Two hundred and forty-nine patients (205 females) died (infections 24.5%, atherosclerosis 15.7%, active lupus 13.3%, malignancy 9.6%); mean age was 53.2±16.6 years and mean disease duration 15.2±11.7 years. The mean age at death was incrementally improved from 42.2±12.9 years in the 1970s to 58.8±14.6 years in the 2010s. All-cause SMR was decreased from 13.5 (95%CI=8.6-18.5) in the 1970s to 2.2 (95%CI=1.4-3.1) in the 2010s. Cause-specific SMRs showed a similar decrease. Atherosclerosis-related SMR was decreased from 8.3 (95%CI=3.8-12.8) to 3.2 (95%CI=0.1-6.3), infection-related SMR from 14.2 (95%CI=8-20.4) to 0.9 (95%CI=0-1.9) and malignancy-related SMR from 14.1 (95%CI=4.3-23.9) to 1.4 (95%CI=0.2-2.7) from the 1980s to the 2010s respectively. Age-specific SMR was highest in the 25-34 years group (19.7, 95%CI=13-26.4) and gradually decreased with increasing age (2.4, 95%CI=1.5-3.4 for the 75-84 years group). The age-specific SMR was particularly high in younger patients (20-39 years old) [SMR=12.4, 95%CI=9.7-15.1] as compared to the patients who were older than 40 years [SMR=3.1, 95%CI=2.6-3.6]. Similar results were obtained for cause specific SMRs [atherosclerosis 14.6 (95%CI=0-43.3) vs. 4.7 (95%CI=3.3-6), infections 30.2 (95%CI=14.4-46) vs. 3.5 (95%CI=2.5-4.5), malignancies 31.9 (95%CI=0.6-63.1) vs. 3 (95%CI=1.9-4.1).
Conclusion: The SMR for all-cause and cause-specific mortality has significantly decreased

over time, likely reflecting the advances in the management of SLE and atherosclerosis, infections and malignancies. The SMR is particularly high for younger patients (<40 years old) and it remains higher than that of the general population even for the older patients.

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Epidemiology of Employment Outcomes in Systemic Sclerosis. A Systematic Review

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Objectives: Systemic sclerosis (SSc) is a chronic autoimmune condition that predominantly occurs between the ages of 30-50 years old, putting individuals at significant risk of poor workforce health and work disability. Work disability can be defined as either loss of employment or work-related productivity. The epidemiology, including determinants of SSc-related work disability, are poorly understood. The objectives of this study were to evaluate unemployment rates, risk factors, and associated economic burden of work disability in patients with SSc.

Methods: A systematic search of Ovid Medline, Embase, and Cochrane Central Register of Controlled Trials, PsycINFO, CINAHL, and Clinicaltrials.gov was performed to identify studies from inception to July 2018. Included search terms were relevant to employment and systemic sclerosis. Studies were included for data extraction if they met the following inclusion criteria: 1) human participants with a diagnosis of SSc, 2) controlled trials or observational studies, 3) the study described employment status, or reported an outcome related to employment or work-related disability, and 4) the study presented original data. We extracted information on study setting, design, patient population and size, employment outcomes, risk factors for work disability, and related costs.

Results: From 4381 abstracts, we included 44 quantitative studies, from 15 countries. Thirty-five studies identified the employment status of 11,315 individuals. The majority of these studies (86%) were cross-sectional in design and employment definitions were based on self-report. Unemployment rates varied from 4% and 66% after an average disease duration of 4.3 to 11 years. Twenty-five studies reported work-related productivity outcomes. Productivity definitions varied significantly and in 80% of the studies they were captured by non-standardized, self-report measures (e.g. self-defined as work disabled, having professional difficulties, or required sick leave). Significant risk factors for unemployment included less education, worse physical function, higher disease duration, and reduced quality of life scores. The average annual cost of productivity loss based on seven studies was $9934/year in 2018 Canadian dollars.

Conclusion: Work disability is an important outcome for patients with SSc conferring significant unemployment and economic burdens. Determinants of work disability relate to demographic and disease-related characteristics, but few studies evaluate the impact of work-context related factors on employment sustainability or productivity.

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Addressing Challenges to Patient-centered Care in a Rare Disease Context: The

Scleroderma Patient-centered Intervention Network (SPIN)

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Objectives: People with rare diseases face unique challenges. Trials are challenging to conduct, and few Canadian centres treat enough patients with any given rare disease to sustain patient-centered intervention programs. Systemic sclerosis (SSc, scleroderma) is a rare autoimmune connective tissue disease. Common problems faced in SSc include limitations in hand function and mobility, pain, fatigue, gastrointestinal symptoms, breathing problems, pruritus, depression, and body image distress due to disfigurement. The objective of the Scleroderma Patient-centered Intervention Network (SPIN) was to develop an infrastructure that would support observational studies to better understand problems faced by people with SSc and as a framework for large randomized controlled trials (RCTs) of educational, self-management, rehabilitation, and psychosocial programs to support quality of life.

Methods: SPIN's international team determined that achieving its goals in a rare disease environment would require (1) the use of novel cohort-based, economically efficient trial methods; (2) online patient program delivery; (3) a global network of SSc care centres and researchers; and (4) strong patient and patient organization partnerships.

Results: SPIN was launched in 2011 with seed funding from Scleroderma Canada and the Scleroderma Society of Ontario. It received a CIHR Emerging Team Grant in Rare Diseases in 2012. SPIN has brought together over 150 members of the international SSc community and raised over $3.5 million in funding. People with SSc serve on SPIN's Patient Advisory and several project-specific advisory boards. SPIN adopted the cohort multiple RCT design and has enrolled over 2,400 participants (1,750 active) from 45 sites in 7 countries (Canada, USA, UK, France, Spain, Mexico, Australia) in the SPIN Cohort. SPIN Cohort participants complete patient-reported outcome measures via the internet every 3 months and are available to participate in trials of SPIN's internet-based patient programs. SPIN has been funded by the CIHR and the Arthritis Society to conduct large (e.g., N = 500 to 600) RCTs of hand exercise and SSc-specific self-management programs. Outside of its cohort, SPIN received funding from CIORA and completed a successful feasibility trial of the SPIN Support Group Leader Education (SPIN-SSLED) Program. Canadian and international patient organizations are preparing to provide SPIN's first tested programs free-of-charge to patients via their websites. Other projects are underway.

Conclusion: SPIN is an example of international research, clinical, and patient communities working together to overcome barriers to patient-centered intervention research in a rare disease. SPIN's approach can be applied in other common and rare rheumatic diseases.

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Factors Influencing Patient Interest in Participating in an Online Self-care Intervention: A Scleroderma Patient-centered Intervention Network (SPIN) Cohort Study

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Objectives: The SPIN Cohort was created to develop and test online self-care interventions for people living with scleroderma (systemic sclerosis, SSc). Patients in the observational Cohort complete assessments every 3 months, consent to be automatically assessed for eligibility when trials are conducted, and, if eligible, to be randomized to be offered one of SPIN's interventions. In order to offer interventions to patients interested in using online self-help tools, a 'signaling questionnaire' was designed to identify patients who would be likely to accept an intervention offer. The signaling questionnaire inquiries about interest in 9 different interventions, each designed to address a different problem associated with SSc. It is not known, however, what factors influence patient interest in participating in a particular online intervention, and if intervention-specific signaling questions provide unique information or replicate broader characteristics, such as overall willingness to participate in any intervention or patient-reported self-efficacy. The objective of this study was to determine factors that explain responses to intervention-specific signaling items.

Methods: Participants consisted of SPIN Cohort participants from Canada, the US, the UK and France who completed baseline questionnaires from March 2014 through June 2017. Signaling questions queried about interventions to address fatigue, hand function, sleep, emotions and stress, body image concerns, pain, self-efficacy for managing SSc, nutrition, and exercise, on a 0 (not likely at all) to 10 (very likely) scale. Linear regression analyses were conducted for each of the 9 signaling questions, separately. Predictor variables included demographic variables, general interest in online interventions (mean of the remaining signaling questions), patient-reported self-efficacy, and severity of symptom associated with the individual signaling question.

Results: A total of 964 participants completed all baseline measures and were included in analyses (116 men; 12%). Mean signaling question scores per item ranged from 5.1 to 7.0. General interest in online interventions was the strongest predictor for all individual signaling questions (standardized regression coefficient β from 0.61 (sleep) to 0.80 (self-management). Smaller, but statistically significant, associations were found with the symptom associated with the respective signaling question for 7 of 9 signaling questions and with general patient self-efficacy for 6 of 9 signaling questions.

Conclusion: Findings suggest that the main factor influencing patients' interest in participating in a disease-specific online self-care intervention is their general interest in participating in interventions.

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Challenges and Support Service Preferences of Informal Caregivers of People with Systemic Sclerosis

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Objectives: To assess the frequency and importance of challenges and the preferences for types of support services for information caregivers to persons with systemic sclerosis (SSc). We aimed to disseminate surveys to an international sample of caregivers of persons with SSc in order to identify priorities for support services that could be developed.
Methods: Current or previous caregivers of people with SSc from North America, Europe, and Australia were recruited to complete an online questionnaire to rate the importance of 61 possible caregiver challenges and the likelihood of using 18 different forms of support services. These challenge and support service items had been previously generated by SSc caregivers in structured focus groups. Importance of challenges was rated from 1 (not important) to 4 (very important). The likelihood of using support services was also rated on a scale from 1 (not likely) to 4 (very likely). Frequencies were presented for all items included in the questionnaires. Potential gender differences in demographic factors and survey responses were considered using chi-square tests, adjusted for multiple comparisons with the Hochberg Sequential Method was used to adjust for multiple comparisons.
Results: A total of 202 informal caregivers completed the survey (79 women, 123 men). The mean age was 58 years (standard deviation = 13). Caregivers were providing care for a partner (72%), parent (12%), child (7%), sibling (4%) or friend (5%). The most important challenges were related to supporting the care recipient with emotional difficulties and physical discomfort. Caregivers indicated that they would be more likely to use support services that involved online or hard-copy information resources, including those provided soon after diagnosis, compared to support that involved interacting with others. There were statistically significant differences, after adjusting for multiple comparisons, on five challenges, including "finding time for myself", "not having access to a caregiver support group", "finding assistance for things that my care recipient use to do", "feeling ashamed to think about my own well-being or needs", and "noticing others' lack of knowledge and awareness about scleroderma". For each of these 5 items women rated the challenge as being more important than men.
Conclusion: Caring for a person with SSc can be challenging. Supporting the care recipient in managing emotional difficulties and physical discomfort were important challenges among caregivers. Interventions delivered through hardcopy or online resources, including those delivered soon after the care recipient's diagnosis, were rated as being most likely to be used by caregivers.

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Feasibility Trial of the Scleroderma Patient-centered Intervention Network Support Group Leader Education (SPIN-SSLED) Program

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Objectives: Systemic sclerosis (SSc), or scleroderma, is a rare autoimmune connective tissue

disease where peer-led support groups play an important role for patients. Many SSc patients, however, cannot access support groups, and some support groups are not sustained due to factors that include the burden on group leaders living with a serious, unpredictable disease and limited group leadership skills of untrained leaders. We developed the Scleroderma Patient-centered Intervention Network Support Group Leader EDucation (SPIN-SSLED) Program, which is designed to improve support group leader confidence and self-efficacy, reduce burnout and improve emotional well-being among leaders. The objective was to evaluate the feasibility of delivering the SPIN-SSLED Program to scleroderma patient support group leaders, including required resources, management issues, and scientific aspects.

Methods: Eligible participants were current support group leaders or individuals identified by \ patient organization partners as a new leader. Scleroderma Canada and the Scleroderma Foundation provided us a list of 12 leaders to invite to participate. The SPIN-SSLED program includes 13 modules that are delivered live via webinar over the course of the 3-month program (April to July 2018). Modules are delivered in 60- to 90-minute sessions. Module topics include (1) the leader's role; (2) starting a support group; (3) structuring a support group meeting; (4) scleroderma 101; (5) successful support group culture; (6) managing support group dynamics I; (7) managing support group dynamics II; (8) grief and crisis in scleroderma; (9) marketing and recruitment; (10) the continuity of the group; (11) supporting yourself as a leader; (12) virtual support group meetings, (13) support group leader resources.

Results: All 12 potential participants agreed to enroll, and the first 10 who responded were included (2 training groups, 5 per group). Participants attended 91% of sessions. Required technical support was minimal. Overall rating for program was 9.4/10. Mean item rating on 8 items from the Client Satisfaction Questionnaire-8 was 3.83 (possible scores 1-4). Pre-post scores on the Scleroderma Support Group Leader Self-efficacy Scale increased by 1.7 standard deviations (large effect), and scores on burnout and emotional distress measures decreased by 0.45 and 0.38 standard deviations (moderate effect).

Conclusion: The SPIN-SSLED Program has the potential to significantly improve the effectiveness and sustainability of existing SSc support groups and to increase the number of available support groups by giving people with SSc the skills they need to establish support groups where none exist. It should be tested in a full-scale randomized controlled trial. Supported by a CIORA grant.

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Latent Profile Analysis-Derived Typologies of Systemic Sclerosis Patients Using Body Image Indicators: A Scleroderma Patient-centered Intervention Network (SPIN) Cohort Study

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Objectives: A common and distressing manifestation of systemic sclerosis (SSc, or scleroderma) is disfigurement in socially relevant areas of the body. Disease-related changes in appearance have been associated with body image dissatisfaction and social anxiety. Although there have been studies identifying correlates of body image dissatisfaction, there is a need for an

examination that considers the complex relationships among the personal and social aspects of appearance changes. The present study used latent profile analysis (LPA) to identify body image typologies (i.e., groups) based on variables representing body image and social anxiety.
Methods: The sample consisted of 942 patients with SSc enrolled in the Scleroderma Patient-centered Intervention Network (SPIN) Cohort. The sample was randomized into two groups (N = 469 in Sample 1 and N = 473 in Sample 2) in order to attempt to replicate the findings. For the first aim, LPA was used identify profiles of similarly scoring individuals using three indicators of body image (dissatisfaction, social discomfort, and body concealment) and three indicators of social anxiety (social interaction anxiety, social appearance anxiety, and fear of negative evaluation). For the second aim, group differences were examined for selected variables.
Results: The samples were predominantly female (87.4%), White (79.8%), had limited disease (59%), with average age of 55. In both samples, a two-profile solution was derived. These two classes were substantively analyzed for patterns of scores and termed the Appearance Comfortable (n = 336 and n = 375 in Sample 1 and Sample 2, respectively) and Appearance Distressed (n = 133 and n = 98 in Sample 1 and Sample 2, respectively) groups. In both samples, younger age, diffuse disease subtype, and the presence of hypo/hyper-pigmentation were associated with membership in the Appearance Distressed group. The mean modified Rodnan skin scores were 7.05 (SD = 7.3) and 7.67 (SD = 8.3) in Samples 1 and 2, respectively for the Appearance Comfortable groups and 9.83 (SD = 9.6) and 9.60 (SD = 9.7), in Samples 1 and 2 respectively for the Appearance Distressed group. Additionally, patients in the Appearance Distressed group had significantly higher scores on measures of depressive and anxious symptoms and disability.
Conclusion: This analysis was the first study to identify typologies of patients based on indicators of body image in any disfiguring condition. Two distinct groups were identified distinguishing between an Appearance Comfortable group and an Appearance Distressed group. The results also elucidated variables that can indicate likely group membership.

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Randomized Feasibility Trial of the Scleroderma Patient-centered Intervention Network Hand Exercise Program (SPIN-HAND)

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Objectives: Significant functional impairment of the hands is nearly universal in systemic sclerosis (SSc, scleroderma). Hand exercises may improve hand function, but developing, testing and disseminating rehabilitation interventions in SSc is challenging. The Scleroderma Patient-centered Intervention Network (SPIN) was established to address this issue and has developed an online hand exercise program to improve hand function for SSc patients (SPIN-HAND). The aim of the SPIN-HAND feasibility trial was to evaluate the feasibility of conducting a full-scale RCT of the SPIN-HAND intervention by obtaining data related to the study's process, required resources and management, scientific aspects, and participant acceptability.

Methods: The SPIN-HAND feasibility trial was conducted via the SPIN Cohort. The SPIN Cohort was developed as a framework for embedded pragmatic trials using the cohort multiple RCT design. English-speaking SPIN Cohort participants with at least mild hand function limitations (Cochin Hand Function Scale ≥ 3) and an indicated interest in using an online hand-exercise intervention were randomized with a 1:1 ratio to be offered to use the SPIN-HAND program or usual care for 3 months. Usage of the SPIN-HAND program modules among participants in the intervention arm were examined via intervention usage data and at 3-months post-randomization, qualitative interviews were conducted to assess user acceptability and satisfaction (Clinicaltrials.gov trial registration NCT03092024).
Results: Between June 1, 2017 and June 18, 2017, 40 SPIN Cohort participants were included in the SPIN-HAND feasibility trial: 24 were allocated to the intervention arm, and 16 to the control arm. Automated eligibility and randomization procedures via the SPIN Cohort platform functioned properly. In total, 15/24 cases (62.5%) consented to use the SPIN-HAND program, of which 7 logged in only once (mean number of logins 4, median = 2). The mean number of modules accessed was 1.3 (median = 0). Overall, users reported a positive general experience with no major issues and graded the program an 8 or higher on 10-point scale. Participants would recommend SPIN-HAND to others.
Conclusion: The SPIN-HAND exercise program is a self-help tool that may improve hand function in patients with SSc. The SPIN-HAND feasibility ensured that trial methodology was robust, feasible, and that the online intervention is user-friendly and acceptable to trial participants. However, uptake of the program was low. Adjustments implemented prior to the SPIN-HAND full-scale RCT include improving information available prior to consent and a 2:3 randomization ratio to ensure sufficiently a large sample for dose-response and other secondary analyses.

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Immunosuppression in Diffuse Systemic Sclerosis Improves Outcomes using a Novel Composite Response Index

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Objectives: Diffuse systemic sclerosis (dcSSc) is a devastating multi-organ disease where the mainstay of treatment is immunosuppression. Data on these therapies are mostly based on skin or organ specific outcomes such as lung involvement. However, a new composite response index in dcSSc (CRISS) was proposed to improve assessment of treatment interventions. Our aim is to examine the effect of current immunosuppressive therapy on the CRISS in an observational dcSSc cohort.
Methods: Adult dcSSc patients without prior immunosuppression followed in the Canadian Scleroderma Research Group (CSRG) registry between 2005 and 2017 were included. Patients newly treated with methotrexate, azathioprine, mycophenolate and/or cyclophosphamide for ≥1 year were the exposed group and untreated patients with at least the same follow up duration were controls. To account for disparity between treated and untreated patients, inverse probability of treatment weighting (IPTW) was performed to balance potential confounders: age, sex, disease duration and CRISS variables (modified Rodnan skin score, forced vital capacity, patient and physician global assessments, and HAQ-DI). Overall disease evolution after 1 year

was qualified using CRISS which defines improvement as a score ≥0.6. Missing data were multiply imputed and logistic regression was used to obtain pooled odds ratios and confidence intervals.
Results: 301 dcSSc patients were analyzed. Of these, 47 (15.7%) were treated and 254 (84.4%) were untreated. At baseline, treated compared to untreated patients were younger (50.1±10.4 vs. 55.1±12.3 years respectively, p=0.008), had significantly shorter disease duration (5.5±7.4 vs. 11.7±9.3 years respectively, p<0.001) and higher mean physician global assessment scores (4.2±2.3 vs. 2.5±1.9 points respectively, p<0.001). After IPTW correction, treated patients were significantly more likely than untreated patients to have improved disease, regardless of age, sex, or disease duration (odds ratio 1.85, 95% confidence interval 1.11, 3.09, p=0.018)
Conclusion: Assessing the effects of treatment in an observational cohort is intrinsically biased as treated patients will likely have more severe disease. After balancing using IPTW to reduce these confounders, we demonstrated that patients on immunosuppression are more likely to experience substantial improvement than untreated patients after 1 year using the CRISS score, a newly proposed global measure of disease severity.

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Evolving Patterns of Reactive Arthritis

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Objectives: Previous studies report that recurrent or chronic reactive arthritis (ReA) occurs in approximately 50–60% of adult ReA patients. The prevalence of recurrent full triad ReA (arthritis, conjunctivitis, urethritis) has not been reported. We sought to understand Canadian rheumatologists' perspectives on changes in frequency, severity, manifestations, tests ordered and treatment of ReA.
Methods: 548 members of the Canadian Rheumatology Association (CRA) were surveyed. We obtained physician perspectives on the evolving clinical landscape of ReA. There were six groups of questions covering prevalence, tests, treatments, incidence, severity and causes of ReA. Results were by physician report and were not compared to chart data.
Results: Sixty-six responded (15.5%), of whom 47% thought that the incidence of ReA is declining, compared to 6% who thought it is increasing, and 39% thought that the common causes may be changing. Acute, chronic, and recurrent ReA were all thought to have similar frequencies. In terms of presentation, asymmetric oligoarthritis occurred in the majority of ReA seen by participants (78%). Full triad ReA was reported to occur in 21% of ReA cases, and patients with conjunctivitis were very likely to exhibit the rest of the triad. Similarly, patients with recurrent ReA were more likely to exhibit the full triad (43%) compared to acute or chronic ReA (14%). One-third thought that the most common cause of ReA was an unidentified infectious organism, followed by gastrointestinal and sexually transmitted infections (STIs). The three most common investigations ordered included testing for chlamydia (66%), CRP (62%), and HLA-B27 (50%). Imaging was ordered by 39% of respondents with SI joint imaging ordered by 21%, X-rays of the affected joints by 15%, and other imaging by 7.5%. Figure 1 shows these results. Treatments used for ReA, as shown in Figure 2, included NSAIDs (97% frequently or always used), intra-articular corticosteroid injections (65% frequently or always used), and DMARDs (45% frequently or always used). Two-thirds said they used TNF alpha inhibitors at least occasionally in chronic ReA.
Conclusion: ReA may be decreasing in frequency and severity. Epidemiologic changes in ReA

could be due to less food borne illness, cleaner water, and possibly more rapid treatment of STIs. We found evidence that Canadian rheumatologists perceive full triad and recurrent ReA to be linked. Future research could include audits to verify the perceived changing ReA epidemiology.

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Neuromuscular Activation Differences during Gait in Patients with Ehlers Danlos Syndrome and Healthy Subjects

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Objectives: Patients with Ehlers-Danlos syndrome (EDS) have diminished strength and proprioception compared to healthy participants. It is not clear how these impairments affect muscle function during gait. The primary objective was to compare muscle activation during gait between participants with Ehlers-Danlos syndrome (EDS) and healthy adults. The secondary objective was to compare joint angles and spatiotemporal parameters during gait.

Methods: Participants diagnosed with EDS by their referring physician (n=14, 12 women; mean age 42 years; 1 classical type, 13 hypermobility type) and healthy adults (n=14, 12 women; mean age 50 years) were recruited for this cross-sectional study. Participants ambulated over ground at self-selected speeds for five trials. Muscle activation of ten lower extremity muscles were measured with surface electromyography (EMG). Three-dimensional lower extremity joint angles and spatiotemporal parameters were measured using an optical motion capture system and force plates. Gait EMG amplitudes were normalized to maximum voluntary contractions and the overall EMG amplitude was determined across the gait cycle for each muscle. EMG amplitude and spatiotemporal parameters (e.g., gait speed, step length, step width, and percent stance) were compared between groups using Mann-Whitney U-tests and non-parametric effect sizes (r). Muscle activation and joint angle waveforms throughout the gait cycle were compared using a percentile bootstrap procedure with 95% confidence intervals.

Results: The EDS group had significantly slower gait speeds and greater percentage of time in stance ($p<0.050$) than the healthy group. No significant differences ($p>0.050$) were found between groups for overall EMG amplitude. However, lateral hamstring ($p=0.061$, $r=0.37$) and tibialis anterior ($p=0.051$, $r=0.39$) EMG amplitude approached significance with the EDS group having lower EMG amplitudes representing moderate effect sizes. Waveform EMG analysis revealed lower lateral hamstring and tibialis anterior EMG amplitudes during the swing phase of gait in the EDS group. Differences in joint angles during specific moments in gait were found with the EDS group demonstrating: increased ankle dorsiflexion during pre-swing; delayed knee flexion during pre-swing and initial swing; and decreased hip adduction during mid-swing.

Conclusion: There are differences in muscle activation and joint angles in patients with EDS compared to healthy adults during specific phases of gait. Some differences might be due to slower gait speeds in the participants with EDS. However, the muscle dysfunction and impaired motor control often found in patients with EDS might also account for these findings. Functional strengthening programs should target these motor dysfunctions.

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Factors Predictive of Radiographic Progression in Ankylosing Spondylitis

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Objectives: By using a longitudinal observational cohort of ankylosing spondylitis (AS) patients, we sought to identify progression rates, and factors predictive of spinal progression. As a secondary aim we analyzed the effect of tumor necrosis factor inhibitor (TNFi) treatment on radiographic progression.
Methods: AS patients who had follow-up cervical and lumbar X-rays were included in the study. Radiographic damage was assessed by the modified Stoke Ankylosing Spondylitis Spinal Score (mSASSS). A change of 2 mSASSS units in 2 years was defined as progression. The characteristics of the study group such as demographic, clinical, laboratory, and treatment history were collected.
Results: There were 350 patients (76% male [M], 38.4 [13.7] years) in the study. The mean symptom duration at baseline was 14.9 (11.1) years and 75.1% were positive for HLA-B27. Baseline damage, in terms of syndesmophyte formation, was present in 46.6% of the patients. The mean mSASSS increased from 9 (15.8) units at baseline to 24.8 (27.3) units at the 10th year. Change in mSASSS scores between the 0 to 2, 2 to 4 and 4 to 6 years were 1.2 (2.89), 1.37 (3.13), and 1.56 (3.81) units respectively. When considering all time periods, change in total mSASSS was 1.02 (2.67) units in 2 years. Overall 25.7% of the group progressed in 2 years' time. This was calculated as 16.3% and 10.7% for the thresholds of ≥3 and ≥5 units respectively. On the other hand, 71.5% of the patients did not show any progression in the total follow-up period. There were 230 patients (65.7%) treated with TNFi at some point of their follow-up. The total anti-TNF exposure period was 5.2 (4.9) years. Male sex (HR 2.46, 95%CI 1.05, 5.76), presence of baseline damage (HR 7.98, 95%CI 3.98, 16), increased inflammatory markers (logCRP; HR 1.35, 95%CI 1.07, 1.70) and TNFi use (HR 0.82, 95%CI 0.70, 0.96) were predictive of radiographic progression. There was a 20% reduction in the rate of progression with TNFi.
Conclusion: Male sex, presence of baseline damage, active disease state and higher inflammatory markers confer a high-risk group for disease progression. Treatment with TNFi showed a disease modifying effect by slowing the rate of radiographic progression.

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Progression to Radiographic Sacroiliitis in Patients with Non-diagnostic Sacroiliac Joints: Results from a Longitudinal Observational Cohort of AxSpA Patients

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Objectives: The spectrum of axial spondyloarthritis (axSpA) is thought to start from a pre-radiographic stage and may progress to radiographic sacroiliitis over time. In this study, we aimed to identify the characteristics and rate of progression in axSpA patients who had nondiagnostic sacroiliac joints (nd-SIJs) at baseline and progressed to radiographic axSpA (r-axSpA).
Methods: Subjects who had at least two follow-up pelvic radiographs with a minimum interval of 24 months were identified (n=455). Two independent readers scored the baseline radiographs

of each subject and identified those with nd-SIJs (N=75). In reading follow-up radiographs, readers identified those whose pelvic radiographs had progressed to ankylosing spondylitis (r-axSpA, grade ≥2 bilateral or grade ≥3 unilateral, N=13). Clinical variables, B27 status, treatment and laboratory tests were evaluated in progressors and non-progressors.
Results: A total of 75 patients had nd-SIJs at baseline and all were included in the study. The median age and disease durations were 34 (17-57) and 5 (1-28) years respectively. Sixty percent of the patients were male and 56% were HLA-B27 positive. The median duration of follow up was 56 months with a range of 24-166 months. The overall progression rate in the total group over 2 years was 17.3% (undifferentiated spondyloarthritis [uSpA], 14.3% and nr-axSpA, 18.5%). There was an incremental rate of progression over time, from 7% in the second year of observation and increasing to 24% in the 8th year. Subjects who progressed were more frequently male, younger, and had higher baseline inflammation markers compared to non-progressors. Comparison of patients according to age groups showed that patients ≤20 years had 9.8 times higher risk for progression to r-axSpA. Increased baseline ESR and young age were identified by a multivariate Cox regression model as significant independent predictors of SIJ progression.
Conclusion: 17% of patients with nd-SIJs at baseline progressed to r-axSpA over 2 years. Progression rates between uSpA and nr-axSpA were similar. Subjects with a higher inflammatory burden and younger age may predispose a risk for progression.

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Regional and Temporal Variation in the Baseline Profile of Ankylosing Spondylitis Patients Initiating Adalimumab Following Failure of Non-Biologic Treatment in Canadian Routine Care

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Objectives: The objective of this analysis was to describe the regional and temporal variability of the profile of anti-TNF naïve patients with ankylosing spondylitis (AS) at initiation of adalimumab (ADA) following failure of initial non-biologic treatment.
Methods: COMPLETE-AS is an ongoing Canadian observational study of anti-TNFα naïve adults with active AS who require, per the judgment of the treating physician, change in current treatment. Patients are followed for up to 2 years. Regional variation between the following regions was assessed: Alberta/British Columbia/Manitoba (AB/BC/MB) vs. New Brunswick/Newfoundland/Nova Scotia (NB/NL/NS) vs. Ontario (ON) vs. Quebec (QC). In a sensitivity analysis, patients from AB and MB were excluded due to low numbers. Temporal variation over the following periods was assessed: 2011-2012 vs. 2013-2014 vs. 2015-2017. To evaluate the independent impact of region and time period on disease activity (BASDAI) and function (BASFI) multivariate linear regression was used.
Results: A total of 459 patients were included of whom 95 (20.7%) were from AB/BC/MB, 39 (8.5%) from NB/NL/NS, 202 (44%) from ON and 123 (26.8%) from QC. By period, 133 (29%) were enrolled in 2011-2012, 133 (29%) in 2013-2014, and 193 (42%) in 2015-2017. In univariate analysis, significant regional variation was observed in mean age (range from 41.1 to 48.4; p=0.013), gender (males from 46.3% to 64.2%; p=0.036), tobacco use (current smoking: 15.4% to 30.7%; p=0.003), alcohol use (non-drinker 17.9% to 52.6%; p=0.007), disease duration (4.2 to 9.7 years; p<0.001), and use of ADA monotherapy (71.6% to 87.2%; p=0.033). No

differences in BASDAI and BASFI were observed. Similar results were observed in the sensitivity analysis. In terms of temporal variation, more recent years (2015-2017) were associated with lower BASDAI (6.4 vs. 6.7 vs. 6.2; p=0.040) and BASFI (5.6 vs. 5.9 vs. 5.1; p=0.013) scores without any other differences. In multivariate analysis adjusting for age and gender, enrollment period but not region was associated with BASDAI (p=0.034) and BASFI (p=0.006) levels, with patients in more recent years having less severe disease when initiating ADA.

Conclusion: The results of this analysis have shown that significant regional and temporal variation exists in the profile patients selected for ADA treatment in Canadian routine care. Furthermore, a significant independent association was identified between more recent years and lower BASDAI and BASFI scores at ADA initiation.

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Comparing Patients Responding Well to Infliximab-Originator and Patients Switched to an Infliximab-Biosimilar. A Preliminary Analysis from the Rhumadata® Clinical Database and Registry

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Objectives: Data comparing infliximab biosimilar (INF-B) to infliximab originator (INF-O) is coming from two different sources. Phase 1 and 3 trial have shown similar pharmacokinetics, pharmacodynamics, clinical efficacy and safety, radiographic efficacy as well as comparable immunogenicity in patients with rheumatoid arthritis newly exposed to infliximab. Data from observational studies has demonstrated effectiveness from the moment patients were transitioned but no comparative effectiveness since the comparator group was most of the time transfer to infliximab-B hence losing the possible comparator cohort. No study has to this date shown such a comparative evaluation. Our objective is to evaluate retention of patients with inflammatory arthritis on INF-O transitioning to INF-B compare with a synchronous cohort of patients remaining on INF-O over the same period.

Methods: Data from RHUMADATA® patients with a diagnosis of inflammatory disease (RA, AS or PsA) prescribed and responding well to INF-O or switched to an INF-B was extracted from the RHUMADATA® clinical database and registry on September 2, 2018. All patients switched to INF-B were used. Patients taking INF-O on the date at witch the first patient switched occurred (October 21, 2015) were labelled INF-O responders. For these patients, time zero is defined as October 21, 2015. Patient characteristics were compared using descriptive statistics and discontinuation rates using Kaplan-Meier methods.

Results: The data from 160 patients with inflammatory disease was extracted. Of those, 109 were responders to INF-O and 51 were switched to INF-B. The percentage of patients diagnosed with RA, AS and PsA in the INF-O and INF-B groups were respectively 32 vs 49%, 53 vs 33% and 15 vs 18%. Patient and physician global assessment of disease activity in these groups were 3.1(STD=2.7) vs 3.2 (2.4) and 1.9 (2.2) vs 1.5 (1.6) respectively. Mean treatment duration for

patients receiving INF-O and INF-B was 2.3 (1.0) and 0.6 (0.7) years. At six months, retention probabilities were 85% (SE=3%) in the INF-O group and 94% (SE=4%) in the INF-B group. No significant differences in drug retention was observed between these groups (Kaplan-Meier log-rank p-value=0.3969).
Conclusion: Although patients switched to INF-B were few and followed for a short duration, this preliminary result demonstrates that sustainability is similar. More extended observation period will warrant more conclusive results.

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Infliximab Biosimilar use in Rheumatoid Arthritis, Ankylosing Spondylitis, and Psoriatic Arthritis Patients: The RHUMADATA® Registry Experience

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Objectives: To describe the recent use of an infliximab biosimilar (Inflectra, infliximab-B) and to compare therapy persistence with the infliximab originator (infliximab-O) in patients with rheumatoid arthritis (RA), ankylosing spondylitis (AS), and psoriatic arthritis (PsA).
Methods: Data from patients initiating infliximab-B (either biologic-naïve users or switchers from infliximab-O) were extracted from Rhumadata®, a practice-based registry (12 Quebec rheumatologists) for the period of July 2000 to July 2018. For comparison purposes, we identified patients initiating infliximab-O, matched 1:1 within each condition (RA, AS, PsA) for age at diagnosis and sex. We obtained baseline demographics and clinical data for all patients. Therapy persistence (continued use over time) in infliximab-B versus infliximab-O initiators was compared using Kaplan-Meier methods and adjusted hazard ratios (HR). Our hazard models adjusted for age, sex, primary diagnosis, and baseline disease duration and comorbidities.
Results: We studied 86 infliximab-B initiators including 36 AS, 30 RA, and 20 PsA patients. Just over half (N=48, 56%) of these were switchers from infliximab-O. Compared to infliximab-O initiators, infliximab-B initiators at baseline had longer disease duration (difference between means: 4.0 years, 95% CI 1.1-6.9) and more comorbidities (based on age-adjusted Charlson Comorbidity Index scores). Almost two-thirds (55/86) of patients on infliximab-O were biologic naïve, versus only 13% (11/86) of infliximab-B patients. Persistence on therapy was similar in both groups: 80.4% of infliximab-B initiators remained on treatment after 7.5 months versus 86.1% of infliximab-O initiators. After 15 months, treatment persistence was above 60% in both groups. Adjusting for baseline age, sex, and disease duration, the adjusted HR for therapy persistence in infliximab-B versus infliximab-O groups was 1.30, 95% CI 0.73, 2.32. Among infliximab-B initiators, those with past exposure to infliximab-O had longer disease duration (18.3±11.6 years) versus those in the infliximab-naive group (4.9±7.0 years, difference between means: 13.4 years, 95% CI: 9.1-17.7). Among infliximab-B initiators, adjusting for baseline demographic and clinical characteristics, the HR for treatment persistence in those with past infliximab exposure (versus those who were infliximab-naïve) was 0.49, 95% CI: 0.10, 2.33).
Conclusion: As expected, patients initiating an infliximab biosimilar were different from initiators of the infliximab originator, in terms of disease duration, prior biologic use, and co-morbidity. Adjusting for these factors, we were unable to identify differences in treatment persistence between these two groups. Further work is ongoing to study outcomes in a larger, multi-centre group of patients with more sophisticated analyses.

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Does Positive Latent TB Testing Delay Biologic Start? A Retrospective Chart Review.

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Objectives: Canadian guidelines recommend latent tuberculosis infection (LTBI) screening prior to initiation of biologic therapy. All rheumatoid arthritis (RA) patients with a positive LTBI result should be referred to an infectious disease specialist. Biologic therapy can be initiated one to two months after beginning therapy for LTBI. The purpose of this review is to quantify the incidence of positive LTBI testing in our rheumatology population and measure the subsequent delay in biologic therapy.

Methods: A retrospective chart review was conducted on all patients seen in The Ottawa Hospital Arthritis Centre between September 2015 and August 2017 with a documented tuberculosis skin test and identified as candidates for biologic therapy. Consecutive sampling was used to determine the sample size. Data was collected from the rheumatology consult and follow up notes, infection diseases notes, laboratory reports, and diagnostic imaging reports, up to 6 months after the patient was identified as a candidate for biologic therapy.

Results: A total of 187 patient charts were reviewed. The mean age of the patients was 48.8 years ± 15.0, and 60.9% were female. Primary rheumatic diseases included: RA 90 (48.1%), ankylosing spondylitis 43 (23.0%), and psoriatic arthritis 32 (17.1%). Twelve of the 187 (6.45%) patients had positive LTBI test results. Ten of these patients were referred to infectious disease and 5 were prescribed LTBI treatment. Only 2 of the 12 (16.7%) patients with a positive LTBI test initiated biologic therapy within 6 months of the biologic eligibility date. These 2 patients were considered high risk for LTBI and had been tested and treated for LTBI months prior to meeting criteria for a biologic. 145 of the 175 (82.8%) patients with a negative LTBI result, initiated biologic therapy within 6 months of the biologic eligibility date. Patients from both groups who initiated biologic therapy waited an average of 55 days between biologic eligibility and administration of the first biologic dose. A chi-square test of independence was performed to examine the relation between LTBI test positivity and biologic start. The relation between these variables was significant, $p<0.001$ (Cramer'sV=0.4).

Conclusion: Although patients with a positive LTBI test result can initiate biologic therapy 1-2 months after starting LTBI treatment, these results demonstrate that patients with positive LTBI are significantly less likely to initiate biologic therapy within 6 months of biologic eligibility.

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Comparison of Female Sexual Function Index in Patients with Rheumatoid and Psoriatic Arthritis and Healthy Controls

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Objectives: Alteration in sexual functioning is not well understood in rheumatoid arthritis (RA) and psoriatic arthritis (PsA). A review of the limited current literature suggests that decreased sexual function in female RA patients is common. Although RA and PsA differ in presentation and patient experience, literature regarding sexual health of female PsA patients is lacking. The Female Sexual Function Index (FSFI) is a validated and reliable self-reporting tool to assess sexual function in women within six domains: desire, subjective arousal, lubrication, orgasm, satisfaction, and pain. The purpose of this study was to identify and compare the FSFI of three female populations: RA, PsA, and healthy individuals.

Methods: Convenience sampling was used for this descriptive correlational study to recruit 50 female RA patients, 33 female PsA patients, and 25 healthy females for the control group between June to September 2018. Data collection was obtained using questionnaires and a

review of the medical record including demographic characteristics, the validated FSFI, medication history, pain score, patient global, Health Assessment Questionnaire (HAQ), and laboratory data. Data was analyzed using ANOVA test with Tukey's post-hoc to determine if any differences exist for FSFI scores based on diagnosis. Data was run twice, initially for all participants, and secondly removing the participants who reported not having had sex within the last month.
Results: The mean age of the RA patients was 53.1 ±1 1.8, PsA patients was 51.6 ± 13.7, and healthy controls was 37.4 ± 10.4. Controls were significantly younger than RA ($p < .001$) and PsA patients ($p = .002$). Data including all participants: Based on the total sexual functioning score of <26.55, the following had sexual dysfunction RA female patients 68% (34/50), PsA females' patients 67% (22/33) and healthy controls 44% (11/25). Data excluding participants who reported not having had sex in the past month: Controls had significantly higher FSFI scores than the RA patients across all six domains ($p \leq 0.001$) and the overall score ($p < 0.001$). Controls had significantly higher FSFI scores than the PsA patients across four of the six domains ($p \leq 0.026$) and the overall score ($p = 0.008$). There were no statistically significant differences between the RA and PsA group.
Conclusion: These findings demonstrate that decreased sexual functioning is more common in patients with RA and PsA when compared to a control group. All female patients with RA and PsA should be screened for sexual dysfunction.

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Antiphospholipid Antibody Testing in a General Population Sample

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Objectives: The antiphospholipid syndrome (APS) is defined by vascular thrombosis or pregnancy morbidity in the presence of persistently circulating antiphospholipid antibodies (aPL). Those positive for multiple aPLs have the greatest thrombotic risk. Little is known regarding aPL testing patterns in a population-based sample and whether it is done in accordance to the revised Sydney recommendations. We characterized patterns of aPL testing in a large general population sample.
Methods: We performed a retrospective analysis using Truven Health MarketScan® Research Databases which integrate de-identified patient data and laboratory results. We used MarketScan from 2010-2015 to identify individuals tested for lupus anticoagulant (LA), anti-cardiolipin (aCL), and anti-beta2-glycoprotein1 (aGP1) antibodies. All subjects were required to be at least 18 years old, having continuous eligibility for medical and pharmaceutical benefits at least 12 months before and 3 months following the first aPL test.
Results: We identified 33,456 individuals who had had at least one aPL test performed. The distribution of testing is shown in Figure 1. In these 33, 456 individuals, only 6,391 (19%) had been tested for all three tests (LA, aCL, aGP1). Of those 33,456 tested at least once, 5786 (17.3%) were initially positive for at least one test and 255 of these 5,786 (4.4%) had a confirmatory positive finding. 18,370 individuals had one or more LA test, among which 1,291 (7%) were positive initially. Among these 1,291 initially positive, only 996 (77%) were known

to have been retested ≥12 weeks later. 24,964 individuals had one or more aCL test, among whom 3,753 (15%) were positive initially. Of those 3,753 initially positive, only 1,707 (45%) were re-tested ≥12 weeks. 11,456 individuals had one or more aGP1 test, among whom 1,304 (11%) were positive initially. Of those 1,304 initially positive, only 537 (41%) were re-tested ≥12 weeks.

Conclusion: Applying the revised Sydney criteria for APS, we determined that confirmatory aPL testing was performed ≥12 weeks in 77%, 45%, and 41% of initially positive LA, aCL, and aGP1, respectively. In addition, in those individuals who had been tested at least once for any aPL, only 19% had been tested for all 3 aPL. Although limitations include the possibility that testing was done outside the study window, these findings suggest that aPL testing may be incompletely performed. Further characterization of testing patterns in individuals with known thrombotic events, pregnancy morbidity, systemic lupus, and other high-risk conditions is warranted and may help to inform local diagnostic practices.

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Use of Vedolizumab in Patients with Rheumatic Diseases

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Objectives: Vedolizumab, a humanized monoclonal antibody against alpha-4-beta-7 integrin, has become important for the treatment of inflammatory bowel disease (IBD). Vedolizumab interferes with gut-specific leukocyte trafficking and is not felt to affect other tissues (including joints). Existing data on outcomes of rheumatic disease in patients with IBD on vedolizumab are mixed. We examined the characteristics of Rheumatology patients treated with vedolizumab including rheumatologic diagnosis, disease flares with vedolizumab therapy, concurrent DMARD therapy, and adverse outcomes.

Methods: We performed a chart review of patients evaluated in the Division of Rheumatology at the University of Alberta Hospital since 2015 who have been treated with vedolizumab.

Results: Eighteen patients were seen in the Rheumatology Department who were prescribed vedolizumab. The average age was 45 years old (range 23-71) and 11 patients were female. Crohn's disease was present in 11 patients while 7 had ulcerative colitis. Diagnoses after rheumatology evaluation included: inflammatory arthritis (n = 7), arthralgia (n = 6), mechanical back pain (n = 3), erythema nodosum (n = 2), systemic sclerosis (n = 1), granulomatosis with polyangiitis (n = 1), hypogammaglobulinemia (n = 1). Thirteen patients had worsening joint symptoms after vedolizumab initiation; these included arthralgias (n = 6), new onset inflammatory arthritis (n = 2), and flare of known enteropathic arthritis (n = 5). All flares of inflammatory arthritis involved peripheral joints; there were no flares of spondyloarthritis observed. All patients who flared had been switched to vedolizumab from anti-TNF therapy (infliximab or adalimumab). Average time to onset of new inflammatory arthritis after vedolizumab was 2 months and time to flare of known inflammatory arthritis was 1.75 months There was one outlying patient who experienced a flare of known enteropathic arthritis after 72 months of vedolizumab. Two patients required discontinuation of vedolizumab. Of the remaining patients who continued vedolizumab, patients improved with addition of the following DMARDs: methotrexate (n = 4), hydroxychloroquine (n = 1), azathioprine (n = 2), and sulfasalazine (n = 1). There was one patient who developed an intra-abdominal abscess and shingles on vedolizumab and azathioprine.

Conclusion: IBD patients treated with vedolizumab may be referred to Rheumatology with worsening arthralgias, new onset inflammatory arthritis, or flares of known inflammatory

arthritis. Inflammatory arthritis does seem to respond to conventional DMARDs in this setting. More study is needed to determine if joint flares are a direct side effect of vedolizumab or an indirect effect of switching from anti-TNF therapy.

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Residual Fatigue in RA is Less Over 4 Years if in Remission by 3 Months: Results from the CATCH Cohort

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Objectives: To examine the relationship between fatigue and disease activity over time in early rheumatoid arthritis (ERA) and compare fatigue in patients achieving disease remission versus no remission.

Methods: Analysis was performed on data from the Canadian Early Arthritis Cohort (CATCH), a prospective observational incident cohort study of adults with ERA or suspected RA. Fatigue was described using a 10-point numerical rating scale (NRS) for up to 5 years of follow-up. Fatigue severity was classified as acceptable ($\leq$2), moderate (>2 but <5) and high ($\geq$5) based on other published RA studies. Bivariate relationships between disease activity measures and fatigue over time were estimated using the Pearson correlation coefficient. T-tests and repeated measures ANOVA were used to compare the differences in fatigue over time based on initial (0-3 months) disease activity score (DAS28) and fatigue severity.

Results: Of the 1864 patients included, 88% had classifiable RA, 72% were women, baseline mean (SD) DAS28 was 4.9 (1.5); 19% had moderate and 59% severe fatigue. Mean fatigue was highest at baseline and decreased significantly over time. Baseline and three months fatigue were significantly correlated with DAS28, MD global, patient global, pain and fatigue at one year ($p<0.001$), but not with ESR and CRP. Throughout the first year of follow-up fatigue was moderately correlated with pain and patient global scores (r 0.56-0.67, $p<0.001$); weakly correlated to DAS28 and MD global scores (r 0.23-0.48, $p<0.001$); and very weakly correlated to ESR and CRP (r 0.10-0.14, $p<0.01$). Patients with acceptable fatigue levels at baseline had significantly lower fatigue throughout follow-up compared to those with moderate ($p<0.05$) and severe ($p<0.001$) baseline fatigue. Patients with acceptable fatigue by three months continued to have significantly lower fatigue throughout follow-up compared to moderate or severe fatigue at three months ($p<0.001$). Patients who achieved a DAS28 remission state (<2.6) within 3 months had significantly lower mean fatigue at all follow-up visits for 4 years compared to those with DAS28 moderate (>3.2) or high (>5.1) at 3 months ($p<0.005$). In general, patients with high DAS28 at baseline and/or 3 months continued to have a decrease in their mean fatigue level at each visit up to 4 years.

Conclusion: Fatigue is common in early RA but decreases over time, with highest level of fatigue occurring at baseline. Initial fatigue level is a predictor of future fatigue. Disease remission within 3-months was associated with lower fatigue over subsequent years.

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Longitudinal Changes in Relative Market Share Proportions of Biologic, and Targeted

Synthetic, Disease-Modifying Anti-Rheumatic Drugs (DMARDs) for Treatment of Rheumatoid Arthritis: Results from the Ontario Best Practices Research Initiative (OBRI)

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Objectives: For patients with Rheumatoid Arthritis (RA) without adequate clinical response with conventional synthetic disease modifying anti-rheumatic drugs (csDMARDs), the next therapy is either biologic DMARDs (bDMARDs) or targeted synthetic DMARDs (tsDMARDs). bDMARDs include tumour-necrosis factor inhibitors (TNFi) or non-TNFi classes. Since inception of Ontario Best Practice Research Initiative (OBRI), new treatment options have become available. We describe evolving use of non-TNFi vs. TNFi in Ontario practices from 2008-2018.

Methods: Adult patients with RA enrolled in OBRI who started bDMARDs/tsDMARDs anytime during, or up to 30 days before, enrollment was included. The yearly proportion of the population treated with TNFi and non-TNFi therapy was measured for (i) all patients and (ii) those initiating their first bDMARD/tsDMARD. TNFi included: Etanercept, Adalimumab, Certolizumab, Golimumab, and Infliximab. Non-TNFi included: Abatacept, Rituximab, Tocilizumab, and Tofacitinib.

Results: A total of 1,057 patients were included of whom 653 were bDMARD/tsDMARD naïve. In the biologic-naive group mean age (SD) and disease duration was 56.5 (12.2) and 8.0 (8.8), respectively. Biologic-naive patients in the non-TNFi group had significantly more post-secondary education, more additional private drug coverage and less concurrent use of csDMARDs. In 2008, the relative non-TNFi use was 3/56 (5.4%) in all patients and 0/31 (0%) in treatment-naïve patients. By 2016, relative use was 224/679 (33.0%) in all patients and 17/56 (30.4%) in treatment-naïve. This was followed by 144/426 (33.8%) and 4/15 (26.7%), respectively in 2017.

Conclusion: This descriptive analysis shows an increase in non-TNFi therapy use. The overall trend towards greater use of non-TNFi therapies as first line advanced therapeutics may be partially explained by recent guidelines allowing clinicians to select either class as first line advanced therapies. Future analyses evaluating patient-, disease- and concomitant drug use-specific determinants of physician decision-making will be conducted.

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Review of a Nurse Specialist-Led Clinic in the Care of Patients with Chronic Inflammatory Arthritis

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Objectives: A treat-to-target approach to managing chronic inflammatory arthritis (CIA) results in improved clinical outcomes but increases demand for rheumatology care. Expanding nurses' roles may help meet this demand, and studies have shown that, in the right clinical setting, nurse-led care (NLC) for patients with CIA is effective, acceptable, and safe. Studies reporting on

Canadian experience in this context are limited. This study aims to examine the characteristics and outcomes of CIA patients in remission or with low disease activity (LDA) referred to an Advanced Clinician Practitioner in Arthritis Care (ACPAC)-trained nurse at our centre.
Methods: A retrospective chart review was conducted for patients with CIA seen in a nurse-led clinic at an academic hospital between Jan 1 and Dec 31, 2017. Three encounters were examined: the appointment with the nurse-specialist (visit 1), and visits with the rheumatologist preceding (visit 0) and following (visit 2) this appointment. Data extracted included patient characteristics, disease activity measures, treatment plan, and outcomes. Descriptive statistics are reported.
Results: Of the 70 patients seen by the nurse-specialist, 42 (60.0%) had rheumatoid arthritis (28 (66.7%) seropositive, 21 (50%) erosive), while 20 participants (28.6%) had psoriatic arthritis, 5 (7.1%) ankylosing spondylitis and 3 (4.3%) juvenile idiopathic arthritis. The average age was 57; 46 participants (65.7%) were women. At baseline, 26 (37.1%) patients were taking biologics, and 61 (87.1%) were on conventional disease-modifying antirheumatic drugs. 59 of 70 patients (84.3%) were thought to have remained in remission or LDA at visit 1, as had 55 of 66 patients (83.3%) at visit 2 (4 participants were lost to follow up). Average time between visits 0-1 and 1-2, respectively, was 167 and 168 days. Objective measures reflected high remission rates, with average tender joint count ≤ 1.2 at all visits, average swollen joint count ≤ 1.3, average ESR ≤ 14.6, and average CRP ≤ 5.23. The nurse-specialist's roles included medication counselling, referral to specialists and allied health professionals, and medication initiation and titration: at visit 1, medication changes were made for 22 (31.4%) patients (in response to active disease for 11 patients and medication side effects for 5 patients). There were only 5 emergency department visits and 4 hospital admissions during the study period, with no presentations related to inflammatory arthritis.
Conclusion: CIA patients in remission or with LDA seen in follow up by a nurse-specialist experienced high rates of sustained remission and received comprehensive care that included active medication management, counselling, and referral.

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From Bench to Bedside: Nintedanib for Progressive Fibrosing Interstitial Lung Diseases

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Objectives: A proportion of patients with interstitial lung diseases (ILDs) develop fibrosis that becomes progressive and self-sustaining independent of the underlying etiology. No drugs are licensed for the treatment of ILDs other than idiopathic pulmonary fibrosis (IPF). Nintedanib, a tyrosine kinase inhibitor with specificity for FGFR 1-3, VEGFR 1-3, PDGFRa/b, Src, Lyn, Lck and CSF1R, is an approved treatment for IPF. Nintedanib slows disease progression in patients with IPF by reducing decline in forced vital capacity (FVC) by about 50%.
Methods: Human cellular systems representing relevant mechanistic aspects of progressive fibrosing ILDs, including lung fibroblasts, cells of the immune system and the vasculature, were used to explore the in vitro activity of nintedanib at clinically relevant concentrations. The in vivo activity of nintedanib was explored in diverse animal models reflecting mechanisms involved in different ILDs such as silicosis, hypersensitivity pneumonitis (HP), rheumatoid arthritis-associated ILD (RA-ILD) and systemic sclerosis-associated ILD (SSc-ILD).
Results: Nintedanib attenuated the release of immune-stimulating and pro-fibrotic mediators; the

migration and differentiation of fibrocytes; and the proliferation, migration and contraction of fibroblasts and their transformation into myofibroblasts. Nintedanib also inhibited the polarisation of profibrotic M2 macrophages and attenuated functions of endothelial cells, vascular smooth muscle cells and pericytes. In a bleomycin model of lung fibrosis, nintedanib reduced collagen deposition/content in the lung, the fibrotic area evident on histology, and lung density as assessed by micro-CT. In a silica model of lung fibrosis, nintedanib reduced collagen in the lung and the fibrotic score on histology. In a model resembling the fibrotic and vascular manifestations of systemic sclerosis (Fra2 transgenic mice), nintedanib reduced the number of myofibroblasts, hydroxyproline levels and the fibrotic area of the lung evident on histology, as well as the extent of fibrosis in the skin and heart. In a model of RA-ILD, nintedanib reduced hydroxyproline levels and lung collagen measured by histology. In a model of chronic allergic remodeling resembling features of chronic HP, nintedanib reduced hydroxyproline levels in the lung.
Conclusion: Nintedanib attenuates fundamental processes in the pathobiology of progressive fibrosing ILDs, with anti-fibrotic activity that is independent of the initiating trigger. Ongoing clinical trials are exploring the efficacy and safety of nintedanib in patients with SSc-ILD (SENSCIS® trial; NCT02597933) and patients with progressive fibrosing ILDs of various clinical diagnoses (INBUILD® trial; NCT02999178).

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Clinical Manifestations of Twenty-Two Patients Testing Negative for Anti-Nuclear Antibodies but Positive for Extractable Nuclear Antigen Antibodies

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Objectives: Approximately one in fifteen Canadians suffer from autoimmune disease. Clinicians use autoantibody testing to help identify and diagnose autoimmune conditions. In general, patients with a positive ENA test also have a positive ANA test. However, there is a subset of patients that test negative for ANA. The aim of this study is to analyze the clinical features of these patients to note if certain autoimmune conditions are more prevalent in this subgroup of patients. We hypothesize that these unique patients are more likely to have a specific autoimmune condition and this pattern of autoantibody testing could aid clinicians in diagnosis.
Methods: A retrospective chart review was completed at The Ottawa Hospital (TOH) on patients with a positive ENA test but negative ANA test between January 2014 and January 2018. Inclusion criteria included age greater than 18, testing done at TOH, and complete chart documentation. Exclusion criteria included pregnant females at the time of testing and incomplete charting. A total of 22 patients were included for review: we extracted data related to age, sex, indication for testing, physician department, ENA specific positive antibody types, clinical manifestations, and final diagnosis. In those cases, the Hep-2 ANA slides were reviewed to identify any additional patterns. This study is qualitative and descriptive in nature.
Results: A total of 26 patients (22 females, 4 males) were identified as having a negative ANA test but a positive ENA test. Four patients were excluded due to missing clinical information. Testing requisitions were most frequently ordered by rheumatologists. The most common ENA specific auto-antibody present was Anti-Ro52/TRIM 21 with 14 patients testing positive. A wide variety of clinical manifestations were documented but as expected 17 of 22 patients exhibited signs and symptoms of connective tissue disease. The most prevalent final diagnoses were anti-synthetase syndrome (8 patients) and systemic lupus erythematosus (6 patients). Review of the

ANA slides showed the majority were negative for any staining (65%) corresponding to low ENA positivity. Significant cytoplasmic staining was seen in 23% of the slides corresponding to high titer Ro-52 ENA.
Conclusion: In summary, our chart review of patients testing ANA negative but ENA positive, showed that over 60% of patients had a specific diagnosis, lupus or anti-synthetase syndrome. In this subset of patients, if ANA is negative but clinical suspicion is high, further testing is warranted. Due to the relatively small sample size, further study is required to delineate the relevance of these findings.

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Rheumatic Immune Related Adverse Events Associated with Cancer Immunotherapy: Experience from the Canadian Research Group of Rheumatology in Immuno-Oncology (Can-RIO)

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Objectives: Immune checkpoint inhibitors (ICIs) have revolutionized cancer therapy by harnessing the immune system to fight cancer. However, the use of ICIs is limited by the development of autoimmune toxicities, referred to as immune-related adverse events (irAEs). Rheumatic irAEs (Rh-irAEs) were likely under-reported in clinical trials and their optimal management remains unknown. The Canadian Research Group of Rheumatology in Immuno-Oncology (CanRIO) is an emerging network of Canadian rheumatologists with an interest in Rh-irAEs secondary to ICIs. In this retrospective review, we describe the clinical presentation and management of Rh-irAEs associated with ICIs in patients seen at 6 CanRIO sites.
Methods: Patients presenting with rheumatologic symptoms associated with ICI therapy between 2013 and Sept 2018 at participating CanRIO sites were identified. Standardized data was extracted by retrospective chart review. The data was pooled and analyzed descriptively.
Results: A total of 79 cases of Rh-irAE were identified, 56% male with mean age of 62 years. Underlying malignancies included melanoma (n=38), lung (n=20), genito-urinary (n=12), gynecological (n=3), lymphoma (n=2), and other (n=4). Exposures included Pembrolizumab (n=26), combination Ipilimumab/Nivolumab (n=19), Nivolumab (n=15), blinded clinical trial-drug unknown (n=8), Durvalumab (n=5), Atezolizumab (n=4), and Ipilimumab (n=2). Rh-irAE included inflammatory arthritis (n=41; 2% RF/CCP positive), polymyalgia rheumatica-like (n=8), sicca (n=8), arthralgias/myalgias (n=7), worsening osteoarthritis (n=5), pneumonitis (n=5), myositis (n=4), sarcoid/erythema nodosum (n=4), psoriatic arthritis (n=2), Achilles tendonitis (n=2), and other (n=5). The majority (n=44, 56%) had more than one irAE. Mean time from first ICI exposure to onset of Rh-irAE was 6 months. ICI was discontinued in 25% (n=19). Despite this, 77% (n=61) had favorable tumor response, while 14% (n=11) had tumor progression and 4 died from their cancer. There were no Rh-irAE related deaths. Seven patients had pre-existing autoimmune diseases, of which 2 had flares and one had an unrelated irAE.

Treatment of Rh-irAE included oral prednisone (n=39; mean starting dose 45 mg/d), intra-articular corticosteroids (n=11), hydroxychloroquine (n=16), methotrexate (n=14), sulphasalazine (n=1), leflunomide (n=1), IVIG (n=1), adalimumab (n=2), infliximab (n=3), and secukinumab (n=1), with either partial or complete response. No treatment was required in 15 patients.
Conclusion: This is the largest multi-centered cohort of Rh-irAE described to date. The spectrum of Rh-irAE is broad, with seronegative inflammatory arthritis being the most common. Prednisone was effective, but higher doses were required, compared to traditional rheumatic diseases. DMARD and biologic therapy were well tolerated and effective. Despite moderate to high doses of immunosuppression, majority of patients had favorable tumor responses.

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Prevalence of Progressive Fibrosing Interstitial Lung Disease

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Objectives: There is an important group of patients with a progressive fibrosing form of interstitial lung disease (PF-ILD) (Flaherty, K.R. et al. BMJ Open Respir Res 2017;4:e000212) who do not meet idiopathic pulmonary fibrosis (IPF) diagnostic criteria but have a similar natural history and prognosis. Compared to IPF, the relative prevalence of PF-ILD is unknown. The aim of this study is to estimate the prevalence of PF-ILD in Europe and the USA.
Methods: Systematic literature review in Medline and Embase (1990–2017) focused on the prevalence of ILD and the forms of ILD known to be at risk for a progressive fibrosing phenotype. Supplemented by data from physician surveys and interviews, prevalence estimates were generated for each subtype and then combined to estimate overall PF-ILD prevalence. Sensitivity analyses were performed to determine the upper bounds of the estimate.
Results: The overall prevalence of ILD (per 10,000 persons) was reported as 0.63–7.6 in 4 studies in Europe and 7.43 in the USA. Prevalence estimates for individual progressive fibrosing ILDs and PF-ILD overall are presented in the Table. PF-ILD prevalence (per 10,000 persons) ranged from 0.22–2.0 in Europe and was 2.80 in the USA.
Conclusion: PF-ILD affects fewer than 5 in 10,000 persons in Europe and the USA, a patient population with an unmet need for treatment.

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Splenic Sarcoidosis: An Unusual Primary Manifestation of Extra Pulmonary Sarcoidosis

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Case Report: Sarcoidosis is an inflammatory systemic disease predominantly with pulmonary involvement (>90% of the cases) and less commonly other extra-pulmonary manifestations. Here we present a case of isolated primary splenic sarcoidosis as an unusual presenting disease manifestation.
Ms D. is a 37 years old with a history of long-standing Raynaud's presenting with mild intermittent abdominal pain. Her physical examination revealed normal alveolar breath sounds, soft and nontender abdomen and no hepatosplenomegaly. She underwent a chest x-ray which did not show hilar or parenchymal lung abnormality. An ultrasound of the abdomen revealed multiple hypoechoic liver nodules. Subsequently an MRI abdomen with contrast revealed multiple nonspecific T2 dark splenic lesions, showing delayed enhancement concerning for

malignancy but without splenomegaly. A SPECT nuclear scan was indeterminant. She underwent a splenic biopsy which revealed focal necrotizing granulomatous inflammation. Investigative blood work revealed Hg 137 g/l , Eosinophils 0.4, PLT 330, C-reactive protein 1 mg/l , ESR 7 mm/hr, ENA was negative, P-ANCA and C- ANCA were both normal. Acid fast bacilli staining and fungal cultures were negative. Her serum ACE was 78 U/l (normal < 52) in keeping with the diagnosis of splenic sarcoidosis.
Splenic involvement in patients with sarcoidosis have been reported with a variable prevalence ranging from 6 % to 50 % reported by either imaging or autopsy studies. However, isolated splenic lesions as a primary presentation is very rare. Lesions described includes nodular changes or splenomegaly. Splenic sarcoidosis focal lesions can mimic metastatic malignancies, lymphoma, splenic hemangiomas and chronic infectious processes. The classic features of splenic sarcoidosis on MRI includes hypointense lesions in all sequences and hypo enhancing changes relative to the background parenchyma. In patients with asymptomatic splenic sarcoidosis treatment is seldom required unless symptomatic or complicated by hypersplenism causing thrombocytopenia. Treatment options for symptomatic cases includes steroid sparing agents in combination with corticosteroids and rarely splenectomy have been described in few cases. Prognosis is good for asymptomatic limited splenic involvement, however recent emerging evidence suggests that diffuse splenic involvement may be a reliable indicator for chronic persistent disease. In patients with multiple hypo-enhancing lesions without systemic symptoms the diagnosis of splenic sarcoidosis should be considered.

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Humanistic and Cost Burden of Systemic Sclerosis: A Review of the Literature

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Objectives: Systemic sclerosis (SSc), or systemic scleroderma, is a chronic multisystem autoimmune disease characterized by widespread vascular injury and progressive fibrosis of the skin and internal organs. Patients with SSc have decreased survival, with pulmonary involvement as the main cause of death. Current treatments for SSc manage a range of symptoms but not the cause of the disease. Our review describes the humanistic and cost burden of SSc.
Methods: A structured review of the literature was conducted, using predefined search strategies to search PubMed, Embase, and the Cochrane Library. Grey literature searches also were conducted.
Results: In total, 2,226 articles were identified in the databases and 52 were included; an additional 10 sources were included from the grey literature. The review identified six studies reporting relevant cost estimates conducted in five different countries and four studies that assessed the humanistic burden of SSc. Total direct annual medical costs per patient for Europe varied from €3,544 to €8,452. For Canada, these costs were reported to be from Can$5,038 to Can$10,673. In the United States, the total direct health care costs were reported to be US$17,365 to US$18,396. Different key drivers of direct costs were reported, including hospitalizations, outpatients, and medication. The total annual costs per patient were reported at Can$18,453 in Canada and varied from €11,074 to €22,459 in Europe. Indirect costs represented the largest component of the total costs. EQ-5D utility scores were lower for patients with SSc than those observed in the general population, with reported mean values of 0.49 and 0.68, respectively. The average value of the Health Assessment Questionnaire for patients with SSc

was significantly higher than the control population (0.94), and the average value of the SF-36 was significantly lower than the control population: 49.99 for the physical dimension and 58.42 for the mental dimension.

Conclusion: Overall, there is a paucity of information on the burden of SSc. Nonetheless, our review indicates that the quality of life of patients with SSc is considerably lower than that of the general population. In, addition, SSc places a considerable economic burden on health care systems and society as a whole.

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Propylthiouracil-induced ANCA Associated Vasculitis: A Case Report and Literature Review

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Case Report: Antineutrophil cytoplasmic antibody (ANCA)-associated vasculitis (AAV) is a group of systemic diseases characterized by vasculitis affecting small to medium vessels and by the presence of circulating autoantibodies.[1] Propylthiouracil (PTU), one of the most commonly used antithyroid drugs for Grave's disease, is known to induce AAV as a rare side effect.[2] Early diagnosis and treatment could lead to complete resolution of symptoms. We report a case of AAV associated with PTU.

A 65-year-old gentleman with Graves' disease, diagnosed in 2013, on PTU 400mg daily, presented with a 2-month history of anorexia, lethargy, 40-pound weight loss, chills and shortness of breath. He was admitted to hospital to rule out atypical infection or malignancy. Initial investigations revealed normocytic anemia (Hb 98 g/L), leukocytosis (WBC 12.9 x 1000/mm3) and increased C-reactive protein (188 mg/L). Urinalysis revealed microscopic proteinuria and hematuria. ANA was negative. Immunofluorescence was positive for p-ANCA and c-ANCA (MPO 12 IU/mL, PR-3 27 IU/mL). Renal biopsy showed a cellular crescent with necrotizing lesions consistent with pauci-immune ANCA glomerulonephritis, and interstitial infiltrate with eosinophilia. PTU was discontinued, and he was treated with high dose prednisone and azathioprine and responded well to this therapy.

The frequency of antithyroid drug related AAV, from both PTU and methimazole (MMI) is 4-6.5%.[3] It has been reported that out of patients that develop AAV related to antithyroid drugs, 75% of these were associated PTU and 25% MMI.[4] Other medications known to cause AAV include hydralazine, minocycline, cocaine and levamisole.[5] The duration until the development of drug induced vasculitis from PTU is variable, and the risk increases with longer duration of treatment and higher doses (more than 250mg/day).[3] Clinical manifestations of PTU related AAV are heterogeneous. The kidneys, lungs and skin are the most frequent organs affected.[6] Compared to patients with primary AAV, manifestations were less severe.[7] Most patients recover with PTU discontinuation. Majority of the patients treated with immunosuppressive therapy discontinued corticosteroid and immunosuppressive agents within 12 months successfully and no relapse.[8]

Although AAV is a rare complication of PTU use, it is important to maintain a high index of suspicion when patients taking PTU develop specific signs of vasculitis. Patients may present with diverse symptoms. Although clinical manifestations are usually less severe than primary AAV, early diagnosis and prompt cessation of PTU therapy is essential in limiting associated morbidity and mortality.

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A Case Series of Isolated Pulmonary Capillaritis with anti-Ro52 Positivity

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Case Report: Isolated Pulmonary Capillaritis (IPC) is a rare autoimmune cause of diffuse alveolar hemorrhage (DAH) in the absence of ANCA, underlying systemic vasculitis, connective tissue disease, or findings to suggest an alternative diagnosis. To date, there remain 18 case reports in the English literature with no description of any associated autoantibodies. Here, we describe two cases of biopsy proven IPC associated with anti-Ro52 positivity.
A 55 year old male with no features of an autoimmune disease and a remote 20 pack year smoking history was worked up as an outpatient for recurrent hemoptysis not responsive to initial management. He ultimately presented to the hospital with sudden onset severe pulmonary hemorrhage requiring intubation and ventilation. There were no other clinical findings. Infectious disease, systemic vasculitis, and malignancy workups were negative. Diagnostic imaging was consistent with DAH. Open lung biopsy revealed pulmonary capillaritis. Treatment initially was with cyclophosphamide, plasmapheresis and systemic steroids. This was followed by azathioprine. He remained in remission for 2 years, however had recurrence of hemoptysis 9 months later following tapering of azathioprine. This was treated with repeat steroid pulse and methotrexate. He declined further cyclophosphamide and rituximab. He tested positive for anti-Ro52 antibodies, all other serology was negative.
A 68 year old female with no features of an autoimmune disease, history of COPD, hypertension, hypothyroidism, alcohol abuse and remote 26 pack year smoking history presented with hemoptysis and respiratory failure requiring intubation and ventilation. Infectious disease, systemic vasculitis, and malignancy workups were negative. CT chest was consistent with DAH. Open lung biopsy confirmed pulmonary capillaritis. Treatment initially was with cyclophosphamide, high dose pulse steroids, and plasmapheresis. She had persistent pleural effusions and failed withdrawal of ventilatory support on multiple occasions. She was then treated with rituximab and eventually weaned from ventilation 8 months after initial presentation. She tested positive for anti-Ro52 antibodies, all other serology was negative.
There have only been 18 documented cases of IPC in the literature thus far, none have identified associated serological markers. The anti-Ro52 antibody is frequently tested for in a standard ENA panel. It has been associated with Sjögren's syndrome, systemic lupus erythematosus, systemic sclerosis, inflammatory myositis, autoimmune hepatobiliary syndrome and pediatric autoimmunity. Its association with Raynaud's phenomenon and interstitial lung disease remains controversial. Nevertheless, it has yet to be reported in IPC. Here, we present the first case series of biopsy proven IPC associated with anti-Ro52.

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Giant Cell Myocarditis: Fifteen-year Case Series of a Single Institution

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Objectives: Giant cell myocarditis (GCM) is a severe and rapidly progressing inflammatory disease of the heart, first described in 1905. It is a rare condition, with limited published literature. Multicenter GCM disease registry (n=63) and case series describe an average age of 42.6 years (range 16-69), with historic median survival of 5.5 months from symptom onset.

Recent data describes two thirds of GCM patients achieve clinical remission with aggressive immunosuppression, demonstrating the importance of early diagnosis and treatment. GCM is a pathological diagnosis, historically based exclusively on autopsy or explanted hearts, however recently endomyocardial biopsy is more common. Pathology is characterized by mixed inflammatory infiltrate with multifocal necrosis and multinucleated giant cells.
Methods: Keyword search of the local pathology database identified cases of GCM over the last 15 years at the University of Alberta. Chart review was completed via paper charts and electronic records.
Results: Nine patients were identified; two were excluded with alternate diagnoses. Of the seven patients remaining, there were four males (57%) and average age of presentation was 39.6 years (range 22-61). All patients developed heart failure; most presentations (86%) were rapidly progressive with fulminant heart failure within two months of symptom onset. Three patients had significant arrhythmias. Presentations were severe with three patients requiring VAD (ventricular assist device), one of which later progressed to transplant, with a total of five patients receiving heart transplants, three urgently. Four patients were diagnosed with GCM upon transplant, and did not receive prior immunosuppressive therapy. Three patients were diagnosed via endomyocardial biopsy, and received various immunosuppressive therapies (including steroids, tacrolimus, mycophenolate mofetil, thymoglobulin), after which: one patient was lost to follow up after 2 months, one patient is currently alive one year post presentation, and one patient received heart transplant 3 years after diagnosis. Finally, two patients were lost to follow up at 2 months, and the remaining five patients were alive one year after presentation, with known survival ranging from 1-16 years. No recurrence was seen after transplant.
Conclusion: This study characterized seven cases of GCM in the last 15 years at our institution. Trends in age and presentation are consistent with published literature. Survival is challenging to analyze as most patients were lost to follow up; however, survival appears to be longer than historical reports. This could be due to improved diagnostics, management or therapeutics. Further evaluation of this rare condition is necessary to better understand future treatments.

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Intracranial Vascular Involvement in Takayasu's Arteritis: Common or Not?

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Objectives: Takayasu's Arteritis (TAK) is a large-vessel vasculitis of unknown etiology resulting in aneurysms, stenoses and occlusions of the aorta and its branches. Involvement of the intracranial vessels is believed to be uncommon, but has not been well-studied. Review of the literature suggests 11.2% of TAK patients may develop intracranial disease, but there is high variability. We aimed to determine the prevalence of intracranial vascular lesions in TAK patients seen by Rheumatologists at the University of Alberta.
Methods: We retrospectively reviewed the clinical records of patients diagnosed with TAK by any Rheumatologist at the University of Alberta between 2012-2018. Demographic, clinical, laboratory data and baseline extra-vascular imaging results were recorded. Vascular (CT angiography, MR angiography, conventional angiography) and non-vascular (CT, MR, PET/CT) neuroimaging studies were reviewed by a single Neuroradiologist.
Results: Of 24 patients identified, 2 were excluded due to presence of alternate diagnoses, leaving 22 patients with TAK included in this study. Of these, 19 were female (86.4%), with an average age at diagnosis of 32.2 years (range 13-63). The most common symptoms at disease presentation were: limb claudication (31.8%), headache (31.8%), stroke (27.3%), and vision

change (22.7%). On exam, patients had documented loss of pulse (40.9%), asymmetric blood pressure (36.3%) and bruits (31.8%). Symptoms were present for an average of 11.2 months prior to diagnosis (range 0 to 36 months). Extracranial lesions were most commonly identified in the extracranial carotid arteries (54.5%), thoracic aorta (50%), and subclavian arteries (50%). Vascular imaging findings included wall thickening (59.1%), stenosis (50%), occlusion (27.3%) and aneurysms (22.7%). Thirteen of 22 patients had available baseline imaging of the intracranial vessels. Intracranial vascular lesions were found in 5 patients (38.5% of those with neuroimaging available, 22.7% of all patients). Among these 5 patients, 3 had lesions of the intracranial portion of the internal carotid artery and 2 patients had disease of the middle cerebral arteries. Initial treatment included steroids (90.9%). Sixty-eight percent of patients received concomitant steroid-sparing agents.

Conclusion: The frequency of intracranial vessel involvement in TAK may be more common than previously suspected. In our institution, intracranial vascular lesions were identified at baseline in 22.7% of all Takayasu's patients, and in 38.5% of those with dedicated neuroimaging. Gaining an improved understanding of the true frequency of intracranial involvement will be important to aid in appropriately monitoring these young patients for disease activity. Prospective study is needed.

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Ultrasound Detects Subclinical Inflammation in the Hands and Feet of Patients with Rheumatoid Arthritis in CDAI Remission

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Objectives: Clinical examinations for rheumatoid arthritis (RA) focus on symptoms in the hands and wrists, and often exclude feet. Despite absent symptoms in hands, inflammation in the feet may persist, leading to undertreatment and progressive joint damage. This study compared disease activity in the hands and feet in patients with RA using clinical examination and ultrasound (US).

Methods: Patients with RA (ACR criteria, disease duration 2-4 years, treatment as per standard of care) were recruited from a rheumatology practice. Bilateral metacarpophalangeal joints (MCPJs) 2-3, proximal interphalangeal joints (PIPJs) 2-3 and metatarsophalangeal joints (MTPJs) 2-5 were examined for the presence of swelling and tenderness and imaged using US (Esoate MyLab70) by a single rheumatologist. Each joint was semi-quantitatively graded (0-3, with 3=severe inflammation) for synovial thickening (ST) and power Doppler (PD). ST measures synovial proliferation and PD measures hypervascularization suggesting active inflammation. ST grade ≥2 and PD grade ≥1 were considered pathological. Clinical Disease Activity Index (CDAI) was recorded (≤2.8 in-remission, >2.8 and ≤10 low disease activity). The prevalence of US findings in clinically asymptomatic joints was determined.

Results: Thirty-six patients [mean (SD) age=55.4 (10.0), 83% female] were included. Clinically asymptomatic MTPJs had higher prevalence of ST (21%) compared to asymptomatic MCPJ/PIPJs (5%). However, they had lower prevalence of PD (4%) compared to asymptomatic MCPJ/PIPJs (9%). Of 13 patients with clinically asymptomatic MCPJ and PIPJs, clinical examination of the MTPJs found swelling in 1 (9%) patient and tenderness in 6 (55%) patients, while US observed inflammation in the MCPJs of 1 (9%) patient but inflammation in the MTPJs of 9 (81%) patients. Furthermore, 21 (20%) MTPJs had ST and 3 (3%) had PD regardless of clinical symptoms in these MTPJs. According to CDAI, 6 patients were in-remission, of whom 3

(50%) had tender MTPJs and 5 (83%) had ST grade ≥2 in at least one MTPJ. An additional 14 patients were in the low disease activity range for CDAI, of whom 4 (29%) had swollen MTPJs, 6 (43%) had tender MTPJs, 10 (71%) had ST grade ≥2, and 4 (29%) had PD.
Conclusion: Both clinical examination and US observed disease activity in the feet of patients with clinically asymptomatic hands, and in patients who met CDAI criteria for remission and low disease activity. US often observed subclinical inflammation in the MTPJs. Our findings demonstrated the importance of including MTPJs in routine assessments, and the additional value of using US.

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Bitter Taste Receptor Genetics, Oral Health and Rheumatoid Arthritis

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Objectives: The association between periodontal disease and rheumatoid arthritis (RA) suggests altered oral mucosal immunity may contribute to RA pathogenesis. Antimicrobial peptides (AMPs) are produced in response to infectious and non-infectious stimuli and may modulate immune responses relevant to RA. Sweet, umami and bitter taste perceptions are mediated by oral taste receptors. Bitter taste receptors (T2Rs) and their associated genes (TAS2Rs) are detected in oral and extraoral tissues including circulating immune cells. T2R activation mediates the expression of antimicrobial peptides (AMP) suggesting additional roles for T2Rs in inflammation and possibly autoimmunity. The most common TAS2R haplotype (T2R38) has amino acid variations at positions 49, 262 and 296. The PAV haplotype (proline, alanine, valine; super/hypertaster) is associated with increased AMP expression, the AVI haplotype (alanine, valine, isoleucine non/hypotaster) is associated with reduced AMP expression. We propose variation in T2R38 gene expression may contribute to the genetic risk of RA.
Methods: Genomic DNA was isolated from saliva samples obtained from 55 RA patients (93% female, mean 58 years, 71% ACPA positive). T2R38 haplotype was determined by restriction fragment digestion and gene sequencing. A subset (n=28) were screened for periodontal disease using the periodontal screening record (PSR). The observed and expected genotype frequency between the RA patients and a published control population (Adappa and colleagues, 2014) was evaluated by chi-square analysis.
Results: The frequency of the PAV/PAV genotype was significantly higher in the RA group than in the published healthy population (42% versus 20%) whereas the frequency of the AVI/AVI genotype was significantly lower than expected based on control population (16% versus 29%) (Chi square = 13.14, p =0.0014). All RA subjects screened with the PSR (n=28) had evidence of periodontal disease (7% edentulous, 32% gingivitis, 61% periodontitis) median (25th, 75th percentile) PSR 2(1.3, 2.5). T2R38 did not associate with periodontitis severity (gingivitis PAV/PAV n=6 (55%), AVI/AVI n=1 (14%), mild periodontitis PAV/PAV 3(27%), AVI/AVI 2(29%), moderate periodontitis PAV/PAV n=2(18%), AVI/AVI n=2(29%) p=NS). Of the 20/28 subjects with current or past smoking history,10 (50%) were PAV/PAV hypertasters. T2R38 haplotype was similar in ACPA positive and negative RA.
Conclusion: The T2R38 PAV/PAV hypertaster haplotype is associated with increased AMP expression and is the predominant genotype in patients with rheumatoid arthritis compared to controls. This suggests taste receptor expression or activity may be an additional mechanism linking periodontal disease to RA. Further study is needed to determine if T2R genotype is

linked to oral AMP expression in RA.

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Longitudinal Expression of CXCL10 in Psoriasis Patients that Develop Psoriatic Arthritis Patients

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Objectives: Psoriatic arthritis (PsA), an inflammatory musculoskeletal disease, develops in approximately 30% of patients with psoriasis. We previously found that C-X-C motif chemokine 10 (CXCL10) was elevated in psoriasis patients who developed PsA compared to those that did not develop PsA over the same psoriasis duration, suggesting CXCL10 could be a predictive biomarker of PsA. In this study, we monitored the expression of CXCL10 over time in psoriasis patients who developed PsA to determine whether the drop in CXCL10 levels was specific to psoriasis patients who develop PsA and to further assess the usefulness of CXCL10 as a predictive biomarker of PsA.

Methods: Psoriasis patients without arthritis (PsC) were followed prospectively beginning in 2006, and were assessed yearly by a rheumatologist for the presence of PsA. PsC patients who developed PsA were termed 'converters', and serum samples were taken at baseline and follow-up visits. PsC who did not convert were matched based on psoriasis duration and the time difference between follow-up visits. The duration between baseline and the development of PsA was used to identify matched assessment intervals in non-converters. The expression of CXCL10 was measured using Milliplex MAP human magnetic bead panels (EMD Millipore), according to the manufacturer's instructions. Data were acquired using the Luminex 200 system and analyzed with the Bio-Plex Manager software (Bio-Rad Laboratories). Linear mixed-effects models were used to model the expression of CXCL10 over time.

Results: CXCL10 was measured in 24 converters and 16 non-converters at baseline and at least three follow-up time points. A decrease in CXCL10 levels was observed over time ($p=0.026$); however, the trend in CXCL10 expression in assessments post-conversion was significantly different between converters and non-converters ($p=0.030$). In order to assess the usefulness of CXCL10 to predict conversion to PsA, CXCL10 levels in 29 converters prior to PsA development were compared to 52 non-converters over a minimum of four time points. A significant difference in CXCL10 was observed between converters and non-converters ($p=0.0009$). The conclusions were robust in that they held with adjustments for the use of systemic treatments.

Conclusion: We observed a reduction in serum CXCL10 expression in psoriasis patients after they developed PsA which was different from patients who did not develop PsA over the same time interval. CXCL10 levels also differed in PsC patients prior to PsA onset compared to those that did not develop PsA, suggesting that CXCL10 may be useful as a predictive marker for PsA onset.

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An Evaluation of Utilization Patterns and Appropriateness of Laboratory Tests among New Referrals to Rheumatologists

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London); Sherry Rohekar (Western University, London); Pari Basharat (University of Western Ontario, London); Janet Pope (Western University, Department of Medicine, Division of Rheumatology, London)
Objectives: Laboratory testing including autoantibodies are common investigations ordered by physicians in diagnosing rheumatic diseases. Tests such as rheumatoid factor (RF) and antinuclear antibody (ANA) have been shown to have low positive predictive value and questionable clinical utility in patients in general practice. Optimizing value in medical care is a worldwide concern. To that end, the Canadian Rheumatology Association (CRA) joined the national Choosing Wisely Canada Campaign and developed a list of 5 tests with evidence indicating they may not be adding value. Among these, ANA testing was identified as one of the procedures often inappropriately ordered. Our objective was to evaluate the utilization patterns, appropriateness, and associated cost of tests (ANA, ENA, anti-dsDNA, RF, and HLA-B27) in patients referred to our rheumatology center.
Methods: A chart audit reviewing the records of all referred patients and (including referrals that were rejected) and laboratory tests within 2 years prior to referral was conducted. Specific tests and their indication based on clinical presentation were extracted. The number of unnecessary laboratory tests and associated cost was calculated.
Results: Over 700 patients were reviewed. Most common referrals were for possible diagnosis of rheumatoid arthritis, lupus, and seronegative spondyloarthropathies. Prior to referral: 61% had undergone ANA testing at least once, 50% of ANA tests were repeated; 25% had ENA testing and 30% had anti-dsDNA ordered. Among all ANA tests, 25% were requested when there was no clinical suspicion for connective tissues diseases. 50% of ENA and anti-dsDNA testing was requested in the context of negative ANA. RF was requested in 65% of the referrals and in one third, there was no clinical suspicion of inflammatory arthritis.
Conclusion: RF, ANA, ENA, and anti-dsDNA are among commonly ordered investigations prior to referral to rheumatology. Despite the recommendations by CRA choosing wisely campaign up to 50% of these investigations are ordered without clinical indication. Based on cost estimation, more selective ordering of the above tests, and minimizing inappropriate investigations would lead to 49% cost reduction.

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Screening for Comorbid Seronegative Arthritis and Inflammatory Bowel Disease in an Ambulatory Gastroenterology and Rheumatology Practice Model

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Objectives: The most common extra-intestinal manifestation of inflammatory bowel disease (IBD) is arthritis with a prevalence of 17-39%. Two thirds of patients with seronegative spondyloarthropathies show histologic signs of gut inflammation, and some of these patients go on to develop clinically symptoms of IBD. Though the frequency of bowel and joint symptoms in the respective diseases has been well published there is no data that shows how frequently these symptoms are screened for and the extent of screening. This is important knowledge as the identification of comorbid disease may have a critical impact on initiation of therapy and reduction in disease related morbidity. The objective of this study was to determine the frequency and type of screening for bowel and joint symptoms in outpatient rheumatology and gastroenterology (GI) clinics in an academic ambulatory hospital.
Methods: A retrospective cohort study was performed using data from a sample of

gastroenterology (n=221) and rheumatology (n=172) patients recorded in the electronic medical record between January 2015 and December 2018. Data was extracted between February 1st, 2018 and May 31st, 2018. Data on patient characteristics, disease type, medications and presence and method of screening was manually extracted data from each patient's electronic chart. Chi-square tests of independence were conducted to assess the distribution of patient and provider baseline characteristics based on screening status. Multivariate logistic regression was used to investigate the likelihood of being screened while adjusting for baseline characteristics. Time to screening from first visit was measured using a Kaplan-Meier survival analysis.
Results: In rheumatology, 87.8% of patients were screened for GI symptoms. Age, type of arthritis, and medications did not affect screening rates. Providers who were in practice longer tended to screen less frequently (16.4 vs 13.5 years p value = 0.0003). In GI, only 16.3% of patients were screened for joint symptoms. Age and medications did not affect screening rates, however patients with a history of ulcerative colitis tended to be screened less frequently (77.8% not screened, p value = 0.0059). A history of any extra- intestinal manifestation of IBD increased screening rates (77.8% screened p value < 0.0001) and providers who were in practice longer tended to screen less frequently (9.5 vs 5.1 years, p value < 0.0001).
Conclusion: There exist patient and provider characteristics that predict screening rates for comorbid conditions in GI and rheumatology. This baseline data will be used to develop a quality improvement intervention to improve screening rates in both populations.

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Enthesitis Predicts Persisting Pain in Children with Juvenile Idiopathic Arthritis: A Case-control Comparison from the ReACCh-Out Cohort

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Objectives: To identify potential baseline predictors of persisting pain in children with JIA, using data from the Research in Arthritis in Canadian Children emphasizing Outcomes (ReACCh-Out) cohort.
Methods: The ReACCH-Out cohort is a Canadian inception cohort of approximately 1500 children followed for up to 5 years. In this nested case-control study, we compared JIA cases of 'moderate-to-severe persisting pain' (31 patients) with JIA controls of 'moderate-to-severe decreasing pain' (118 patients). Moderate-to-severe pain was defined as > 3.5 cm using a standard 10 cm Visual Analogue Scale (VAS) for pain measurement. Follow-up was minimum 3 years. Logistic regression was performed to examine the association between each of the following potential baseline predictors with persisting pain at final follow-up: age at onset, sex, JIA category at baseline, enthesitis at baseline, and active joint count at baseline.
Results: Enthesitis count at baseline (OR 1.30, CI 95% 1.12-1.56; p 0.002) was found to be a statistically significant predictor of moderate-to-severe persisting pain in the logistic regression model. Age at onset (OR 1.07, CI 95% 0.98-1.18; p 0.14), sex (OR 1.85, CI 95% 0.77-4.98; p 0.19) and active joint count at baseline (OR 1.03, CI 95% 1.00-1.07; p 0.08) were not statistically significant predictors of persisting pain. JIA category was also not a significant baseline predictor.
Conclusion: Children with active enthesitis at baseline assessment were more likely to have

persistent pain versus resolving pain over the next 3 years. This finding should guide future research in understanding which factors lead to transition from acute to persistent pain in JIA and why children with enthesitis are at risk.

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"Quantitative Sensory Testing Demonstrates Similar Patterns of Pain Sensitization between Rheumatoid Arthritis Patients and Their Unaffected First Degree Relatives"

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Objectives: Pain sensitization has been associated with high disease activity measures in RA patients [PMID:28437846]. Interestingly, we have shown that pain is a prevalent symptom in our large cohort of first degree relatives (FDR) of Indigenous North American (INA) RA patients, some of whom are at risk of future RA development [PMID:23504380]. Our study objective was to determine whether pain sensitization differs between unaffected FDR and RA patients, and whether this corresponds to subjective pain experiences.

Methods: To date, 11 RA patients and 14 FDR have participated in the study and recruitment is ongoing. Using Quantitative Sensory Testing (QST) methodology, which includes peripheral pain thresholds (PPT) representative of peripheral sensitization, and temporal summation (TS) representative of central sensitization, we examined several joint and non-joint areas. A mean PPT and TS score was calculated for each site. To capture subjective pain experiences, we used a custom designed pain mapping tool which allowed participants to mark their pain sites on an electronic homunculus in a highly intuitive manner. A VAS and 68 joint count were also recorded. Data from QST and pain mapping were compared between RA patients vs FDR, opiate vs non-opiate users, and ACPA+ vs ACPA- individuals.

Results: Not unexpectedly, RA patients as a group identified more pain areas using the pain mapping tool than did the FDR. Although opiate use was prevalent in all study subjects, irrespective of whether or not they had RA, this did not impact on the subjective pain scores. Also, being ACPA+ did not predict higher pain area scores in FDR, although the number of ACPA+ FDR was small. There was modest correlation between the pain maps and VAS scores (rho=0.46, p=0.03). The minimum swollen joint count for RA patients was four, suggesting active disease for this group. Surprisingly, there were no overall differences in QST measures between RA patients and FDR. Moreover, there were no overall differences in QST measures between opiate and non-opiate users or ACPA+ and ACPA- individuals.

Conclusion: Despite higher rates of subjective pain in multiple joint and non-joint areas in RA patients, QST measures did not differ between the RA patients and their unaffected FDR. Prevalent opiate use in this population, although a potential confounder, did not seem to impact on either the subjective pain experience or QST measures. The biological and psychosocial factors impacting on the pain experience in INA people are not well understood and require further study using culturally sensitive approaches. Supported by a CIORA grant.

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CRA Summer Studentship Case Study: Polyostotic Fibrous Dysplasia with Optical Nerve Involvement

Michael Grossi (McGill University, Montreal); Hani El-Gabalawy (University of Manitoba, Winnipeg); Cory Baillie (University of Manitoba, Winnipeg)

This case study occurred during the CRA Summer Studentship while shadowing Dr. Hani El-Gabalawy at the Health Sciences Centre Rheumatology Clinic in Winnipeg, MB. Ms. M presented in July 2018 with a known diagnosis of polyostotic fibrous dysplasia and chronic pain

syndrome. Her principle concern at this visit was a "stroke-like" feeling of clumsiness, vertigo, decreased coordination and diplopia that occurred one week prior to the visit. The local hospital ruled out an ischemic event and Ms. M was diagnosed with "failure to cope" secondary to fibrous dysplasia, for which she was given hydromorphone. On exam, she presented with left eye pain, decreased V1 and V2 sensation and slight left facial droop. Nuclear Medicine imaging showed extensive abnormal uptake in skull base and increased activity along 1st left rib, along with MCP and phalanges involvement, while MRI indicated prominence in left parietal bone, temporal bone, and left frontal bone into lateral orbital wall. Ms. M had been treated with maximum dose zoledronic acid, along with gabapentin. Initial treatment plan was to reduce episodes with 50 mg prednisone, consult with NIH specialists in treatment options, and supply written directives for her local hospital to initiate transport to Winnipeg for flares. Ms. M responded to the prednisone course, while consultants recommended the use of 60 mg denosumab for future flares. This case highlights the complex, systemic nature of many disorders under the purview of Rheumatology, often requiring collaboration with multiple specialist teams, as well as the need for written directives for rural centres to deal with these complex cases.

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CRA Summer Studentship Case Study: Highlights from Rheumatology Consults on Internal Medicine Wards

Michael Grossi (McGill University, Montreal); Cory Baillie (University of Manitoba, Winnipeg)

Case Report: The CRA offers a clinical-based summer studentship, designed for Canadian students to shadow a Rheumatologist in a clinical setting. This project was set up by Dr. Cory Baillie and the Rheumatology department at the University of Manitoba. This case study summarizes the experiences of a first year medical student joining the Rheumatology consult team for complex Internal Medicine cases at the Health Sciences Centre and St. Boniface General Hospital in July and August 2018. The case study consists of four distinct encounters, highlighting the clinical question for which the team was consulted to answer, aspects of history taking and physical exam, consideration of differential diagnosis and key takeaway points. The four cases included, ER consults for suspected disseminated Gonococcal infection and Buerger's disease, as well as medicine ward consults for methotrexate toxicity and adult onset Still's disease. These cases were chosen because they highlight the diversity and complexity of the patient population Rheumatologists interact with on a daily basis.

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Strategies to Enhance Vaccination Coverage among Rheumatoid Arthritis Patients: A Intervention Development

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Objectives: National guidelines emphasize the importance of immunization for patients living with a rheumatoid arthritis (RA) diagnosis, but vaccination rates remain suboptimal in this population. Previous research suggests that patients' concerns about adverse effects, lack of knowledge or information shared by the health care provider (HCP) and associated beliefs about RA and vaccination were associated with lower vaccination rates. As part of a larger study aiming to develop a motivational communication (MC) intervention to improve vaccination uptake among vaccine hesitant RA patients, this systematic review explored the efficacy of interventions designed to improve vaccination rates among RA patients, as well as what features

and intervention were associated with the greatest efficacy.
Methods: A systematic review (SR) was performed in accordance with the PRISMA guidelines to examine the efficacy of interventions targeting vaccination uptake. The review focused on the following keywords: vaccination, rheumatoid arthritis and behavioural intervention.
Results: From the 474 initial search results, a total of five articles met inclusion criteria and included a total of 47 HCPs (rheumatologists, general physicians, etc.) and 7500 RA patients. For the three types of vaccines under study (influenza, pneumococcal and herpes zoster), pre-intervention vaccination rates ranged from 10.1% to 90.2%. Post-intervention (12-16 months follow-up) vaccination rates increased by a mean of 16.9±14.1%, with all studies reporting significant improvements. While all interventions involved some form of HCP reminder to prescribe vaccination, studies varied greatly regarding the intervention timing (e.g., real-time electronic medical record and point-of-care paper reminders), delivery mode (e.g., educational sessions, e-mail reminders, best practice alerts) and behaviour change techniques (Michie' taxonomy) used to encourage HCPs to prescribe vaccination (e.g., feedback and monitoring, shaping knowledge, self-regulation).
Conclusion: Results indicate that interventions targeting HCPs are effective in improving vaccination rates in RA patients. However, few studies have been conducted to date and used heterogeneous interventions and behavior change techniques to encourage vaccine prescription among providers. Results will be used to inform the development of a low-cost, evidence-based intervention delivered by HCPs to improve vaccination acceptance among RA patients.
Supported by a CIORA grant.

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Development of an Algorithm for the Classification of Cardiovascular Comorbidity in Rheumatoid Arthritis: Data from the Ontario Best Practices Research Initiative

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Objectives: Cardiovascular disease (CVD) is increased in rheumatoid arthritis (RA). The ability to accurately identify CVD and its risk factors (RFs) is important for primary and secondary prevention strategies. RA registries collect comorbidity data, but discordance between physician-reported and patient-reported comorbidities often exists. Therefore, we aimed to develop an algorithm for the classification of CVD and CVD RF in a representative RA registry.
Methods: Data were collected from the Ontario Best-practices Research Initiative (OBRI), a clinical registry of RA patients followed in routine care in Ontario, Canada. Clinical information, including patient medication profile, was obtained at registry entry, through physician visits and patient telephone interviews. Cardiovascular disease (CVD) was defined as having ≥ 1 of myocardial infarction (MI), coronary artery disease (CAD), cerebral vascular accident (CVA, including transient ischemic attack and stroke), or peripheral arterial disease (PAD). CVD RF included hypertension (HTN), dyslipidemia (DLD), diabetes mellites (DM), and current smoking.
Results: An algorithm for classifying CVD and CVD risk factors was developed including the 2033 subjects with baseline data. At cohort entry, the prevalence of CVD was 5.4% (n=110), HTN 670 (32.9%), DLD 401 (19.7%), DM 165 (8.1%), and current smoking 346 (17%). Seventeen (15.7%) subjects were not identified as having CVD by physician-report but were classified as having CVD upon medication review. Discrepancy between physician and patient-reported CVD RF were: 207 for HTN (31%), 291 for DLD (73%), and 22 for DM (13%).

Chart review of 55 patients showed sensitivity of 100% for CVD, 78% for HTN, and 42% for DLD classification.
Conclusion: An algorithm for classification of CVD has been successfully developed in a representative RA registry. The discrepancy between physician and patient-reported CVD highlights the importance of utilizing information from multiple sources when classifying comorbidities.

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Cardiovascular Disease Risk Factors May Negatively Impact Rheumatoid Arthritis Disease Outcomes: Findings from the Ontario Best Practices Research Initiative

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Objectives: Rheumatoid arthritis increases the risk of cardiovascular disease (CVD). Less is known about the direct influence of CVD and CVD risk factors (RF) on RA outcomes, but higher comorbidity burden has been suggested to adversely affect RA treatment response. We tested our hypothesis that CVD risk factors (RFs) alone, in the absence of CVD, are associated with higher disease activity and disability in RA.
Methods: The Ontario Best Practices Research Initiative (OBRI) is a clinical registry of RA patients followed in routine care. RA subjects with complete data to calculate disease activity according to the Disease Activity Score-28 (DAS28), Clinical Disease Activity Index (CDAI), 28 swollen joint count (SJC28) and functional status (Health Assessment Questionnaire Disability Index [HAQ-DI]) at cohort entry were selected. Patients were divided into mutually exclusive groups by baseline CVD status as: (1) no CVD/no CVD RFs; (2) CVD including coronary artery disease, myocardial infarction, cerebral vascular accidents, and peripheral arterial disease; (3) no CVD but CVD RFs including hypertension (HTN), dyslipidemia (DLD), diabetes (DM), or smoking. We performed separate linear regression analyses for each outcome, adjusted for baseline clinical and demographic variables, to determine the independent effect of CVD status on disease outcomes at baseline.
Results: Of 2033 patients examined, 49.5 % had no CVD, 5.4% had CVD and 45.1% had CVD RFs alone. The most common RF was HTN (33%) followed by DLD (19.7%), current smoking (17%), and DM (8.1%). At cohort entry, having a CVD RF was associated with significantly higher DAS28 (β 0.13, 95%CI 0.002-0.26, p 0.04) and HAQ-DI (β 0.16, 95%CI 0.10-0.23, $p<0.0001$). At one year, CVD RF was associated with worse DAS28 (β 0.17, 95%CI 0.05-0.30, p 0.01) and CDAI (β 0.96, 95%CI 0.05-1.87, p 0.04) but not HAQ-DI (β 0.03, 95%CI -0.002-0.08, p 0.17). Having higher number of CVD RF was associated with worse disease outcomes. No association between CVD status and swollen joint count was observed.
Conclusion: Even in the absence of CVD, traditional CVD RF are associated with greater RA disease severity and disability. Self-perceived impact of comorbidity (patient global assessment of health) may be driving this relationship. Moreover, patients with CVD RF maybe more treatment-resistant, suggesting that co-management of CVD RF in RA patients may be beneficial on both fronts.

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Incidence of Imminent Fracture and the Subsequent Fracture Cascade After Index Fragility Fracture in Ontario, Canada

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Objectives: Fragility fractures due to osteoporosis (OP) reduce quality of life, increase risk for subsequent fractures, and are a major economic burden. In 2010, Osteoporosis Canada produced guidelines on the management of OP patients at risk for fractures (Papaioannou et al. CMAJ 2010). We describe the real-world incidence of primary and subsequent fragility fractures in elderly Canadians in Ontario, Canada in a timespan (2011–2017) following guideline introduction.
Methods: This retrospective observational study used de-identified health services data generated from the publicly funded healthcare system in Ontario, Canada from the Institute for Clinical Evaluative Sciences. The study population included individuals ≥66 years of age who were hospitalized with a primary (i.e. index) fragility fracture (identified using ICD-10 codes from hospital admissions, emergency and ambulatory care) occurring between January 1, 2011 and March 31, 2015. Prior OP treatment and subsequent fracture information were collected until March 31, 2017.
Results: 115,776 patients with an index fracture were included in the analysis. Mean (standard deviation) age at index fracture was 80.4 (8.3) years. In the year prior to index fracture, 32,772 (28.3%) patients received OP treatment. The incidence of index fractures per 1,000 persons (95% confidence interval) from 2011–2015 ranged from 15.16 (14.98–15.35) to 16.32 (16.14–16.51). The majority of index fractures occurred at major osteoporotic fracture sites: 27.3% (hip), 15.4% (wrist), 11.4% (humerus), 6.7% (vertebral), and 4.2% (radius and ulna). The proportion of patients incurring a second fracture of any type ranged from 13.4% (tibia, fibula, knee, or foot index fracture) to 23.0% (vertebral index fracture). Median (interquartile range [IQR]) time to second fracture ranged from 436 (69–939) days (radius and ulna index fracture) to 640 (297–1,023) days (tibia, fibula, knee, or foot index fracture). Median (IQR) time from the second to third fracture ranged from 237 (75–535) days (pelvis index fracture) to 384 (113–608) days (femur index fracture).
Conclusion: This real-world study found that elderly patients in Ontario, Canada incurring a primary fragility fracture from 2011–2015 were at risk for future fractures occurring over shorter periods of time with each subsequent fracture. These observations are consistent with previous reports of imminent fracture risk and fracture cascades in OP patients with prior fractures, further highlighting the importance of rapid screening and initiation of effective treatment after occurrence of an index fragility fracture.

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Sub-Clinical Disease Activity in the Feet of Patients with Early Rheumatoid Arthritis: What Clinical Assessments Miss

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Objectives: Early RA diagnosis and effective monitoring of disease activity are important for making treatment decisions and preventing erosive disease. Although physical examination has low accuracy and reliability, it remains the cornerstone of assessment despite emerging imaging modalities. This study compares the prevalence of early inflammation in the feet assessed by clinical examination, US and MRI, the latter being the reference standard.

Methods: Treatment naive patients with early RA (ACR criteria, <2 years symptom duration) were recruited. The 2nd-5th metatarsophalangeal joints (MTPJs) of the most clinically symptomatic foot were assessed for swelling and tenderness and imaged by US (Esaote MyLab70, 6-18 MHz linear array probe) and peripheral MRI (1.0 Tesla, GE Medical). US images were semi-quantitatively graded for synovial thickening (ST) (0-3) and Power Doppler (PD) (0-3). Based on OMERACT RA MRI scoring criteria, a radiologist blinded to clinical and US results semi-quantitatively graded bone marrow edema (BME) (0-3 per metatarsal head and phalanx base, max=24) and synovitis (0-3 per MTPJ, max=12). The prevalence of inflammation on US and MRI was assessed in MTPJs with and without clinical findings.
Results: The analyses included 39 patients; 33 female (84.6%), mean (SD) symptom duration 12.2 months (10.9), 18 anti-CCP positive (46.2%), and 15 RF positive (38.5%). Mean (SD) CRP and ESR levels were 18.9 mg/L (30.7) and 28.4 mm/hr (22.4), respectively. Of 31 swollen MTPJs, 81% had ST on US, of which 44% showed PD and 64% had grade ≥2 synovitis or BME on MRI. Of 125 non-swollen MTPJs, 41% had ST, with 22% also showing PD and 27% with grade ≥2 synovitis or BME. Of all patients, 18 had ≥1 swollen MTPJ and, of this subset, 94% had ST, with 41% showing PD and 57% having grade ≥2 synovitis or BME. Of 21 patients without any swollen MTPJs, 86% had ST in ≥1 MTPJ, with 28% showing PD and 40% having grade ≥2 synovitis or BME.
Conclusion: In examining patients with early RA, US frequently showed subclinical inflammation in the MTPJs. Furthermore, inflammation on MRI was often found in MTPJs with ST and PD on US, suggesting that US findings may be an accurate representation of true disease activity. Basing treatment solely on clinical assessment may result in under-treatment of a moderately high proportion of patients with sub-clinical inflammation. In summary, US evidence of ST and PD may be helpful as an adjunct to clinical examination in assessing disease activity in the feet.

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Anakinra Exposure in a Pregnant Patient with Juvenile Idiopathic Arthritis: A Case Report

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Case Report: The use of Anakinra, an IL-1 inhibitor, has not been assessed in well-controlled, adequate studies in pregnancy. Retrospective studies conducted in animals show no harm, with one study in mice showing prevention of embryo implantation; however, generalizability to humans is limited. The literature includes two retrospective studies and a few case reports and case series in humans that have examined the use of Anakinra during pregnancy, reporting a few cases of congenital renal anomalies. Our objective was to add to the limited data on IL-inhibitor use in pregnancy and report a case of a patient with Juvenile Idiopathic Arthritis (JIA) who continued on Anakinra during pregnancy.
A 22-year-old Caucasian female with polyarticular JIA, ANA positive, RF negative, on treatment with Sulfasalazine (SSZ) and Anakinra was assessed for preconception counseling. She was in remission for three years prior to conception. SSZ was continued at a dose of 3000 mg daily through the pregnancy. Anakinra was initially continued at a dose of 100 mg subcutaneous daily until 19 weeks of gestation and then weaned off by extending the dosing interval by one day each week until it was administered weekly, then discontinued by week 27. She was on folate for 1.5 months pre-conception and did not have any issues with conception. Her CRP prior to conception was 1.4.

The fetus growth was normal. Initially, there was concern regarding a prominent and echogenic bowel on Ultrasound, which resolved on repeat imaging. The patient did not have any flare-ups of her JIA, including the period after discontinuation of Anakinra. Her peak CRP during pregnancy was 7.7 and repeat ANA was negative.
The patient had a post-dates pregnancy requiring induction at 41 weeks. Due to an abnormal fetal heart rate during labour, she had a vacuum-assisted delivery. Her postpartum course was complicated by postpartum hemorrhage (PPH) treated with Misoprostol. No postpartum flare-ups.
Her pregnancy resulted in a healthy male with a birth weight of 3,840 grams and Apgars of 9 at both one and five minutes. Anakinra was restarted at two weeks postpartum and continued while the patient was breastfeeding and supplementing with formula.
This case adds to the existing literature on the effect of IL-1 blockade on pregnancy outcomes. No significant adverse maternal or fetal outcomes were observed. This case demonstrates that Anakinra is a potential therapeutic option that can be continued and tapered safely during pregnancy.

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Identifying Factors Associated with Participation in School and Work-Related Activities among Young People and Adults with Juvenile Idiopathic Arthritis (JIA)

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Objectives: The aim of this systematic review was to describe the level of participation in school and work-related activities among young people and adults with juvenile idiopathic arthritis (JIA), as well as identify associated factors.
Methods: Electronic databases Medline, PsychInfo, CINALH and Embase were systematically searched for articles published from the year 2000 to the end of July 2018 pertaining to participation in school and/or work activities, and associated factors among people aged between 11 and 40 years with a diagnosis of JIA. The younger age limit of 11 years was chosen as it corresponds to the transition into adolescence, a time when children may begin to explore their vocational interests. Studies were included if they measured involvement and/or performance in school and work-related activities. Qualitative, quantitative and mixed study designs were considered. Quality assessment was completed using the Mixed Methods Appraisal Tool (MMAT). Selection of articles was completed independently by two authors. Findings were summarized and organized using a structured analysis table based on the health and health-related domains contained in the International Classification of Functioning, Health and Disability (ICF).
Results: Four hundred and fifty-four articles were identified through electronic and reference search. Thirty-nine full text articles were reviewed to assess for eligibility. Eighteen articles met inclusion criteria and findings were reviewed. Most focused on describing participation in work-related activities. Results suggest that people with JIA participated less in both school and work activities as compared to healthy peers due in large part to the impact of disease-related factors (pain, fatigue, lack of physical endurance and physical dysfunction), as well as psychosocial factors (family environment and dynamics, friends and health care professionals, age, gender, level of education, socio-economic status, coping skills, physical environment, and level of activity).
Conclusion: Our findings underline that in addition to commonly assessed disease-related

factors, personal and environmental (social and physical) factors may help explain difficulties in socio-professional integration among young people and adults living with JIA. By identifying the barriers and facilitators to socio-professional integration across those living with arthritis health care professionals may be better able to meet the needs of this population with greater precision and facilitate fulfillment of their vocational goals.

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Ready or Not: Transition Readiness in JIA and SLE

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Objectives: Transitioning from pediatric to adult care represents a particularly vulnerable period among patients with Juvenile Idiopathic Arthritis (JIA) and childhood-onset Systemic Lupus Erythematosus (cSLE). The shift to adult care can often be unsuccessful, resulting in unfavourable health outcomes. Successful transition necessitates that adolescents acquire skills necessary to manage their own disease. Measuring patients' current level of transition readiness is the first step in identifying areas for improvement in both self-management skills and the transition process itself. In adolescent patients with JIA or cSLE, we aimed to 1) determine variability in readiness for transition and 2) identify areas of weakness in transition readiness.

Methods: The TRANSITION-Q, a validated questionnaire for use in adolescents with chronic disease, assesses patients' self-management skills and transition readiness in health care. It contains 14 questions to which adolescents respond "never," "sometimes," or "always". Total scores range from 0-100; higher scores indicate greater transition readiness. The TRANSITION-Q was completed by 14-18-year-olds with JIA or cSLE during their regular follow up appointments at McMaster Children's Hospital between August-October 2018. Age, sex, disease duration, disease severity and TRANSITION-Q scores were determined, as were frequencies of responses to each question.

Results: Twenty adolescents (n=17 JIA, n=3 cSLE) completed the TRANSITION-Q. Their mean (SD) age and disease duration was 16.1 (1.0) years and 5.8 (4.6) years, respectively. The mean (SD) TRANSITION-Q score of 54.7 (12.2) is comparable to reported scores in other patient populations. Scores appeared to plateau at age 16 with a mean (SD) 55.6 (11.4) versus 56.9 (14.9) at 17 and 56.0 at 18. More than half (60%) of adolescents "always" answer a nurse's/doctor's questions, make decisions about their health and talk about their health condition when needed. When asked if respondents speak to the physician/nurse instead of parents speaking for them, 70% responded "sometimes" while only 20% responded "always". Half "sometimes" see the physician/nurse on their own during appointments; the other half "never" do. Over half (55%) "never" contact a doctor when they need to.

Conclusion: This is the first study to use the TRANSITION-Q to measure transition readiness in adolescent rheumatology patients. Readiness for transition varied among patients the same age, yet mean values appeared similar between patients aged 16-18. Future work will explore the trajectory of changes in transition readiness scores within patients of the same age and between patients of different ages. We will explore strategies to improve self-management skills and, subsequently, TRANSITION-Q scores.

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FGF-23 and Vascular Dysfunction in Patients with Familial Mediterranean Fever-related

Amyloidosis and Association with Cardiovascular Events

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Objectives: Cardiovascular disease (CVD) risk increases as kidney function declines and this elevated risk is apparent even in early chronic kidney disease (CKD). CVD in people with CKD is characterized by arterial stiffening and left ventricular hypertrophy. Blood fibroblast growth factor-23 (FGF-23) concentration rises early in CKD, and increases exponentially in relation to a falling eGFR. FGF-23 is expressed both in the myocardium and in the vascular system. It is positively associated with CVD risk in patients with CKD, and suggested as a therapeutic target. FMF is an autosomal recessive disorder associated with the development of amyloidosis, proteinuria and CKD. Our aim was to compare parameters of endothelial function in patients with FMF related amyloidosis and primary glomerulonephropathies (GN) to define risk factors for a CVD event in the FMF population.

Methods: A cross-sectional evaluation with prospective follow-up of consecutive patients with FMF related amyloidosis or other non-diabetic GN was performed. All patients had nephrotic-range proteinuria and normal GFR. Flow-mediated dilatation (FMD) was assessed as well as FGF-23 levels, serum lipid levels, CRP and BMI were determined. Homeostasis model assessment (HOMA) was computed. Patients were followed for cardiovascular events.

Results: Patients with amyloidosis secondary to FMF (n=107), showed higher levels of CRP, triglycerides, lower FMD and albumin as compared to patients with other GN (n=126). CVD events (n=47, 28 of amyloidosis, 19 of other GN) were registered during the 4.2-years follow up. More significant proteinuria, elevated CRP, FGF23 and lower FMD were observed in patients with cardiovascular risk in both groups. A cox regression analysis was performed to evaluate the probability of a CVD event associated with each risk factors . Across both groups, FGF23 and FMD levels were factors independently contributed to risk of CVD events.

Conclusion: Patients with FMF related amyloidosis are at increased CVD event risk possibly related to elevated inflammatory markers, and decreased FMD measures observed in these patients. CRP, FGF 23 and FMD levels were the strongest predictors of CV risk in patients with FMF by cox regression analysis. Ideally, effective control of subclinical inflammation will mitigate the risk of CVD events for this group. Patient at increased risk require aggressive control of subclinical inflammation but also evaluation and modification of other CV risk factors.

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Patient and Caregiver Engagement in Research (PACER): Examining Attitudes towards Co-enrollment in Research Studies

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Objectives: The overall objective of the PACER project is to identify how to improve the engagement of patients and caregivers in clinical research. The aim of this portion of the project was to identify how to best approach patients and caregivers to co-enroll in pediatric rheumatology research; this included understanding factors which influence their decisions to participate in multiple studies.

Methods: Patients and caregivers attending the rheumatology clinic at The Hospital for Sick Children were invited to participate in semi-structured interviews and focus group sessions.

Participants were asked to respond to prompts about their experience participating in clinical research, including their opinion of participating in multiple studies, the number of studies that they would like to be presented to consider, their preferred time of being approached for research, and other comments. Sessions were recorded, transcribed and analyzed using the NVivo 10 qualitative data analysis software to identify relevant themes.
Results: Overall, participants felt that the intensity of the study requirements, rather than the number of studies, was the biggest factor affecting their decision to participate in multiple studies. Another factor commonly identified was the competing demands of participants' work/school and family life. Participants indicated that they generally preferred to be informed about all study opportunities and liked to receive this information prior to their appointments. Once informed, they preferred to be approached by the research team while they were waiting for their appointment. Participants suggested that the integration of technology may aid the study recruitment process.
Conclusion: Patients and caregivers are open to the concept of co-enrolling in research studies. Multiple factors influence their decisions to co-enroll including the demands of the study and personal limitations. These factors should be considered by the research team and will be incorporated into research practices when approaching future potential study participants.
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Improving Methotrexate Knowledge in Chinese-speaking Patients with Inflammatory Arthritis: A Quality Improvement Initiative
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Objectives: Suboptimal adherence to methotrexate therapy by patients is a significant barrier to achieving disease modifying effects. Studies have shown that medication adherence may be influenced by language barriers in patients who are non-native English speakers.
Methods: 17 Chinese speaking and 44 native English speaking patients with inflammatory arthritis taking methotrexate were recruited for this study. A validated methotrexate knowledge questionnaire and methotrexate information sheet were translated into Chinese characters. 2 methotrexate questionnaires were answered by each patient; a 'pre' questionnaire prior to, and a 'post' questionnaire after reading the methotrexate information sheet. Questionnaires and information sheets were provided in the patients' native language. Information pertaining to education, self-assessed English proficiency and basic demographics were collected for each patient.
Results: Patients in both cohorts improved their overall methotrexate knowledge scores after reviewing the information sheet (Chinese: 4.5 to 7.5, $p<0.001$; English: 6.7 to 7.8, $p<0.001$). Chinese patients scored significantly lower in the pre-questionnaire ($p=0.002$), but did equally well in the post-questionnaire ($p>0.05$) after reviewing the translated information sheet. Improvements were significant among the subset of Chinese speaking patients who self-identified as poor English speakers ($p=0.002$). Significant improvement in scores were found in Chinese speaking patients, regardless of level of education.
Conclusion: A simple quality improvement initiative of providing patients with a translated methotrexate information sheet in their native language significantly improved their understanding of this drug regardless of the patient's level of education. Self-identified poor English speakers were identified as those with the poorest knowledge of methotrexate, but after the intervention caught up with both native English speakers and native Chinese speakers with

good English speaking ability. This simple intervention may be immensely useful for improving medication adherence and disease modifying effects.

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A Ten-Year Retrospective Review of Temporal Artery Biopsy Lengths in Alberta

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Objectives: Temporal arteritis or giant cell arteritis (GCA) is a large vessel vasculitis that involves the temporal arteries and other extra-cranial large arteries. The historical gold standard for diagnosis is a temporal artery biopsy (TAB) which has potential for false negativity due to the unevenly distributed nature of the condition. Although literature varies, the consensus suggests an in vivo length of at least one to two centimetres. The purpose of this study is to review all biopsy lengths performed in the province of Alberta over the last decade in order to assess whether an adequate sampling is being done to optimize diagnostic yield for quality assurance and to identify predictors of a positive diagnosis of GCA.

Methods: A retrospective chart review was performed on patients identified who had undergone a TAB procedure in 22 sites in Alberta between January 1st, 2008 to January 1st, 2018. Data extracted included patient's age, sex, levels of inflammatory markers (ESR and CRP), side of biopsy, post-fixation length and final pathological diagnoses. Predictors of positive pathology were modelled using logistic regression. All statistical tests were two-sided, and a p-value of < 0.05 was considered statistically significant. Stata 14.1 (StataCorp) was used for data analysis.

Results: A total of 1203 biopsies were identified over the decade. Median age was 73 (quartile range [QR], 64–80) years, with 806 (67%) female patients. A total of 235 (20%) biopsies were diagnosed as GCA, with median biopsy length of 1.3 cm (QR, 0.9–1.8 cm). Biopsy lengths between sites ranged between 0.8 cm (QR, 0.6–1.1 cm) to 2.2 cm (QR, 1.5–3.3 cm). Univariate analysis noted increased age (odds ratio [OR] 1.04 per year, 95% CI, 1.02–1.05; $p < 0.001$), ESR (OR 1.01 per unit, 95% CI, 1.01–1.02; $p < 0.001$), CRP (OR 1.01 per unit, 95% CI, 1.01–1.01; $p < 0.001$) and biopsy lengths (OR 1.25 per cm, 95% CI, 1.06–1.46; $p = 0.007$) were associated with positive GCA diagnosis. In multivariate analysis, only age (OR 1.04 per year, 95% CI, 1.02–1.05; $p < 0.001$) and CRP (OR 1.01 per unit, 95% CI, 1.00-1.01; $p < 0.001$) remained statistically significant predictors of a positive GCA diagnosis.

Conclusion: Our study indicates that the length of TABs performed in Alberta is variable and some sites acquire lengths that are less than typically recommended. We have noted that age, ESR, CRP and length of biopsies were significant independent predictors of pathological diagnosis.

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Intravenous Immunoglobulin Therapy in the Treatment of Idiopathic Inflammatory Myopathies

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Objectives: Dermatomyositis (DM) and polymyositis (PM) are idiopathic inflammatory myopathies characterized by weakness and inflammation of the muscles. First line therapy typically involves high dose systemic steroids to establish disease control along with steroid

sparing agents to minimize steroid induced morbidity. Other immunosuppressive agents are typically initiated as an adjunct to systemic steroids, with scarce evidence supporting use of various agents in the context of the clinical presentation of a patient. Intravenous immunoglobulin therapy (IVIG) in particular has demonstrated evidence in severe refractory disease. Our study aims to investigate the efficacy of IVIG in the treatment of various clinical manifestations of inflammatory myopathies.
Methods: A retrospective chart review was performed on patients identified through the Sunquest Laboratory Information System who had received IVIG for the treatment of DM or PM between January 1st, 2012 to January 1st, 2018 at the University of Alberta Hospital. Data extracted included patient's age at initiation of treatment, sex, duration of treatment, presenting symptoms (weakness, myalgias, skin rashes, calcinosis, dysphagia and interstitial lung disease [ILD]) and outcome of treatment.
Results: A total of 46 DM and 19 PM patients were identified. Median age of treatment onset was 54 (interquartile range [QR], 40 – 64) years, with 49 (75%) female patients. The median duration of treatment was 13 (QR, 3 – 37) months. Fifty-six of sixty-five (86%) patients had weakness, 7/65 (11%) patients had myalgias, 40/65 (62%) patients had rashes, 5/65 (8%) had calcinosis, 16/65 (25%) had dysphagia and 6/65 (9%) had ILD. Initiation of IVIG improved symptoms of weakness for 41/56 (73%) patients, myalgias for 6/7 (86%) patients, rashes for 33/40 (83%) patients, calcinosis for 0/5 (0%) patients and dysphagia for 12/16 (75%) patients. IVIG improved the ILD for 1/6 (17%) patients and the remaining 5/6 (83%) patients did not demonstrate progression of their ILD.
Conclusion: The results of our study suggest that a course of IVIG at 2 g/kg per month administered over 2-5 days is effective in treating refractory inflammatory myopathies and particularly effective in treating symptoms of weakness, myalgias, rashes and dysphagia. IVIG however appears generally ineffective in treating calcinosis as well as ILD.

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When it's not Necrotizing Autoimmune Myopathy

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Case Report: We present a case of sporadic late-onset nemaline myopathy. This is a rare but important disease to consider in the differential diagnosis of inflammatory myositis.
Our patient is a 63 year old man with metastatic prostate cancer and previous rosuvastatin use. He was noted to have elevated CK in 2014 but was asymptomatic at the time. Rosuvastatin was discontinued. Despite this, his CK remained persistently elevated. He was referred to us in 2018 with a 6-month history of progressive proximal muscle weakness. There was no history of dysphagia or shortness of breath.
On examination he had significant proximal muscle weakness, but no other clinical evidence of dermatomyositis. Investigations revealed CK 5806, ALT 203, AST 102, normal TSH. Myositis panel was negative except for strongly positive antibodies to HMG-CoA reductase. EMG demonstrated myopathic units consistent with a primarily proximal myopathy. Based on this information, the most likely diagnosis was felt to be statin-induced necrotizing autoimmune myopathy (NAM). He went on to have muscle biopsy which showed very rare necrotic fibers with no perimysial thickening or infiltrate. Based on this, NAM was felt to be unlikely. In contrast, Gomori trichrome stain showed rods in many fibers. Electron microscopy confirmed nemaline rods in the contractile elements at the Z-band level. In the context of this patient, this is consistent with a diagnosis of sporadic late-onset nemaline myopathy (SLONM).

SLONM is a rare muscle disorder characterized by proximal muscle weakness and the presence of nemaline rods on muscle biopsy. Nemaline rod myopathy can also be seen in patients with HIV. Predominant phenotypic presentation of the disease is slowly progressive weakness and atrophy of the proximal upper and lower limbs. Up to 50% of patients describe dyspnea and/or dysphagia. Serum CK levels are usually normal or mildly increased. Monoclonal gammopathy of unknown significance (MGUS) can be found in up to 50% of patients. Treatment depends on the presence or absence of MGUS. Most patients with MGUS respond to autologous peripheral blood stem cell transplantation. For patients without MGUS, treatment typically involves immunosuppressive therapy which may include: steroids, methotrexate, azathioprine, IVIg, rituximab and cyclophosphamide. Response to immunosuppressive therapy is variable.
Our patient has no evidence of monoclonal gammopathy and HIV serology was negative. He was treated with prednisone for 3 months with no response. He has since been started on IVIg. He continues to be followed in our clinic.

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Establishment of a Rheumatology Training Program in Nepal

Stephen Aaron (University of Alberta, Division of Rheumatology, Edmonton); Buddhi Paudyal (Patan Academy of Health Sciences, Patan)

Objectives: Nepal is a country of 30 million people, served by only two foreign- trained rheumatologists working in its public health system. The first training program in rheumatology is to begin in October 2018, based at the Patan Academy of Health Sciences, a medical school dedicated to the principles of Social Accountability. The program will be based upon the requirements of the Nepal Medical Council and the principles of Competency based training. The establishment of this program has been supported by the work of rheumatologists in Canada, the United States and other First World countries. It is grounded in the principle that training must take place within the local experience of Nepali patients. For that reason Entrustable Professional Activities (EPA's) were designed within the social accountability framework of the Patan Academy, and clinical training will take place in Nepal, rather than in first world clinics. We are recruiting teachers to help with the program in Patan. The estimated prevalence of rheumatic disease, the complexities involved in the care of these diseases and the problems faced in the care of these patients will be outlined. The steps involved in the curricular design process will be described, and an outline of the Fellowship program, including EPA's, rotations, assessment and evaluation presented. Contrasts will be highlighted between the accessibility to care, the availability of medications and the risks of comorbid infections, between Canada and Nepal. Suggestions for improving access to care in Nepal, or other third world countries will be solicited, particularly those that might be involved in the training program.

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A Case of Balloon: Bronchiolitis and Allergic Alveolitis or an Opportunistic Organism Nesting?

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Case Report: Allergic Alveolitis, also referred to as hypersensitivity pneumonitis, is a group of lung diseases often resulting from inhalation of an antigen in the form of environmental or occupational exposure. Manifestations include a febrile reaction, malaise, and dyspnea. The onset of such symptoms in an immune-compromised host, such as any number of rheumatology patients, often triggers a concern for opportunistic infections in the setting of immune

suppression.
To describe a case of bilateral lung infiltrates in an immune-suppressed patient
We report a case of a 45 year-old male with Psoriatic arthritis, on methotrexate who presented with symptoms of dyspnea, rigors, fevers, and decrease exercise capacity and imaging consistent with bilateral, widespread miliary pattern nodules in the lungs. His infectious and environmental risk factors included a trip to the United States and inflating 200 balloons for a celebration. He was referred to respirology for further assessment and his methotrexate was stopped.
This reported case of allergic alveolitis was likely precipitated from inhalation of the powdery substance through inflation of a large quantity of balloons. This is the first case report of such particular association.

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pGALS Training Increases Canadian and Kenyan Physicians' Confidence in Examining the Musculoskeletal System in Children

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Objectives: pGALS (paediatric Gait Arms Legs Spine) is a simple, validated musculoskeletal (MSK) assessment tool for the school-aged child. Studies have shown physicians lack confidence in the pediatric MSK examination. We evaluated the effect of a pGALS teaching session on enhancing physicians' confidence in examining the MSK system in children. We compared the impact of the intervention on two culturally distinct groups of physicians. We explored preferred methods of learning and applying pGALS in clinical practice.

Methods: Physicians enrolled in a pGALS workshop in Canada (Quebec) and Kenya (Nairobi) completed anonymous questionnaires on-site before and after the teaching session. Canadian participants were also asked to complete an anonymous electronic follow-up survey 6 months later.

Results: A total of 103 physicians completed the questionnaires (51 Canadian; 52 Kenyan); 68.4% were family physicians (FP), 31.6% were pediatricians (P). Among Canadians, FP and P were similar in number (P 53.2%, FP 46.8%); most Kenyan participants were FPs (88.2%) ($p<0.001$). Canadian participants had more years of practice (C:17.2±10.3 vs K:4.3±3.6, $p<0.0001$). MSK examination was previously taught in 98/103 (95.2%); however only 60.8% were taught the MSK exam in children (C:66% vs K:55.8%, p=n.s). Before the workshop, only 26.5% (26/98) felt 'confident' or 'very confident' in evaluating the pediatric MSK system (C:28.3% vs. K:25%, p=n.s). Confidence in examining the MSK exam was significantly lower than that of the following systems: cardiovascular, respiratory or abdominal. Following the teaching session, increased level of confidence was seen, with 88.8% feeling 'confident' and 'very confident" (C:80.4% vs K:96.2%, p=0.014). Most common barrier identified for its use was that it was time-consuming (C:37.3% vs K:53.9%, p=n.s). More Kenyan physicians reported that an office poster could facilitate pGALS use (C:51% vs K:71.2%, p=0.041); a pocket card was suggested equally (C:67.4% vs K:50%, p=n.s). Over half of participants agreed that web-based demonstrations (C:55.3% vs K:57.7%; p=n.s) could improve confidence in pediatric MSK examination; workshops were preferred by Canadians (C:72.3% vs K:46.2%; p=0.004). Only 27.5% (14/51) of Canadian participants responded to a follow-up survey. Among those, improved confidence was maintained in 92.9% (13/14). Most respondents (78.6%, 11/14) were

using pGALS in clinical practice and 75% found it ‘useful’ or ‘very useful’ in evaluating MSK symptoms.
Conclusion: Self-perceived confidence in examining the pediatric MSK system was low in both Canadian and Kenyan physicians. pGALS training improved practitioners’ confidence regardless of type of physician, experience or culture. pGALS reminders may be useful to ensure pGALS implementation into clinical practice.

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Inflectra and Remicade Use and Cost in Canada Under Provincial Drug Plans in 2016

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Objectives: To assess recent use of Inflectra (infliximab) versus Remicade (regardless of indication), within Canadian provincial publicly financed drug benefit programs.
Methods: We used aggregate claims data from the National Prescription Drug Utilization Information System (NPDUIS), for 2016. This contains public drug plans data from across Canada except Quebec. Aggregated data were obtained by province, sex, and age groups. We described patients for whom the public drug plan/program accepted at least part of 1 or more claims for Inflectra or Remicade, either towards a deductible (if applicable) or payment. We also calculated total number of claims and recorded amounts paid by the public drug plan (drug cost and pharmacy fees).
Results: In 2016, there were 218 beneficiaries with at least one Inflectra dispensation, with a total of 856 claims approved. During this time, at least 12,912 individuals were dispensed Remicade, with a total of 80,862 approved claims. No other infliximab biosimilar was dispensed under public drug plans in 2016. Stratified information (sex, age group, province financing the claim) was available for 184 Inflectra and 12,904 Remicade users. Most patients were dispensed Inflectra in Ontario (146 /186, 79%) or in British Columbia (38/186, 21%). Excluding Quebec, other provinces with Inflectra dispensation were Alberta, Newfoundland and Labrador, New Brunswick, Saskatchewan, and Manitoba. There was a significantly higher proportion of seniors receiving Inflectra (71/184, 38%) versus Remicade (2362/12912, 18%) and more females. The estimated total cost recorded according to public plans for Remicade in Canada (exclusive of Quebec) in 2016 was $361,502,867 Canadian, representing an average cost per claim of Remicade of $4,471 (versus Inflectra, $1,934). If half of the Remicade claims had been Inflectra instead, the cost difference would have been over $102.5 million. This does not consider undisclosed rebates/discounts which may have been in place. The findings are limited in terms of our inability to stratify by indication. We were unable to establish if subjects were primarily new-users. No analyses of drug persistence (which may reflect safety and effectiveness) were done.
Conclusion: In 2016, there were 12,912 Remicade users and 218 Inflectra users in Canada, exclusive of Quebec; Remicade’s recorded price tag was over $361.5 million, not including rebates/discounts. Although cost savings of using biosimilars are potentially large, our estimates

do not account for other considerations, such as safety and effectiveness, and rebates/discounts offered by drug companies.

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Fatigue Measurements in Systemic Lupus Erythematosus

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Objectives: Fatigue is one of the most frequent and disabling issues in systemic lupus erythematosus (SLE). It is, however, difficult to quantify. The Ad Hoc Committee on SLE Response Criteria for Fatigue in 2007 recommended use of the Krupp Fatigue Severity Scale (FSS). Since then, the Functional Assessment of Chronic Illness Therapy (FACIT)- Fatigue score has also been validated in SLE. We performed a review of instruments used to measure fatigue in adult SLE patients from 2007 onward.

Methods: We used Medline and EMBase from 2008 to Oct. 2017 search terms to identify clinical trials and observational studies in adult SLE, where fatigue was an outcome. All English and French studies were reviewed to determine the fatigue measures used, and study results.

Results: 22 studies met our inclusion criteria. Eight fatigue scales were used. The most frequently used instruments were the Visual Analogue Scale (VAS) for fatigue (used in 32%), the FSS (32%) and the FACIT-Fatigue scale (14%). The FSS was used in the majority of clinical trials (5 of 12; 42%) with the remaining evenly divided between the two other scales. The VAS was used by the majority of observational studies (5 of 10; 50%), followed by the FSS (2 of 10; 20%). Fourteen of the 22 studies demonstrated a difference in fatigue levels in terms of statistical and clinically meaningfulness. Of the 8 studies which did not, 3 used the FFS, 3 used the VAS and 2 used other scales (MFI and BFI). All 3 studies using FACIT detected clinically and statistically significant differences.

Conclusion: The VAS, FSS and FACIT Fatigue scale were the most frequently used instruments to measure fatigue in adult SLE studies from 2008-2017. Several studies detected clinical important changes in fatigue with these instruments. If fatigue is considered a core data element of observational studies in SLE, this review may help inform choice of instruments.

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The Changing Faces of Rheumatoid Arthritis Patients at Presentation: A 20-Year Study

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Objectives: To analyze the evolution over 20 years of baseline characteristics of patients with incident RA.

Methods: Since 1998, the Early Undifferentiated PolyArthritis (EUPA) cohort recruits consecutive adults with recent-onset immune-mediated synovitis affecting at least 3 joints; patients come from a catchment area of about 500,000 individuals for which >90% of acute and chronic rheumatological care is given locally. Baseline characteristics were compared in three subgroups of patients fulfilling RA criteria according to date of inclusion (1998-2004; 2005-2010; 2011-2017). Anti-cyclic citrullinated peptide (CCP2) antibodies and RF were measured

using commercial assays. Human Leucocyte Antigen (HLA)-DR alleles were determined using sequence specific primer PCR. False discovery rate correction was used to adjust p-values for multiple comparisons.
Results: 753 patients were included: 247 in 1998-2004; 263 in 2005-2010; 243 in 2011-2018. Symptom duration increased (2.8, 3.5, 4.1 months; p=0.002) over time. Markers of inflammation decreased (ESR (mm/h): 36, 26, 24, p=0.025; CRP (mg/L): 15.0, 11.0, 9.0, p=0.0046), as did disease activity (DAS28-CRP: 5.5, 5.1, 5.0, p=0.031), and patient overall assessment of disease activity (PGA) (59.0, 56.5, 49.0 mm, p=0.044); without a parallel decrease in joint counts (SJC: 11, 11, 12, p=0.5). The mean titers of RF (p=0.031) and anti-CCP2 (p<0.001) significantly decreased between each period. RF positivity decreased (47.8, 36.9, 35.0%, p=0.031), but positivity remained stable for anti-CCP2 (40.8, 35.0, 33.6%, p=0.4). We observed a decrease in current smokers over time: 22.4, 18.6, 12.2%, respectively (p=0.015). Among anti-CCP positive patients, the proportion of SE (about 63%) and current (19-25%) and ever (~70%) smoking remained stable. Among anti-CCP negatives, current smoking decreased significantly (20.6, 17.2, 8.8%, p=0.02), and the proportion of SE trended to decrease below the prevalence in the population (38%). Cardiovascular (CV) comorbidities (especially hypertension and dyslipidemia) increased over time as did history of solid cancer; this increase occurred solely among anti-CCP negatives: 44.8, 55.0, 60.0% for CV (p=0.03) and 4.1, 7.1, 13.1% for cancer (p=0.01).
Conclusion: In this cohort of recent onset RA recruited over 20 years, we observed a constant drift towards less inflammatory RF-negative arthritis at baseline. Decreasing smoking rates paralleled lower levels of antibodies but not lower incidence of positive CCP. The increasing proportion of seronegative patients in this RA cohort with a relatively stable incidence over 20 years suggest the implication of as yet unidentified environmental arthritis-inducing factors acting on this aging population.

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Predictors and Incidence of Cardiovascular Events in Patients with Rheumatoid Arthritis

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Objectives: Rheumatoid arthritis (RA) is a systemic inflammatory disease that causes pain and swelling of the joints leading to joint damage and functional disability if left untreated. Chronic inflammation in RA has also been linked to premature atherosclerotic cardiovascular disease (ASCVD) events. Despite remarkable strides in RA treatment including an earlier treat-to-target paradigm, deaths occur 10 to 15 years sooner than in the general population. This is due to the physiologic changes caused by uncontrolled inflammation in RA: increases in arterial stiffness, changes in lipid metabolism, and destabilization of plaques. In this study we aim to assess the association of cardiovascular comorbidities, inflammatory biomarkers, and therapies for RA with occurrence of ASCVD events in patients with RA.
Methods: The single-system cohort study in central Texas used medical records, laboratory results, and claims data (July 2010-December 2017) of adults 18-89 years old enrolled ≥6 months prior to and 1 year after first RA diagnosis (index date). Generalized linear models were used to determine associations between ASCVD events and predictors – age, sex, comorbidity, RA medication use, oral and injectable glucocorticoid use, and opioid use. Time-averaged

disease activity was assessed using the area under the curve of the Routine Assessment of Patient Index Data 3 (RAPID-3). Cox proportional hazards regression models were constructed to determine risk of ASCVD.
Results: 727 patients (mean age 57+/-11, 81% female) were followed for an average of 1.9 years (1-4.1 years). There were 141 confirmed ASCVD events for an incidence rate of 39.4 (95% confidence interval, CI, 25.1 – 61.8) per 1000 person-years. Treatment with an anti-tumor necrosis factor (anti-TNF) biologic or with methotrexate was significantly associated with a reduction in ASCVD risk, whereas higher frequencies of intra-articular steroid injections and longer duration and higher dose of oral steroids (>15mg per day) were associated with an increased ASCVD event risk (all $P<0.05$). RA patients on anti-TNFs had a 43% decrease in ASCVD hazard rate compared to those not on anti-TNFs (HR=0.573; 95% CI: 0.330 - 0.997; p=0.0488). In covariate-adjusted models, an increase in severity of time-averaged RAPID-3 was associated with a 0.1% increase in ASCVD risk (95% CI 0.0% to 0.2%; p=0.02).
Conclusion: Use of methotrexate or anti-TNFs was associated with decreased ASCVD risk while steroid use was associated with an increased risk of ASCVD in RA. It is likely that a reduction in disease activity due to RA medication contributes to the observed ASCVD risk reduction.

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Developing a Patient-Centered Balanced Scorecard for Quality of Care in Rheumatoid Arthritis: Vision and Strategic Objectives

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Objectives: A balanced scorecard (BSC) is a tool that outlines the vision for quality improvement (QI) and strategic goals along multiple domains and uses performance measures to monitor progress towards QI targets. The study objective is to define the vision and strategic objectives for monitoring and improving rheumatoid arthritis (RA) quality of care in Canada. This work represents the first phase in the development a patient-centered BSC to measure the quality of RA care.
Methods: Focus groups and interviews were conducted with healthcare providers, patients living with RA, clinic managers, regional healthcare administrators and policy leaders to obtain stakeholder perspectives on the BSC vision and strategic objectives. Participants were recruited using purposive sampling to ensure representation based on the following characteristics: stakeholder type, regional representation, urban/rural location, and sex. Provincial rheumatology leaders recommended rheumatologists, clinic managers, regional healthcare administrators and policy leaders for recruitment. Allied health professionals (AHP) were recruited through the AHP Association and the Advanced Clinician Practitioner in Arthritis Care program. People living with arthritis were recruited through advocacy organizations. Each interview/focus group was conducted according to an interview/focus group guide by

experienced qualitative researchers and transcribed verbatim. Two readers independently analyzed the anonymized transcripts independently. Thematic development was done with broad categories initially. NVivo was used to assist in data analysis. Sub-themes and then overall categories were identified. Strategic objectives and the vision statement were drafted based on the overarching themes from the qualitative analysis. A working group including healthcare providers, patients and researchers finalized these statements.
Results: A total of 54 participants were recruited and data were collected during 3 focus groups and 19 interviews. Participants included 21 AHPs, 12 patients, 8 rheumatologists, 4 managers, and 9 healthcare administrators/policy leaders. Nine provinces were represented. Six strategic objectives were derived from the qualitative analysis representing the following themes: early access and timeliness of care, high quality care for the ongoing management of RA and comorbidities, patient self-management tools and educational materials for shared decision-making, multidisciplinary care, patient outcomes, and patient experience with care. Equity also emerged as an overarching theme and not a separate strategic objective. "Ensuring patient-centered, high quality care for people living with rheumatoid arthritis" was defined as the ultimate vision for the scorecard.
Conclusion: The six strategic objectives identified in this project highlight national priorities for RA quality of care, which will be used to guide the development of a patient-centered BSC.

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All-cause and Cause-specific Mortality Trend in Patients with Systemic Sclerosis: A Population-Based Study

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Objectives: Systemic sclerosis (SSc) is one of the most life-threatening connective tissue diseases. There has been an improvement in detection of organ involvement with development of various guidelines, and an expansion of therapeutic consideration for SSc associated organ disease, including renal disease, interstitial lung disease, and pulmonary hypertension. Purpose of this study was to investigate all-cause and cause-specific mortality in patients with newly diagnosed systemic sclerosis (SSc) between 2 calendar time periods, 1997–2004 and 2005–2012.
Methods: Using an administrative health database, we compared all patients with new diagnosis of SSc with non-SSc individuals randomly selected from the general population matched for sex, age, and time of entry into the study. The study cohorts were divided into 2 groups based on the year of diagnosis ("early cohort [1997–2004] and "late cohort" [2005–2012]). The outcome was death (all-cause and cause specific including cancer, cardiovascular disease [CVD], and other causes) during the follow-up period. Hazard ratios (HR) were estimated using Cox proportional hazards models, first adjusted for age, sex, and entry cohort time and then adjusted for selected covariates (health care resource utilization, dispensing of medication during an outpatient visit, comorbidities, and socioeconomic status), based on a purposeful selection algorithm.
Results: 874 patients with SSc and 8,740 non-SSc controls were included in this study, contributing 4,083.8 and 47,515.8 person-years of follow-up, respectively. We observed 168 deaths in the SSc cohort, and 504 deaths occurred in the non-SSc cohort during the follow-up. Overall, the age-, sex-, and entry time–adjusted all-cause mortality HR in the SSc cohort was 4.5 (95% confidence interval CI 3.7–5.4). Moreover, there was excess mortality due to CVD-related causes in the age-, sex-, and entry time–adjusted model (HR= 2.7, 95% CI 1.7 – 4.2), but it did not persist in the fully adjusted model. There was no significant difference in cancer mortality in

the SSc cohort. Overall, there was no statistically significant improvement in all-cause mortality between the early cohort and late cohort time periods (HR 3.73 and 95% CI 2.49-5.59; HR 2.51 and 95% CI 1.88-3.34, respectively).
Conclusion: This population-based study showed that people with SSc have a 5-fold increase risk of death when compared with the general population. The risk of death has not improved over time and this calls for further research to close this gap.

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TNF Induced Hepatitis

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Case Report: Ankylosing spondylitis (AS) is an autoimmune disease characterized by inflammation of the sacroiliac joints and spine (1). Non-steroidal anti-inflammatory drugs (NSAID) and physiotherapy are considered first-line treatment for AS (2). When these therapies are insufficient, patients require treatment with biologics such asanti-tumor necrosis factoragents(anti-TNFs). Anti-TNFssuppressthe immune response. Common adverse effects include infusion site reactions with less common side effects being induction of autoimmunity, exacerbation of demyelinating disease and uncommonly, hepatitis.
We present a case of a previously healthy 30-year-old female who developed hepatitis after initiation of infliximab for AS. Our patient had a long history of lumbar pain without peripheral manifestations and minimal response to NSAIDs. She has an elevated CRP (64.4mg/L) and positive HLA-B27. Sacroiliac joint x-rays showed bilateral erosions. MRI revealed fatty infiltration suggestive of long-standing sacroiliitis. She was started on infliximab and prior to her first infusion, she had normal liver enzymes. After the 4th infusion, she had mild alanine aminotransferease (ALT) elevation of 114U/L (20-60U/L). After the 5th infusion, she developed pruritis, jaundice and a peak ALT of 1538U/L. Workup for viral hepatitis, non-alcoholic fatty liver disease, alcoholic hepatitis, and other hepatotoxic drugs was negative. Liver ultrasound was normal. Infliximab was stopped, and herliver enzymes trended down. Given the response, further workup for autoimmune hepatitis, and liver biopsy was not pursued. Within three months her liver enzymes normalized. However, her back pain recurred with widespread enthesitis. She was started on etanercept 25 mg SC weekly with great response. Over the past 10 years, she has tolerated her medication with no side-effects.
TNF induced hepatitis is an uncommon adverse effect. The first published report of anti-TNF drug-induced liver injury (DILI) was in December 2004 when the FDA reported 38 severe hepatic reactions associated with infliximab (3). Since then, 34 reports of anti-TN associated DILI have been published (4). Data from the Biologic Treatment Registry Across Canada (BioTRAC) database for patients with AS found that infliximab was associated with increased hepatic enzymes in 3.1% of patients (14 adverse events) (5). It has been previously reported that patients with infliximab-induced hepatitiscan be successfully treated with etanercept without recurrence of hepatitis (6,7).
Anti-TNF therapy can result in various types of hepatic involvement ranging from hepatitis and cholestasis to acute liver failure that can be fatal if not recognized (3). Clinicians using anti-TNFs need to be vigilant of the potential, though rare, hepatoxicity associated with this class of medications.

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Effectiveness of Fibromyalgia Referrals to Rheumatology Care: An Evaluation of Diagnostic Accuracy, Resource Utilization, and Patient Perspectives

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Objectives: Current Canadian guidelines recommend that the diagnosis and management of fibromyalgia be concentrated at the primary care level. However, 35% of primary care providers refer patients with a suspicion of fibromyalgia to specialist care. Our aim was to evaluate the quality of rheumatology care in the diagnosis, healthcare access, utilization, and patient experience of fibromyalgia.
Methods: Records of patients referred for fibromyalgia and seen for an initial rheumatology consultation at a single academic centre between June 19, 2017 and July 5, 2018 were extracted by retrospective chart review. Variables included diagnostic accuracy (diagnosis at referral vs. following consultation), consultation wait time, resource utilization (investigations ordered, medications prescribed, referral to allied health), and direct costs (physician billing, staff salary, investigation fees). An adapted version of the Picker Patient Experience Questionnaire was prospectively disseminated between June 11, 2018 and July 31, 2018 to evaluate patient perspectives. Variables included provider communication and patient expectations.
Results: Seventy-nine charts were identified. Following consultation, 81% of patients (n = 64) maintained the same diagnosis of fibromyalgia, 19% (n = 15) were diagnosed with osteoarthritis or regional pain, and 0% of patients (n = 0) were diagnosed with an inflammatory arthritis or connective tissue disease. Patients waited an average of 184 days (62 – 228 days). Investigations were ordered for 37% of patients (n = 29), medications were prescribed for 10% (n = 8), and an allied health referral was provided for 54% (n = 43). Costs incurred by the health system, attributed only to staff and investigation fees at this single centre within the study period, totaled $19,745 (average $250/consult; $157 - $968/consult). Extrapolating this cost using a 35% referral rate and 2.2% prevalence of fibromyalgia, the economic impact across Ontario equals to $27,322,264. Seven responses to the patient experience survey were received (64% response rate). It revealed that 86% of patients (n = 6) were satisfied with provider communication. The consultation “definitely” met the expectations of only 57% (n = 4). Eleven percent (n = 11) of all patients referred for fibromyalgia (n = 102) did not attend their scheduled initial consultation, which exceeded the centre’s target no-show rate.
Conclusion: Referral to rheumatology for fibromyalgia involves lengthy wait times, considerable costs, and unnecessary healthcare utilization that are not balanced by improved diagnostic accuracy or positive patient experiences. Identifying solutions to support primary care in managing fibromyalgia will allow attention to be focused towards timely, value-based, and effective care.

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A Novel Duplication in the X-linked Inhibitor of Apoptosis Protein Gene Leading to Recurrent Hemophagocytic Lymphohistiocytosis

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Case Report: A 9 year-old male patient, initially presented at age 2 with recurrent fevers and clinical features of Kawasaki disease, requiring treatment with two doses of intravenous immunoglobulin and a short course of prednisone. He was subsequently well until age 7, when

he presented again with recurrent fevers, and bloodwork suggestive of hemophagocytic lymphohistiocytosis (HLH). He was treated with corticosteroids, cyclosporine and anakinra but had a recurrence at age 8 within months of weaning off the medications, which necessitated re-initiation of corticosteroid therapy. Given the repetitive episodes of HLH, we investigated for an underlying genetic condition to explain his presentation.

Peripheral blood samples were obtained from the patient for analysis using next generation sequencing of panels of genes commonly associated with HLH and recurrent fever syndromes, followed by whole exome and whole genome sequencing. The patient's blood was also assessed using an enzyme-linked immunosorbent assay for serum interleukin-18 (IL-18) levels and flow cytometric analysis of X-linked inhibitor of apoptosis protein (XIAP) levels in the peripheral blood mononuclear cells.

The genetic panels and whole exome sequencing were initially unable to identify a contributory variant in this patient. Given elevated IL-18 levels and a family history of recurrent fevers in the maternal grandfather, we suspected an X-linked condition, such as XIAP deficiency. Therefore, while awaiting results of whole genome sequencing, we performed flow cytometry for XIAP, which demonstrated reduced protein levels in the patient's leukocytes. Subsequent results from whole genome sequencing revealed a duplication spanning three exons within the XIAP gene, which was present in the patient, his asymptomatic mother, and his 76 year-old maternal grandfather. While the above testing was being completed, the patient was started on anakinra and was successfully weaned off steroids, with no further recurrences of HLH to date.

This case describes the identification of a novel large duplication within the XIAP gene, which was initially not identified on gene panels and whole exome sequencing. This genetic alteration is associated with reduced expression of XIAP in peripheral blood mononuclear cells, and appears to be responsible for recurrent episodes of HLH in our patient. We thereby illustrate the utility of combining molecular and genetic tools for the identification of potential contributors to unexplained autoinflammatory presentations. While patients with XIAP deficiency are typically treated with hematopoietic stem cell transplantation, our work suggests that anakinra may be a safe and effective alternative for patients with partial XIAP expression.

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Scurvy Secondary to Celiac Disease Presenting with Rheumatologic Manifestations

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Case Report: Scurvy, caused by vitamin C deficiency, is a rare disorder in developed countries, and is typically confined to those with risk factors for a poor diet such as poverty, alcohol abuse or eating disorders. Vitamin C is of particular importance in the production of collagen. Thus, Vitamin C deficiency results in pathology in collagen-rich tissues, such as blood vessels, tendons and bone. Rheumatologic manifestations of scurvy can include a vasculitic-appearing rash, arthralgias, hemarthroses, tendon ruptures and muscle tears.

Vitamin C is absorbed in the small intestine via epithelial transporters. Thus, its absorption can be hindered by processes that disrupt or damage intestinal villi. Celiac disease is an autoimmune reaction, triggered by gluten ingestion in susceptible individuals, causing damage to intestinal villi resulting in malabsorption. We describe an unusual case of scurvy secondary to celiac disease that presented with rheumatologic manifestations.

A 41-year old presented to rheumatology clinic for assessment of recurrent synovitis and history of non-traumatic muscle/tendon injuries. At age 30, he developed acute intermittent synovitis affecting his right knee, right olecranon bursa and then first MTP joint. His urate level was

elevated (629 mg/dl) despite his lack of risk factors. He was diagnosed with probable gout and started on allopurinol. The diagnosis was never confirmed by arthrocentesis, however, normalization of his uric acid level prevented additional episodes of synovitis. More recently, he had a history of two separate quadriceps tears (15 months prior) and a spontaneous Achilles tendon injury (14 months prior).
The patient had a diet rich in fruits and vegetables. He had no diarrhea or weight loss, however, he had been reviewed by gastroenterology and labelled with "alcohol intolerance" because of a history of bloating following meals where wine was served.
Lab investigations revealed a strongly positive anti-tTG and extremely low serum ascorbic acid. Vitamin C supplementation was initiated. UGI endoscopy confirmed a diagnosis of celiac disease. A diagnosis of scurvy related to celiac disease was made.
This case highlights an unusual presentation of celiac disease. To our knowledge there are only 2 other such cases of celiac disease resulting in scurvy reported in the literature. Although the effects are far from clear, low Vitamin C intake has previously been associated with risk of gout. It is interesting that this patient had hyperuricemia and/or gout in the absence of other traditional risk factors.

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Self-reported Indirect Costs are Underestimated in a Canadian Cohort of Patients with SLE

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Objectives: Indirect costs (IDC) experienced by SLE patients reflect lost productivity in work force and non-work force activities and can be expressed as: 1) patient self-report of lost productivity or 2) the difference between productivity of an age-and-sex matched general population and the patient's stated productivity. We assess IDC calculated by both methods in a Canadian-wide SLE cohort and compare IDC, stratified by damage, across methods.
Methods: Patients fulfilling the ACR or Systemic Lupus International Collaborating Clinics (SLICC) Classification Criteria for SLE from 6 Canadian centres were enrolled. Participants completed a validated questionnaire on lost productivity. Lost productivity was calculated as: 1) the difference between the time patients reported they would be engaged in work force and non-work force activities if not ill versus the time they reported working and 2) the difference between the time worked by an age-and-sex matched general population in work force and non-work force activities versus the time patients reported working. IDC were valued using age-and-sex-specific wages from Statistics Canada. Annual IDC associated with damage expressed on the SLICC/ACR Damage Index (SDI) were obtained from multiple regressions adjusting for age, race/ethnicity, and disease duration.
Results: 1368 patients participated, 90.4% female, 70.9% Caucasian, mean age at diagnosis 33.0 years (SD 13.5), mean SLE duration at questionnaire completion 16.8 years (SD 11.6), mean SLE Disease Activity Index (SLEDAI-2K) 2.15 (SD 3.07), and mean SDI 1.54 (SD 1.87). Using

method #1 versus method #2, for SDI=0, mean predicted IDC were $17,109 (2017 Canadian dollars) versus $19,326 (difference $2217, 95%CI $-3782, $8216); for SDI=1, $19,937 versus $25,963 (difference $6027, 95%CI $378, $11,676); for SDI=2 $22,825 versus $31,733 (difference $8908, 95%CI $2772, $15,044); for SDI=3 $19,398 versus $30,022 (difference $10,624, 95%CI $2293, $18,956); for SDI=4 $26,159 versus $37,712 (difference $11,553, 95%CI $1027, $22,079); for SDI≥5 $25,265 versus $41,220 (difference $15,955, 95%CI $7906, $24,004).

Conclusion: IDC calculated by method #2 were greater for SDIs 1 through ≥5 and the difference between methods increased with increasing damage. Our results suggest that IDC calculated by comparing the patient's actual productivity to their self-report of anticipated productivity versus the productivity of an age-and-sex-matched general population leads to underestimation, which is not associated with disease damage. Patient's expectations of productivity appear to plateau with increasing disease damage and do not reflect their likely productivity if they were not ill.

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Measuring Advanced/Extended Practice Roles in Arthritis and Musculoskeletal Care in Canada: Stand Up and be Counted Too (2)!

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Objectives: Arthritis and musculoskeletal disorders are the most common chronic health conditions in Canada but there is a critical and growing shortage of rheumatologists relative to the present and growing needs of this population. Models of care involving advanced or extended role health disciplines practitioners to augment provision of arthritis care are emerging. Research supports these roles, however there are no studies to date documenting the workforce capacity or learning needs of advanced or extended role health disciplines. The primary objective of this exploratory, mixed-methods, cross-sectional self-report study was to capture descriptive information on the current workforce of advanced or extended role practitioners (ERPs) working in arthritis care in Canada. A secondary objective was to determine perceived opportunities and barriers to formal academic/clinical training to support these roles.

Methods: This study was developed and based on the original Stand Up and Be Counted Rheumatologist Workforce Survey conducted in 2015 by the Canadian Rheumatology Association. Data was collected using anonymous, online questionnaires deployed in early 2018 to groups of non-physician health-disciplines professionals across Canada with potential to have undertaken formal and informal post-licensure training in arthritis care. Descriptive statistics were generated to describe the demographics and practice information of the sample. Qualitative responses were analyzed using Grounded Theory techniques.

Results: There were 141 respondents; 87 were identified as practicing in an extended role capacity based on pre-determined practice characteristics. Respondents were further characterized by profession (PT>OT>RN>Chiropractor/Pharmacist) and by their post-licensure training in arthritis care (ACPAC>CPSIA>ACR>Institutional-apprenticeship>ISAEC). Mean age of ERP respondents was 49±9 years, 87% were female, and 45% of ERPs planned to retire within 5-10 years. Geographic practice sites were Ontario>Alberta>BC>NFLD and practice

settings were urban academic= community>rural. 95.1% of all study respondents (n=141) agreed that formal training is necessary to work as an ERP but only half felt that they had sufficient opportunities for training. Barriers to pursuing training are various: from personal, geographic, and patient-care/patient-needs related, to administrative, post-program recognition and financial/remuneration concerns. While there is an expressed desire for post-licensure training, significant barriers currently exist at the health system level impeding engagement of prospective trainees and utilization of those already trained from being fully deployed.
Conclusion: No previous studies have assessed the workforce capacity or the perceived need for the training of ERPs working in arthritis and musculoskeletal care. It is important to measure the workforce capacity of these health disciplines practitioners as they evolve and integrate into the Canadian healthcare system.

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Review of Current Innovations in Rheumatology Models of Care and Recommendations for Future Improvement

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Objectives: Arthritis is a prevalent chronic disease that impacts the lives of over 4.6 million Canadians. Healthcare expenditure is projected to increase to $37.4 billion for Rheumatoid Arthritis (RA) by 2040. The proportion of RA in the population currently exceeds the capacity for Rheumatologists in Ontario to care for these patients effectively, resulting in delayed management of inflammatory arthritis (IA) and worse outcomes for patients. Therefore, there is an urgent need for the implementation of better models of care (MOC) for better triaging and co-management of stable RA patients. Therefore the objective of this study is: 1) To identify what models of care are currently available in Rheumatology practices 2) Assess their effectiveness in reducing wait times, improving patient management, and outcomes
Methods: PubMed was searched for articles in English using MeSH terms. Multiple combinations of Keywords were utilized related to: Rheumatology, Arthritis, Waiting lists, Physicians' Practice Patterns, Cost-Benefit Analysis, Outcomes and Process Assessments (Health care), Pharmacists, and Nurses. Two independent reviewers screened abstracts for inclusion. A third reviewer resolved any discrepancies.
Results: A total of 1573 articles were assessed, of which 71 were included for analysis. In addition to technologies such as EMR and telemedicine, a majority of identified MOC innovations involved the utilization of allied health professionals with extended training in rheumatology, including ACPAC Extended Role Practitioners (ERP's). They consistently produced high levels of patient satisfaction, improved patient outcomes, and contributed to more efficient patient triaging. Cost-effectiveness data was limited, due to the heterogeneous nature of the roles and practice environments of EPR's. Overall, their broad scope of practice, competence, and quality of care made them a valuable resource for management of stable patients with IA.
Conclusion: Several innovative MOC's currently in place have shown the potential to alleviate the scarcity of healthcare human resources in Rheumatology, by facilitating for earlier and more aggressive treatment of IA, and increasing access to care particularly in underserviced communities. Further research is required to identify cost-benefit analysis and impact on patient flow that is generalizable to Rheumatology practices across the country to encourage widespread implementation. Although several innovations such as central triage systems help streamline the

process of care, they are insufficient in addressing the increased burden of disease and rheumatologist shortage alone. Further interventions in MOC's that target practice redesign, efficiency, and expansion of shared care and co-management of patients are required.

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The State of Rheumatology Care in Tanzania: A Systematic Literature Review

Maysam Khalfan (University of British Columbia, Vancouver)

Objectives: Rheumatology is an underdeveloped specialty in Tanzania. This study is a systematic literature review to provide a detailed assessment of the history and current state of rheumatology care in Tanzania based on published literature with a view towards laying a foundation for future development in this field.

Methods: We searched PubMed, EMBASE, CINAHL and Cochrane databases for literature published until September 2018 that refer to any aspect of rheumatologic disease or rheumatology care in Tanzania. Data from qualifying articles was extracted and grouped according to key themes relating to rheumatology care in Tanzania: 1) epidemiology of rheumatologic disease, 2) availability of expertise, 3) infrastructure (i.e. availability of diagnostic tools or therapeutic options), and 4) unique challenges of rheumatology care in Tanzania.

Results: Of 107 search results, 12 articles met the inclusion criteria. Almost half of the articles were cross-sectional studies (5), while the rest were a mixture of case reports (2), brief reports (3), and letters to the editor (2). Epidemiologic data relating to rheumatologic diseases in Tanzania is lacking in the literature. Case reports and brief reports allude to the presence of a wide range of rheumatologic disease present in the country. With respect to expertise, there does not appear to be a single rheumatologist in the country based on literature until September 2018. There is insufficient information to comment on available infrastructure, however one case report highlights the absence of certain basic diagnostic tools, and there is no information on available therapeutic options. The literature highlights a wide range of unique challenges such as concerns with respect to the use of immunosuppressants in an area with high rates of infectious disease, concern for a rapid rise in incidence and prevalence of rheumatologic disease, and the presence of musculoskeletal diseases uncommon in the West such as inflammatory arthritis due to tropical infectious disease and skeletal deformity due to fluorosis.

Conclusion: There is sufficient published literature to suggest that there is a significant need for development of rheumatology care in Tanzania. However, the existing data is not comprehensive enough to guide the process of development. We believe this literature review identifies the information gaps that would be filled with a needs assessment study in order to develop a framework for further development of rheumatology care in Tanzania.

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Retrospective Review of the COnnective Tissue DiseAse Clinic of Northern AlberTa (CONTACT) – A Combined Rheumatology-Dermatology Clinic

Navjeet Gill (University of Alberta, Edmonton); Stephanie Keeling (University of Alberta, Division of Rheumatology, Edmonton); Alain Brassard (UC Davis, Sacramento)

Objectives: Due to the prevalence of cutaneous manifestations of autoimmune diseases, the CONnective Tissue DiseAse Clinic of Northern AlberTa (CONTACT), a monthly combined rheumatology-dermatology clinic, was created at the University of Alberta, operating from 2011 to 2017. We aimed to characterize the patients, their diagnoses and treatment plans to evaluate the extra value in such a combined clinic.

Methods: A retrospective electronic medical record (EMR) review was performed on all new consults assessed at the CONTACT clinic between 2012 and 2017. Data was collected in an

online case report form using RedCAP. Variables collected included: patient demographics, referral statistics, pre- and post-clinic diagnoses, investigations performed and management algorithms. The data was exported to Excel for analysis through descriptive statistics.
Results: Two-hundred and twenty-eight (228) patients (87.3% female; mean age 48 (SD 16); 36.3% smokers) were seen between 2012 and 2017, average travel distance 150 km and wait of 73 days to be seen. Most common rheumatologic co-morbidities included: systemic lupus erythematous (SLE) (n=27), osteoarthritis (n=10), and fibromyalgia (n=8) and most common dermatologic co-morbidities included: Raynaud's (n=21), dermatitis (n=10) and psoriasis (n=9). The most common referring diagnoses were cutaneous lupus (33.6%), dermatomyositis (DM) (14.0%), SLE (11.4%), and unspecified lupus (7.9%). The most common diagnoses made after first consult were cutaneous lupus (23.1%), SLE (9.2%), DM (8.7%) and dermatitis (7.4%). New diagnoses after first CONTACT consult were made in a mean of 52.6% of patients while 17.9% of patients received a modified diagnosis. Common lupus mimics included rosacea (n=5), neurodermatitis (n=2), nummular eczema (n=2), and pyoderma gangrenosum (n=2). Common DM mimics included cutaneous lupus (n=4) and contact dermatitis (n=2). Most patients (69.4%) received a change in treatment (new medication initiated in 59.0%) with 42.8% noting an improvement in their follow-up CONTACT/rheumatology/dermatology appointment. Methotrexate was the most common treatment added overall (n=18) and for dermatomyositis (n=5). Tacrolimus 0.1% ointment was the most common treatment initiated in lupus patients (n=9). Referrals from dermatology had the highest incidence of diagnosis (66.2%) and treatment change (76.1%).
Conclusion: CONTACT provided valuable and timely care of patients with connective tissue diseases, specifically SLE and DM. Important changes in treatment were made in a large percentage of patients with quick improvement. Combined clinics provide extra value for patients and educational opportunities for rheumatology and dermatology.

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Vasculitis Patient Journey: A Scoping Review of Patient Experiences with Vasculitis

Navjeet Gill (University of Alberta, Edmonton); Elaine Yacyshyn (Division of Rheumatology, University of Alberta, Edmonton)

Objectives: Optimal management of vasculitis needs to address disease aspects of significance to patients. Understanding the patients' journey with vasculitis allows clinicians to identify patient goals for treatment. We aimed to review the existing literature regarding patient perceptions of vasculitis' effect on four main domains of health: physical, psychological, social, and financial.
Methods: A scoping review was performed using CINHL, EMBASE, MEDLINE, PsychINFO, and other sources (smaller databases and grey literature). Inclusion criteria included all forms of primary vasculitis, adult patients (> 18 years old), and patient perspectives regarding at least one of the four identified health domains. Aggregates of patient experiences with vasculitis were categorized into one of the four health domains: physical, psychological, social, and financial.
Results: 19 studies from 2220 total (2095 after duplicates removed) were included: 14 quantitative, 4 qualitative, and one mixed quantitative-qualitative methods. Few articles covered more than one of the four health domains. Together, generalized themes emerged for each of the four domains. In relation to physical health, patients were most affected by fatigue. Psychologically, patients were most affected by anxiety and depression. Socially, patients experienced decreased social participation due to lifestyle changes associated with disease and social perceptions of vasculitis. Financially, vasculitis patients had decreased employment due to

functional decline. Each of the four domains contributed to a decreased quality of life associated with vasculitis.
Conclusion: Decreased quality of life in vasculitis is due to multiple factors across several health domains. Understanding what patients are most affected by in each domain allows physicians to tailor care to meet the needs of the patient. Understanding the patient's journey will allow physicians to understand patient goals and to better support them in their recovery. Patients will also have an improved understanding of their journey and the most relevant health domains affected.

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Health Care Providers' Perceptions Regarding Barriers in the Implementation of Preventive Therapies in Rheumatoid Arthritis

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Objectives: Rheumatoid arthritis (RA) is thought to develop through a process of "multiple hits", involving a series of risk factors that accumulate during an "at-risk" pre-clinical phase. Increasingly, it is thought that the pre-clinical phases of the disease might offer a window of opportunity to identify those at risk and to offer potential preventive treatment. A number of clinical trials are underway to test a number of treatments for RA as prevention. The objective of this study was to examine rheumatologists' perceptions of barriers in the implementation of preventive therapies for RA.
Methods: A cross-sectional online survey was distributed to rheumatologists in Canada as part of a larger project on the acceptability of preventive treatment for people at high risk of developing RA. Participants were asked to report their perception of ten potential barriers to the implementation of preventive RA therapies. Chi-Square tests were used to explore associations between perceptions of potential barriers and respondents' characteristics, such as age, sex, ethnicity, years in practice, type of medical practice, and province.
Results: The sample contained 76 health care practitioners, including 64 rheumatologists. The number of endorsed barriers to implementation of preventive treatment ranged from 1 to 8 (median: 4). The most frequently endorsed barrier was the quality of research/knowledge on possible preventative therapies (87%) and identifying and accessing at-risk populations (81%). Further, over half of the sample (55%) perceived the quality of research/knowledge on the development and diagnosis of RA and patient adherence to the treatment as potential barriers. Less frequently endorsed barriers were the lack of support to help patients make good decisions about preventative treatment (43%), capacity of clinics (35%), and the time required to discuss preventive options with at-risk individuals (33%). Female practitioners more frequently endorsed quality of research/knowledge on preventative therapies as a barrier than males ($p < 0.01$), but no other significant differences in endorsement of barriers were found by respondent characteristic.
Conclusion: Health care providers will be crucial in implementing any future preventive therapies for RA. Our findings provide insight into the main barriers that will need to be overcome before preventive therapies for RA can be offered. Specifically, HCPs placed particular value on the quality of research/knowledge on possible preventative therapies, ways to identify and access an at-risk population, the quality of research/knowledge on the development and diagnosis of rheumatoid arthritis and patient adherence to the treatment when considering the implementation of preventive RA therapies. Supported by a CIORA grant.

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The Scleroderma Patient-centered Intervention Network (SPIN): Engaging Patients in Rheumatology Research

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Objectives: Patient engagement in research and care is linked to improved health outcomes, increased uptake of care, and reduced healthcare costs. It is increasingly seen as a core component of high-quality patient-centered care. Founded in partnership with patient organizations, the Scleroderma Patient-centered Intervention Network (SPIN) is a collaboration of patients, healthcare providers, and researchers who work together to develop and test interventions to improve quality of life in people with scleroderma. From its inception, SPIN has sought to maximize the impact of its research by engaging patients to take an active, meaningful role in research. The objective of this presentation is to describe steps SPIN has taken to engage patients and subsequent results.

Methods: A diverse, international group of patients serve on all levels of SPIN's organization, including: 3 patients on SPIN's Steering Committee; 8 patients on the SPIN Patient Advisory Board; 9 patients on the SPIN-Scleroderma Support Group Leader Education (SPIN-SSLED) Program Team; and one patient Co-Leader of each Project Team for SPIN's online interventions. SPIN engages these and other patients in all phases of research, from (I) Preparation: generating research questions and priorities, to (II) Execution: designing interventions and trial methods, and (III) Translation: disseminating SPIN's online programs and study results.

Results: (I) Preparation: SPIN has determined patient research priorities through numerous outreach initiatives, including administering an online survey soliciting suggestions for future research projects, completed by 124 patients; conducting over 20 focus groups with patients and caregivers; and collecting data about common problems from SPIN's ongoing cohort of over 1,700 scleroderma patients. The Patient Advisory Board uses these data to select and prioritize topics for interventions. (II) Execution: Patients contribute to research execution by: co-leading Project Teams that develop SPIN interventions; reviewing all intervention content; helping select and validate outcomes for SPIN's clinical trials; and providing other feedback on study designs and procedures. (III) Translation: The dissemination of online interventions will be led by SPIN's partner patient organizations, who will advertise and distribute the interventions free-of-charge through their websites. Reflecting their engagement, patient members of SPIN have co-authored 25 peer-reviewed articles, 6 oral conference presentations, and 51 conference poster presentations.

Conclusion: Patients actively participate at all levels of SPIN's organization, contributing significantly and sometimes leading phases of SPIN's research projects. SPIN's process of patient engagement can serve as a model for research initiatives in other rheumatic and rare diseases. Supported by a CIORA grant.

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Analysis of Pediatric Rheumatology Referral Wait Times

Erin Dockery (Windsor); Dax Rumsey (University of Alberta, Edmonton); Mercedes Chan (University of British Columbia, Vancouver)
Objectives: Prompt access to pediatric rheumatology care reduces morbidity in pediatric patients with rheumatic diseases. The Arthritis Alliance of Canada recommends that all patients with inflammatory arthritis or systemic lupus erythematosus be seen within 28 days. Current literature suggests that patients referred to pediatric rheumatology clinics for inflammatory arthritis should be seen within 30 days of referral to reduce the likelihood of accruing joint damage. This study aims to determine wait times at a tertiary care pediatric rheumatology center for patients eventually diagnosed with rheumatic conditions.
Methods: Referrals made to the pediatric rheumatology clinic at our center were prospectively triaged by pediatric rheumatologists over a 23-month period. Those patients likely to have inflammatory arthritis were triaged to be seen within one month of referral; those with more acute or emergent conditions, e.g., vasculitis, were triaged to be seen sooner. Referral wait times were calculated using date of triage and date of appointment as endpoints. Median referral times and interquartile ranges (IQR) were calculated for different disease categories.
Results: Four hundred and forty-three patients were triaged, of whom 182 (41%) were diagnosed with a pediatric rheumatic disease. Categories of rheumatic diseases diagnosed included: inflammatory arthritis (including juvenile idiopathic arthritis, JIA); systemic rheumatic diseases, e.g., lupus; vasculitis; autoinflammatory diseases; and other rheumatic diseases. The median referral wait time for all rheumatic diseases was 56 days (n=182, IQR = 24-101). The median wait time for inflammatory arthritis was 47 days (n=130, IQR = 22-93 days); within this group, patients with juvenile idiopathic arthritis had a median wait time of 45 days (n=97, IQR = 21-77 days). Other median referral times were: 46 days (n=12, IQR = 25-88 days) for systemic rheumatic diseases, 72 days (n=15, IQR = 35-119) for vasculitis, 80 days (n=19, IQR = 47-129) for autoinflammatory diseases and 47 days (n=6, IQR = 14-86) for other rheumatic diseases.
Conclusion: The median referral wait time for patients with inflammatory arthritis was 47 days, 19 days longer than the 28-day recommendation. Patients with autoinflammatory conditions had the longest median wait time (80 days). Further inquiry into factors affecting wait time (human resources, referring doctors' knowledge of rheumatic disease, referral letter content, triage practices, and patient factors affecting appointment attendance) would be valuable to inform strategies to improve access to care and recommendations for appropriate wait times for pediatric rheumatic disease.

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Osteochondritis Dissecans of the Knee in Juvenile Idiopathic Arthritis: A Case Series

Bradley Jackson (University of Western Ontario, London); Debra Bartley (Children's Hospital, London); Erkan Demirkaya (Children's Hospital, London); Roberta Berard (Children's Hospital, London)
Objectives: Osteochondritis dissecans (OCD) is a focal alteration of subchondral bone structure that causes softening of the overlying cartilage, which can progress to instability, eventual osteochondral detachment, and early osteoarthritis. The predominant symptoms in early OCD are knee aching and pain with weight-bearing, which may progress to swelling, and catching or locking of the joint as the lesion becomes unstable. Joint pain and swelling are also common symptoms of patients with juvenile idiopathic arthritis (JIA) with active joint inflammation. We sought to characterize patients with co-incident JIA and OCD.
Methods: Case series of patients with JIA and OCD who presented to the paediatric rheumatology clinic between January 2010 and July 2018 identified via clinic charts. Charts

were reviewed to characterize the presentation of JIA and OCD.
Results: We identified 10 patients with co-incident JIA and OCD. Ten osteochondral lesions involving 10 joints were observed in 9 female patients and 1 male patient with JIA. Of the 10 OCD lesions, 4 involved the medial femoral condyle, 4 involved the lateral femoral condyle and 2 involved the patella. The mean age of patients at the time of JIA diagnosis was 6.16 ± 3.74 years (mean ± s.d.). Eight patients received methotrexate during the treatment of their JIA. Four patients required the use of biologics. The mean age of patients at the time of diagnosis with OCD was 10.85 ± 1.74 years (mean ± s.d). The mean interval between diagnosis of JIA and diagnosis of OCD was 4.69 ± 4.50 years (mean ± s.d.). Four patients underwent non-operative treatment with rest and activity modification including avoidance of high-impact sports and repetitive load-bearing. Six patients underwent arthroscopic examination, with four requiring debridement, one requiring micro-fracturing, one requiring transchondral drilling, and one requiring fixation of a loose fragment.
Conclusion: Our findings suggest that OCD can be a cause of pain and functional limitation in patients with otherwise well treated JIA. Previous epidemiologic studies have shown that OCD typically affects the medial femoral condyle in male patients, with a male to female ratio of approximately 3:1, and with roughly 65% of knee lesions involving the medial femoral condyle compared to 23% affecting the lateral condyle. In contrast, our population consisted mostly of females, and the lateral femoral condyle was affected as often as the medial condyle. This suggests that there may be etiological differences between our population and typical population of patients with OCD lesions.

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No Evidence for an Increased Risk of Infection in Newborns and Postpartum Mothers after Exposure to Biologics in the Third Trimester: A Single Center Observational Cohort Study

Jason An (McMaster University, Hamilton); Viktoria Pavlova (McMaster University, Hamilton)

Objectives: It is well established that biologics being IgG1 molecules can transfer through the placenta at the end of the second and during the third trimesters. When fetuses were exposed to anti-TNFs in the second half of gestation, drug was detected in their cord and plasma after birth with exception of Certolizumab that has little transplacental transfer. Due to concerns of a potentially higher risk of infection and immunosuppression in newborns, the approach in general Rheumatology practice is to hold biologics in the second trimester. The EULAR 2016 pregnancy recommendations suggest such a conservative approach; to stop Infliximab and Adalimumab at 20 weeks, and Etanercept at week 30-32 of pregnancy. Early discontinuation of a biologic during pregnancy may cause a disease flare in high risk patients with subsequent worsening of maternal-fetal outcomes. In addition, discontinuation of a biologic and restarting it later may put the patient at risk for antibody formation to the drug and inability to recapture the disease.
Methods: This was a single-center retrospective observational study. All women who were treated with biologics in the second and third trimesters with known maternal and fetal outcomes were included. The incidence of infant infections was recorded from birth up to 6 months. Maternal infections requiring antibiotics in the post-partum period up to 6 weeks was also assessed.
Results: A total of 22 pregnancies in 17 mothers with biologic exposure between 28-40 weeks gestation were reviewed. 6 patients had AS, 5 RA, 3 PsA, 2 Crohn's, 1 Bechet's with GI involvement. Patients were treated with the following biologics in pregnancy: infliximab (4), adalimumab (5), etanercept (5), certolizumab (4). The median gestational age at delivery was 39 weeks. The median gestational age in which the last biologic dose given was 35.5 weeks (after

mid-third trimester). The median birth weight was 3,303g. No infection was observed in any infants from birth up to 6 months. There was only one case of infection in a post-partum mother on certolizumab, who developed chorioamnionitis.

Conclusion: In this single center study, late exposure to biologics in pregnancy was not associated with increased risk of infection in newborns and in mothers up to 6 weeks postpartum. Although current EULAR recommendations suggest that anti-TNFs should be discontinued during the second to third trimester due to a theoretical increased risk of infection in newborns, our data suggests that we should individualize our therapeutic decisions based on specific patient and disease factors.

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Case Series of 7 Patients in Vancouver with Eosinophilic Fasciitis

Jasmine Dhillon (Royal College of Surgeons in Ireland, Dublin); Julia Tan (University of British Columbia, Vancouver); Neda Amiri (Division of Rheumatology, University of British Columbia, Vancouver); Kamran Shojania (St. Paul's Hospital, Vancouver); Natasha Dehghan (University of British Columbia, Division of Rheumatology, Vancouver); Anne Colwill (University of British Columbia , Vancouver)

Case Report: With roughly 300 cases reported in the literature, Eosinophilic Fasciitis (EF) is a rare fibrosing disorder affecting the deep fascia. Although patients classically present with symmetrical limb erythema, edema, and induration, leading to characteristic physical exam findings such as peau d'orange and Groove sign, the clinical presentation of this disease can be variable. EF is therefore an often-challenging diagnosis and consequently, there is a relative paucity of data surrounding this disease. We are reporting 7 cases of EF treated by a group of local rheumatologists from Vancouver, BC.

We conducted a retrospective chart review of EF patients identified within a group of local rheumatologists in Vancouver, BC from 2012 to 2018. Diagnoses were made based on clinical presentation and confirmed on biopsy.

This case series includes 7 patients (3 male, 4 female) with a median age at diagnosis of 39.6 years (range 23-63). All diagnosis of EF were confirmed histologically with full thickness skin biopsy. Raynaud's phenomenon was observed in 3/7 cases. Positive groove sign was seen in 2/7 cases. Carpal tunnel syndrome was seen in 3/7 cases. Sicca was noted in 2/7 cases. EF presented concurrently with morphea in 3/7 cases.

Peripheral eosinophilia was observed in 5 cases (mean 1.34; range 0.6-2.6). Median elevated CRP in 3 cases (median 21.9; range 14-32.6). Magnetic resonance imaging when performed (3/7) showed nonspecific fascial edema.

In terms of treatment, steroids was a common first line treatment with a median dose of 43 mg Prednisone (range 20-75mg with taper). The addition of methotrexate (MTX, median dose of 20 mg range 25-15 mg weekly, administered subcutaneously) as a steroid-sparing agent was introduced in 4 cases. One case resolved spontaneously without treatment after 2 years but continues to be associated with occasional flares of fasciitis in the left medial arm area. Most (6/7 patients) experienced gradual skin improvement (swelling and tightening), range of motion improvement as well as normalization of peripheral eosinophil count.

Based on our review of 7 histologically confirmed cases of EF, a high index of suspicion for this condition should arise in patients presenting with bilateral limb edema, erythema, induration and Groove sign. Prednisone and methotrexate are often successful in treating the condition. Further research will be beneficial in elucidating more information about EF.

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A Description of Fractures in Patients Treated for Rheumatoid Arthritis at The Institut de Rhumatologie de Montréal and Centre de l'Ostéoporose et de Rhumatologie de Québec. A Report from the RHUMADATA® Clinical Database and Registry

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Objectives: Rheumatoid arthritis (RA), is a chronic autoimmune inflammatory disease affecting primarily the synovial tissue. Many comorbidities are associated with RA. Osteoporosis is one of those. Incidence rate of osteoporosis is 1.9 times higher in RA populations compared to normal population. The present study aims at evaluating the different aspects of the site-specific fracture in a cohort of patients suffering from RA.

Methods: All fractures recorded for patients with RA in the RHUMADATA® clinical database and registry between 1958 to 2017 were classified as occurring in one of 7 anatomical regions (skull, vertebral-cervical, -dorsal, -lumbar or sacrum, upper or lower limbs), osteoporotic or other(unspecified). We compare distribution of fractures, several risk factors including disease severity and medications usage in patient treated with conventional synthetic DMARDs (csDMARD) and with biologic DMARDs (bDMARD). Inclusion criteria are a diagnosis of RA and documented fracture(s) in patients giving informed consent. There were no exclusion criteria.

Results: A total of 1337 fractures occurring 708 patients were recorded in RHUMADATA®. Of those 540 (40.4%) occurred prior to treatment with csDMARDs alone, 546 while treated with csDMARDs (40.8%) alone and 251 (18.8%) during treatment with a bDMARD. The most commonly reported fracture sites were: lower limbs (30.4%), upper limbs (20.7%) and fracture considered as osteoporotic (13.5%). The incidence of fractures in the csDMARD group was 30.5 per 1000 person-years (95% CI: 28.0, 33.2) which was significantly higher than in the bDMARD group 20.7 person-years (95% CI: 18.2, 23.5), p-value < .0001. The most common medication taken in the csDMARD group was methotrexate (56.1%). In csDMARD group, 5.4% used prednisone, 14.0% calcium and vitamin D and 5.9% bisphosphonates. Whereas the most common medication taken in the bDMARD was etanercept (20.5%). In this group, 6.2% were on prednisone, 5.8% on calcium and vitamin D and 6.07% on bisphosphonate.

Conclusion: Fractures seems to be a frequent event in patient with RA. Most of them appear traumatic according to their localization. The incidence of fractures in the csDMARD group was significantly higher than in the bDMARD group, which could be due to multiple reasons, such as the control of the disease, the risk factors of RA, the duration of the different treatment. Hence, a retrospective study focused on the risk factors and control of the disease of RA using the same group of patients could be a future topic of discussion.

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Impact of Adalimumab vs. Non-Biologic Treatments on Skin Outcomes of Psoriatic Arthritis Patients: Real-World Data from the COMPLETE Study

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Objectives: The aim of this analysis was to compare the effect of adalimumab (ADA) vs. non-biologic treatments (nbDMARD: NSAIDs, and DMARDs) on skin outcomes and patient reported outcomes following initial treatment failure. In addition, the impact of the extent of

baseline skin disease on treatment outcomes was examined.
Methods: Patients eligible for COMPLETE PsA are anti-TNFα naïve adults, with active PsA who require change in their treatment regimen, per the judgment of the treating physician. In the current analysis, patients enrolled between July 2011 and June 2016 who had available information on baseline psoriasis body surface area (BSA) were included. Outcome measures analyzed were: BSA, Dermatology Life Quality Index (DLQI), Short Form Health Survey (SF-12), and the Beck Depression Inventory (BDI). Analyses were conducted by initial group assignment (intent-to-treat approach).
Results: A total of 392 patients were included (ADA n=249, nbDMARD n=143). Baseline demographics and disease duration were comparable between treatment groups. However, patients initiating ADA were more likely to have BSA≥3% (44.6% vs. 35%, p=0.063) and had higher DLQI (6.2 vs. 4.3, p=0.006) scores. No differences were observed in SF-12 physical (PCS) and mental (MCS) component scores at baseline. During treatment, BSA levels significantly improved in both groups but more patients achieved a BSA<3% when treated with ADA vs. nbDMARD both at 6 months (89.7% vs. 80.2%, p=0.027) and 12 months (89.0% vs. 83.7%, p=0.222). Furthermore, upon adjusting for baseline scores, patients in the ADA group experienced greater improvements in DLQI (ΔLSM=-1.62, p=0.004), particularly in the daily activities, leisure, and work/school domains, and SF-12 PCS (ΔLSM=0.36, p<0.001). These differences between groups in BSA levels and DLQI improvement were more profound among patients with BSA≥3% at baseline. During follow-up, 9.2% of ADA patients initiated another biologic and 32.2% of patients in the nbDMARD group initiated biologic treatment (p<0.001).
Conclusion: PsA patients starting ADA following initial failure of non-biologic treatment in Canadian routine clinical care experience greater benefits in skin outcomes and quality of life compared to switching to different non-biologic treatment. These benefits are particularly evident among patients with more severe skin disease at baseline.

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Concurrent Kikuchi-Fujimoto Disease and Neuropsychiatric Lupus in a Rhupus Patient

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Case Report: Kikuchi-Fujimoto disease is a rare, self-limited, histiocytic necrotizing lymphadenitis characterized by cervical lymphadenopathy and fever. An association has been made between the presence of this uncommon disease and systemic lupus erythematosus. We describe a unique case of a 31 year old female with rheumatoid arthritis and lupus overlap syndrome with concurrent Kikuchi-Fujimoto disease who initially presented with severe headache and subsequently developed altered level of consciousness and seizures.
The patient underwent extensive investigations consisting of an infectious work up, numerous imaging modalities, a lymph node biopsy, a bone marrow biopsy, and a brain biopsy.
The patient was diagnosed with an exacerbation of her systemic lupus based upon the presence of hypocomplementemia and non-infectious encephalitis with concurrent biopsy-proven Kikuchi-Fujimoto disease. She was successfully treated with corticosteroids and mycophenolate mofetil.
This case highlights the difficulty of diagnosing and managing central nervous system involvement in complex overlap patients. Moreover, though neurological involvement is considered to be milder in rhupus patients, we describe a case of severe neuropsychiatric lupus with concurrent Kikuchi-Fujimoto disease and emphasize the need for early recognition to minimize unnecessary and potentially harmful interventions and treatments.

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Overlap of Antisynthetase Syndrome with Atypical Hemolytic Uremic Syndrome in a Woman with Anti Ro and Anti EJ Antibodies

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Case Report: This is a unique case of an overlap of anti-synthetase syndrome myositis and ILD with diffuse alveolar haemorrhage and atypical hemolytic uremic syndrome in the setting of an anti Ro antibody in a 75 year old Caucasian woman.

In 2012 she presents with a persistent dry cough and weight loss. She is diagnosed to have an atypical pulmonary fibrosis in an NSIP/ atypical UIP pattern based on imaging and BAL is predominant eosinophilic. It is believed to be drug related, so she is taken off hydrochlorothiazide and acetaminophen. Her eosinophilia improves, her lung function stabilizes, and she is followed without any clinical change for 5 years.

During this time she is also seen and followed by rheumatology due to Raynaud's phenomenon and periungal erythema and the question whether her ILD is related to a CTD. She has mild sicca, her ANA is 1:40 and she has an anti Ro antibody. She has no other systemic features of a connective tissue disease (CTD). She is followed in clinic annually.

In 2018 the patient presents with worsening weight loss, fatigue and clinical proximal muscle weakness. She has evidence of myositis with elevated muscle enzymes and an anti EJ antibody. She also has myocarditis with clinical heart failure, pericardial and pleural effusions. She also has nephrotic range proteinuria. Her ANA has risen to 1:320 with a high anti Ro titre and low complements. This is believed to be a CTD flare and she is treated with moderate dose oral corticosteroids and she improves clinically.

Unfortunately, one dose of steroids is missed accidentally. The patient develops diffuse alveolar hemorrhage that night confirmed on bronchoscopy. She also develops thrombotic microangiopathy with Coombs negative hemolytic anemia and schistocytes on her smear and a low alternative pathway functional assay. Her ADAMTS13 level is 30%. Her complements are persistently low.

She is treated with pulse IV steroids and plasmapheresis which does not stabilize her hemoglobin despite multiple treatments. She responds to IV cyclophosphamide and receives the Euro Lupus protocol. She is weaned off the ventilator, her muscle function improves and she is now maintained on azathioprine and low dose corticosteroids.

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Knitting for Older Women with Osteoarthritis of the Hands: A Community-based Pilot Randomized Controlled Trial

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Objectives: Hand osteoarthritis affects a large proportion of the world population, and is recognized as a significant cause of disability. Although exercise therapy is effective to reduce symptoms of hand osteoarthritis, exercise adherence remains low. Knitting, a meaningful activity, could be an interesting strategy to foster regular low-intensity exercise in older

individuals suffering from hand osteoarthritis. Research objective: This pilot randomized controlled trial aimed to examine the effectiveness of a 8-week supervised knitting program on morning stiffness, pain, and patient global assessment in older women with mild to moderate osteoarthritis of the hands, compared to a waiting list control group.
Methods: 37 women (mean age 67 ±7 years) were randomly allocated, either to the knitting group (n = 19) or to the control group (n = 18). Participants in the intervention group took part in a knitting program, involving bi-weekly 20-minute knitting sessions at a senior's club, and 20-minute daily home knitting sessions for the 5 remaining days of each week, over 8 consecutive weeks. Morning stiffness, pain and patient global assessment were evaluated in both groups at baseline, over the course of the active intervention (4 weeks and 8 weeks), as well as 4 weeks after the end of the intervention (follow-up).
Results: 30 participants (15 in both groups) completed the study. Participants in the knitting group tented to report higher pain compared to the control group; differences were statistically significant at 4 weeks ($p < 0.05$), but never reached clinical significance. The duration of morning stiffness was lower in the knitting group at 8 weeks (1.3 hours) compared to the control group (2.5 hours; $p < 0.01$). Knitters tended to experience a global improvement of their condition between 4 and 8 weeks while knitting compared to the control group ($p =0.063$), but participants in the knitting group observed a statistically significant global deterioration of their condition between 8 and 12 weeks when they stop knitting compared to the control group ($p < 0.001$).
Conclusion: Although knitting can slightly and transiently increase pain in the first 4 weeks, its longer use can be beneficial to reduce the duration of morning stiffness and global improvement in elderly women suffering from hand osteoarthritis. This beneficial effect is not observed at follow-up (i.e., 4 weeks after the end of the program), suggesting knitting may need to be performed on a regular basis. Future studies are needed.

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A Qualitative Study Exploring Relevance of the Making it Work Program to Osteoarthritis

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Objectives: Osteoarthritis (OA) causes pain, stiffness and physical limitations and is a leading cause of disability in adults. Due to this, OA may cause significant work impairment. Making it Work (MiW) is an online self-management program developed by Dr. Lacaille to assist people with inflammatory arthritis to deal with employment issues. This study assessed the relevance of the content of MiW to people with OA to adapt the content to meet their needs.
Methods: Fifteen participants were recruited through outpatient clinics, arthritis consumer organizations and a teachers' benefit plan. Ten participants reviewed a single module and commented on the relevance of the content in a semi-structured interview loosely based on the 'Think Aloud' technique. Five participants completed the entire program and answered a survey rating the relevance of different sections of each module. All participants completed a standardized questionnaire that captured their overall rating of relevance and helpfulness from a scale of 1 (very relevant/helpful) to 4 (not relevant/helpful) and satisfaction rating from a scale of 1 (very satisfied) to 5 (very dissatisfied). Open-ended questions captured perceived missing

content. Semi-structured interviews and open-ended survey questions were recorded, transcribed verbatim and analyzed independently by two researchers to identify emergent themes using content analysis.
Results: Overall, participants felt that most of the program content was relevant to them. Median (25th, 75th percentile) relevance, helpfulness and satisfaction for all modules and overall program was 2 (1,3), 2 (1,2) and 1 (1,2). Eighty percent of participants expected to use the content they learned from the program in their work life. Major themes regarding program content not as relevant to their situation related to participants who felt changes at work were not warranted due to their OA not being severe enough, or upcoming retirement. In contrast to people with inflammatory arthritis (IA), people with OA described pain as more of a concern to them at work than fatigue. Due to this, several participants identified pain management strategies, including complementary and alternative medicine, as missing from the program. Several participants noted the modules were lengthy and difficult to complete in one sitting due to OA pain.
Conclusion: Overall, the MiW program was found to be highly relevant to study participants with OA and the topics were considered helpful and personally applicable. Some modifications to program content are needed to address the unique challenges that people with OA face at work.

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Osteoporosis Screening and Management in Patients with Rheumatoid Arthritis

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Objectives: To review current practice for screening and management of osteoporosis (OP) in Rheumatoid Arthritis (RA) patients compared to current guidelines and the proposed Quality Indicators (QIs).
Methods: A literature review of four databases was conducted to identify guideline recommendations for OP and RA, studies evaluating OP management in RA patients and those evaluating the use of quality indicators in OP. Five QIs were identified: i) bone mineral density (BMD) for RA patients aged ≥50 years; ii) annual OP assessment and therapy evaluation; iii) appropriate OP treatment based on risk category; iv) OP prevention in patients on long-term glucocorticoids (GCs) v) BMD evaluation and treatment for patients with fragility fractures. Alberta RA patients aged ≥ 50 years with an established history with their rheumatologist (≥ 11 months) were selected consecutively from October 2017 appointment lists of eligible physicians. Chart reviews were supplemented with dispensing data from the Pharmaceutical Information Network (PIN) database for prescription OP therapy, estrogens, Calcium, Vitamin D and GCs. Proportion of patients where adherence was demonstrated to QIs ii-v) over the prior year and to QI i) since age 50 were evaluated.
Results: 116 patients were included in the study, 77% were female, the mean age was 66.3 years (range 51-88) and they averaged 2 visits (range 1-6) in the prior year. QI evaluation revealed the following: i) 50% had a documented BMD since age 50; ii) 11% had an OP risk assessment; iii/iv/v) 30%, 18% and 8% of the high, moderate and low risk patients, 40% of patients on GCs and 20% of patients with fragility fractures were on prescription therapy. 53% of patients on GCs and 20% of patients with fragility fracture had a BMD. 55% of all patients had documented Vitamin D (range 43%-68% per risk group) in the past year. To demonstrate full QI adherence, all study patients would have had a BMD, Vitamin D supplementation and an OP assessment and all high-risk patients would have been prescribed therapy.

Conclusion: Patients with Rheumatoid Arthritis are at increased risk of osteoporosis (OP) and fragility fractures which contribute to morbidity and mortality. Despite this, there appears to be a care gap in fracture risk screening and OP management for patients with RA. This work will inform the development of a pharmacist-led model in the rheumatology clinic, and identifies a potential role for all pharmacists in the screening and management of OP in patients with RA.

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Depression and Anxiety Reduce Probability of Achieving a State of Minimal Disease Activity in Patients with Psoriatic Arthritis

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Objectives: Depression and/or anxiety are comorbidities associated with psoriatic arthritis (PsA) that may affect treatment response. We aimed to determine whether the presence of depression/anxiety is associated with lower probability of achieving minimal disease activity (MDA) in patients with PsA.

Methods: Patients with PsA from a large cohort evaluated at 6-12-month intervals according to a standard protocol were studied. Those with a minimum number of 2 visits between 2008 and 2017 were eligible for this study. Given the lack of a formal psychiatric assessment, patients were classified as having depression/anxiety based on 3 definitions: 1) if they scored ≤ 38 on the Mental Component Summary of the SF-36 questionnaire (Definition 1); 2) if they scored ≤ 56 on the Mental Health subscale (Definition 2); and 3) if the physician reported a diagnosis of depression/anxiety in the PsA clinic protocol (Definition 3). The primary outcome was the achievement of sustained MDA, defined as meeting 5 of the 7 following; tender joint count ≤ 1, swollen joint count ≤ 1, tender entheseal points ≤ 1, Psoriasis Activity and Severity Index ≤ 1 or Body Surface Area ≤ 3%, patient pain visual analogue scale (VAS) ≤ 20, patient global disease activity VAS ≤ 20; Health Assessment Questionnaire ≤ 0.5, for at least two consecutive visits. Univariable and multivariable proportional odds discrete time to event analyses were conducted to identify predictors for sustained MDA.

Results: 743 patients were included in the study (Table 1). The total number of patients identified as having depression/anxiety according to the 3 definitions was: Definition 1- 331 (44.54%), Definition 2- 364 (48.99%), and Definition 3- 211 (28.39%). A total of 337 patients (45.35%) failed to achieve sustained MDA during follow-up. The presence of depression/anxiety was associated with reduced probability of achieving sustained MDA in the multivariable regression analysis (reduced model), (OR 0.29 p <0.0001 [Definition 1], OR 0.33 p <0.0001 [Definition 2] and OR 0.44 [Definition 3] p <0.0001). Male sex and daily alcohol intake were associated with a higher probability of achieving sustained MDA, whereas Charlson Comorbidity index reduced the probability. Similar results were observed when using the definitions 2 and 3 for anxiety/depression.

Conclusion: The presence of anxiety/depression reduces the probability of achieving sustained MDA in PsA. Comprehensive management of PsA thus should include measures for addressing these comorbidities.

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Role of miRNA-21-5p as a Potential Biomarker for the Inflammation Pathway in Psoriatic Disease and Response to Methotrexate Treatment

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Objectives: Psoriatic arthritis (PsA) is an inflammatory arthritis occurring in patients with psoriasis. miRNAs are small non coding RNAs whose main function, at a post transcriptional level, is to modulate the expression of target genes via translation inhibition or mRNA degradation. Several studies have shown links between altered miRNA expression with the pathogenesis of several autoimmune disorders. We demonstrated earlier that miR-21-5p was upregulated in PsA and psoriasis without arthritis (PsC) compared to healthy controls (HC) ($p<0.001$), thus a potential biomarker for PsA. We aimed to determine whether miR-21-5p modulates inflammation in psoriatic disease (PsD = PsA & PsC) through IL-17/IL-23 axis, and determine its role in the treatment response to methotrexate treatment (MTX).

Methods: Serum & whole blood RNA samples were collected from 40 patients with early PsA (<2 years' disease duration and not receiving biologic therapy), 40 patients with psoriasis who have been confirmed by rheumatologist not to develop PsA (PsC >10 years disease duration, not receiving biologic therapy, and matched to PsA patients on age, sex, psoriasis duration, and age of psoriasis onset), and 42 HC (matched to patients based on age, sex). RNA was extracted using the Tempus Spin RNA Isolation Kit. miR-21-5p was validated using droplet digital PCR (ddPCR). Serum levels of IL-17, IL-23, TGFβ1 and CXCL10 were measured by ELISAs from R&D Biosystems kits as per protocols. Descriptive statistics are provided, Spearman correlations were performed.

Results: miR-21-5p was significantly down regulated 24 weeks post-MTX treatment in 30 patients ($p< 0.008$), which correlated with the actively inflamed joint counts (AJTOT) ($r=0.897$, $p=<0.0001$), as well as swollen ($r=0.49237$, $p=0.0027$) and tender joint counts ($r=0.40757$, $p=0.0151$), and Disease activity in Psoriatic arthritis score (DAPSA) score ($r= 0.34$, $p= 0.034$). IL-17 levels in PsA & PsC were significantly different from HC ($p= 0.031$), but not different between PsA & PsC. IL-17 levels were down- regulated post treatment and correlated with miR-21-5p ($r=0.559$, $p= 0.0002$), CXCL10 levels ($r=0.485$, $p=0.013$), IL-23 levels ($r=0.429$, $p=0.02$) and negatively correlated with TGFβ1 ($r= -0.449$, $p=0.038$), DAPSA ($r=0.52431$, $p=0.0042$), AJTOT ($r=0.40350$, $p=0.0162$).

Conclusion: In the presence of upregulated miR-21-5p, IL-17 and IL-23 are upregulated while TGFβ1 is down regulated. When miR-21-5p is decreased IL-17 and IL-23 downregulate, with up regulation of TGFβ1. We have thus determined the role of miR21-5p as a biomarker for inflammation pathway in psoriatic disease and response to methotrexate possibly through modulation of CXCL10 and IL-17/IL-23 axis.

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Macrophage Migration Inhibitory Factor as a Marker of Disease Progression in Psoriatic Arthritis

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Objectives: Macrophage migration inhibitory factor (MIF) is a ubiquitously expressed, pleiotropic cytokine that exhibits pro-inflammatory effects and enzymatic properties. Levels of MIF have also been shown to be elevated in Ankylosing Spondylitis (AS) and a marker of

radiographic progression in this condition. We propose that elevated MIF levels at baseline may predict radiographic progression in terms of erosive and bone proliferative changes in the periphery and new bone formation in spine of PsA patients.
Methods: Serum MIF levels were measured using R&D Human Quantikine ELISA kit in patients with Psoriatic arthritis satisfying CASPAR criteria from the Toronto Psoriatic arthritis program that had baseline serum samples and at least one radiograph at follow up to assess for disease progression (measured on mSASSS for spine and modified Steinbrocker index for peripheral arthritis). Serum MIF levels were also measured in serum samples from healthy controls and psoriasis patients that were age and sex matched. Results were compared using Mann-Whitney U-test to look for difference between the three groups.
Results: An interim analysis of 70 PsA patients, 22 healthy controls and 24 psoriasis patients was carried out. There was not a statistically significant difference in age between the 3 cohorts. Serum MIF levels were higher in PsA group (44.34 ± 4.2 ng/ml) as compared to healthy controls (33.41 ± 4.5 ng/ml) and psoriasis patients (33.97 ±4.4 ng/ml) but this difference was not statistically significant. 15 of the 70 PsA patients showed radiographic progression. However, there was no statistically significant difference in serum MIF levels between progressors and non-progressors.
Conclusion: This interim analysis of an ongoing study shows a trend towards increased MIF levels in patients with Psoriatic arthritis compared to healthy controls or psoriasis patients. Further analysis with more patients followed by regression analysis to account for confounding factors is needed before reaching any conclusions.

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Long-Term Safety of Ixekizumab in 17034.7 Patient-Years from 15 Global Clinical Trials in Psoriasis and Psoriatic Arthritis: 3-Year Results

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Objectives: Ixekizumab (IXE) is a high-affinity monoclonal antibody that selectively targets interleukin (IL)-17A. We report the integrated safety results in IXE-treated patients who have either plaque psoriasis (PsO) or psoriatic arthritis (PsA) following 3 years of exposure.
Methods: All safety data were integrated from 12 trials (controlled and uncontrolled) in PsO, including 3 pivotal phase 3, randomized, double-blind clinical trials (UNCOVER-1, -2, -3) and from 3 trials (controlled and uncontrolled) in PsA, including 2 pivotal phase 3, randomized, double-blind clinical trials (SPIRIT-P1, -P2). Safety data were integrated from all IXE exposure-safety population (AIESP; defined as all patients receiving ≥1 dose of IXE) by indication. We report exposure-adjusted incidence rates (IRs) per 100 patient-years (PY) at 1-year intervals up to 3 years for adverse events (AEs).
Results: The total exposure to IXE for PsO and PsA reached 17034.7 PY, that is, 6989 patients (15212.5 PY, 5871 patients for PsO; 1822.2 PY, 1118 patients in PsA). In both PsO and PsA, the cumulative IRs/100 PY for: treatment discontinuation due to AEs (2.8 and 5.3), death (0.2 and 0.3), serious infections (SI; 1.3 and 1.3), injection-site reaction (ISR; 5.8 and 12.7), and infections (25.0 and 34.2). The IRs for treatment-emergent AEs (TEAEs) decreased or remained stable overtime in both PsO and PsA indications. The most common TEAEs in PsO were upper respiratory tract infection (URTI) and ISR, and, in PsA, they were URTI, nasopharyngitis, and

ISR. The IRs for serious AEs and SI remained stable overtime, whereas, for ISRs and general infections, it decreased with longer IXE exposure. Opportunistic infections were limited to oral and esophageal Candida and localized herpes zoster. Cumulatively, IRs/100 PY for safety topics of special interest in PsO and PsA included inflammatory bowel disease (non-adjudicated; 0.2 each), depression (1.2 and 1.6), malignancies (0.8 and 0.7), and major adverse cardiovascular events (0.5 and 0.6).

Conclusion: IXE showed a consistent long-term safety profile with increasing duration of drug exposure with a large database including 17034.7 PY (15212.5 PY for PsO and 1822.2 PY for PsA). No unexpected safety outcomes were reported, and the safety profile is consistent with previous reports in IXE treated PsO and PsA patients. This analysis supports a favorable benefit/risk profile for IXE in both PsO and PsA up to 3 years.

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Efficacy and Safety of Ixekizumab in Patients with Active Psoriatic Arthritis: Three Year Results from a Phase 3 Study (SPIRIT-P1)

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Objectives: Ixekizumab (IXE) is a high-affinity monoclonal antibody that selectively targets interleukin-17A. IXE, every 4 (Q4W) or 2 (Q2W) weeks, was superior to placebo in improving the signs and symptoms of psoriatic arthritis (PsA) at Week 24 in biologic-naïve patients. The objective of this study was to determine the efficacy and safety of IXE treatment up to 3 years in biologic-naïve patients with PsA.

Methods: In SPIRIT-P1, 381 patients entered the extension period (EP; Weeks 24-156). Patients failing to demonstrate ≥20% improvement in both tender and swollen joint counts at Week 32, or any subsequent visit, were discontinued (mandatory discontinuation criteria). Ad-hoc efficacy data are presented for intent-to-treat (ITT) patients initially randomized to IXE at Week 0. Modified non-responder imputation (mNRI; missing data treated as non-response for patients discontinued due to lack of efficacy or adverse events [AEs]; multiple imputation [MI] for all other missing data) was applied to categorical measures. Modified baseline observation carried forward (mBOCF) was applied to continuous efficacy measures. Safety assessments are presented for all patients who entered the EP; baseline was the first IXE dose during the EP.

Results: Of the 210 patients initially randomized to IXE at Week 0 (ITT), 125 (60%) patients completed 156 weeks of treatment; 28 patients discontinued due to AEs, and 26 patients met the mandatory discontinuation criteria. Improvements in American College of Rheumatology (ACR) 20/50/70 (69%, 51% and 33% for IXE Q4W; 62%, 56% and 44% for IXE Q2W, respectively) and Psoriasis Area and Severity Index (PASI) 75/90/100 responses (63%, 51% and 44% for IXE Q4W; 69%, 65% and 61% for IXE Q2W, respectively), resolution in enthesitis and dactylitis (47% and 62% for IXE Q4W; 40% and 69% for IXE Q2W, respectively), and improvements from baseline Health Assessment Questionnaire Disability Index (HAQ-DI: -0.4 for IXE Q4W and -0.5 for IXE Q2W) persisted up to Week 156. Frequencies of treatment-emergent AEs (TEAEs) were similar between IXE Q4W and Q2W (76%). The majority of TEAEs were mild or moderate in severity; serious AEs occurred in 47 patients (15% for IXE Q4W and 10% for IXE Q2W).

Conclusion: In patients treated with IXE, improvements in the signs and symptoms of PsA

persisted up to 3 years. No unexpected safety signals were observed, and the safety profile was consistent with previous studies of IXE.

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Radiographic Progression of Structural Joint Damage in Patients with Active Psoriatic Arthritis Treated with Ixekizumab for up to 3 Years

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Objectives: Ixekizumab (IXE), an interleukin (IL)-17A antagonist, was shown to be superior to placebo (PBO) in inhibiting the progression of structural joint damage in patients with psoriatic arthritis (PsA) treated for 24 weeks. We assessed the progression of structural joint damage in PsA patients with IXE for up to 3 years.

Methods: SPIRIT-P1 is a Phase 3 study which included patients with ≥1 joint erosion on the hand and foot radiographs confirmed by central reading or had a C-reactive protein level >6 mg/L at screening. 417 patients were randomized to 80 mg IXE every 2 (Q2W; N=103) or 4 weeks (Q4W; N=107) following a 160 mg initial dose, PBO (N=106), or 40 mg adalimumab Q2W (ADA; active reference arm; N=101) for 24 weeks. PBO and ADA patients were re-randomized (1:1) to IXEQ2W or IXEQ4W at Week 16 (inadequate responders) or Week 24. Analyses are presented for patients who entered the long-term extension (LTE; Weeks 52-156) or intent-to-treat [ITT] patients initially randomized to IXE (Weeks 0-156). Radiographs were scored independently by 2 readers blinded to timepoint and clinical data. All patients were assessed for structural joint damage using the van der Heijde modified PsA Total Sharp Score (mTSS, 0-528 scale; average of readers). For LTE patients, data is presented as linear extrapolation as observed. For linear extrapolation, any missing post-baseline data were imputed if patients had a baseline and ≥1 post-baseline value (i.e. Week 52, 108, or 156). For ITT patients, post-hoc data is presented from a mixed-effects model for repeated measures (MMRM).

Results: Of 417 patients, 300 (72%) entered the LTE and 243 completed SPIRIT-P1 (58%). Adverse events and lack of efficacy were the primary reasons for discontinuation. 260 LTE patients had radiographs; Week 156 mean (SD) mTSS change from baseline values (linear extrapolation) were 1.7 (6.6) and 1.0 (3.2) for patients initially randomized to IXEQ4W and IXEQ2W. For ITT patients, Week 156 least squares mean (SE) mTSS change from baseline values (MMRM) were 1.9 (0.4) and 0.9 (0.4) for patients initially randomized to IXEQ4W and IXEQ2W. For LTE patients initially randomized to IXE, the majority of patients had Week 156 mTSS change from baseline values (linear extrapolation) ≤0 (IXEQ4W: 67%; IXEQ2W: 62%) or ≤0.5 (IXEQ4W: 74%; IXEQ2W: 70%).

Conclusion: Over a 3 year period, minimal changes in mTSS were observed in the majority of PsA patients treated with IXEQ2W or IXEQ4W.

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Combining Infliximab with Methotrexate Does Not Improve Long Term Sustainability in Patients with Psoriatic Arthritis. A Real-World Evidence Report from the Quebec Database RHUMADATA®

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Objectives: Psoriatic Arthritis (PsA) in a musculoskeletal inflammatory condition associated with psoriasis that has a heterogeneous set of clinical manifestations. In current practice, the treatment of PsA involves initiating a conventional synthetic DMARD (csDMARD), usually followed by an initial Tumor Necrosis Factor inhibitor (TNFi) and then a second TNFi before considering other classes of biological DMARD (bDMARD). The efficacy of the TNFi in patients with PsA has been documented in randomized clinical trials (RCTs) involving several of these agents, including infliximab (INF), compared with placebo. However, little is known about the utility of combining a TNFi with MTX (C) versus TNFi monotherapy (M) in psoriatic arthritis and studies to this day show conflicting results. We evaluate here the comparative sustainability of INF used in first or second intention in patients with PsA initially treated in C or M.
Methods: Data from all RHUMADATA® patients with PsA prescribed INF either as an initial or second TNFi was analyzed. Patients were followed until treatment discontinuation, loss to follow-up or September 2, 2018. Only patients who were treated for at least 6 months were included. The characteristics of selected patients were tabulated and the INF discontinuation rates of patients who initiated C and M were compared using Kaplan-Meier estimates and multivariate Cox models adjusting for potential confounders.
Results: A total of 65 patients with PsA (according to CASPAR criteria) received INF in first or second intention. Of those, 30 (46%) and 35 (54%) received treatment without and with MTX respectively. Patients treated with and without MTX were similar at treatment initiation. Fourteen (47%) and 19 (54%) of patients were men in the M and C groups respectively. Mean age at treatment initiation was 47.8 (STD=9.2) years in the M group and 48.1 (11.3) years in the C group while disease duration was 5.8 (7.8) and 8.0 (7.8) years respectively. Patient and MD global assessment of disease activity was 5.0 (2.8) vs 5.1 (2.7) and 2.4 (2.8) and 3.1 (2.8). No significant differences in retention rates were observed between the groups (see figure below). Mean retention time for M and C therapy were respectively 3.88 (SE=0.59) and 5.37 (SE=0.83) years. The principal reason for treatment cessation was inefficacy, followed by adverse events. There were more adverse events in the C group (22.7% vs 12.5%).
Conclusion: Combining MTX to INF does not improve sustainability in patients with PsA.
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Combining Etanercept with Methotrexate Does Not Improve Long Term Sustainability in Patients with Psoriatic Arthritis. A Real World Evidence Report from the Quebec Database RHUMADATA®
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Objectives: Psoriatic Arthritis (PsA) in a musculoskeletal inflammatory condition associated with psoriasis that has a heterogeneous set of clinical manifestations. In current practice, the treatment of PsA involves initiating a conventional synthetic DMARD (csDMARD), usually followed by an initial Tumor Necrosis Factor inhibitor (TNFi) and then a second TNFi before considering other classes of biological DMARD (bDMARD). The efficacy of the TNFi in patients with PsA has been documented in randomized clinical trials (RCTs) involving several of these agents, including etanercept (ETA), compared with placebo. However, little is known about the utility of combining a TNFi with MTX (C) versus TNFi monotherapy (M) in psoriatic arthritis and studies to this day show conflicting results. We evaluate here the comparative sustainability of ETA used in first or second intention in patients with PsA initially treated in C

or M.
Methods: Data from all RHUMADATA® patients with PsA prescribed ETA either as an initial or second TNFi was analyzed. Patients were followed until treatment discontinuation, loss to follow-up or February 21st 2018. Only patients who were treated for at least 6 months were included. The characteristics of selected patients were tabulated and the ETA discontinuation rates of patients who initiated C and M were compared using Kaplan-Meier estimates and multivariate Cox models adjusting for potential confounders.
Results: A total of 195 patients with PsA (according to CASPAR criteria) received ETA in first or second intention. Of those, 102(52.3%) and 93(47.7%) received treatment without and with MTX respectively. There were statistically significant differences in populations in table 1 for the BASDAI (M: 5.8±2.8; C: 3.9±2.3; p=0.03) and BASFI (M: 5.0±3.0; C: 2.8±2.0; p=0.011) scores, both being higher in the M group. No significant differences in retention rates between M and C therapy were observed (see figure below). Mean retention time for M and C therapy were respectively 8.25(SE=0.68) and 7.12(SE=0.42) years. The main reason for treatment cessation was inefficacy, followed by adverse events. There were more adverse events in the C group (26.1% vs 9.3%). Sub analysis looking at ETA in first and second intention separately showed similar results.
Conclusion: Combining MTX to ETA does not improve sustainability in patients with PsA.

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Combining Adalimumab with Methotrexate Does Not Improve Long Term Sustainability in Patients with Psoriatic Arthritis. A Real World Evidence Report from the Quebec Database Rhumadata®

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Objectives: Psoriatic Arthritis (PsA) in a musculoskeletal inflammatory condition associated with psoriasis. It has a heterogeneous set of clinical manifestations which include peripheral arthritis, axial involvement, enthesitis, dactylitis, ski, and nail disease. In current practice, the treatment of PsA involves initiating a conventional synthetic DMARD (csDMARD), usually followed by an initial Tumor Necrosis Factor inhibitor (TNFi) and then a second TNFi before considering other classes of biological DMARD (bDMARD). The efficacy of TNFi in patients with PsA has been documented in randomized clinical trials (RCTs) for several of these agents, including adalimumab (ADA), etanercept, infliximab, adalimumab, golimumab, and certolizumab, compared with placebo. However, little is known about the utility of combining a TNFi with MTX (C) versus TNFi monotherapy (M) in psoriatic arthritis and studies to this day show conflicting results. We evaluate here the comparative sustainability of ADA used in first or second intention in patients with PsA initially treated in C or M.
Methods: Data from all RHUMADATA® patients with PsA prescribed ADA either as an initial or second TNFi was analyzed. Patients were followed until treatment discontinuation, loss to follow-up or February 21st, 2018. Only patients who were treated for at least six months were included. The characteristics of selected patients were tabulated, and the ADA discontinuation rates of patients who initiated C and M were compared using Kaplan-Meier estimates and multivariate Cox models adjusting for potential confounders.
Results: A total of 247 patients with PsA received ADA in first or second intention. Of those, 105(42.5%) and 142(57.5%) received treatment without and with MTX respectively. There was a statistically significant difference in populations in table 1 for the age at diagnosis (M:

39.8±11.7; C: 43.5±11.4; p=0.012). No significant differences in retention rates between M and C therapy were observed (see figure below). Mean retention time for M and C therapy were respectively 5.06(SE=0.29) and 6.82(SE=0.35). Sub analysis looking at ADA in first and in second intention showed similar results.
Conclusion: Combining MTX to ADA does not improve sustainability in patients with PsA.

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Effectiveness and Safety of Infliximab in the Management of Psoriatic Arthritis: Real-World Data from the Biologic Treatment Registry Across Canada (BioTRAC)

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Objectives: To describe the patient profile of psoriatic arthritis (PsA) patients treated with infliximab (IFX) over time in Canadian routine clinical care, and to assess the long-term effectiveness and safety of IFX in a real-world setting

Methods: This study included PsA patients from the Biologic Treatment Registry Across Canada (BioTRAC) registry who were enrolled between 2006 and 2015. Summary statistics were used to describe effectiveness outcomes over time. Safety was assessed with drug survival using Kaplan-Meyer survival analysis and the incidence of adverse events (AEs)

Results: A total of 111 PsA patients were included between 2006-2008 (n=51), 2009-2012 (n=37), and 2013-2015 (n=23). Patients enrolled in more recent years had significantly higher IFX dose administration (p=0.004) at treatment initiation. Baseline disease activity was generally comparable across enrolment periods, though higher dactylitis score (p=0.023) and lower morning stiffness (p=0.003) was observed among patients enrolled in more recent years. In terms of treatment history, previous NSAID use generally decreased in more recent years (p=0.028), while previous methotrexate use increased (p=0.020). Significant improvements were observed in all clinical and patient-reported outcomes examined ($p<0.05$). The proportion of patients in minimal disease activity (MDA) was 15% at baseline and increased in all follow-up visits from a minimum of 35% (month 6) to a maximum of 59% (month 72). About 66% of patients continued IFX after 12 months and mean time to discontinuation was 41.1 months. AEs were reported for 74.8% of patients (138 events/100 PYs), SAEs for 19.8% (9 events/100 PYs), and serious infections for 2.7% (0.95 events/100 PYs). Cancer developed in 3.6% (1.26 events/100 PYs) of patients. No cases of tuberculosis were reported.

Conclusion: Comparison between enrolment periods demonstrated significant differences in a few baseline patient and disease characteristics including treatment history and disease parameters IFX treatment reduced disease activity and symptoms and was generally safe and well tolerated for long-term use in patients with PsA.

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Efficacy and Safety of Ixekizumab in Patients with Active Psoriatic Arthritis and Previous Inadequate Response to TNF Inhibitors: Two-Year Follow-up from a Phase 3 Study

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Objectives: Ixekizumab (IXE), a high-affinity monoclonal antibody that selectively targets IL-17A, was superior to placebo (PBO) at Week 24 for treating signs and symptoms in patients with active PsA and prior inadequate response or intolerance to 1 or 2 TNF inhibitors (TNFi). We report efficacy and safety results of IXE following 2 years of treatment in SPIRIT-P2.
Methods: Adult subjects (N=363) were randomized 1:1:1 to 80mg IXE every 4 weeks (Q4W, N=122) or 2 weeks (Q2W, N=123) following a 160mg starting dose of IXE at Week 0, or PBO (N=118). PBO patients were re-randomized 1:1 to IXE Q2W or Q4W at either Week 16 if inadequate responders (<20% improvement in both tender and swollen joint count) or Week 24. From Week 32, <20% improvement in both TJC and SJC led to mandatory discontinuation. Efficacy outcomes were ACR20/50/70, Leeds Enthesitis Index (LEI), Leeds Dactylitis Index-Basic (LDI-B), Psoriasis Area and Severity Index (PASI) 75/90/100, Minimal Disease Activity (MDA), and HAQ-Disability Index (DI). Ad-hoc efficacy analysis for combined treatment periods from Weeks 0-108 included patients initially randomized to IXE. Missing values were imputed by modified nonresponder imputation for categorical data or modified baseline observation carried forward (mBOCF) for continuous data. Safety analyses included all available safety data at the time of Week 108 database lock for patients receiving ≥1 dose of IXE and was summarized as incidence rates (IR) per 100 pt-years.
Results: Overall, 54.2% of randomized patients completed 108 weeks of treatment. Responses at Week 108 for IXE Q4W and Q2W were: 59.6% and 47.9%, 46.2% and 32.5%, 23.2% and 22.6% for ACR20/50/70; 45.5% and 37.5% for LEI=0; and 63.0% and 60.0% for LDI-B=0; 65.1% and 48.3%, 55.3% and 40.3%, 39.0% and 35.3% for PASI 75/90/100; 33.2% and 27.8% for MDA, respectively. Mean change from baseline in HAQ-DI was -0.4 for both IXE doses. Most treatment-emergent adverse events (AE) were mild or moderate in severity. Serious AE IRs were 5.8 (IXE Q4W) and 7.7 (IXE Q2W). Three deaths occurred: myocardial infarction (IXE Q2W/Q2W), metastatic renal cell carcinoma (IXE Q4W/Q4W), and cardiopulmonary arrest (PBO/IXE Q2W).
Conclusion: IXE provided clinically meaningful and sustained improvement in PsA signs and symptoms for up to 2 years of IXE treatment, consistent with responses during earlier treatment periods of SPIRIT-P2. No unexpected safety outcomes were reported; the safety profile was consistent with other IXE Phase 3 trials in active PsA and moderate-to-severe plaque psoriasis patients.

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Prediction of Response to Tofacitinib, an Oral Janus Kinase Inhibitor, in Patients with Active Psoriatic Arthritis

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Objectives: Tofacitinib is an oral Janus kinase inhibitor for the treatment of psoriatic arthritis (PsA). Treatment recommendations advocate remission or low disease activity as targets for

patients with PsA, but evidence showing whether patient and disease characteristics are predictive of achieving these is limited. This analysis aimed to determine if baseline variables are predictive of therapeutic response to tofacitinib in PsA patients.
Methods: Patients from 2 placebo-controlled, randomized, double-blind, Phase 3 studies (OPAL Broaden [NCT01877668]; OPAL Beyond [NCT01882439]) who received tofacitinib 5 mg or 10 mg twice daily were included. Patients had active PsA and inadequate response to ≥1 conventional synthetic disease-modifying antirheumatic drug (and were tumour necrosis factor inhibitor [TNFi]-naïve; OPAL Broaden) or to ≥1 TNFi (OPAL Beyond). The effects of study, dose and 26 baseline demographic and disease characteristics were assessed against 3 efficacy endpoints: ACR50 response rate (RR; ≥50% improvement in ACR criteria), Minimal Disease Activity (MDA) RR (achieving ≥5 of 7 criteria) and Psoriatic ArthritiS Disease Activity Score (PASDAS) RR (post-baseline ≤3.2; improvement from baseline ≥1.6) at Months (M) 3 and 6. The 26 baseline variables were analyzed against each efficacy endpoint through multiple logistic regression, using a stepwise variable selection method with each time point analyzed separately and a significance level of 0.05 (2-sided). Logistic pseudo-partial correlation between significant baseline variables and RR was determined from the same model.
Results: In total, 450 (ACR50 and MDA) and 447 (PASDAS) patients were included. Neither study nor dose were significantly related to ACR50, MDA or PASDAS response at M3 or M6. Of 26 baseline variables assessed, 13 had a significant relationship with ≥1 efficacy endpoint at ≥1 time point. Each efficacy endpoint contained ≥1 dependent variable as its component (eg Leeds Enthesitis Index [LEI]: MDA/PASDAS; swollen joint count: ACR50/MDA/PASDAS), so partial correlation was expected. Logistic regression analysis determined that both LEI and Functional Assessment of Chronic Illness Therapy-Fatigue (FACIT-F) were significantly associated with ACR50, MDA and PASDAS response at M3 and M6, with greater odds of higher response associated with lower baseline LEI (less enthesitis) and higher baseline FACIT-F (less fatigue). Pseudo-partial correlations of significant baseline variables vs ACR50, MDA and PASDAS at M3 and M6 were weak (-0.16 to 0.19).
Conclusion: While baseline LEI and FACIT-F were consistently and significantly associated with ACR50, MDA and PASDAS in tofacitinib-treated patients, associations were weak, making it difficult to predict tofacitinib response in patients with PsA in this setting.

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The Effect of Guselkumab on PASDAS, GRACE Index, mCPDAI and DAPSA: Results from a Phase 2 Study in Patients with Active Psoriatic Arthritis

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Objectives: Psoriatic ArthritiS Disease Activity Score (PASDAS), GRAppa Composite scorE (GRACE) Index, modified Composite Psoriatic Disease Activity Index (mCPDAI), and Disease Activity Index for PSoriatic Arthritis (DAPSA) are composite indices recently developed to assess disease activity in psoriatic arthritis (PsA).1,2 The effect of guselkumab (GUS) on these

indices was evaluated in a phase 2 study in patients with active PsA.
Methods: Patients with ≥3 tender and ≥3 swollen joints, C-reactive protein ≥3 mg/L, and ≥3% body surface area (BSA) of plaque psoriasis despite treatment were randomized 2:1 to receive GUS 100 mg subcutaneously (N=100) or placebo (PBO, N=49) at Weeks 0, 4, and every 8 weeks thereafter through Week44. At Week16, patients with <5% improvement in both swollen and tender joint counts were eligible for early escape (EE) to open-label ustekinumab. All remaining PBO patients crossed-over to receive GUS 100 mg at Weeks 24, 28, 36, and 44 (PBO to GUS). The PsA composite indices through Week24 were analyzed using last-observation-carried-forward for missing data and data post EE. After Week24, observed data were used. Missing baseline data were excluded in the analyses.
Results: Baseline PASDAS, GRACE, mCPDAI, and DAPSA showed moderate to high disease activity (mean (SD): 6.53 (1.079), 6.08 (1.208), 7.5 (2.27), and 46.65 (20.391), respectively), and were generally comparable between PBO and GUS. At Week24, GUS significantly decreased PASDAS, GRACE, mCPDAI, and DAPSA scores (mean (SD) change from baseline: -2.50 (1.59), -2.73 (1.76), -3.9 (2.79), -23.08 (20.21), respectively) vs PBO (mean (SD) change from baseline: -0.49 (1.33), -0.35 (1.39), -0.8 (2.26), -4.97 (20.11), respectively, all $p<0.001$). Significantly more GUS-treated patients achieved a low or very low disease activity state defined by PASDAS, GRACE, and mCPDAI (35.0%, 29.6%, and 51.0%, respectively) vs PBO (4.1%, 2.1%, and 16.7%, respectively, all $p<0.001$). In addition, 12% of GUS- vs 0% of PBO-treated patients achieved DAPSA remission ($p<0.01$). Post Week24, improvements in PASDAS, GRACE, mCPDAI, and DAPSA were also observed in PBO-to-GUS patients (39.3%, 39.3%, 75.0%. and 50.0% achieved disease activity states of low, very low, or remission at Week 44, respectively), and were maintained through Week44 in GUS patients (45.8%, 42.2%, 63.9%, and 51.1% achieved disease activity states of low, very low, or remission, respectively).
Conclusion: Conclusion: GUS demonstrated consistent improvements based on all PsA composite indices evaluated, and efficacy was maintained through Week44. 1. Helliwell PS, FitzGerald O, and Fransen J. JRheumatol 2014;41:1212-1217. 2. Scholes MM, Aletaha D, Alasti F, Smolen JS. AnnRheumDis 2016;75:811-818.

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Ixekizumab Treatment Significantly Improves Enthesitis and Dactylitis in Patients with Active Psoriatic Arthritis: Results from the SPIRIT Trials

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Objectives: To investigate the impact of ixekizumab (IXE) treatment on resolution of enthesitis or dactylitis and whether such improvements were associated with improved function and health-related quality of life (HRQoL).
Methods: Patients with active psoriatic arthritis (PsA) who were biologic-naïve (SPIRIT-P1) or with prior inadequate response to tumor necrosis factor inhibitor(s) (SPIRIT-P2) were randomized to placebo or 80-mg IXE every 4 weeks (IXEQ4W) or 2 weeks (IXEQ2W), after a 160-mg starting dose. Inadequate responders at Week 16 received rescue therapy. Leeds Enthesitis Index (LEI), Leeds Dactylitis Index-Basic (LDI-B), Health Assessment Questionnaire Disability Index (HAQ-DI), and EuroQoL-5D Visual Analog Scale (EQ-5D VAS) were measured at Week 24. Missing data or data from inadequate responders were considered non-response or imputed with last observation carried forward for categorical and continuous

measures. Statistical comparisons between placebo and IXE treatment groups were performed with a logistic regression model using Wald's test with treatment and study as factors. In post hoc analyses, associations between enthesitis and dactylitis with HAQ-DI and EQ-5D VAS are based on an ANCOVA model adjusting for study and Disease Activity of Psoriatic Arthritis.
Results: In the integrated SPIRIT-P1 and -P2 dataset (N=679), 403 patients (59%) had baseline enthesitis (LEI>0) with a mean 2.9 LEI score, and 155 patients (23%) had baseline dactylitis (LDI-B>0) with a mean 56.4 LDI-B score. Relative to placebo, IXE resulted in significantly higher resolution of enthesitis (SPIRIT-P1) and dactylitis (SPIRIT-P1,-P2) after 24 weeks. Both IXEQ4W and IXEQ2W had significantly higher enthesitis and dactylitis resolution than placebo at Week 24 (IXEQ4W 39%; IXEQ2W 35%; placebo 21%; $p<0.05$) and dactylitis (IXEQ4W 78%; IXEQ2W 65%; placebo 24%; $p<0.001$). In ad hoc analysis, IXE treatment had significantly higher resolution of enthesitis compared to placebo at the entheseal points comprising the LEI score. For all placebo- and IXE-treated patients at Week 24, least squares mean (SE) HAQ-DI improvement from baseline were -0.44 (0.05) and -0.25 (0.03; $p<0.01$) for patients who did/did not resolve enthesitis, and -0.41 (0.06) and -0.31 (0.07; $p=0.34$) for patients who did/did not resolve dactylitis. Corresponding EQ-5D VAS improvements were 12.3 (2.2) and 5.8 (1.5; $p=0.02$) for patients who did/did not resolve enthesitis, and 10.8 (2.8) and 9.8 (3.5; $p=0.83$) for patients who did/did not resolve dactylitis.
Conclusion: Treatment with IXE resulted in significant improvement in enthesitis and dactylitis in patients with pre-existing enthesitis or dactylitis. Resolution of enthesitis symptoms was associated with improvements in patients' function and HRQoL.

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Guidelines on Prescribing and Monitoring Antimalarials in Rheumatic Diseases: A Systematic Review

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Objectives: The purpose of this systematic review was to compare guidelines for antimalarial prescribing and monitoring, specifically for hydroxychloroquine, and how they have evolved over time.
Methods: A literature search was conducted using Embase and Medline to identify guidelines published from 1946 to September 2018. The following MeSH terms were employed: 'hydroxychloroquine' AND 'retinal diseases' AND 'practice guideline or gold standard or consensus or consensus development or professional standard or algorithm'. Alternative spelling and related words were entered as keywords and separated from MeSH terms by 'OR' to broaden results. In addition to reviewing search results, references of all articles were reviewed to retrieve additional guidelines.
Results: A total of 243 results were reviewed, after accounting for duplicates, to obtain 11 recommendations. The American Academy of Ophthalmology published guidelines in 2002, 2011, and 2016. ACR issued a position statement, last revised in 2016. The Royal College of Ophthalmologists published guidelines in 1998, 2009, and 2018. Canadian recommendations included a CRA consensus conference in 1998 and ophthalmology editorials in 1998, 2002, and 2012. American recommendations progressed from suggesting hydroxychloroquine doses <6.5 mg/kg/day (ideal body weight), to ≤400 mg daily to, most recently, ≤5 mg/kg/day. British guidelines initially recommended ≤6.5 mg/kg/day, however, now recommend <5 mg/kg/day. The older Canadian sources suggested <6.5 mg/kg/day. American guidelines recommend baseline fundus exam with visual field testing and annual screening after five years of therapy. Field

testing evolved from the Amsler grid to current recommendations of 10-2 automated visual fields and spectral domain optical coherence tomography (SD-OCT). In 2012, a Canadian editorial recommended initial field testing every two years, with SD-OCT after 10 years. Older British guidelines suggested baseline optometry assessment including visual fields with Amsler grid and referral to ophthalmology for abnormalities, with no systematic recommendations. The 2018 British guidelines endorse baseline and annual screening after five years with 10-2 visual fields and both SD-OCT and fundus autofluorescence imaging if available.
Conclusion: The newest recommendations suggest a hydroxychloroquine dose of ≤5 mg/kg/day. Retinal toxicity is irreversible, and the risk increases over time. Annual screening after five years of treatment with automated visual fields and SD-OCT may be warranted to detect early changes and discontinue therapy if necessary. It is uncertain whether the magnitude of retinal toxicity is increasing due to early detection with more sensitive tests or if newer recommendations are based on best evidence. The CRA should consider new guidance for antimalarial prescribing.

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Regional and Temporal Variation in the Baseline Profile of Psoriatic Arthritis Patients Initiating Adalimumab Following Failure of Non-Biologic Treatment in Canadian Routine Care

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Objectives: The objective of this analysis is to investigate the regional and temporal variability of the profile of anti-TNF naïve psoriatic arthritis (PsA) patients at initiation of adalimumab (ADA) treatment following failure of initial non-biologic treatment.
Methods: COMPLETE-PsA is an ongoing Canadian observational study of anti-TNFα naïve adults with active PsA who require change in their current treatment as per the judgement of their treating physician. Patients are followed for up to 2 years. Regional variation was assessed for the following regions: British Columbia/Manitoba (BC/MB), Newfoundland/Nova Scotia (NL/NS), Ontario (ON) and. Quebec (QC). Temporal variation was assessed for the following periods: 2012-2014 and 2015-2017. Multivariate linear regression was used to evaluate the independent impact of region and time period on disease activity (DAS28) and patient function (HAQ).
Results: A total of 278 patients were included, of whom 68 (24.5%) were from BC/MB, 25 (9%) from NL/NS, 104 (37.4%) from ON and 81 (29.1%) from QC. 153 patients (55%) were enrolled in 2012-2014 and 125 (45%) in 2015-2017. Using univariate analysis, significant regional variation at ADA initiation was observed for the following disease parameters: BSA<3% (from 42.3% in ON to 76% in NL/NS; p=0.003), morning stiffness (from 60.9 min in QC to 119.7 in BC/MB; p=0.049), WLQ productivity loss score (from 8.4% in BC/MB to 12.9% in NL/NS; p=0.028), and DLQI (from 3.5 in NL/NS to 7.9 in ON; p=0.007); and for the initiation of ADA monotherapy vs. ADA combination therapy (range from 9.9% in QC to 27.9% in ON; p=0.022). No differences were observed in demographics (other than race: Caucasian range from 85% to 100%; p=0.006), or other disease parameters (DAS28, HAQ, SJC, TJC, DAPSA, PtGA, BDI). A statistical trend towards lower DAS28 (2012-14 vs. 2015-17: 4.9 vs. 4.6; p=0.070), SJC (8.3 vs. 6.4; p=0.001), TJC (9.5 vs. 8.1; p=0.074), and DAPSA (30.8 vs. 27.8; p=0.083) at ADA initiation was observed for the more recent time period. Using multivariate analysis to adjust for

age, gender, BSA levels, and corticosteroid use, there was no regional or temporal variation in DAS28 and HAQ.
Conclusion: The results of this analysis demonstrate that there is significant regional and temporal variation in the profile of PsA patients initiated on ADA treatment in Canadian routine care. The impact of this profile variation on treatment outcomes requires further investigation.

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Effectiveness and Safety of Infliximab in Ankylosing Spondylitis: A Multi-Centre, Prospective, Observational Study from the Biologic Treatment Registry Across Canada (BioTRAC)

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Objectives: To describe the profile of ankylosing spondylitis (AS) patients treated with infliximab (IFX), along with its long term effectiveness and safety in Canadian real world care.
Methods: AS patients were enrolled in the Biologic Treatment Registry Across Canada (BioTRAC) between 2005 and 2015. Effectiveness was assessed with changes in disease parameters (ASDAS, BASDAI, BASFI, MDGA, HAQ-DI, PtGA and back pain). Safety was evaluated with the incidence of adverse events (AEs), and drug survival rates.
Results: Of the 389 AS patients included, 192 (49.4%) were enrolled in 2005-2008, 121 (31.1%) in 2009-2012, and 76 (19.5%) in 2013-2015. Patients enrolled in more recent years (2013-2015) had significantly shorter mean disease duration compared to 2005-2008 and 2009-2012 (4.6 vs. 10.5 vs. 8.2 years; $P<0.001$); they also had significantly lower mean BASFI score compared to the earlier enrollment periods (5.1 vs. 6.3 vs. 5.9; $P=0.011$). Treatment with IFX significantly improved all disease parameters over time ($P<0.001$). The drug survival rate for IFX was over 65% at 1-year of treatment and the mean time to discontinuation was 53.3 months. AEs were reported for 67.9% of patients (136 events/100 PYs) and SAEs for 15.4% (10.5 events/100 PYs). Reasons for discontinuation over the course of the study were due to AEs (19.1%), lost to follow-up (14.1%), loss of response (14.1%), lack of response (8.2%), withdrawal of consent (6.3%), geographic barriers (3.5%), disease progression (3.1%), alternative therapy to IFX (2.7%), financial basis (2.0%), complete response (1.2%), and 'other reason' (24.6%). A total of 3 (1.2%) patients did not provide a reason.
Conclusion: Over the past decade, we found that AS patients were treated earlier with IFX and had lower disease activity at baseline. In most patients, IFX treatment significantly reduced disease activity, improved functionality and was well tolerated.

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Psychometric Assessment and Correlation of Psoriatic Arthritis Outcome Measures in Real-World: Results from the COMPLETE-PsA Study

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Objectives: The purpose of this analysis was to evaluate the correlation and psychometric properties of currently available outcome measures in a cohort of psoriatic arthritis (PsA) patients followed in Canadian routine care.

Methods: COMPLETE-PsA is an ongoing Canadian observational study of anti-TNFα naïve adults with active PsA requiring, per the treating physician, change in current treatment. Here, the correlation of the following measures at baseline was assessed with the Pearson coefficient: Disease Activity in PSoriatic Arthritis (DAPSA), Disease Activity Score 28 (DAS28), 28-tender (TJC) and swollen joint count (SJC), patient pain (VAS), patient global assessment (PtGA; VAS), Dermatology Life Quality Index (DLQI) score, SF-12 physical component (PCS) and mental component (MCS) summary scores, Health Assessment Questionnaire (HAQ), morning stiffness, Beck Depression Inventory (BDI) score, and work limitations questionnaire (WLQ) productivity loss score (PLS). Discriminative performance (sensitivity, specificity, positive [PPV] and negative [NPV] predictive values, % concordant pairs, and the Cohen's Kappa coefficient) between the following outcomes at 6 months was evaluated: modified Minimal Disease Activity (mMDA) (4 of 6 [mMDA 1] and 5 of 6 [mMDA 2] following criteria: TJC≤1, SJC≤1, body surface area (BSA)≤3%, pain VAS≤15mm, PtGA≤20mm, HAQ≤0.5), modified remission (mREM: SJC=0, TJC =0, no enthesitis and dactylitis, BSA≤3%, HAQ≤0.5), DAPSA low disease activity (LDA) (≤14), DAPSA remission (REM; ≤4), DAS28 LDA, DAS28 REM, and American College of Rheumatology (ACR) (ACR20/50/70) and PsA response criteria (PsARC).

Results: Significant variation was observed in the correlation between the various outcome measures. Strong correlations were seen between SF-12 PCS and HAQ ($r=-0.607$; $p<0.001$), SF-12 MCS and BDI ($r=-0.688$; $p<0.001$), SF-12 MCS and WLQ PLS ($r=-0.669$; $p<0.001$), HAQ and WLQ PLS ($r=0.632$; $p<0.001$), and BDI and WLQ PLS ($r=0.685$; $p<0.001$). DLQI and morning stiffness showed the weakest correlations with all outcomes. In terms of discriminatory performance, using DAS28 LDA as external criterion, DAPSA LDA showed the highest degree of accuracy/correlation (sensitivity=94.6%, specificity=84.9%, PPV=89.8%, NPV=91.9%, 82.5% concordance, kappa=0.804), followed by DAS28 REM, and ACR50. When using ACR50 as external criterion, other than ACR20/70, DAPSA REM was identified as most accurate, followed by DAPSA LDA, DAS28 REM and DAS28 LDA.

Conclusion: Variable degrees of correlation and discriminant capacity were observed across different outcome measures, which should be considered when comparing results from different studies. Overall, DAPSA seems to have the best discriminant capacity in evaluating disease activity in PsA patients treated in real-world.

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Predictors of Survival of Adalimumab Treatment in the Management of Ankylosing Spondylitis and Psoriatic Arthritis in Canadian Routine Care

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Objectives: The objective of this analysis was to assess in Canadian routine clinical practice the survival of treatment with adalimumab (ADA) in ankylosing spondylitis (AS) and Psoriatic Arthritis (PsA), and the determinants of ADA survival.

Methods: COMPLETE-AS is an ongoing Canadian observational study of anti-TNFα naïve adults with active AS or PsA who require, per the judgment of the treating physician, change in current treatment. Patients are followed for up to 2 years. In the current analysis, patients initiating ADA were included. Kaplan Meier (KM) estimates and Cox proportional models were used in the analysis. Potential predictors evaluated were age, gender, enrollment period, combination treatment with non-biologic DMARD(s) (nbDMARDs) vs. monotherapy, baseline disease activity (AS: BASDAI; PsA: DAS28), and baseline functional activity (AS: BASFI; PsA: HAQ). In a secondary analysis, the achievement of BASDAI 50 (AS) and ΔDAS28≥1.2 (PsA) at 3 months were also considered.
Results: A total of 459 AS and 278 PsA patients were included in the analysis. Mean age of the AS and PsA patient cohorts was 43.9 and 52.0 years, respectively. Mean BASDAI and DAS28 scores in AS and PsA patients were 6.4 and 4.8, respectively. KM-based mean (95% CI) time to ADA discontinuation was 1.77 (1.72-1.82) years and 1.83 (1.77-1.88) years for AS and PsA patients, respectively. Among AS patients, BASFI score at baseline was identified as the only significant predictor of ADA survival, (HR [95% CI]: 1.17 [1.08-1.28]). In the secondary analysis considering response to treatment at 3 months, achievement of BASDAI 50 was associated with significantly lower hazard for discontinuation (0.36 [0.20-0.65]); in this analysis, age (0.98 [0.97-1.00]) and baseline BASFI score (1.24 [1.11-1.39]) were also significant predictors of ADA retention. Among PsA patients, male gender was identified as the only significant (positive) predictor of ADA survival, both in the primary (0.50 [0.29-0.85]) and secondary (0.39 [0.18-0.85]) analysis.
Conclusion: The results of this analysis have shown that early achievement of BASDAI 50 is associated with improved long-term retention of ADA treatment among AS patients. Furthermore, gender differences may exist in the real-world survival of ADA treatment in PsA.

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Evaluating the Construct Validity of PROMIS Fatigue Short Forms in Rheumatoid Arthritis

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Objectives: Fatigue is prevalent, severe and one of the most disabling symptoms in rheumatoid arthritis (RA). There is no standardized measure for its assessment nor data concerning the performance of PROMIS-Fatigue short forms (SFs) in people with RA. We evaluated the construct validity of 4-, 7-, and 8-item PROMIS-Fatigue SFs in RA patients across the range of disease activity.
Methods: Adult RA patients were recruited from an online arthritis patient community and an observational cohort drawing from three academic medical centers. Measures included PROMIS-Fatigue SFs (7a, 8a, 4a), other PROMIS measures of RA symptoms, and selected patient reported outcomes including RAND-36 Vitality, Fatigue NRS, and patient global assessment of disease activity. Clinical outcomes from the observational cohort included swollen and tender joint counts (28), physician global assessment, and the RA Clinical Disease Activity Index (CDAI). Associations among variables were examined using Pearson correlations, and ANOVA was used to compare scores across disease and fatigue levels. Data were analyzed using SPSS (v25), and a $p<0.05$ was considered statistically significant.

Results: A total of 548 (200 online, 348 observational cohort) participants were included. PROMIS Fatigue SF scores spanned the measurement continuum and correlated highly with each other (r's ≥0.91) and other fatigue measures (r's ≥0.85). PROMIS-Fatigue SF scores were highly and inversely associated with Physical Function and Participation (r's -0.77 to -0.78), and moderately-highly and positively correlated with pain, sleep disturbance, anxiety, and depression (r's 0.60 to 0.75). PROMIS-Fatigue SF scores showed dose-response relationships across fatigue severity descriptors and CDAI categories.
Conclusion: These results provide new evidence supporting the construct validity of the 4, 7, and 8-item PROMIS-Fatigue SFs. The SFs capture fatigue across the spectrum of RA disease activity in diverse groups of individuals and should be considered for use as patient-centered assessments of RA disease control and treatment efficacy.

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Converting FACIT Fatigue to PROMIS Fatigue Scores: Results from Two Phase 3 Baricitinib Rheumatoid Arthritis Trials

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Objectives: Fatigue in patients with rheumatoid arthritis (RA) may be measured with the 13-item Functional Assessment of Chronic Illness Therapy-Fatigue instrument (FACIT-F). The Patient-Reported Outcomes Measurement Information System (PROMIS) was developed using a population-calibrated T-score metric (mean 50, SD 10). PROMIS Fatigue includes the FACIT-F items, making their scores interchangeable. Crosswalk tables and a pattern scoring system have been developed to link legacy to PROMIS instruments, including fatigue. A subset of 10 FACIT-F items has also been identified as relevant to patients with RA. We assessed treatment response in two phase 3 baricitinib RA trials based on linked FACIT and PROMIS Fatigue scores using both crosswalk tables and the scoring algorithm.
Methods: In RA-BEAM, patients with inadequate response to MTX were randomized 3:3:2 to placebo (PBO) once daily (QD), baricitinib (bari) 4 mg QD, or adalimumab (ADA) 40 mg biweekly. In RA-BEACON, patients with inadequate response to biological DMARDs were randomized 1:1:1 to receive PBO or bari 2 mg or 4 mg QD. Patient-level FACIT-F scores were linked to PROMIS Fatigue scores using validated crosswalk tables (www.prosettastone.org) and the scoring algorithm at http://www.healthmeasures.net/explore-measurement-systems/promis. Analysis of covariance was conducted on PROMIS score conversions to compare bari to all treatment arms.
Results: At baseline, average PROMIS Fatigue scores across treatment groups and scoring methods ranged from 56.8 to 59.7 in RA-BEAM (FACIT-F range 27.6 to 28.6) and 60.1 to 63.7 in RA-BEACON (FACIT-F range 22.2 to 23.4); they thus reflected severe fatigue compared with the population means (e.g., approaching or exceeding 1 SD above). PROMIS Fatigue scores in RA-BEAM reached normal levels (mean <55) by week 4 for bari and ADA. For both studies, at 24 weeks, bari was associated with clinically meaningful improvements from baseline (exceeding 0.5 SD/5 points on the T-score metric) for PROMIS Fatigue scores, and with significant improvements in PROMIS Fatigue for bari 4-mg versus placebo.
Conclusion: These results support the FACIT-F to PROMIS Fatigue crosswalk and scoring algorithm approaches, with similar results shown for the subset of 10 FACIT-F items deemed

most relevant to RA. This approach enables comparisons across studies using FACIT-F or PROMIS Fatigue item subsets, and their interpretation relative to US general population norms.

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Lifestyle and No MTX are the Strongest Predictors for Failing to Reach Remission in the First Year of Rheumatoid Arthritis: Results from the Canadian Early Arthritis Cohort (CATCH)

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Objectives: While implementation of Canadian RA Guidelines have improved outcomes in RA, nevertheless 45% of early RA participants do not achieve remission in the first year. Moreover, fewer women reached remission than men. We identified and compared predictors of persistent disease activity (LDA/MDA/HAD) in the first year of RA treatment in men and women.

Methods: Sample included adults in CATCH (Canadian Early Arthritis Cohort) from 2007-16 with active disease at baseline and ≥12m F/U. Standardized visits included clinical assessments, questionnaires, and lab tests. Logistic regression was used to identify predictors of failing to achieve remission (DAS28<2.6) by 12 months among baseline sociodemographic and RA characteristics and patient-reported outcomes.

Results: The sample included 1628 adults with 2010 or 187 ACR/EUAR criteria for RA, who were mostly female (72%) with a mean (SD) age of 55 (15), with 2 (2) comorbidities, and symptom duration of 6 (3) months. At enrollment, all had active disease (DAS28 MDA (42%); HDA (53%)), almost all most were initially treated with csDMARDS and 75% with MTX. 44% of women and 36% of men did not reach remission by 12 months. Among women, multivariable results showed obesity more than doubled the likelihood of not achieving remission; other key predictors were minority status, lower education, and higher TJC and fatigue scores at baseline (Table). In men, current smoking was associated with a 3.5 greater odds of not achieving remission in the first year; other predictors included older age, and higher pain. Not using MTX increased the likelihood of not achieving remission in women by 28% and men by 45%. Longer symptom duration and higher ESR were associated with not achieving remission in all. Factors not related to persistent disease activity included family history of RA, RF/ACPA status, erosions, SJC, HAQ and depressive symptoms at baseline.

Conclusion: In this large pan-Canadian cohort of early RA patients receiving guideline-based arthritis care, obesity in women and current smoking in men were the strongest predictors of not achieving remission in the first 12 months followed by non-use of MTX, higher baseline inflammation and longer symptom duration. Additional poor prognostic indicators in women included minority status, lower education, and higher fatigue, whereas older age and greater pain were associated with persistent disease activity in men. Smoking cessation in men and weight reduction in women, and optimizing MTX use may facilitate rapid reduction of inflammation, an essential goal of treatment in early RA.

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Could a Short 5-item PROM (RA-FQ) be a Useful Indicator of Inflammatory Disease

Activity between Patient Visits with Their Rheumatologist?

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Objectives: To assess convergent validity of the Rheumatoid Arthritis -Flare Questionnaire (RA-FQ) as an indicator of disease activity in patients with early rheumatoid arthritis (ERA).

Methods: Data were from patients with early classifiable RA (symptoms < 12months) enrolled in CATCH (Canadian early Inflammatory ArThritisCoHort) with complete information to calculate summary scores on the RA-FQ (0-50), modified RAPIDIII (0-10) and clinical disease activity index (CDAI) (0-76) at baseline, 6- and 12-months. Spearman correlations were used to assess the direction and magnitude of relationships between the RA-FQ and 1) a common clinical measure of disease activity that would necessitate a visit to the rheumatologist (CDAI) to calculate, and 2) a common patient -reported measure of disease activity used in routine practice (RAPIDIII). Median (IQR) were calculated to summarize distributions of RA-FQ scores associated with disease activity states on both the CDAI and RAPIDIII.

Results: Of 1942 patients 72% were female, mean (SD) age was 55(15) years, symptom duration 6 (3) months. Mean (SD) disease activity was moderate at baseline (CDAI 15.6 (14.6), RAPID III 3.3 (2.5)). The correlation between the RA-FQ and CDAI was high and positive (spearman rho 0.71) and the correlation between the RA-FQ and RAPIDIII was very high and positive (spearman's rho 0.91). Median (IQR) scores of the RA-FQ that were associated with CDAI and RAPIDIII remission (REM) were 2 (0, 6) for CDAI and 2 (0, 4) for RAPIDIII. Median (IQR) scores of the RA-FQ that were associated with high disease activity (HDA) were 32 (21, 39) for CDAI and 33 (27, 39) for RAPIDIII.

Conclusion: Strong positive correlations between the RA-FQ with a clinician reported outcome measure (CDAI) and a legacy patient reported measure (RAPID III) provide preliminary support for convergent validity of the RA-FQ as an indicator of disease activity. Study findings are a step forward in examining the utility of the RA-FQ as a feasible patient self-assessment tool to inform patients about their disease activity between visits with their rheumatologist. This could have broader implications for observational research, patient monitoring and self-management though further validation work is needed.

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Efficacy of Sarilumab in Patients with Rheumatoid Arthritis with and without Previous Response to Tocilizumab

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Objectives: To examine response rates of patients who switched from tocilizumab intravenous (IV) every 4 weeks (q4w) in the ASCERTAIN trial (NCT01768572) to sarilumab (200 mg subcutaneous [SC] every 2 weeks [q2w]) plus conventional synthetic disease-modifying antirheumatic drug (csDMARD) background therapy in the open-label extension study (EXTEND, NCT01146652).

Methods: In this post-hoc analysis, patients were recorded as responders or non-responders at the end of ASCERTAIN and at Weeks 12 and 24 of EXTEND according to each of 5 criteria: clinical disease activity index (CDAI) ≤2.8, CDAI ≤10.0, disease activity score (DAS)-28 CRP <2.6, DAS-28 CRP <3.2, and American College of Rheumatology (ACR) 20/50/70 response criteria.
Results: A total of 168 patients entered EXTEND from ASCERTAIN, of whom 93 had been in the tocilizumab group (last tocilizumab dose 4 mg/kg in 37 patients and 8 mg/kg in 56 patients). At Week 24 in EXTEND, after switching to sarilumab SC, response was sustained in the majority of patients who were responders on tocilizumab 4 mg/kg and 8 mg/kg at the end of ASCERTAIN: CDAI ≤10, 15/17 (88%) and 20/24 patients (83%), respectively; DAS28-CRP <3.2, 14/15 (93%) and 28/33 patients (85%); ACR 50, 14/16 (88%) and 19/24 patients (79%); ACR 70, 9/10 (90%) and 9/12 patients (75%). Of 16 and 29 patients who were non-responders for CDAI ≤10 on tocilizumab 4 and 8 mg/kg, respectively, at the end of ASCERTAIN, 7 (44%) and 13 (45%) achieved response after 24 weeks' sarilumab treatment in EXTEND. Of 17 and 20 patients who were non-responders for DAS28-CRP <3.2 on tocilizumab 4 and 8 mg/kg, respectively, at the end of ASCERTAIN, 10 (59%) and 7 (35%) achieved response after 24 weeks' sarilumab treatment in EXTEND. Switching from tocilizumab 4 mg/kg or 8 mg/kg achieved similar response rates.
Conclusion: These results suggest that clinical improvements can be maintained when switching from IV administered tocilizumab to SC administered sarilumab. In addition, tocilizumab IV non-responders switching to SC sarilumab may achieve additional improvements in RA signs and symptoms.

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Reversible Decreases in Absolute Neutrophil Count (ANC) in Rheumatoid Arthritis (RA) Patients (pts) on Sarilumab: Comparison of Dose Delay and Dose Decrease vs Continued Treatment

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Objectives: The effects of a dose decrease/delay/no change were evaluated in RA patients who experienced decreased ANC (<1000/mm3) while receiving sarilumab during randomized trials (RCTs: MONARCH [NCT02332590], MOBILITY [NCT01061736] and TARGET [NCT01709578]) and during open-label extension (OLE: EXTEND [NCT01146652]).
Methods: In RCTs, patients had baseline neutrophil levels ≥2000/mm3. In RCTs and EXTEND, patients with ANC <500/mm3 (grade 4 [G4] neutropenia) or ≥500 to <1000/mm3 (G3 neutropenia) and signs of infection were permanently discontinued. Patients with G3 neutropenia (no signs of infection) temporarily (or permanently at investigator discretion) discontinued; patients were retested ≤48 hrs after identifying decreased ANC and before next scheduled dose and could resume if ANC ≥1000/mm3. In RCTs, patients restarted sarilumab at their randomized dose (200 mg q2w in MONARCH; 150 or 200 mg q2w in MOBILITY and TARGET). In OLE, patients received sarilumab 200 mg q2w and restarted at 150 mg q2w (per protocol) or 200 mg q2w (investigator discretion). In OLE, patients requiring dose decrease to 150 mg q2w received that dose for the remainder of the treatment period. ANC normalization was defined as return to patient's baseline or within normal ranges.
Results: Of the 8–11% of patients who experienced ANC <1000/mm3, 81/105 (RCTs) and

132/147 (OLE) were able to continue or reinitiate sarilumab; the majority of patients who experienced ANC <1000/mm3 displayed normalized ANC levels and continued treatment when ANC ≥1000/mm3 (25/38 RCTs; 29/31 OLE). The majority of patients who dose delayed (27/43 RCTs; 66/82 OLE) or dose decreased (51/62, OLE) before their ANC normalized were able to resume treatment. No meaningful differences in DAS28-CRP or CDAI mean change from baseline were observed between patients with ANC <1000/mm3 who reinitiated sarilumab and those without neutropenia who continued without interruption. Among patients with ANC <1000/mm3 who continued treatment, no meaningful differences in CDAI or DAS28-CRP mean change from baseline were observed in RCT patients with/without dose delay or in OLE patients with no action/dose delay/dose reduction (some numerical differences observed). Patients who were neutropenic did not have an increased risk of infections or serious infections (SIEs): RCT, infections/SIEs 35.9%/2.4% (non-neutropenia) vs 35.8%/1.2% (neutropenia); OLE, 57.8%/8.5% vs 57.6%/8.3%.

Conclusion: The majority of patients who discontinued treatment until ANC normalized were able to reinitiate at their randomized dose, or OLE dose (200 mg q2w), or were able to resume at the lower dose (150 mg q2w; OLE), with no clinically meaningful impact on long-term efficacy or safety.

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Comparative Analysis of Outcomes Among Patients with Rheumatoid Arthritis Initiating Tofacitinib in Combination with Oral Methotrexate (MTX) who Discontinue, Interrupt, or Persist with MTX

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Objectives: Objectives: Tofacitinib is an oral Janus kinase inhibitor for the treatment of rheumatoid arthritis (RA), in combination with MTX or other non-biologic disease-modifying antirheumatic drugs (nbDMARDs), or as monotherapy. Two pooled, open-label long-term extension studies previously showed that patients discontinuing concomitant MTX or glucocorticoids could maintain favorable treatment response. This analysis of real-world data assessed characteristics of patients who discontinued MTX after tofacitinib treatment.

Methods: Methods: This retrospective cohort study included patients aged ≥18 years in the Truven MarketScan™ US Commercial and Medicare Supplemental claims database with ≥2 tofacitinib claims (first = index) with <60-day gap between 1/1/2014–1/31/2017, ≥2 oral MTX claims (one ≤90 days post-index) with <60-day gap, and an RA diagnosis on or within 12 months pre-index. Patients were continuously enrolled for ≥12 months pre-/post-index with no prior claim for tofacitinib 12 months pre-index. Patients were assigned to mutually exclusive cohorts for analysis by 12-month post-index MTX persistence: “persistent” (MTX-P; ≤60-day gap), “discontinued” (MTX-D; >60-day gap) and “interrupted” (MTX-I; >60-day gap with ≥1 subsequent MTX claim 12 months post-index). Outcomes at 12 months post-index were tofacitinib persistence (<60-day gap); adherence (proportion of days covered); effectiveness as measured by a composite measure integrating adherence, tofacitinib dose, and RA treatment changes; and RA-related costs. Two sample tests (t-test, chi-squared) were applied separately to MTX-P vs combined MTX-D and MTX-I, and pair-wise among the 3 cohorts, with no

adjustment for multiple comparisons or imbalances in baseline covariates.
Results: Results: 479 patients met inclusion criteria (MTX-P: 337 [70%]; MTX-D: 94 [20%]; MTX-I: 48 [10%]). Due to the small sample size in the MTX-I group, this analysis focused on MTX-P and MTX-D. Demographic and baseline clinical characteristics were similar between MTX-P and MTX-D, with the exception that MTX-D had higher mean all-cause out-of-pocket costs vs MTX-P ($3,297 vs $2,471; $p<0.01$). Tofacitinib persistence, adherence, and effectiveness over 12 months were similar between MTX-D and MTX-P. RA-related total and pharmacy costs were lower in MTX-D vs MTX-P ($35,769 vs $42,403; $p<0.001$ and $31,421 vs $35,143; $p<0.01$, respectively).
Conclusion: Conclusion: Patients who initiate tofacitinib with oral MTX can discontinue MTX with similar persistence, adherence, and effectiveness, and lower RA-related total/pharmacy costs 12-months post-index vs MTX-persistent patients. Larger sample sizes are needed to confirm the robustness of these findings. The use of claims data limits our interpretation of these analyses due to incomplete information available on the decision to withdraw MTX, which may reflect patient choice without physician knowledge.

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Features of Disease Severity Associated with Patient Satisfaction with Biologic Treatment: Results from the Abatacept Best Care Real-World Study

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Objectives: Patients satisfaction with their treatment is important for adherence to medications. The aim of this analysis was to explore the relationship between patient satisfaction with treatment and features of activity as well as to identify thresholds of disease severity optimally associated with satisfaction of RA patients treated in routine clinical care.
Methods: Abatacept Best Care (ABC) is a prospective, multicenter, observational study of patients with RA starting subcutaneous abatacept. Patient expectations in regard to RA activity, pain, function, and fatigue were assessed at baseline using a VAS mm scale (0=no expectation, 100=highest expectation), and patient satisfaction with treatment for each aspect during treatment was assessed in a similar fashion. The correlation of patient satisfaction at 6 and 12 months and TJC28, SJC28, physician global (MDGA), patient global (PtGA), DAS28, CDAI, RAPID3, HAQ, pain, and fatigue (and changes from baseline in these variables) was assessed with the Pearson's correlation coefficient (r). ROC analysis was used to identify thresholds of CDAI, pain, HAQ, and fatigue optimally associated with patient satisfaction (>50mm).
Results: 275 patients (74.8% females) were included with a mean (SD) age of 59.7 (11.7) years and disease duration of 7.4 (8.7) years. At baseline, mean (SD) parameters were: CDAI (30.0 [10.7]), pain (64.6 [23.4]), HAQ (1.5 [0.6]), and fatigue (63.3 [23.4]); patient expectations were: RA activity (70.3 [23.9]), pain (72.1 [24.4]), function (71.1 [23.8]), and fatigue (69.1 [25.7]). At 6 months, weak-to-moderate negative correlations ($0.2<r<0.6$) were observed between patient satisfaction with treatment and all parameters studied, the strongest being with MDGA, DAS28, CDAI, PtGA, and pain. Similar results were observed at 12 months, however patient satisfaction with treatment in terms of function was only correlated (moderately) with DAS28. Regarding the correlation of patient satisfaction with changes from baseline in disease parameters, again, weak-to-moderate negative correlations were observed which were lower at 12 months compared to 6

months. No correlation between patients with high expectations of treatment outcome and satisfaction was observed at any time. In ROC analysis, optimal thresholds of disease severity were identified for all aspects of patient satisfaction which showed statistically significant ($p<0.001$) fair precision (ROC≈0.7).
Conclusion: Weak-to-moderate correlation was observed between patient satisfaction with treatment and various outcomes. Specific thresholds corresponding to moderate disease activity, moderate and mild pain at 6 and 12 months, respectively, and mild functional disability and fatigue were identified which could be targeted in routine clinical care.

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Relationship Between Specific Joint Involvement and Work/Activity Impairment in Rheumatoid Arthritis Patients: Implications for Clinical Practice

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Objectives: Swelling or tenderness of specific joints may differentially impact the ability of rheumatoid arthritis (RA) patients to perform daily activities and work. The aim of this analysis was to explore the relationship between specific joint involvement and work or activity impairment due to RA.
Methods: The Abatacept Best Care Study (ABC) is a prospective, multicenter, observational study evaluating the usefulness and adherence to a T2T approach vs. standard of care in real-life management of patients with active RA starting subcutaneous (SC) abatacept 125 mg once weekly. Interim data were used. Based on joint involvement evaluated with the 28-joint count, five groups were created: shoulder(s), elbow(s), wrist(s), hand(s), and knee(s). The impact of specific joints on % activity impairment (AI) and overall work impairment (WI) due to health at baseline as well as their change from baseline to 12 months, as measured with the Work Productivity and Activity Impairment (WPAI) questionnaire were assessed with general linear regression adjusting for age, gender, and total swollen and tender joint counts.
Results: 255 patients (74.8% females) were included with a mean (SD) age of 59.5 (11.6) years, 7.9 (4.7) swollen joints, and 9.7 (6.2) tender joints at baseline. Of these, 86 (33.7%) had information on WI at BL. At 12 months, 182 (71.4) and 58 (22.7%) had information on AI and WI, respectively. At baseline, increased number of tender, but not swollen, joints was associated with significantly increased AI (increase by 1.3 percentile units for each additional tender joint, $p<0.001$) and WI (increase by 1.9 percentile units for each additional tender joint, $p=0.002$). For specific joints, swollen knee(s), and tender shoulder(s) and elbow(s) were associated with increased, but not statistically significant, AI. Swollen shoulder(s) and elbow(s), and tender shoulder(s) and elbow(s), were associated with numerically, but not statistically, higher WI. For hand(s), nearly all patients had swollen and tender MCPs and/or PIPs so a baseline association was not performed. At 12 months, swollen/tender wrist(s) ($p=0.015/p=0.003$) and hands ($p<0.001/p<0.001$) were associated with significantly lower improvement from baseline in AI. Similarly, swollen/tender wrist(s) ($p=0.002/p<0.001$) and hands ($p<0.001/p<0.001$), as well as tender elbows ($p=0.032$) were associated with significantly lower improvement in WI.
Conclusion: Swelling and tenderness at specific joints has differential impact on the ability to work and perform daily activities. Residual involvement of upper limb joints after 12 months of treatment was associated with persistent activity and work impairment.

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Prevalence and Characteristics of Metabolic Syndrome in Men and Women With Early Rheumatoid Arthritis

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Objectives: Metabolic syndrome (MetS) increases the risk of cardiovascular disease (CVD) and is highly prevalent in established RA but data on the prevalence in early RA (ERA) are conflicting. Furthermore, there are limited data on potential differential expression of MetS by sex in RA. Our aim was to estimate the prevalence and characteristics of MetS among men and women with ERA.

Methods: The Canadian Early Arthritis Cohort (CATCH) is a multicenter observational study of ERA patients. Participants (n=1536) with confirmed ERA (symptoms <12 months) and complete baseline data for MetS components were included to estimate the prevalence of MetS according to the 1999 World Health Organization definition, requiring >2 of 5 components (BMI >/= 30, or BP >/= 140/90, or HDL level </=1.0 mmol/L, or triglyceride level >/= 2.0 mmol/L, or random glucose >/= 6.1 mmol/L). Sex-stratified logistic regression was used to identify clinical, laboratory and treatment variables associated with MetS.

Results: The study sample was 71% female, mean age was 54 (SD 15) years, mean DAS28-ESR at cohort entry was high 5.1(SD 1.4) and the majority was treated with csDMARDs (87%), at or before, the baseline visit. At baseline, 462 (30%) met criteria for MetS; prevalence was higher in men 180 (41%) than women 282 (26%); $p<0.0001$. Age and sex stratified prevalence of MetS is shown in the Figure. The most frequent MetS components in men were hypertension (60%), glucose intolerance (39%), obesity (BMI $\geq$ 30, 36%) and low HDL (36%); and in women were hypertension (47%), obesity (30%) and glucose intolerance (23%). These components were all significantly higher in men than women ($p<0.05$). In univariable analysis, MetS was significantly associated with higher mean uric acid, creatinine and alanine aminotransferase levels in women; and higher mean creatinine in men. These associations were no longer significant after adjustment in multivariable logistic regression

Conclusion: The prevalence and characteristics of MetS were different in male and female ERA patients. Further investigation is needed to determine if different strategies for CVD risk management in men and women with ERA and MetS is required.

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Clinical Swelling in the Feet May Not Accurately Represent Active Inflammation in Patients with Rheumatoid Arthritis

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Objectives: Monitoring of active disease in rheumatoid arthritis (RA) is an ongoing challenge

for physicians. It has been reported that clinical examination of the metatarsophalangeal joints (MTPJs) of the feet is more difficult and less reliable than in the hands. Power Doppler (PD) on ultrasound (US) detects active inflammation in the form of hypervascularization. To determine the accuracy of clinical examination at detecting active inflammation in patients with RA, we compared the presence of swelling and tenderness in the hands and feet of patients with PD findings.

Methods: The charts of patients with RA were retrospectively reviewed from one physician's practice. Eligible patients were age ≥18 years with RA (ACR criteria), no confounding arthritides, and had a clinical examination (swollen & tender joint counts) on the same day as an US (Esaote MyLab70) of the hands and/or feet. Clinical exam and US results were collected for metacarpophalangeal joints (MCPJs) 2-3, proximal interphalangeal joints (PIPJs) 2-3, and MTPJs 2-5. US images were semi-quantitatively graded for power Doppler (PD) (0-3), with grade≥1 defined as pathologic. The Kappa statistic representing the agreement between clinical examination and US findings was determined. Sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) were calculated using US findings as the reference standard.

Results: Charts from 83 patients were examined [n=72 female; mean (SD) age=60.4 (11.8) years; mean (SD) disease duration =93.4 (100.3) months]. A total of 507 MCPJs and PIPJs, and 320 MTPJs were analyzed. In the MCP-PIPJs, PD was most prevalent in joints that were clinically swollen (59%), regardless of whether they were also tender. However, too few MTPJs had PD signals for us to draw definitive conclusions. Swelling and tenderness in the MCP-PIPJs fairly and poorly agreed with PD in the same joints, respectively ($k=0.30$ and $k=0.19$, $p<0.05$), but no significant agreement was seen in the MTPJs. With PD as reference, clinical examination in the MCP-PIPJs had poor sensitivity (51-54%) and PPV (30-39%), moderate specificity (73-80%) and high NPV (86-88%). Swelling in the MTPJs had very poor sensitivity (21%) and PPV (7%) but high specificity (88%) and NPV (96%).

Conclusion: Swelling is only detected in approximately half of MTPJs with positive power Doppler. However, our findings suggest that clinical examination is especially poor at assessing inflammation in the feet. This suggests that US should be used to improve the disease monitoring in the MTPJs.

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Communicating Cardiovascular Risk in Rheumatoid Arthritis: A Quality Improvement Project

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Objectives: Patients with rheumatoid arthritis (RA) have an almost 50% increased risk of cardiovascular disease (CVD) compared to the general population. Nevertheless, studies show that RA patients are less likely to be screened and managed for CVD than non-RA patients. International guidelines state that rheumatologists should communicate the increased risk of CVD to primary care providers (PCPs) at least once per year. Baseline chart review at Women's College Hospital Rheumatology Division showed that only 13% of patient charts documented the increased CVD risk associated with RA within the previous 12 months. Since RA patients are usually seen 3-4 times per year, our aim was to increase the percentage of clinic notes that communicated the increased CVD risk to 30% by July 31, 2018.

Methods: To increase the communication of CVD risk, we designed a 'smartphrase' – an easy-

to-use template that could be inserted by clinicians into clinic notes – that contained information for the PCP. After obtaining feedback from PCPs, rheumatologists and cardiologists, we implemented the smartphrase and used a graduated reminder system to increase usage. Our outcome measure was the percentage of clinic notes for eligible RA patients that communicated the increased CVD risk to PCPs. Our process measure was the inclusion of our "RhuCardio Smartphrase" at the end of clinic notes, and our balance measure was staff satisfaction. Our outcome and process measures were analyzed using statistical process control charts and plotted on a weekly basis.
Results: After implementation of our smartphrase with graduated reminders, the percentage of clinic notes communicating increased CVD risk increased to a median of 35% with evidence of special cause variation. The average length of clinic notes was not significantly different when the smartphrase was included.
Conclusion: Implementation of a smartphrase into clinic notes increased the communication of CVD risk in RA patients. Next steps include surveying PCPs to assess the impact of our smartphrase and adjusting content accordingly.

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Patient Engagement: A Pilot Study of Pre-visit Planning in a Rheumatology Clinic

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Objectives: The lack of patient engagement in and preparation for health visits is a common local and global problem that requires investigation of innovative approaches. Ensuring patients are engaged and able to plan visits prior to appointments may lead to more involved patients, improved care and collaborative decision-making. This pilot project was developed as a quasi-experimental design to answer the primary question: What is the impact of a pre-visit planning intervention for patients with arthritis on their satisfaction with clinic visits? The purpose of this quality improvement pilot project was to determine if a patient intervention could improve patient satisfaction at follow-up appointments at the University of Alberta Rheumatology Clinic.
Methods: The interventions included: mnemonic tool - memory device; standardized appointment scripts; and updated mailed appointment information. The validated Leeds Satisfaction Survey (LSS) assessed patient satisfaction. In this pilot, due to time constraints, only the pre-intervention LSS was completed. Thirty patients completed the survey, with 16/30 (53.3%) diagnosed with vasculitis and 8/30 (26.7%) with rheumatoid arthritis. The setting for this study was the University of Alberta Rheumatology Out-patient clinic during the summer of 2018, and it included only patients from a single rheumatologist at this site.
Results: Overall, there were high levels of satisfaction (4.2/5 (standard deviation [SD]=0.4), however lower satisfaction related to access and continuity of care (3.57/5 [SD]==0.66). Although not the focus of the investigation, patients frequently commented on inability to make follow-up appointments, and contact administrative staff, possibly the reason for lower satisfaction scores.
Conclusion: Overall, this study determined information about an unexpected area of patient satisfaction requiring further exploration. Moving forward, this research has direct implications on patients and to care providers not only in Rheumatology, but all outpatient clinical settings. The strengths of this preliminary study have been to identify concerns from patients and build on ways to improve and effectively partner quality care. By using a patient-centered approach, patient concerns may be more effectively addressed to help promote their care and increase

patient satisfaction.

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Passports for Lupus Pregnancies: Systematic and Narrative Literature Reviews

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Objectives: SLE pregnancies are associated with substantial maternal and fetal morbidity. Optimal SLE pregnancy outcomes often require the involvement of many specialists in the counseling and management of affected women prior to and during pregnancy. In a prior focus group study, we identified a lack of communication between multi-disciplinary team members as a source of concern and anxiety for women with SLE contemplating or undergoing a pregnancy. A 'health passport' (a handheld paper or electronic health record) may be a useful tool to improve pregnancy management in specific populations. Our purpose was to perform a systematic literature review of pregnancy passports specifically designed for SLE women. We also performed a narrative review of passports developed for other high-risk or vulnerable pregnancies, as well as pregnant women in non-lupus settings. The goal of both reviews was to inform the creation of a Lupus Pregnancy Passport that could be tailored to the Canadian context.

Methods: Our systematic review was conducted through 3 databases: Embase, PubMed, and Scopus. Articles from 1990 to 2018 were retrieved, and articles in English, French, Spanish, and Italian were included. The search strategy included 3 initial keywords, "SLE", "pregnant" and "passport", to which were added up Medical Subject Headings and free text terms. Relevant data related to the content of the passport, including items monitored, and how this was used for management or counseling of pregnancies, were extracted. For our narrative review, we used the same 3 databases to retrieve published peer-reviewed articles on existing pregnancy passports for women from the general population, passports regarding other chronic diseases or vulnerable populations, containing elements that could guide the creation of a Lupus Pregnancy Passport.

Results: For the systematic review, 876 articles were initially identified through database searching and 50 more through hand searching. After removal of duplicates and irrelevant articles, 289 remained for full-text screening. We identified only one passport specifically designed for the care of lupus, but not specifically addressing pregnancy. Regarding the narrative review, relevant articles on 14 pregnancy passports were included. These pertained to pregnancy management in diabetes, indigenous women, female military members, and women from the general population (in Canada and Europe).

Conclusion: We did not identify any existing pregnancy passports specifically for SLE. However, we identified one health passport for non-pregnant lupus patients and several for pregnant women in non-lupus populations. This suggests that a Lupus Pregnancy Passport may indeed fill an existing gap.

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An Interesting Case of Lupus Aortitis

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Case Report: Aortitis can be a manifestation of several rheumatologic disorders, including giant cell arteritis, Takayasu arteritis, IgG4-related disease, Cogan's syndrome, and spondyloarthropathy. We report a case of suspected lupus aortitis and discuss diagnostic and treatment challenges.

A 42-year-old male was referred for polyarthritis, with pain and swelling of the knees, ankles,

wrists, MCPs and PIPs. His review of systems was significant for Raynaud's phenomenon, sicca symptoms, and photosensitive rash. His serology was significant for a strongly positive ANA, with a homogenous pattern and titre of 1:640, and elevated inflammatory markers; the remainder of the autoimmune workup demonstrated negative ENA, normal complements, negative dsDNA, and negative RF/anti-CCP. Over the following three years, he was trialed on hydroxychloroquine and methotrexate, with partial improvement of arthritis but intolerance to each. He was intolerant to prednisone due to severe worsening of depression and suicidal thoughts.

Three years after presentation, he was admitted to hospital with severe pleuritic, positional chest pain, with diffuse ST elevations on ECG. Coronary catheterization showed no significant arterial disease, with pericardial effusion and dilated right ventricle. A diagnosis of pericarditis was made. His symptoms resolved with colchicine and high dose ASA. Over the following two years, he experienced approximately 10 recurrent episodes of pericarditis believed to be secondary to connective tissue disease, which were eventually controlled on maintenance colchicine. Azathioprine was trialled for pericarditis prevention, but the patient experienced toxicity. Collectively, a diagnosis of SLE was made based on polyarthritis, pericarditis, Raynaud's phenomenon, photosensitive rash, and positive ANA.

Subsequently, he presented to hospital with severe chest pain out of keeping with his previous pericarditis. CT thorax was performed to rule out aortic dissection, demonstrating inflammatory changes within the distal ascending aorta with soft tissue stranding in the mediastinal fat, strongly suggestive of aortitis. Trace pericardial effusion was also present. Immunology revealed elevated inflammatory markers, negative dsDNA, normal complements, negative ANCA, and normal IgG4 levels. High dose prednisone and cyclophosphamide were initiated with completed resolution of symptomatology.

Unfortunately, he has since presented with worsening dyspnea on exertion. Antiphospholipid antibodies were drawn, with positive lupus anticoagulant and anti-cardiolipin IgG. VQ scan was performed showing bilateral PE, introducing the possibility of APLA contributing to aortitis. This case reinforces the challenges of diagnosing SLE, and presents a unique presentation of probable lupus aortitis. Additionally, it highlights the importance of remaining open-minded toward a definitive diagnosis and avoiding anchoring and confirmation bias.

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Lupus Patients do not Improve Health Self-management Abilities after a Short Exposure to MyLupusGuide

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Newmarket); Davy Eng (Centre de recherche du CHU de Québec - Université Laval, Quebec City); Deborah Da Costa (McGill University Health Center, Montreal)
Objectives: To test if access to MyLupusGuide improved health self-management ability of persons with lupus.
Methods: Population and recruitment strategy. Ten CaNIOS centers were randomized to either immediate access to MyLupusGuide (NOW) or usual care (LATER). Partial cross-over occurred at three months and a final assessment at six months. Data collected. Demographic, socioeconomic, and computer use data were collected at baseline. The 13-item Patient Activation Measure (PAM) was used to assess patient`s healthcare engagement. Higher PAM score relates to greater self-management. Additional self-reported measures were obtained at baseline, 3 and 6 months. Statistical analyses. Linear mixed models were used to test the association between PAM and other variables, as well as our three hypotheses: PAM score will be higher 1) in the NOW group at three months, 2) three months after exposure to MyLupusGuide in the pooled sample, and 3) in a sustained manner at 6 months in the NOW group.
Results: A total of 541 of 1920 (28%) persons responded (265 in the NOW and 276 in the LATER group), 399 at 3-month and 355 at the 6-month visits. At baseline, mean (sd) age = 50.1 (14.2) years, female = 93%, Caucasian = 74%, disease duration = 16.9 (11.9) years and PAM score = 61.1 (13.5). 36% scored low on the PAM demonstrating poor self-management skills. Predictors of a low PAM score at baseline in the multivariate analysis were being single, low lupus activity, low physical health, emotional coping, low self-efficacy, and lack of clarity on IPC. Distractive and instrumental coping were associated with higher PAM scores. Mean (se) PAM scores (NOW vs LATER) at baseline and three months were comparable 61.3 (1.2) vs 61.4 (1.2) and 62.3 (1.3) vs 62.0 (1.2). No further improvement was noted at 6 months in the NOW group. The pooled pre-post PAM score change in all patients did not improve significantly (p=0.16). This intention-to-treat analysis did not show that access to MyLupusGuide improved PAM scores at 3 and 6 months. However, 45% of patients never accessed MyLupusGuide so that only 103 patients in each group accessed the website and completed all surveys. Using them in a per protocol analysis, similar results were obtained.
Conclusion: More than a third of persons with lupus have low skills to self-manage their illness. Modifiable factors associated with patient activation have been described. Access to MyLupusGuide alone did not improve patient activation at 3 and 6 months.

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Prevalence of Cognitive Impairment in a Lupus Cohort as Assessed by a Comprehensive Neuropsychological Battery

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Objectives: Systemic Lupus Erythematosus (SLE) can lead to several neuropsychiatric

manifestations including cognitive impairment (CI). A recent meta-analysis reported the prevalence of CI at 38% (95% CI: 33-43%), with a range of 15-79%. The aim of this study was to use a comprehensive battery (CB) of neuropsychological tests to determine the prevalence of CI in a lupus cohort.

Methods: 245 consecutive consenting SLE patients aged 18-65 years, attending a single center were enrolled (Jul 2016 – Oct 2018). A CB evaluating six cognitive domains was administered to each patient including simple attention and speed of processing, visual spatial construction, verbal fluency, learning and memory, manual motor speed and dexterity, and executive function. Patient scores were compared to a normative sample of age- and gender matched healthy controls to obtain z-scores. CI was operationalized on the CB as either a z-score of ≤ -1.5 on ≥2 domains or a z-score of ≤ -2.0 on ≥2 domains (as compared to controls). Descriptive statistics were used.

Results: 89.4% of the study cohort were female and the average patient age and SLE disease duration at enrolment were 41.9 ± 12.2 and 14.3 ± 10.3 years, respectively. The prevalence of CI was 46.1% (z-score of ≤ -1.5 on ≥2 domains) and 27.7% (z-score of ≤ -2.0 on ≥2 domains). The most affected domains were learning and memory, and visual spatial construction. Prevalence of impairment in learning and memory was 51.8% (n=127, z-score of ≤ -1.5 on ≥2 domains) and 33.1% (n=81, z-score of ≤ -2.0 on ≥2 domains). Prevalence of impairment in visual spatial construction was 33.7% (n=82, z-score of ≤ -1.5 on ≥2 domains) and 23.9% (n=58, z-score of ≤ -2.0 on ≥2 domains). The least affected domains were verbal fluency, and executive function. Prevalence of impairment in verbal fluency was 3.3% (z-score of ≤ -1.5 on ≥2 domains) to 8.6% (z-score of ≤ -2.0 on ≥2 domains). Prevalence of executive function impairment varied between 0.4% (z-score of ≤ -2.0 on ≥2 domains) to 6% (z-score of ≤ -1.5 on ≥2 domains).

Conclusion: The prevalence of CI in this SLE cohort varied with different definitions of CI (27.7%-46.1 % [z-score of ≤ -2.0 on ≥2 domains, z-score of ≤ -1.5 on ≥2 domains]). There is an unmet need to standardize the metrics and the definitions for CI in assessment of SLE patients. CI was evident across all cognitive domains, but most prevalent in learning and memory.

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Assessing Perceptions, Barriers and Preferences to Exercise in Patients with Systemic Lupus Erythematosus

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Objectives: Cardiovascular disease is one of the most significant causes of mortality in patients with Systemic Lupus Erythematosus (SLE). Abnormally high levels of fatigue are reported in >80% of patients with SLE and have significant impact on quality of life. Physical activity is associated with improvements in both cardiovascular disease and fatigue, however, exercise trials often involve activities that may not be feasible or sustainable outside of this setting. Our objective is to gain an understanding of perceptions, attitudes, barriers and preferences to exercise in patients with SLE.

Methods: All patients ≥18 years old with SLE seen in the Lupus Clinic at McMaster University Medical Centre were invited to complete the questionnaire during their routine clinic appointment. The questionnaire took no more than 10 minutes to complete and contained four sections: 1) patient information and lifestyle, 2) perceptions and attitudes towards exercise, 3)

perceived barriers to participating in exercise, and 4) preferences to performing exercise.
Results: Respondents included 21 females and 4 males (mean (SD) age 39.44 (12.5) years), of whom 16 worked full-time, 4 worked part-time, and 5 were not employed. Almost half (12/25, 48%) reported caring for children/family. After performing vigorous exercise compared to not exercising, 60% of patients reported feeling better, 24% reported not knowing how they would feel or feeling the same, and 16% reported feeling worse. After performing moderate exercise, 76% of patients reported feeling better, 12% reported feeling the same, and 12% reported feeling worse. Most patients (72%) reported having barriers to exercise; these included fatigue (n=18, 72%), lack of time (n=9, 36%), lack of motivation (n=7, 28%) and weather conditions (n=7, 28%). Interestingly, 84% of respondents were willing to change their routine to include more exercise. When asked what exercise they preferred to do, the most popular response was walking (n=20, 80%) followed by strengthening exercises (n=17, 68%).
Conclusion: Most of our patients were female and of child rearing/raising years who worked full-time. The majority of patients believed that moderate exercise is beneficial, while many patients believed vigorous activity to be detrimental. Fatigue was the most significant barrier. Most patients are willing to change their routine to incorporate more physical activity. There is a need to create an exercise regime that considers barriers and is suitable to patients' preferences.

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Intralesional Sodium Thiosulfate for the Treatment of Calcinosis Cutis: A Case Report and Review of the Literature

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Case Report: (1) To describe a patient with calcinosis cutis secondary to limited systemic sclerosis (lcSSc), whose disease improved with intralesional sodium thiosulfate (STS) injections; (2) To summarize the literature on the use of intralesional STS for the treatment of calcinosis cutis.

A 54-year-old Caucasian woman was seen at the St. Paul's Hospital combined Dermatology-Rheumatology (DART) Clinic for calcinosis cutis secondary to lcSSc. She had a long-standing diagnosis of lcSSc with diffuse calcinosis of her legs. In February 2016, she developed a skin ulceration in the right pretibial region. Calcium was visible at the base and palpable around the periphery. She was treated initially with topical 25% sodium thiosulfate cream with little benefit. Starting in October 2017, we performed intralesional injections of 1 to 2 mL of sodium thiosulfate 150mg/mL into the base and border of her right pretibial ulceration, as well as to a calcific focus of imminent tender ulceration at the 4 o'clock position outside the ulcer. These injections were performed weekly 4 times, then monthly 3 times, then every 2 months 3 times for a total of 10 injections. The patient was premedicated with lorazepam and a cold pack was used for 20-30 minutes prior to injection. Injectable local anesthetic was rarely used. The patient continued to see wound care for dressing changes. Compression was re-started after the 9th injection.

After 7 injections, the ulcer decreased from 2cm x 1.5cm in size to 1.8cm x 0.5cm and was more shallow. The tender focus of imminent ulceration at 4 o'clock healed completely. The patient perceived less overall discomfort in between injections and there was less reactive erythema around the ulceration. The injections were well tolerated with no complications, except for pain at the injection site lasting only the duration of the procedure.

Our case report adds to the literature suggesting possible efficacy of intralesional STS in the treatment of calcinosis cutis. Calcinosis cutis is a common complication in lcSSc with no

consistently proven treatment. It is painful and can be complicated by ulceration and infection. STS is a calcium-chelating agent that is used to treat calciphylaxis in patients with renal disease, and there are case reports describing the efficacy of intralesional STS in the treatment of calcinosis cutis in lcSSc patients. Future studies, including randomized controlled trials exploring the ideal doses and treatment intervals, are needed.

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Scleroderma and Pregnancy: Worse Pulmonary Outcomes Following Pregnancy in Patients from the CSRG Registry

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Objectives: There is limited guidance for women with scleroderma in making decisions about pregnancy and informing them about their disease post-partum. Peripartum maternal and fetal complications have been reported, yet little is known about disease activity after pregnancy. We explored the trajectory of disease activity in women who experienced a pregnancy after scleroderma diagnosis.

Methods: We identified women in the Canadian Scleroderma Research Group (CSRG) database who were nulliparous (NP) or experienced one or more pregnancy after their diagnosis of scleroderma (PADS). Patients with pre-pregnancy cardiac, lung or renal disease were excluded. At baseline and over 8 years, basilar crackles on physical exam, force vital capacity (FVC), diffusing capacity of the lungs for carbon monoxide (DLCO), antibody-status and physician global assessment of damage were determined. Mean values or frequencies were calculated for each variable over time in both groups.

Results: At entry into CSRG there were 153 women in the NP group and 45 in the PADS group. Mean (SD) age at scleroderma diagnosis was 38.7 (14.2) years for NP and 22.6 (6.8) years for PADS. Prevalence of anti-topoisomerase positivity was 18.3% in NP and 12.5% in PADS. After 6 years, n=48 in NP and n=21 in PADS decreased to 18 and 9 patients after 9 years, respectively. The proportion (%) of women in each group with bibasilar lung crackles on physical exam at baseline was 16.3 NP and 24.4 PADS, at 6 years NP 12.9 and PADS 25, at 9 years NP 45.5 and PADS 60. The mean (SD) percent predicted FVC at baseline was NP 91.2 (17.4) and PADS 92.3 (17.1), at 6 years NP 94.6 (23) and PADS 87.5 (19.0), at 9 years NP 89.7 (26.5) and PADS 84.3 (23.5). The mean DLCO at baseline was NP 75.3 (21.5) and PADS 72.4 (18.0), at 6 years NP 82 (25.9) and PADS 76.8 (20.5), at 9 years NP 72.6 (18.7) and PADS 68.8 (20.6). The mean physician global assessment of damage at baseline was NP 2.8 and PADS 3.2, at 6 years NP 3.2 and PADS 3.5, at 9 years NP 4.1 and PADS 5.

Conclusion: Women with one or more pregnancies after scleroderma diagnosis may have worse

markers of lung disease over 9 years compared to nulliparous women. Limitations include the high rate of attrition and baseline data representing time of entry into CSRG, not time of diagnosis. Future steps include accessing individual patient data and comparing groups with covariates.

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Botulinum Toxin in the Management of Raynaud's Phenomenon

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Objectives: The objectives of this study were to evaluate the effectiveness and safety of botulinum toxin injection in primary and systemic sclerosis (SSc) associated Raynaud's phenomenon.

Methods: Medline, Embase, Cochrane Central Register of Controlled Trials, ClinicalTrials.gov and CINAHL databases were searched to identify eligible studies. Studies reporting use of botulinum toxin, effectiveness measures and safety outcomes were included.

Results: 421 patients with Raynaud's were identified of which 202 (48%) had SSc. Botulinum toxin A doses ranged from 10-200 units, administered with similar frequency to the palm (n=272) and digits (n=253). The mean duration of benefit was 6.28 months (range: 1 month to 8.6 years). The most common adverse event was intrinsic muscle weakness (32 total events, frequency of 7.6%), and pain in 2 subjects. Only a single subject experienced persistent muscle weakness and atrophy. A single death was reported 3 days after botulinum toxin use but was not attributed to the treatment. Outcome measures included the Raynaud's Condition Score, QuickDASH, MCSS, LDI, patient acceptable symptom state, and duration of benefit.

Conclusion: The evidence for botulinum toxin in the treatment of primary and SSc-associated Raynaud's phenomenon is promising. Consistency across patient populations, treatment options (botulinum serotype, dose, injection site) and outcome measures will be essential for further research.

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Use of the Nominal Group Technique to Identify Barriers and Facilitators to Physical Activity for People with Scleroderma

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Objectives: Physical activity is often encouraged for patients with scleroderma (systemic sclerosis, SSc). However, the complex and heterogenous symptom presentation of SSc results in many important barriers that impede engagement in regular physical activity. Our objective was to identify a core list of barriers and facilitators to physical activity participation experienced by SSc patients to inform the development of an online program to support engagement in physical

activity.
Methods: We conducted a series of 60-90 minute sessions using the nominal group technique with 3-8 SSc participants per group at national patient conferences in Canada and the USA, and an international patient conference in France. Participants first identified a personal list of key barriers to physical activity participation and then shared one item from their list in a round-robin format until all items from all participants' lists had been shared. Then, participants identified and shared facilitators for each barrier. With items projected onto a screen, two group moderators led an interactive discussion and removed or merged overlapping items. Finally, participants indicated whether they had tried the facilitator and independently rated each of the barriers and facilitators generated on a scale of 0 (not at all important) to 10 (extremely important). Facilitators were mapped to corresponding barriers. Similar barriers and facilitators were grouped thematically into core barriers and facilitators.
Results: Nine focus groups were conducted (37 participants), and participants generated 181 barrier items and 457 facilitator items. Core barriers were classified into categories, including (1) health and medical (e.g., "fatigue"); (2) social and personal (e.g., "feeling discouraged around others due to physical ability"); (3) environmental (e.g., "lack of exercise professionals with knowledge of scleroderma"); and (4) time, work, and lifestyle (e.g., "scheduling exercise around intake of medication or food"); most core barriers belonged to the health and medical category. The fatigue core barrier was rated for importance by most participants, with 57% of ratings as 8 or greater. Examples of facilitators for core barriers included "rest breaks or naps" ("fatigue") and "stretching" ("joint stiffness"). The number of facilitators per barrier ranged from 0 to 10.
Conclusion: This is the first study that examined barriers and facilitators to physical activity among SSc patients. The core list of barriers and facilitators generated will be reviewed by investigators and a patient advisory team to create survey items that will be incorporated into a large-scale survey to inform the adaptation of a physical activity program for SSc.

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Granulomatous with Polyangiitis and Ulcerative Colitis: Is There an Overlap? Review of the Literature and Case Report

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Case Report: The coexistence of granulomatosis with polyangiitis (GPA) and inflammatory bowel disease (IBD) is extremely rare (1–3). Here, we present a patient with several extra-intestinal manifestations of ulcerative colitis (UC) that mimicked GPA-IBD overlap.

A 42-year-old male with a history of UC, primary sclerosing cholangitis, and chronic sinusitis was initially seen for possible GPA given new onset of epistaxis and gum hypertrophy. He was diagnosed with UC in 1996 and had quiescent disease until 2015. He developed skin lesions suggestive of pyoderma gangrenosum and neutrophilic folliculitis on biopsy in 2016. His gum hypertrophy was thought to be strawberry gingivitis, as seen in GPA; however, the biopsy demonstrated pyostomatitis vegetans, which is seen in IBD. In April 2018 he presented to the hospital with daily fevers, cough, and decompensated liver failure. He was found to have ulcerating tracheobronchitis visualized on bronchoscopy.

The patient had a few mildly elevated PR3 titres; however, his last ANCA test in April 2018 showed an atypical perinuclear pattern with negative ELISA. Multiple sinus, colon and skin biopsies showed no evidence of vasculitis. Previous colonoscopies revealed active inflammation that was confirmed on biopsies.

During his treatment, he failed to respond to infliximab and vedolizumab. He was switched to ustekinumab after his hospitalization in April 2018. Unfortunately, he passed away in July 2018 due to complications of a liver transplant.

This case is a rare presentation of UC with severe extra-intestinal manifestations that mimicked GPA. There are less than 30 cases of GPA-IBD overlap reported (1–3). These patients tend to be female with IBD preceding vasculitis. All previous cases have had serological and histological features of vasculitis which was not seen in our case (1–3).
Extra-intestinal manifestations of IBD can rarely include pulmonary and tracheal involvement (4–9). Furthermore, nasal manifestations of IBD are more common than previously thought; a cross-sectional study of tertiary IBD clinic found 32% of patients had chronic sinus disease (10). Therefore, we feel that this case was more consistent with IBD with extra-intestinal manifestations versus a GPA-IBD overlap.
Inflammatory bowel disease can have many extra-intestinal manifestations that can mimic GPA (4,5). Though this case initially suggested the possibility of GPA-IBD overlap, multiple biopsies failed to demonstrate evidence of vasculitis. When dealing with IBD, it is vital to work closely with gastroenterologists to ensure the bowel disease is suppressed before considering overlapping illnesses.

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Cardiac Transplant for Treatment of Ischemic Cardiomyopathy Post-myocardial Infarction in Adult Takayasu's Arteritis

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Case Report: Takayasu's arteritis is rare large vessel vasculitis, most commonly affecting the aorta and great vessels of young women. Vascular complications include arterial occlusion, myocardial infarction, aortic regurgitation or aneurysm and stroke, with an estimated overall short-term mortality rate of 5%, primarily secondary to aortic aneurysm rupture or mesenteric ischemia. We present the first case of successful cardiac transplant in a patient with Takayasu's arteritis (one prior case documented in an acute pediatric patient).
A 16 year old woman presented with fatigue, worsening back pain and an elevated CRP of 41.6 mg/L. Acute onset, severe aortic regurgitation in the context of aortitis was identified. Working diagnosis was Takayasu's arteritis and the patient was treated with immunosuppressants. Four months later, the patient had cardiac surgery with placement of a mechanical aortic valve and aortic arch reconstruction. Aortic valve pathology demonstrated granulomatous inflammation, consistent with Takayasu's. Treatment consisted of infliximab, methotrexate, corticosteroid and monthly IVIG. Yearly chest MR angiography did not demonstrate changes of active vasculitis. After six years, tocilizumab replaced infliximab due to allergy. At age 24, the patient reported increasing fatigue. Chest MRA revealed aortic pseudoaneurysm and dehiscence of the mechanical aortic valve. Emergency surgery placed a new mechanical aortic valve, as well as a Cabrol graft modification to left and right coronaries. Post-operatively, she received oral cyclophosphamide for 3 months for active vasculitis. She was then switched to adalimumab alongside methotrexate and prednisone. Fifteen months post-surgery, the patient presented to hospital with chest pain. Acute STEMI was diagnosed, and cardiac catheterization revealed 100% thrombosis of the left main Cabrol graft. Thrombectomy and intraarterial thrombolysis were followed by percutaneous coronary intervention with a drug-eluting stent. Post-STEMI, the

patient remained hospitalized and inotrope dependent, with multisystem organ failure secondary to severe left ventricular systolic dysfunction. She was listed status 3B for cardiac transplantation. Three months later, the patient received an orthotopic cardiac transplant. Post-transplant, the patient was maintained on MMF, tacrolimus and prednisone, with adalimumab restarted 3 months post-surgery. At 6 months post-transplant, the patient is doing well, with no evidence of active vasculitis per recent MR chest angiography. The patient's graft demonstrates normal LV EF and no evidence of significant rejection.
This case highlights that despite the potentially disparate immunosuppressive goals of organ transplant and Takayasu's arteritis treatment, organ transplantation is a potentially successful intervention in critically ill Takayasu patients.

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Aortic Dissection as Initial Presentation of Giant Cell Arteritis

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Case Report: Giant cell arteritis (GCA) is a medium- and large-vessel vasculitis typically involving the aorta and other major vessels. GCA generally presents subacutely with systemic symptoms; however, acute presentations involving vasculature affected by GCA can also occur. Aortic dissection is a rare complication of giant cell aortitis that can happen in absence of precipitating symptoms.
A 72 year old Caucasian female was admitted with crushing chest pain and was triaged according to the ST-elevation myocardial infarction protocol. In the catheterization lab, she was found to have an aortic dissection extending from the ascending aorta to the bilateral common iliac arteries with a complex intimal flap involving the arch. She was taken emergently to the operating theatre where she underwent a total arch and ascending aorta replacement. The following day, the patient was noted to have diminished movement in the lower extremities and was found to have multiple embolic infarcts involving the posterior fossa on the CT angiogram from arch to vertex. Surgical pathological specimens of the aorta showed extensive active aortitis with giant cells typical of GCA. The patient's C-reactive protein was elevated. There was no evidence of residual aortitis on postoperative imaging. The patient was started on high dose intravenous methylprednisolone to treat presumptive residual vasculitis and later transitioned to a prednisone taper and methotrexate as a steroid-sparing agent.
Aortic dissection is an uncommon complication of giant cell arteritis. This case demonstrates that patients who are previously healthy can present with tragic sequelae of asymptomatic GCA. Unfortunately, risk factors for the development of aortic aneurysms and dissections in GCA have not yet been identified.

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Polyarteritis Nodosa Presenting as Bilateral Spontaneous Renal Hemorrhage: A Case Report

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Case Report: Polyarteritis Nodosa (PAN) is a rare disease with a broad differential diagnosis which can make it difficult to recognize. However, it should be considered in the proper clinical setting as PAN has a significant mortality rate without immunosuppressive treatment. We report this case to depict an atypical presentation of PAN, initially misdiagnosed as fibromuscular

dysplasia (FMD), with bilateral perinephric hematoma from consecutive renal hemorrhage occurring three weeks apart.

A previously healthy 64-year-old Caucasian female was initially seen by Urology for left flank pain, pre-syncope, and acute anemia. She reported a six-month history of fatigue, nausea, and 30lb weight loss. Abdominal/pelvic CT showed an acute left kidney perinephric hematoma. An urgent left renal arteriogram demonstrated "beading of the mid/distal main left renal artery with weblike stenoses and intervening aneurysmal segments". She was diagnosed with fibromuscular dysplasia and left main renal artery coil embolization was performed.
Three weeks later she presented with right flank pain and gross hematuria prompting an ultrasound demonstrating "new right retroperitoneal/perinephric hematoma". It was then discovered that the patient had a two-month history of bilateral lower limb non-blanching papular rash. Investigations revealed CRP 175.5, ESR 70, pANCA positive. cANCA, ANA/ENA, HepBsAg were negative. Cr 537, UA 3+ blood/protein. Skin biopsy showed leukocytoclastic vasculitis and CT angiography suggested hepatic vessel involvement.
She was diagnosed with PAN based on 1990 ACR criteria with a 5-Factor score of 2-3. While she had a positive pANCA, a primary small vessel vasculitis was not suspected. Initial treatment was with pulsed methylprednisolone and IV cyclophosphamide as per the CYCLOPS protocol. Renal function improved and the patient was discharged home but re-admitted soon after with sepsis. Sadly, she died from septic shock secondary to Escherichia coli bacteremia.
This case demonstrates the importance of considering PAN in the setting of spontaneous renal hemorrhage. While both PAN and FMD can have similar findings on angiography, it is important to differentiate the two conditions as there are significant differences in management. If the other clinical features were considered, the correct diagnosis may have been made on initial presentation, and appropriate therapy instituted earlier. While there is still uncertainty in regards to optimal treatment of PAN, early immunosuppressive therapy has been shown to greatly reduce the overall morbidity and mortality.

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A Case of Aortitis

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Case Report: Aortitis is a radiological or histopathological diagnosis, with a broad differential including both primary and secondary causes. Clinical correlation is required to determine the correct diagnosis.
We report a case of a 51 year old woman with a right middle lobe consolidation, calcified axillary lymph node and circumferential thickening of the abdominal aorta with the purpose of exploring the differential diagnosis of aortitis.
Results: A 51 year old woman from Afghanistan, presented with pleuritic chest pain, bilateral temporal headache, diaphoresis and a C-reactive protein of 70.2. CT PE at presentation ruled out pulmonary embolism but revealed a right middle lobe pleural-based fluid density, an enlarged calcified axillary node, and significant circumferential thickening of the descending thoracic and abdominal aorta. Transbronchial biopsy of the lung lesion revealed necrotic material only. Bacterial cultures, ANCA, angiotensin-converting enzyme and TB skin test were negative. A right axillary node core biopsy revealed numerous non-necrotizing granulomas. Temporal artery biopsy was negative. PET CT showed a long segment of aortitis in the descending thoracic and abdominal aorta as well as mild uptake in the left subclavian. Ultimately, quantiferon testing was

requested and was positive. Four drug anti-TB therapy was initiated without concomitant glucocorticoids. The right axillary node was excised, and stains confirmed acid-fast bacilli. Follow up PET CT 8 weeks later showed resolution of the right middle lobe consolidation, and reduced uptake throughout the aorta both in intensity and extent.
Conclusion: We report a case of a 51 year old woman with thoracic and abdominal aortitis, RML lesion and adenopathy due to active tuberculosis. The initial differential of aortitis was broad, including giant cell arteritis, granulomatosis with polyangiitis (Wegener's), sarcoidosis or infection (TB or fungal). Although the clinical suspicion for mycobacterial infection was high, initial investigations, including TB skin test, were negative. Excisional lymph node biopsy was ultimately required to confirm the diagnosis. This case demonstrates that a high index of suspicion is required for secondary causes of aortitis, especially when there are atypical features.

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Predictors of Fatal and Non-fatal Cardiovascular Events in ANCA-associated Vasculitis: Data from the CanVasc Cohort

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Objectives: Patients with ANCA-associated vasculitis (AAV) are at increased risk for atherosclerosis and cardiovascular events. The aim of the present study was to assess predictors for the development of cardiovascular events in patients with AAV.
Methods: All granulomatosis with polyangiitis (GPA) and eosinophilic granulomatosis with polyangiitis (EGPA) patients who had agreed to be enrolled in the Canadian Vasculitis Research Network (CanVasc) Toronto cohort as of June 2018 were included. Baseline characteristics and Birmingham Vasculitis Activity Scores (BVAS) at diagnosis were collected. During follow-up, non-fatal cardiovascular events were scored on the Vasculitis Damage Index (VDI) and mortality was recorded including cause of death. A multivariable logistic regression model was developed to determine predictors of cardiovascular events including stroke and myocardial infarction.
Results: A total of 336 patients were included, of which 231 (69%) had GPA and 105 (31%) EGPA. The mean age at diagnosis was 44 (± 18) years and 44% were male. The mean BVAS at diagnosis was 16 (± 7), diabetes mellitus was present in 35 (10%) patients and 20 (6%) patients were current smokers. During a median follow-up of 6 (interquartile range 8) years, 16 non-fatal and 2 fatal cardiovascular events were observed in 15 patients (4%). Eight patients (2%) had a stroke and 10 patients (3%) a myocardial infarction. Eight patients (2%) died. In a multivariable logistic regression model, dyslipidemia OR 5.2 (95% CI 1.4 – 18.8) and a higher BVAS (adjusted for stroke at baseline) OR 1.1 (1.0 – 1.2) were predictive of cardiovascular events.
Conclusion: The increased cardiovascular risk in patients with AAV can most likely be explained through a combination of traditional risk factors and disease related risk factors. Future prospective studies should further elucidate these factors.

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The Right Care for the Right Patient at the Right Time: Examining Wait Times to a Vasculitis Referral Centre

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Objectives: In Canada, consensus-based wait time benchmarks of 4 weeks are established for rheumatoid arthritis and systemic lupus erythematosus, but none exist for vasculitis. Our objective was to determine current wait times among patients with suspected systemic vasculitis

referred to a tertiary care vasculitis clinic and determine the proportion of referrals who should be seen, and who are seen, within 4 weeks of clinic referral.
Methods: Forty consecutive referrals, received March 8th - July 31st 2018, who had been scheduled and were awaiting a first vasculitis clinic appointment, were reviewed for referral source, reason for referral, and wait time. Using established benchmarks for other rheumatic diseases, a 4-week wait time target was defined for systemic vasculitis (including small, medium, and large vessel vasculitis). Cutaneous vasculitis was assigned a 3-month target, and the remainder of referrals were assigned targets on a case-by-case basis according to the referral information. We then determined the proportion of referrals that had been scheduled within these retrospectively applied targets.
Results: Of the 40 consecutive referrals sampled, 4 were for non-vasculitic conditions and were excluded. Of the remaining 36, 15 (42%) were followed by another rheumatologist. Eleven referrals (31%) were for ANCA-associated vasculitis, of which 6 (55%) had possible severe organ involvement, 11 (31%) were for large vessel vasculitis, 4 (11%) for cutaneous vasculitis, 2 (6%) each for medium-vessel vasculitis, Behcet's Disease, and central nervous system vasculitis, and 4 (11%) for other possible vasculitic conditions. Of the 23 (64%) referrals retrospectively assigned a 1-month wait time target based on the referral information, mean wait time was 3.3 (SD, 1.5) months, and 6 (26%) had an appointment scheduled within the 1-month target. Eight (22%) were assigned a 3-month wait time target and all were scheduled within this target. Overall, 17/36 (47%) referred patients were waiting longer than their respective target.
Conclusion: At our center, approximately two-thirds of referrals for systemic vasculitis were assigned a one-month wait time, while only a quarter of these were meeting this theoretical benchmark. Of note, pre-consultation advice is often given via phone or email by vasculitis clinic physicians for sicker patients, possibly delaying the need for rapid in-person consultation; this was not captured in the current audit. Establishing national wait time benchmarks for vasculitis according to disease severity, organ involvement, medication use, and co-morbidities may assist in effective triaging.