

## BACKGROUND

- Primary care physicians play a key role in the early detection and referral of rheumatic diseases.
- Understanding the early care management of rheumatic diseases and referral patterns to rheumatologists can help identify opportunities to improve timeliness and appropriateness of care.

## OBJECTIVE

- Our aim was to characterize referrals to rheumatologists, the early care management of patients with rheumatic diseases, and the timeliness of care and treatment.

## METHODS

### Setting:

- In Ontario, Canada, primary care physicians are front-line caregivers & coordinators with secondary care. There is no centralized system for referrals.

### Data Sources:

- We identified patients with first-time rheumatology referrals within the Electronic Medical Record Administrative data Linked Database (EMRALD) – representing pooled EMR data from 168 family physicians
  - Encounters with family physicians were identified within the EMR (all primary care visits, medical histories, diagnostic tests results, prescriptions, referral letters, specialist consultation letters & hospital discharge summaries).
  - Encounters with rheumatologists were identified from consultation letters within the EMR and using the Ontario Health Insurance Plan (OHIP) Claims History Database.

### Data Collection:

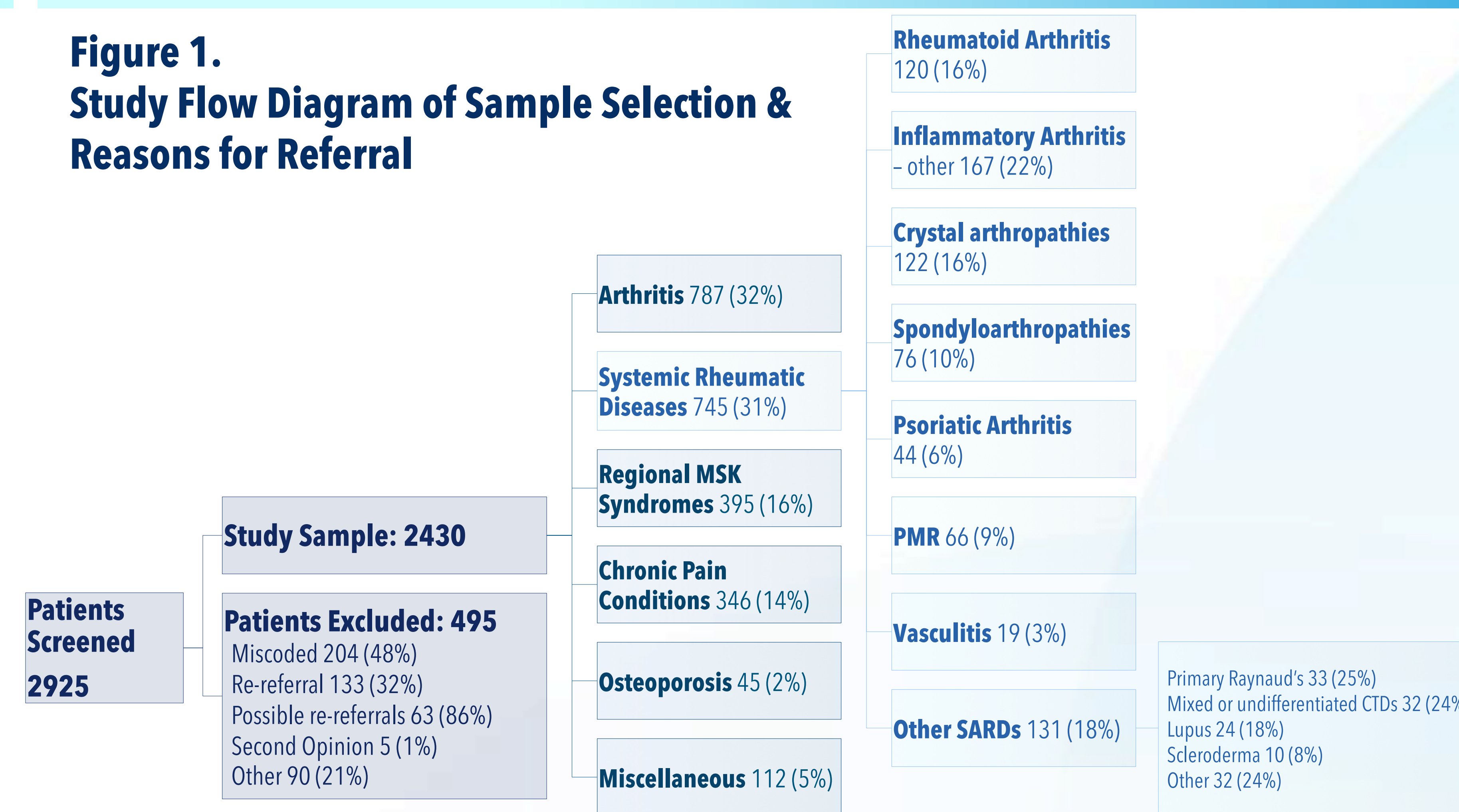
- We used a standardized data abstraction tool to identify:
  - provisional diagnoses/clinical impressions
  - patient demographics
  - other specialists seen with documentation of the complaint prior to rheumatology referral
  - laboratory tests initiated by family physicians
  - treatment initiated prior to & after seeing a rheumatologist
  - timeliness of care

### Analysis:

- Descriptive analyses were used to characterize the study population overall and stratified according to diagnostic categories.
- Analyses were performed on coded data at the Institute for Clinical Evaluative Sciences (www.ices.on.ca) in Toronto, Ontario.

## RESULTS

**Figure 1. Study Flow Diagram of Sample Selection & Reasons for Referral**



**Table 1. Patient Characteristics & General Patterns of Care**

Diagnostic Category	Age <sup>1</sup> Mean (SD)	Female	Received treatment prior to referral <sup>2</sup>	Seen by another specialist with documentation of complaint prior to referral <sup>3</sup>						Seen by a Rheum. within 1 year <sup>4</sup>	Received treatment from Rheum. <sup>5</sup>
				Any	Ortho. Surgeon	Internist	Neurology	ER	Allied Health		
<b>All Patients</b>	<b>53 (16)</b>	<b>69%</b>	<b>49%</b>	<b>40%</b>	<b>8%</b>	<b>3%</b>	<b>5%</b>	<b>4%</b>	<b>23%</b>	<b>83%</b>	<b>37%</b>
<b>Arthritis</b>	<b>56 (16)</b>	<b>70%</b>	<b>44%</b>	<b>40%</b>	<b>10%</b>	<b>1%</b>	<b>3%</b>	<b>3%</b>	<b>26%</b>	<b>84%</b>	<b>27%</b>
<b>Systemic Rheumatic Diseases</b>	<b>53 (17)</b>	<b>57%</b>	<b>61%</b>	<b>33%</b>	<b>6%</b>	<b>4%</b>	<b>5%</b>	<b>7%</b>	<b>14%</b>	<b>86%</b>	<b>56%</b>
RA	55 (16)	70%	72%	33%	8%	-	-	7%	13%	87%	93%
IA - other	51 (16)	57%	63%	36%	10%	-	5%	10%	21%	86%	56%
Crystal	61 (15)	27%	79%	27%	19%	-	-	10%	7%	89%	46%
Spondylitis	42 (15)	41%	46%	41%	-	-	-	-	30%	86%	42%
Psoriatic Arthritis	53 (13)	59%	64%	32%	-	-	-	-	16%	98%	69%
PMR	71 (9)	62%	79%	23%	-	-	-	-	11%	88%	58%
Vasculitis	53 (24)	53%	47%	68%	-	-	-	-	-	79%	-
Other SARDs	45 (14)	82%	35%	31%	-	6%	10%	5%	5%	82%	36%
<b>MSK Syndromes</b>	<b>52 (16)</b>	<b>72%</b>	<b>38%</b>	<b>45%</b>	<b>8%</b>	<b>-</b>	<b>5%</b>	<b>4%</b>	<b>34%</b>	<b>84%</b>	<b>39%</b>
Chronic Pain	47 (14)	86%	49%	49%	6%	5%	10%	4%	32%	78%	19%
Osteoporosis	62 (15)	84%	80%	18%	-	-	-	-	-	62%	42%
Miscellaneous <sup>5</sup>	46 (16)	71%	21%	51%	-	6%	12%	-	5%	73%	8%

<sup>1</sup>Age at time of referral; <sup>2</sup>Prescribed any type of medication for the complaint prior to the referral; <sup>3</sup>Not mutually exclusive categories; <sup>4</sup>Seen by a rheumatologist within 365 days of referral according to administrative data; <sup>5</sup>Miscellaneous referrals such as abnormal tests; Abbreviations: ER = Emergency Room; MSK = musculoskeletal; SARDs = systemic autoimmune rheumatic diseases - include systemic lupus, scleroderma, Sjogren's, dermatomyositis, Raynaud's, Sarcoidosis etc (not defined in the previous categories);

**Table 2. Laboratory testing done within 3 months prior to referral**

Diagnostic Category	ESR <sup>1</sup>		CRP <sup>2</sup>		RF <sup>3</sup>		ANA <sup>3</sup>		ENA <sup>3</sup>		HLA-B27 <sup>3</sup>		Uric Acid <sup>4</sup>	
	Done	Abnormal	Done	Abnormal	Done	Positive	Done	Positive	Done	Positive	Done	Positive	Done	Abnormal
<b>All Patients</b>	<b>30%</b>	29%	<b>36%</b>	19%	<b>41%</b>	24%	<b>28%</b>	11%	<b>5%</b>	14%	<b>3%</b>	18%	<b>4%</b>	100%
<b>Arthritis</b>	<b>22%</b>	23%	<b>30%</b>	10%	<b>33%</b>	21%	<b>20%</b>	6%	<b>2%</b>	-	<b>2%</b>	-	<b>5%</b>	100%
<b>Systemic Rheumatic Diseases</b>	<b>45%</b>	38%	<b>53%</b>	30%	<b>58%</b>	30%	<b>42%</b>	15%	<b>9%</b>	19%	<b>6%</b>	22%	<b>6%</b>	100%
RA	<b>52%</b>	47%	<b>63%</b>	35%	<b>76%</b>	66%	<b>46%</b>	-	-	-	-	-	<b>7%</b>	100%
IA - other	<b>52%</b>	29%	<b>56%</b>	30%	<b>68%</b>	30%	<b>49%</b>	10%	<b>11%</b>	-	<b>7%</b>	-	<b>5%</b>	100%
Crystal	<b>23%</b>	29%	<b>36%</b>	36%	<b>40%</b>	18%	<b>21%</b>	-	<b>6%</b>	-	-	-	<b>14%</b>	100%
Spondylitis	<b>43%</b>	245	<b>50%</b>	24%	<b>51%</b>	-	<b>38%</b>	-	<b>8%</b>	-	<b>30%</b>	39%	-	-
Psoriatic Arthritis	<b>36%</b>	38%	<b>34%</b>	-	<b>50%</b>	-	<b>36%</b>	-	-	-	-	-	-	-
PMR	<b>59%</b>	67%	<b>76%</b>	44%	<b>61%</b>	20%	<b>47%</b>	-	-	-	-	-	-	-
Vasculitis	<b>58%</b>	-*	<b>53%</b>	-	<b>61%</b>	-	<b>47%</b>	-	-	-	-	-	-	-
Other SARDs	<b>47%</b>	34%	<b>50%</b>	14%	<b>57%</b>	18%	<b>53%</b>	35%	<b>18%</b>	44%	<b>5%</b>	-	-	-

\*Not reported due to small cell size; <sup>1</sup>Abnormal:  $\geq 32$  mm/hour; <sup>2</sup>Abnormal:  $\geq 18$  mg/L; <sup>3</sup>Positive reading according individual laboratory; <sup>4</sup>Abnormal:  $> 6.0$  mg/dl; Abbreviations: ANA = Antinuclear Antibodies; CRP = C-Reactive Protein; ENA = Extractable Nuclear Antigen; ESR = Erythrocyte Sedimentation Rate; HLA = Human Leukocyte Antigen; RF = Rheumatoid Factor; SARDs = systemic autoimmune rheumatic diseases;

**Table 3. Treatment prior to and after referral**

Diagnostic Category	FAMILY PHYSICIAN <sup>1</sup>				RHEUMATOLOGIST <sup>2</sup>				
	NSAID/COXIB	Steroid oral	Steroid joint injection	DMARD	Steroid oral	Steroid joint injection	Steroid intra-muscular	DMARD	Biologic
<b>All Patients</b>	<b>38%</b>	<b>8%</b>	<b>2%</b>	<b>1%</b>	<b>5%</b>	<b>15%</b>	<b>1%</b>	<b>12%</b>	<b>1%</b>
<b>Arthritis</b>	<b>38%</b>	<b>3%</b>	<b>4%</b>	-	-	<b>16%</b>	<b>1%</b>	<b>2%</b>	-
<b>Systemic Rheumatic Diseases</b>	<b>48%</b>	<b>19%</b>	<b>1%</b>	<b>2%</b>	<b>14%</b>	<b>13%</b>	<b>1%</b>	<b>32%</b>	<b>2%</b>
RA	53%	25%	-	6%	24%	14%	-	88%	6%
IA - other	54%	15%	-	-	14%	21%	-	34%	-
Crystal	62%	16%	-	-	-	12%	-	-	-
Spondylitis	45%	-	-	-	-	9%	-	-	-
Psoriatic Arthritis	61%	-	-	-	14%	24%	-	52%	-
PMR	44%	59%	-	-	37%	-	-	10%	-
Vasculitis	-*	42%	-	-	-	-	-	-	-
Other SARDs	24%	8%	-	-	8%	-	-	24%	-
<b>Regional MSK Syndromes</b>	<b>33%</b>	<b>2%</b>	<b>3%</b>	-	-	<b>33%</b>	-	-	-

<sup>1</sup> Prescribed by family physician for the complaint prior to the referral; <sup>2</sup> Treatment documented on consultation letters within the first year - denominator confined to patients with consultation letters returned; \*Not reported due to small cell size;

**Table 4. Timeliness of Care, median (interquartile range) in days**

Diagnostic Category	Time from symptom onset to first documentation in primary care	Time from first documentation in primary care to date of referral	Time from date of referral to consultation visit	TOTAL DELAY: Time from symptom onset to consultation visit
<b>All Patients</b>	<b>251 (17-268)</b>	<b>310 (13-324)</b>	<b>74 (27-101)</b>	<b>813 (129-942)</b>
<b>Arthritis</b>	<b>367 (24-391)</b>	<b>423 (14-437)</b>	<b>73 (30-103)</b>	<b>1144 (190-1334)</b>
<b>Systemic Rheumatic Diseases</b>	<b>136 (10-146)</b>	<b>156 (12-168)</b>	<b>66 (18-84)</b>	<b>634 (97-731)</b>
RA	173 (16-189)	115 (14-128)	66 (15-81)	327 (83-410)
IA - other	102 (10-112)	125 (11-136)	55 (17-71)	260 (91-350)
Crystal	188 (4-192)	353 (20-373)	69 (24-93)	1312 (111-1423)
Spondylitis	716 (14-730)	173 (7-181)	62 (29-91)	1262 (112-1374)
Psoriatic Arthritis	228 (17-245)	513 (15-528)	88 (30-117)	680 (125-805)
PMR	63 (14-77)	123 (15-138)	53 (11-64)	240 (81-321)
Vasculitis	128 (3-131)	73 (7-80)	28 (11-39)	608 (59-667)
Other SARDs	208 (14-222)	181 (7-188)	62 (22-83)	940 (113-1053)
<b>Regional MSK Syndromes</b>	<b>155 (21-176)</b>	<b>201 (8-209)</b>	<b>68 (26-94)</b>	<b>410 (117-527)</b>
<b>Chronic Pain Conditions</b>	<b>360 (31-391)</b>	<b>534 (21-555)</b>	<b>90 (35-125)</b>	<b>1101 (200-1301)</b>
<b>Osteoporosis</b>	--	<b>1829 (260-2089)</b>	<b>82 (74-156)</b>	--
<b>Miscellaneous</b>	--	<b>249 (14-263)</b>	<b>69 (40-110)</b>	--

## CONCLUSIONS

- Approximately 1 in 3 referrals to rheumatologists were for a systemic inflammatory rheumatic disease.
- Overall, 37% of referrals resulted in pharmacologic treatment by rheumatologists
- 1/3<sup>rd</sup> of patients with arthritis appeared to be also screened for inflammatory arthritis, and half of all patients with systemic rheumatic diseases had screening for inflammatory markers (ESR, CRP, RF) prior to referral.
- Substantial delays were observed in patients seeking care and family physicians referring, regardless of the patients' diagnosis. Patients with systemic rheumatic diseases were seen earlier by rheumatologists than other types of referrals.
- Our findings will hopefully stimulate continual quality reassessment and development of new strategies to improve the timeliness and appropriateness of referrals.

**Funding:** Canadian Initiative for Outcomes in Rheumatology care (CIORA)

**Acknowledgments:** JW is supported by a Postdoctoral Fellowship Award from The Arthritis Society & the Canadian Institutes of Health Research (CIHR) - Banting; CB holds a Canada Research Chair in Knowledge Transfer for Musculoskeletal Care & Pfizer Chair in rheumatology; KT, RLJ, DB and NI are supported by Investigator Awards from the Department of Family and Community Medicine at the University of Toronto. NI is also supported by a New Investigator Award from the CIHR. SB is supported by CIHR, the Fonds de recherche du Québec - Santé, and the McGill University Health Centre;

**Correspondence:** jessica.widdifield@utoronto.ca