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ABSTRACT. **Objective.** The Canadian Rheumatology Association (CRA) launched the Workforce and Wellness Survey to update the Canadian rheumatology workforce characteristics.

Methods. The survey included demographic and practice information, pandemic effects, and the Mini Z survey to assess burnout. French and English survey versions were distributed to CRA members electronically between October 14, 2020, and March 5, 2021. The number of full-time equivalent (FTE) rheumatologists per 75,000 population was estimated from the median proportion of time in clinical practice multiplied by provincial rheumatologist numbers from the Canadian Medical Association.

Results. Forty-four percent (183/417) of the estimated practicing rheumatologists (149 adult; 34 pediatric) completed the survey. The median age was 47 years, 62% were female, and 28% planned to retire within the next 5–10 years. Respondents spent a median of 65% of their time in clinical practice. FTE rheumatologists per 75,000 population were 0.62 nationally and ranged between 0.00 and 0.70 in each province/territory. This represents a deficit of 1–78 FTE rheumatologists per province/territory and 194 FTE rheumatologists nationally to meet the CRA's workforce benchmark. Approximately half of survey respondents reported burnout (51%). Women were more likely to report burnout (OR 2.86, 95% CI 1.42–5.93). Older age was protective against burnout (OR 0.95, 95% CI 0.92–0.99). As a result of the pandemic, 97% of rheumatologists reported spending more time engaged in virtual care.

Conclusion. There is a shortage of rheumatologists in Canada. This shortage may be compounded by the threat of burnout to workforce retention and productivity. Strategies to address these workforce issues are needed urgently.

Key Indexing Terms: health workforce, rheumatology

There is currently an estimated shortage of rheumatologists in many Canadian regions according to a 2015 Canadian Rheumatology Association (CRA) survey.¹ This shortage is

projected to worsen as one-third of surveyed rheumatologists are planning to retire in the next 5–10 years.¹ Moreover, the demographics of the workforce are changing, with females and

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millennials (born between 1981–1996) now comprising a larger proportion of the workforce.^{2,3,4} As sex and age affect practice volumes, these factors have further implications.^{1,2,3,5}

While not addressed in the 2015 Canadian rheumatologist survey, physician burnout is increasingly recognized as a threat to workforce retention, care quality, and productivity.^{6,7,8,9,10,11} In the US, previous reports indicate high levels of burnout among rheumatology practitioners.^{12,13} While burnout is prevalent among Canadian physicians,¹⁴ little is known about burnout in Canadian rheumatologists.

The challenges of an existing rheumatologist workforce shortage, changing workforce demographics, and physician burnout have been compounded by the coronavirus disease 2019 (COVID-19) pandemic. The pandemic has had many effects on rheumatology outpatient care, most notably a rapid increase in virtual care.^{15,16} Despite this increase in virtual care, in many regions there may still have been reduced access to rheumatology care. Reasons for this include clinic closures, limits on in-person visit numbers for health and safety reasons, recruitment of rheumatologists to work on COVID-19 wards, and reduced capacity for rheumatology outpatient care. It is also unknown what effect, if any, the pandemic had on physician retirement plans.

The CRA Human Resources (HR) Committee launched the Rheumatology Workforce and Wellness Survey to address the following objectives: (1) describe demographic and practice characteristics including retirement plans of the rheumatology workforce; (2) estimate the current number of adult and pediatric clinical full-time equivalent (FTE) rheumatologists per 75,000 population; (3) assess burnout in the rheumatology workforce, and (4) understand the effect of the pandemic on rheumatologists' practices.

METHODS

Survey development. This survey was conducted by the CRA's HR Committee and developed based on the CRA's 2015 workforce survey.¹ Many questions were retained to allow for comparisons over time. Questions that were not relevant or have been explored elsewhere previously were excluded. In this iteration, we included the Mini Z survey to measure burnout.¹⁷ The survey was initially planned for launch in the spring of 2020 but was delayed because of the COVID-19 pandemic. Subsequent modifications were made to explore how the COVID-19 pandemic affected work patterns. A draft survey was then circulated to the CRA HR Committee for input. This committee includes adult, pediatric, community-, and university-based rheumatologists, researchers, CRA staff, representation from allied health professionals, and a rheumatology resident. The survey consisted of 26 questions and was piloted by 8 committee members. The English survey was translated to French by a professional translator and repiloted by a bilingual member.

Survey dissemination. The survey was distributed electronically to all CRA members on October 14, 2020, and closed March 5, 2021. To maximize participation, 4 electronic reminders and 8 reminders in the "President's Update" newsletter were sent by email. The survey was promoted at the CRA Annual Scientific meeting, advertised on the CRA and Ontario Rheumatologist Association (ORA) websites and in membership communications, and promoted at regional rheumatology rounds.

Data profile on the number of rheumatologists in Canada. The number of expected rheumatologists in Canada were ascertained from the Canadian Medical Association (CMA) master file.¹⁸ The CMA conducts an annual survey of active physicians in Canada. The CMA annual physician count

includes nonclinicians and physicians who work primarily in administrative positions and maintain a license to practice, as well as part-time and semi-retired physicians; excluded are medical residents and physicians aged > 80 years. The CMA master file is an original CMA database that receives data from the Royal College of Physicians and Surgeons in Canada, the College of Family Physicians of Canada, Collège des Médecins du Québec, and from its own members. The CMA master file does not report number of adult vs pediatric rheumatologists separately.

Analysis. To maintain the privacy of individual respondents, cells sizes of < 6 are not displayed and/or data are aggregated. In the case of incomplete data, the denominator is displayed (n). Statistical significance was accepted at $P \leq 0.05$. Analysis was conducted in R (R Core Team, 2019).¹⁹ Descriptive statistics including mean and SD, or median and IQR, were used depending on data normality. Information about practice characteristics included time worked, numbers of new patients and follow-ups seen, on-call roster participation, and delivery of care services using virtual or traveling clinics. Respondents were asked for their impression of whether the COVID-19 pandemic resulted in higher, lower, or unchanged estimates for each variable. Content analysis²⁰ was used to analyze the responses to an open-ended question about the effects of the COVID-19 pandemic on burnout and work practices.

The Mini Z is a 10-item survey that uses 3 questions to measure satisfaction, stress, and burnout, and 7 questions to measure their risk factors (also sometimes called drivers).¹⁷ The single-item burnout question was used to measure burnout. The item was dichotomized for analysis with scores of 1–3 indicating burnout and 4–5 indicating absence of burnout. This has been validated against the emotional exhaustion component of the Maslach Burnout Inventory (MBI).²¹ Burnout results were reported for demographic groups (sex/gender, ethnicity, age, career stage, and type of practice). Group differences were assessed using univariable logistic regression models. Results are presented as ORs with 95% CIs. Multivariable regression analysis was performed to identify demographic (sex/gender, age, ethnicity) and workplace variables (practice setting and hours worked per week) as predictors of burnout. Selection of predictor variables was informed by existing literature.

The clinical FTE was estimated based on percentages of time allocated to clinical practice (grouping together time spent in virtual and/or in-person care and removing estimates of time for research, administration, and teaching) and applied to the number of rheumatologists practicing in each province according to data from the CMA Rheumatology Profile (2019).¹⁸ This was then used to estimate the number of FTE rheumatologists (adult and pediatric considered together) per 75,000 population based on population data from Statistics Canada. We then determined the deficit of FTE rheumatologists required to meet the target of 1:75,000 population. This is a threshold recommendation by the CRA HR Committee and has been endorsed nationally.²² We mapped the current number and deficit of FTE rheumatologists in each province using ArcGIS version 10.8 (Esri).

Ethics. Ethics was approved by the University of Calgary (ID: REB19-1287) and all participants provided consent. The CRA HR Committee approved the survey and the final manuscript.

RESULTS

Response rates. Supplementary Figure 1 (available with the online version of this article) shows survey response rates. The survey was sent to 599 CRA members. CRA membership data estimates 417 practicing rheumatologists (354 adult and 63 pediatric rheumatologists). There were 218 valid responses and of these, 35 did not meet inclusion criteria (nonrheumatologists, retired rheumatologists, rheumatologists currently on leave, and rheumatology trainees), yielding a sample of 183 rheumatologists and a response rate of 44% of CRA's 417 practicing rheumatologist members.

Respondent characteristics. Table 1 depicts respondent characteristics. The median age was 47 years (IQR 40–60) and 21% were millennials. Nearly one-third (28%) of respondents planned to retire in the next 5–10 years. Over half (62%) were female and 74% were White. The median age of female (47.5 yrs) rheumatologists was significantly younger than males (52.3 yrs, $P = 0.03$). Rheumatologists who self-identified as Black, Indigenous, and people of color were significantly younger (45.1 yrs) than White rheumatologists (50.9 yrs, $P = 0.02$).

Work characteristics. Table 2 depicts work characteristics. These varied by type of rheumatologist (adult or pediatric), practice setting (community- or university-based), and sex/gender (female or male; Supplementary Table 1, available with the online version of this article). Adult rheumatologists allocated a median of 73% of their time to clinical practice, worked a median of 45 hours a week, and held a median of 6 half-day clinics per week. They saw a median of 8 new patients and 45 follow-up visits per

week. Fifty-six percent participated in rheumatology on-call rosters. Pediatric rheumatologists allocated 60% of their time to clinical practice, worked 50 hours a week, and held a median of 3 half-day clinics per week. They saw a median of 4 new patients and 18 follow-ups per week. Eighty-two percent participated in pediatric rheumatology on-call rosters. Both adult and pediatric rheumatologists reported spending 10 hours per week on clinical paperwork. Nearly all rheumatologists (93%) were accepting new patients.

Most rheumatologists were affiliated with an academic center or hospital (85% and 89%, respectively), and 57% work in a university-based clinic. Rheumatologists in community-based clinics reported higher volumes of clinics, as well as new and follow-up patients (Table 2). Rheumatologists in university-based clinics worked an average of 50 hours per week compared with 40 hours per week worked by community-based rheumatologists ($P < 0.001$).

Table 1. Characteristics of respondents to the Workforce Wellness survey.

	Total ^a	Adult Rheumatologists	Pediatric Rheumatologists
Distribution by province of region, n ^b	183	149	34
British Columbia	28 (15)	23 (15)	5 (15)
Ontario	54 (30)	41 (28)	13 (38)
Quebec	21 (11)	17 (11)	4 (12)
Prairie provinces ^c	32 (17)	26 (17)	6 (18)
Atlantic provinces ^d	10 (5)	9 (6)	1 (3)
Location not specified	36 (20)	31 (21)	5 (15)
Years in practice, n	170	137	33
≤ 5	38 (22)	36 (26)	2 (6)
6–10	29 (17)	19 (14)	10 (30)
11–20	50 (29)	38 (28)	12 (36)
21–30	25 (15)	19 (14)	6 (18)
> 31	28 (16)	25 (18)	3 (9)
Median age, n	149	118	31
Yrs (provincial range)	47 (40–60)	46 (39–61)	48 (42–57)
Female, n	172	139	33
% (provincial range)	62 (48–100)	60 (35–100)	70 (62–100)
Race/ethnicity, n	167	134	33
White	123 (74)	98 (73)	25 (76)
BIPOC	41 (25)	33 (25)	8 (24)
Arab/West Asian	8 (5)	NR	NR
Black or Latin American	6 (4)	NR	NR
Indigenous	NR	NR	NR
East Asian	10 (6)	NR	NR
South or Southeast Asian	14 (8)	NR	NR
Multiracial/multiethnic	NR	NR	NR
Other	NR	NR	NR
Prefer not to disclose	NR	NR	NR
Retirement plans, n	170	137	33
Retire in 5 yrs	33 (19)	30 (22)	3 (9)
Retire in 10 yrs	14 (8)	10 (7)	4 (12)

Does not include rheumatology trainees, rheumatologists who do 100% research, rheumatologists on leave, or retired rheumatologists. Values are n (%) unless otherwise specified. ^a Includes adult and pediatric rheumatologists. ^b n indicates the total number of respondents for each question. ^c Because of small cell sizes in some provinces, the Prairie provinces were combined (Alberta, Manitoba, and Saskatchewan). ^d Because of small cell sizes, aggregated data for the Atlantic provinces are reported (Nova Scotia, New Brunswick, Prince Edward Island, and Newfoundland and Labrador). BIPOC: Black, Indigenous, people of color; NR: cell size too small to report ($n < 6$).

Table 2. Work characteristics.

	Total	Adult	Pediatric
Practice setting, n	167	135	32
Solo community-based private practice	32 (19)	31 (23)	1 (3)
Group community-based private practice	36 (22)	34 (25)	2 (6)
Academic setting (university-based clinic)	96 (57)	67 (50)	29 (91)
Other	3 (2)	3 (2)	0 (0)
Allocation of time ^{a,b} , %			
Clinical (in-person and virtual), n	173	140	33
Academic setting, n	65 (35–85)	73 (30–90)	60 (50–70)
Private practice, n	89	61	28
In-person, n	60 (30–70)	50 (25–80)	60 (50–70)
Academic setting, n	65	62	NR
Private practice, n	90 (80–95)	90 (80–96)	NR
Virtual, n	173	140	33
Academic setting, n	20 (10–45)	20 (8–47)	25 (20–45)
Private practice, n	89	61	28
Academic setting, n	20 (10–40)	20 (10–40)	30 (20–50)
Private practice, n	65	62	NR
Virtual, n	25 (10–50)	28 (10–50)	NR
Academic setting, n	173	140	33
Private practice, n	25 (6–50)	25 (6–52)	20 (10–30)
Academic setting, n	89	61	28
Private practice, n	20 (10–35)	20 (13–40)	20 (10–30)
Academic setting, n	65	62	NR
Private practice, n	50 (20–70)	50 (20–70)	NR
Research	5 (0–19)	1 (0–13)	10 (10–25)
Administration	5 (0–10)	5 (0–10)	10 (5–15)
Teaching	5 (0–10)	5 (0–10)	10 (5–18)
Other	0 (0–0)	0 (0–0)	0 (0–0)
Weeks worked per year, n	134	107	27
Hours worked per week, n	48 (45–48)	48 (45–48)	48 (46–48)
Academic setting, n	136	109	27
Private practice, n	50 (40–55)	45 (40–55)	50 (50–56)
Academic setting, n	76	52	24
Private practice, n	50 (45–60)	50 (44–60)	50 (50–56)
Academic setting, n	58	55	NR
Private practice, n	40 (36–50)	40 (35–50)	NR
Call participation, n ^c	144	116	28
Rheumatology call participation ^d	88 (61)	65 (56)	23 (82)
Internal medicine or pediatric call only	12 (8)	11 (9)	1 (4)
COVID-19 inpatient call participation	12 (8)	12 (10)	0 (0)
Days per year providing rheumatology on-call coverage ^d , n	87	64	23
Half-day clinics per week ^e , n	56 (40–76)	45 (30–71)	70 (67–79)
New patients seen per week ^{e,f} , n	136	108	28
Academic setting, n	6 (3–7)	6 (4–8)	3 (3–5)
Private practice, n	131	105	26
Academic setting, n	6 (4–12)	8 (5–15)	4 (3–5)
Private practice, n	75	52	23
Academic setting, n	5 (3–8)	6 (3–10)	4 (3–5)
Private practice, n	54	51	NR
Follow-up patients seen per week ^{e,f} , n	11 (8–20)	11 (8–20)	NR
Academic setting, n	134	109	25
Private practice, n	40 (25–60)	45 (30–60)	18 (10–24)
Academic setting, n	76	54	22
Private practice, n	30 (20–42)	35 (26–50)	19 (15–23)
Academic setting, n	56	53	NR
Private practice, n	55 (40–77)	60 (40–80)	NR
Hours spent per week on clinical paperwork, n	132	107	25
No. of respondents reporting that they are currently accepting new patients, n	10 (5–12)	10 (5–10)	10 (6–15)
	147	119	28
	137 (93)	110 (92)	27 (96)

Values are median (IQR) or n (%) unless otherwise specified. ^a Eleven participants were excluded because the total time allocations reported did not sum to 100%.

^b Nineteen participants did not indicate whether they worked in an academic setting or private practice. They are included in the Total, Adult Rheumatologist, and Pediatric Rheumatologist results and omitted from the Academic setting and Private practice results. ^c Rheumatologists may be counted in multiple categories (eg, rheumatology call participation and COVID-19 inpatient call participation) if they provided coverage for > 1 category. ^d Combination of those who participated in rheumatology alone or in rheumatology plus a second roster. ^e Rounded to the nearest whole number. ^f Two participants did not indicate whether they work in an academic setting or private practice. They are included in the Total, Adult Rheumatologist, and Pediatric Rheumatologist results and omitted from the Academic setting and Private practice results. NR: cell size too small to report (n < 6).

Women and men allocated roughly the same proportion of time to clinical practice (70% and 68%, respectively). They both held a median of 6 half-day clinics per week. However, women saw fewer patients per week with a median of 6 new patients compared to 10 for men and 35 compared to 45 follow-ups (Supplementary Table 1, available with the online version of this article).

Effect of the pandemic. Table 3 depicts rheumatologists' perceptions of the effect of the pandemic on their practices. Most rheumatologists (97% of respondents) reported spending more time engaged in virtual care, less time providing in-person care (89%), and the same amount of time on research (74%), administrative (60%), and teaching (58%) activities. Over one-third of rheumatologists (37%) reported seeing fewer new patients and 25% reported fewer follow-ups per week despite holding the same number (61%) or more (21%) half-day clinics per week. Over half (53%) of rheumatologists reported spending more time on clinical paperwork per week. Telephone and video visits continued even after the peak pandemic shutdowns (Supplementary Table 2, available with the online version of this article).

Results from the open-text question about the effect of the pandemic were overwhelmingly negative. Many rheumatologists identified difficulties with virtual care, increased patient and physician stress in clinical practice, and increased workload (Supplementary Table 3, available with the online version of this article).

Burnout. Table 4 shows the prevalence and comparison of burnout by demographic characteristics. Over half (51%) of respondents reported burnout. Women were more likely to report burnout (OR 2.86, 95% CI 1.42–5.93). Older age was protective against burnout (OR 0.95, 95% CI 0.92–0.99 per year of age).

Drivers of burnout were examined by sex/gender (Supplementary Table 4, available with the online version of this article) and by age (Supplementary Table 5). Women were more likely (OR 2.89, 95% CI 1.26–7.34) to report poor or minimal personal control over workload and of feeling a great deal of stress because

of their job (OR 2.99, 95% CI 1.43–6.55). Women were also less likely to perceive their workplace as supportive compared to men (OR 0.36, 95% CI 0.16–0.79). Increasing age was associated with perceiving a supportive workplace (OR 1.05, 95% CI 1.02–1.09 per yr of age). Conversely, increasing age was associated with reporting a less manageable work pace and electronic medical record stress (OR 0.92, 95% CI 0.83–0.99, per yr of age). Older age was protective against an increased effect of the pandemic on burnout level (OR 0.96, 95% CI 0.92–0.99 per yr of age).

Results of a multivariable logistic regression model considering age, sex/gender, ethnicity, hours worked per week, and practice setting (university-based vs community-based) revealed female sex/gender (OR 2.42, 95% CI 1.07–5.60; $P = 0.04$) and younger age (OR 0.95, 95% CI 0.92–0.99; $P = 0.007$) were significant predictors of burnout (Table 5).

Rheumatologists per capita. The national estimate of the percentage of time allocated to clinical work from the workforce survey was used to adjust the 2019 data on rheumatologist numbers per province from the CMA¹⁸ to estimate the number of clinical FTE rheumatologists (adult and pediatric considered together) per 75,000 population (Figure 1).²² We estimated 0.62 per 75,000 population across Canada and between 0.00 and 0.70 FTE rheumatologists per 75,000 population in each province/territory. This represents a deficit of 1–78 FTE rheumatologists per province/territory and a total of 194 FTE rheumatologists needed in Canada to meet the CRA benchmark. Results of a sensitivity analysis considering an international benchmark of 2 rheumatologists per 100,000 population²³ identify an estimated deficit of 447 rheumatologists (Supplementary Table 6 and Supplementary Figure 2; available with the online version of this article).

DISCUSSION

This workforce survey provides a timely update of the Canadian rheumatology workforce for use in planning, recruitment, and

Table 3. Perceived effect of the pandemic on work characteristics.^a

Work Characteristics (n)	Higher	Lower	Unchanged
Allocation of time, %			
Clinical, in person (158)	10 (6)	141 (89)	7 (4)
Clinical, virtual (157)	152 (97)	2 (1)	3 (2)
Research (136)	6 (4)	30 (22)	100 (74)
Administration (134)	49 (37)	5 (4)	80 (60)
Teaching (137)	10 (7)	48 (35)	79 (58)
Other (56)	7 (13)	3 (5)	46 (82)
Weeks worked per year (148)	50 (34)	18 (12)	80 (54)
Hours worked per week (145)	52 (36)	30 (21)	63 (43)
Call participation (100)			
Rheumatology call participation (95)	14 (15)	8 (8)	73 (77)
Internal medicine or pediatric call only (69)	15 (22)	4 (6)	50 (72)
Half-day clinics per week (147)	31 (21)	27 (18)	89 (61)
New patients seen per week (148)	18 (12)	55 (37)	75 (51)
Follow-up patients seen per week (142)	35 (25)	35 (25)	72 (51)
Hours spent per week on clinical paperwork (142)	75 (53)	4 (3)	63 (44)

Values are n (%) unless otherwise specified. ^a Includes adult rheumatologists, pediatric rheumatologists, and rheumatology trainees.

Table 4. Prevalence and comparison of burnout by demographic characteristics using Mini Z single-item metric of burnout.^a

	n (%)	OR (95% CI)	P
Sex/gender	n = 140	2.86 (1.42–5.93)	0.004
Male (ref)	18 (35)		
Female	53 (60)		
Ethnicity ^c	n = 138	1.61 (0.74–3.60)	0.24
BIPOC (ref)	14 (42)		
White	57 (54)		
Age (numeric, per year of age)	n = 126	0.95 (0.92–0.99)	0.005
Rheumatologist type	n = 142	0.93 (0.41–2.14)	0.09
Adult (ref)	59 (52)		
Pediatric	14 (50)		
Practice setting	n = 140	1.24 (0.63–2.44)	0.53
Community-based private practice (ref)	38 (56)		
Academic setting	44 (61)		
Hours worked per week (numeric, per hour)	n = 127	1.00 (0.97–1.03)	0.94
Career stage	n = 142	1.09 (0.55–2.15)	0.80
Early career, ≤ 10 yrs	29 (53)		
Established career, > 10 yrs (ref)	44 (51)		
Retirement	n = 137	0.48 (0.22–1.01)	0.06
Retiring in next 10 yrs	15 (38)		
Not retiring in next 10 yrs (ref)	54 (56)		

Values in bold are statistically significant. ^a The Mini Z burnout item was dichotomized with those indicating the presence of ≥ 1 symptoms of burnout, grouped (scoring 1–3 on the item) and those indicating no symptoms of burnout, grouped (scoring 4–5). ^b One respondent was omitted from analysis due to low cell count. ^c Respondents who did not select White as their ethnicity were combined under the heading BIPOC due to low cell counts in non-White ethnic groups. BIPOC: Black, Indigenous, people of color.

Table 5. Results from multivariable logistic regression model predicting rheumatologist burnout using the single-item metric on the Mini Z survey.^a

	Estimate	Standard Error	Z	OR	95% CI	P
Intercept	1.89	1.22	1.55	6.63	0.63–77.8	0.12
Sex/gender	0.88	0.42	2.10	2.42	1.07–5.60	0.04*
Age	–0.05	0.02	–2.71	0.95	0.92–0.99	0.007**
Ethnicity	0.62	0.48	1.31	1.86	0.74–4.83	0.19
Practice setting ^b	0.34	0.45	0.76	1.41	0.59, 3.41	0.45
Hours worked per week	–0.01	0.02	–0.58	0.99	0.96–1.02	0.56

^a In the multivariable model the following coding was used: sex/gender (male = 0, female = 1), age (numeric), ethnicity (BIPOC = 0, White = 1), practice setting (community = 0, academic = 1), and hours worked (numeric). ^b Academic or community-based private practice. Full model $P = 0.006^{**}$ and effect size = 0.10.

* $P < 0.05$. ** $P < 0.01$. BIPOC: Black, Indigenous, people of color.

retention strategies. Our findings also provide physician perspectives on the pandemic effect. To our knowledge, this is the first Canadian national rheumatology survey to address burnout. While the pandemic affected many of the workforce variables examined in this survey, there continues to be important workforce trends demonstrated that may affect workforce capacity and access to care.

The survey results were used to generate an updated estimate on the overall national deficit of FTE rheumatologists. The current deficit is estimated at 194 rheumatologists using the benchmark of 1 FTE rheumatologist per 75,000 population. This is relatively stable compared to the previously reported deficit of 203 rheumatologists in 2015.¹ These estimates are based on previous consensus-based recommendations that have been endorsed nationally but require additional validation.²² In

a sensitivity analysis, a benchmark of 2 FTE rheumatologists per 100,000 population was examined to align with previous published targets,²³ identifying an estimated deficit of 447 rheumatologists. Regional workforce projections should be generated in future work accounting for population characteristics and other practice variables,²⁴ which were not readily available for this study. The results remain aligned with international concerns for workforce shortages such as those in the US in both adult²⁵ and pediatric rheumatology.²⁶

The results of our survey warn of an ongoing workforce shortage as a result of retirement and highlight the changing demographics of the workforce. Presently, 28% of the rheumatology workforce plans to retire between 2025–2030. This is comparable to the results from the 2015 survey, which reported 32% planned to retire between 2020–2025.¹ The CMA¹⁸

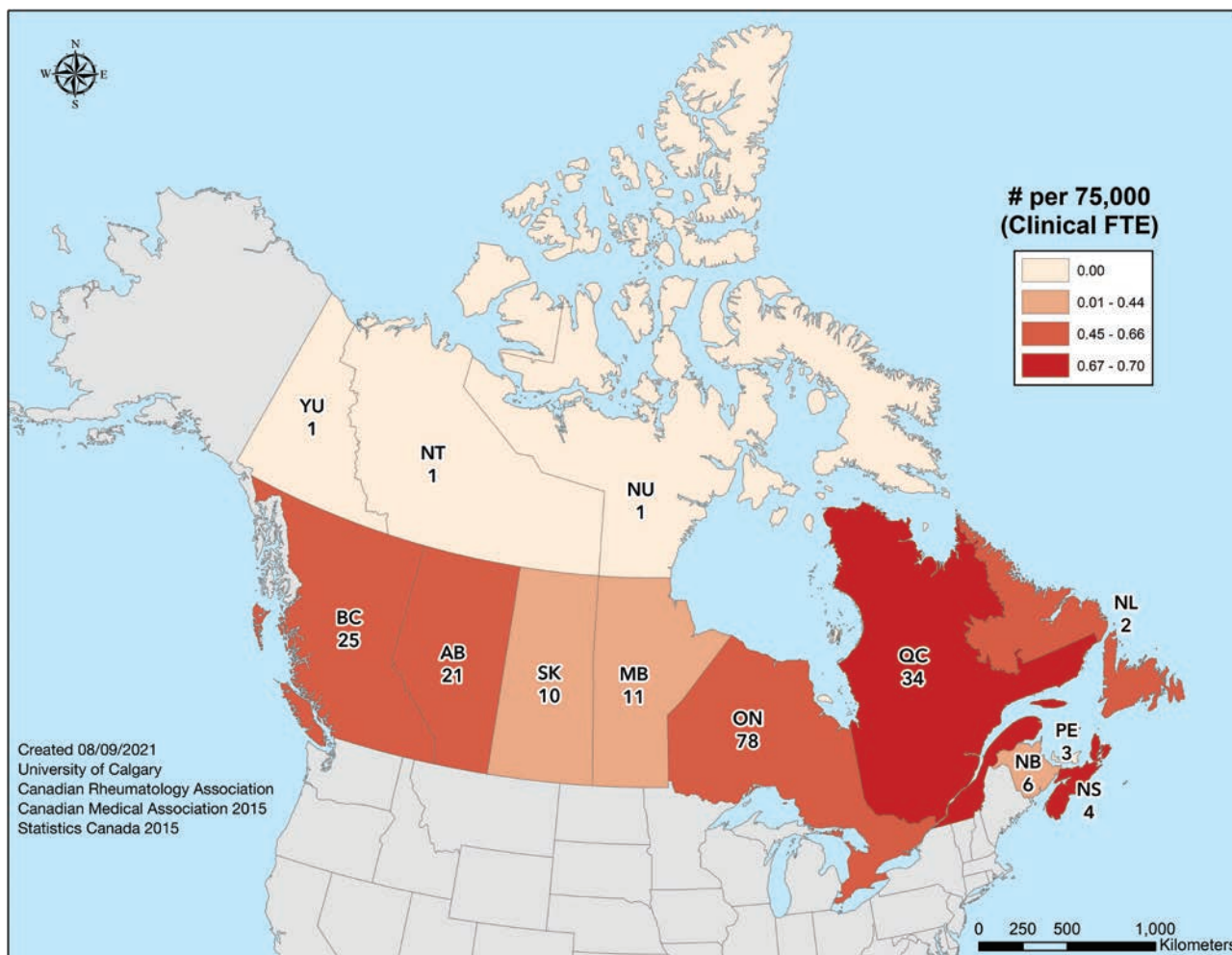


Figure 1. Map of Canada depicting number of clinical full-time FTE-practicing rheumatologists per 75,000 people. The superimposed count on the provinces and territories represents the number of FTE rheumatologists required to meet the target of 1:75,000. FTEs were estimated based on the national median reported time allocated to clinics from all respondents in the 2020 Workforce and Wellness survey and used to adjust the 2019 Canadian Medical Association numbers of rheumatologists in each province. AB: Alberta; BC: British Columbia; FTE: full-time equivalent; MB: Manitoba; NB: New Brunswick; NL: Newfoundland and Labrador; NS: Nova Scotia; NT: Northwest Territories; NU: Nunavut; ON: Ontario; PE: Prince Edward Island; QC: Quebec; SK: Saskatchewan; YU: Yukon.

reported 10 retirements over a 3-year period from 2016 to 2018. Although these data may not be complete, it suggests a discrepancy between retirement plans and actual retirements. Current nonvisa rheumatology trainee numbers from the Canadian Post-MD Education Registry (CAPER)²⁷ indicate that in 2019–2020, there were 88 current adult rheumatology trainees and 11 pediatric rheumatology trainees nationally, with 32 adult and 3 pediatric rheumatology trainees completing training. It is likely it will take some time before the deficit is resolved. Further, the female predominance of the Canadian rheumatology workforce is increasing as over half of Canadian rheumatologists are female²⁸ and between 56–68% of adult rheumatology trainees since 2015–2016 are female.²⁷ This feminization has significant implications for workforce supply given that women, on average, see fewer follow-up and new patients per week, and studies on physician billing support this finding.^{3,4} However, women rheumatologists do not work fewer clinical hours than males, and thus, likely have different practice patterns including spending

more time with patients. Patient outcomes may also be different based on physician sex²⁹ and a dedicated evaluation of this may be of future interest.

Our findings demonstrate ongoing differences in practice characteristics between community- and university-based rheumatologist practices as clinical volumes are nearly double in the community compared to the university setting. This difference is likely because of increased teaching, research, and administrative demands in university-based settings and potential complexity of cases referred to university-based clinics. Similarly, adult rheumatology practices see higher volumes, in part, as most pediatric practices remain in university-based clinics. The present survey did not inquire about models of arthritis care involving other healthcare professionals in advanced practice roles as this was previously published nationally.³⁰

The pandemic had a predictable effect on rheumatologist work patterns. Most notable was the large increase in virtual care. Compared to the 2015 survey, only 14% of respondents

at that time participated in telehealth or e-consultation.¹ Our results are aligned with findings from other practices around the world, which also reported a large increase in virtual care.^{15,16,31,32} Delivering care virtually allowed for provision of rheumatology care despite pandemic-related lockdowns, although many reported that it was difficult to assess a patient's disease activity without being able to complete a physical exam in person.¹⁶ Providers were more comfortable providing virtual care for patients with established, stable disease.¹⁵

Historically, rheumatology has been considered by many to be a relatively "happy specialty" and one that allows for a good work-life balance. One study found that 92% of rheumatologists in the US were satisfied with their job³³ and yet, this present survey shows that burnout is a significant issue, with over half of rheumatologists reporting burnout. This is higher than the national (prepandemic) average of 30% reported in the CMA's National Physician Health Survey.¹⁴ Although our findings are likely affected by the pandemic, this is the present reality, and it is anticipated that the pandemic will have a lasting effect on the workforce. Interestingly, Medscape, which had previously found rheumatologists to be among the happiest specialists, now reports that rheumatologists have the second highest level of burnout among 29 subspecialties.^{11,13} This survey goes on to identify administrative/bureaucratic tasks as the main source of burnout. While there have been some concerns reported with the methodology of the Medscape inquiry,³⁴ the results echo a survey of rheumatologists on burnout that was conducted prepandemic, in which 54% of rheumatologists reported burnout according to the MBI.¹² Further, in our study, women were more likely to report burnout, and both sex/gender and age were significantly associated with burnout. We did not find ethnicity or race to be associated with burnout in our sample. This may be because the number of respondents was low or that there were unique challenges not addressed in the burnout questionnaires. In a large study from American physicians, minority racial/ethnic groups were less likely to report burnout compared with non-Hispanic White physicians.³⁵ In contrast, higher burnout was reported in Canadian ethnic minority internal medicine residents during the pandemic compared to White residents.³⁶ We did not examine resident burnout given the low sample size. Burnout in rheumatology is poorly studied, perhaps as it was historically not considered a significant issue. However, this work suggests potential workforce implications.

While this is the only national Canadian rheumatology survey of its kind, to our knowledge, we recognize several limitations. First, as the survey was sent only to CRA members, nonmember rheumatologists did not have access unless they were ORA members and accessed it through the ORA website. Unfortunately, there is no single comprehensive list of rheumatologists in Canada. Therefore, the CRA membership list was considered a reasonable sample for survey dissemination. This also created challenges for determining an appropriate denominator for our estimate of FTE rheumatologists. We elected to use the CMA master file as it is compiled from multiple sources and was also used for our 2015 survey.¹ However, it is possible there are inaccuracies in these data and a 2020 version was not

available at the time of analysis. Additionally, the CMA numbers were prepandemic and would not have captured any changes to the workforce that were precipitated by the pandemic, such as possible increased retirements. Given the incomplete response rate, generalizability may be a concern because of a higher representation of female respondents and higher numbers with academic affiliation in comparison to the CMA master file.¹⁸ Indeed, female pediatric rheumatologists may see lower patient volumes, affecting some overall estimates. Additionally, surveys may have a response bias such that respondents may have different characteristics compared to nonrespondents. Respondents may also over- or underestimate practice volumes, and in future, linkage to physician billing data would make for an interesting evaluation.

Further, the accepted CRA benchmark of 1:75,000 population was used for our calculations of rheumatologist deficits and as discussed above, this is not a proven benchmark based upon population estimates of rheumatic disease prevalence and health-care use. Last, the COVID-19 pandemic likely influenced several aspects of this survey. We attempted to quantify physician perception of the pandemic's effect but with many pandemic waves, this was difficult. The survey was deployed just after the "first wave" in Canada and remained open many months to improve the response rate. Language in the survey questions such as "prepandemic" and "peak pandemic" may have been difficult to interpret for survey respondents and may have influenced our results. It is possible that the pandemic resulted in higher reported rates of burnout than would usually be present in the workforce, and that levels of pandemic-related burnout varied by COVID-19 case numbers and vaccine development and rollout.

In conclusion, our findings highlight the ongoing shortage of rheumatologists in Canada and that this deficit will worsen without increasing new graduates to cover retirements. This problem may be compounded by the threat of burnout to the retention and the productivity of the current workforce. The pandemic created an immediate threat to the workforce by significantly affecting patient volume, likely affecting rheumatologist remuneration and contributing to delayed care. A further evaluation of the effect of the pandemic and increasing virtual care on rheumatology practices and patient outcomes is warranted. Future advocacy and research efforts should also continue to evaluate the predictors of burnout among rheumatologists as well as to develop strategies to address burnout at local, regional, and national levels.

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ONLINE SUPPLEMENT

Supplementary material accompanies the online version of this article.

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