

Medical oncology workload in Canada: infrastructure, supports, and delivery of clinical care

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ABSTRACT

Background In 2000, a Canadian task force recommended that medical oncologists (MOs) meet a target of 160–175 new patient consultations per year. Here, we report the Canadian results of a global survey of MO workload compared with MO workload in other high-income countries (HICs).

Methods Using a snowball method, an online survey was distributed by national oncology societies to chemotherapy-prescribing physicians in 22 HICs (World Bank criteria). The survey was distributed within Canada to all members of the Canadian Association of Medical Oncologists. Workload was measured as the annual number of new cancer patient consults per oncologist.

Results The survey was completed by 782 oncologists from HICs, including 58 from Canada. Median annual consults per MO were 175 in Canada compared with 125 in other HICs. The proportions of MOs having 100 or fewer consults or more than 300 consults per year were 3% (2/58) and 5% (3/58) in Canada compared with 31% (222/724) and 16% (116/724) in other HICs ($p < 0.001$ and $p = 0.023$ respectively). The median number of patients seen in a full-day clinic was 15 in Canada and 25 in other HICs ($p = 0.220$). Canadian MOs reported spending a median of 55 minutes per new consultation; new consultations of 35 minutes were reported in other HICs ($p < 0.001$). Median hours worked per week was 55 in Canada and 45 in other HICs ($p = 0.200$).

Conclusions Although the median annual clinical volume for Canadian MOs aligns with recommended targets, half the respondents exceeded that level of activity. Health policymakers and educators have to consider MO workforce supply and alternative models of care in preparation for the anticipated surge in cancer incidence in the coming decade.

Key Words Medical oncology, workforce, care delivery

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INTRODUCTION

Cancer is now the leading cause of death in Canada; it is responsible for 30% of all mortality nationally¹. Moreover, the burden of cancer is rising, and by 2032, incident cancer cases in Canada are projected to increase by 79%².

A systemic therapy task force report commissioned in 2000 by Cancer Care Ontario developed recommendations to ensure high-quality, sustainable cancer care. One of the key recommendations was a maximum caseload per

medical oncologist (MO) of 160–175 new patient consults per year³. We are not otherwise aware of any systematic study of the medical oncology workload in Canada. Moreover, we are aware of only three studies from other high-income countries (HICs) that have explored these issues^{4–6}. In those studies (from New Zealand, the United States, and Australia), the MO caseload was 220–280 new patients per year. We recently reported the results of a global analysis of MO workload in which we observed a striking difference in case volumes between HICs and low-to-middle income countries

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(LMICS)⁷. In the absence of Canada-specific workload data, it is difficult for policymakers and educators to anticipate and prepare for future workload needs.

To address this gap in knowledge, we report a subset analysis of a global study, describing the clinical workload of Canadian mos compared with mos in other HCS; the available infrastructure and supports; and the delivery of clinical care in the Canadian context. Data from this study could be useful for human resource planning in the Canadian context.

METHODS

Study Population

We recently reported the results of our global study of medical oncology workload⁷. The population for that study included any practicing physician who delivers chemotherapy (trainees were ineligible). The Web-based survey was distributed using a modified snowball methodology to oncologists in 54 countries and 2 regional networks (Caribbean and Africa). Contact was preferentially directed to established national associations of mos; if that method was not possible, we approached 1 personal contact per country to invite participation and distribute the survey using an informal national network. The survey was distributed to Canadian mos by the Canadian Association of Medical Oncologists (CAMO). The global study attracted 1115 participants from 65 countries. In Canada, 58 mos participated in the study; they form the primary cohort described in the present analysis and are compared with 724 participants from other HCS. The study was approved by the Research Ethics Board of Queen's University.

Survey Design and Distribution

Using Fluid Surveys (Ottawa, ON), an online electronic questionnaire was developed to capture participant demographics, clinical practice setting, clinical workload, and barriers to patient care. The survey was designed with multidisciplinary input from the study investigators. A complete survey was then piloted and subsequently revised based on feedback from 10 additional oncologists. The final survey had 51 questions and took 10–15 minutes to complete.

The survey was distributed by two primary methods. The senior investigator (CMB) contacted individuals and regional oncology associations to create a broad distribution network. The national contact, whether an association or an individual, was provided with an electronic link to the survey for distribution to their national membership or network. The links were unique to each nation, but were not individualized. For ascertaining the national response rate for the survey, the distributing partners were asked to provide the team with the number of survey recipients. The survey was distributed in November 2016. A second reminder e-mail to all national contacts was sent in January 2017.

Statistical Analysis

Countries participating in the global study were classified as LMICS, upper-middle income countries, and HCS based on World Bank criteria⁸. Survey results of respondents who identified Canada as their country of practice were

extracted and analyzed as a group. Those results were then compared against the results from the 21 other HCS that participated in the global study. The primary objective was to compare the workload of Canadian oncologists with the workload of oncologists practicing in other HCS. "Workload" was defined as the annual number of new cancer patient consults per oncologist. All data were initially collected in Fluid Surveys and subsequently exported to the IBM SPSS Statistics application (version 24: IBM, Armonk, NY, U.S.A.). Data consisted of categorical, ordinal, and continuous formats, occasionally collected as ranges (for example, <50, 51–100, 101–150, and so on for consults). In the latter case, medians were generated using the midpoint of the categorical range (for example, a median value of 101–150 would be reported as 125). Pearson chi-square tests were used to test categorical variables for differences in proportions, and the Mann–Whitney *U*-test was used to compare ordinal and continuous data between Canada and the other HCS. A *p* value of less than 0.05 was deemed statistically significant. No adjustments were made for multiple comparisons.

RESULTS

Survey Distribution and Response

Participation in this global study was invited from 31 HCS (including Canada), and mos from 22 HCS (71%) participated, with 724 complete responses being received from mos in HCS. The overall survey response rate for HCS with a known denominator was 12% (400/3362). The survey was distributed to 322 CAMO members, 115 of whom were trainees and therefore not eligible to participate in the study. The response rate within Canada was 28% (58/207), and the response rate for the other HCS (known distribution list denominator) was 11% (342/3155).

Characteristics of Study Participants

The median age of respondents from Canada was 46 years; 50% (29/58) were men (Table 1). Age and sex did not differ substantially between Canadian mos and those from other HCS. Of respondents from other HCS, 81% were mos (590/724). Practitioners from other countries included clinical oncologists (9%, 67/724), pediatric oncologists (1%, 4/724), and hematologists (4%, 28/724). In addition to chemotherapy, radiation was prescribed by 11% of respondents from other HCS (79/724). The mos in Canada were more likely than those from other HCS to have completed training outside their home country [21% (12/58) vs. 8% (56/724), *p* = 0.002]. Median duration of postgraduate training in Canada and other HCS was 6 years and 7 years respectively.

Clinical Practice Setting

Of the Canadian mos, 100% (58/58) reported working exclusively in the public health system; in other HCS, 78% of mos (562/724) worked exclusively in the public system (*p* < 0.001). Fewer oncology inpatient beds were reported at Canadian centres than at centres in other HCS (median: 15 beds vs. 36 beds, *p* < 0.001), and 28% of Canadian mos (16/58) compared with 45% of mos in other HCS (328/724) worked at centres with more than 50 beds (*p* < 0.001).

TABLE 1 Demographics and clinical practice setting of respondents from Canada and other high-income countries (HICs) to a medical oncology workload survey

Variable	Respondent group ^a		p Value
	Canada	Other HICs	
<i>Demography</i>			
Respondents (n)	58	724	
Sex [n (%)]			
Men	29 (50)	407 (57)	0.329
Women	29 (50)	312 (43)	
Median age (years)	46	45	0.221
Specialty [n (%)]			
Medical oncologist	58 (100)	590 (82)	0.073
Clinical oncologist	0	67 (9)	
Pediatric oncologist	0	4 (1)	
Hematologist	0	28 (4)	
Other	0	35 (5)	
Median duration (years) of ...			
Postgraduate training	6	7	0.466
Practice	12	10	0.154
Completed training in home country [n (%)]			
Yes	45 (78)	662 (91)	0.002
No	12 (21)	56 (8)	
No response	1 (2)	6 (1)	
<i>Clinical practice setting</i>			
System [n (%)]			
Public	58 (100)	562 (78)	<0.001
Private	0	65 (9)	
Both	0	97 (13)	
Setting ^b [n (%)]			
Hospital inpatient	30 (52)	552 (76)	<0.001
Hospital outpatient	54 (93)	649 (90)	0.502
Other outpatient	7 (12)	57 (8)	0.262
Hospital type [n (%)]			
General hospital	37 (64)	499 (69)	0.613
Cancer hospital	21 (36)	3 (0)	
Not in hospital setting	0	222 (31)	
Radiotherapy on site [n (%)]			
Yes	57 (98)	612 (85)	0.016
No	1 (2)	109 (15)	
Palliative care on site [n (%)]			
Yes	57 (98)	636 (88)	0.055
No	1 (2)	85 (12)	
Chemotherapy pharmacist on site [n (%)]			
Yes	58 (100)	639 (88)	0.022
No	0	81 (11)	

TABLE 1 Continued

Variable	Respondent group ^a		p Value
	Canada	Other HICs	
<i>Clinical practice setting continued</i>			
Training program in centre [n (%)]			
Yes	47 (81)	574 (79)	0.751
No	11 (19)	150 (21)	
Supervise trainees [n (%)]			
Yes	56 (97)	629 (87)	0.036
No	2 (3)	95 (13)	
Electronic medical record [n (%)]			
Yes	53 (91)	638 (89)	0.537
No	5 (9)	81 (11)	
Clinic notes ^b [n (%)]			
Dictated	58 (100)	280 (39)	<0.001
Hand-written	1 (2)	191 (26)	<0.001
Typed	1 (2)	458 (63)	<0.001
Service extenders ^b [n (%)]			
Nurse	55 (95)	541 (75)	<0.001
Nurse practitioner	29 (50)	400 (55)	0.440
Medical students	42 (72)	194 (27)	<0.001
Residents	47 (81)	436 (60)	0.002
Other physicians	37 (64)	163 (23)	<0.001

^a Because of small amounts of missing data (sex, *n* = 5; age, *n* = 4; radiotherapy on site, *n* = 3; palliative care on site, *n* = 3; chemotherapy pharmacist on site, *n* = 4; access to electronic medical record, *n* = 5), item percentages do not always exactly equal 100%.

^b Respondents could choose multiple responses to this question.

Despite having fewer inpatient beds, Canadian centres had more chemotherapy-prescribing physicians than did centres in other HICs: 69% of Canadian centres (40/58) compared with 52% of centres in other HICs (375/724) had more than 15 chemotherapy physicians (*p* = 0.025). Compared with mos in other HICs, Canadian mos reported greater access to on-site radiation [98% (57/58) vs. 85% (612/724), *p* = 0.016], palliative care [98% (57/58) vs. 88% (636/721), *p* = 0.055], and chemotherapy pharmacists [100% (58/58) vs. 88% (639/724), *p* = 0.022].

Trainee supervision was performed by 97% (56/58) of Canadian mos compared with 87% of mos in other HICs (629/724, *p* = 0.036). Availability of a medical oncology training program at their centre was reported by 81% of Canadian (47/58) and 79% (574/724) of other-HIC respondents. Clinic notes were dictated by 100% (58/58) of Canadian mos and by 39% of mos at other HICs (280/724, *p* < 0.001). A substantial proportion of mos at other HICs reported typing (63%, 458/724) or handwriting (26%, 191/724) clinic notes (or both). Canadian mos were more likely than mos in other HICs to have additional service extenders, including other physicians [64% (37/58) vs. 23% (163/724), *p* < 0.001] and nurses [95% (55/58) vs. 75% (541/724), *p* < 0.001]. Nurse practitioners worked with 50% of Canadian mos (29/58) and 55% of other-HIC mos (400/724, *p* = 0.440). Canadian mos,

compared with other-HIC mos, more commonly reported having medical students [72% (42/58) vs. 27% (194/724), $p < 0.001$] and residents [81% (47/58) vs. 60% (436/724), $p = 0.002$].

Delivery of Clinical Care

Canadian and other-HIC mos both reported working a median of 5 days per week; they reported weekly hours to be 51–60 and 41–50 respectively ($p = 0.200$, Table II). Canadian mos receive a median of 6 weeks' annual vacation compared with 5 weeks in other HICs ($p < 0.001$). The Canadian and other-HICs mos received a median of 2 weeks' annual conference leave. The mos in Canada reported being on call for a median of 2 nights per month; 13% (96/724) of mos in other HICs reported being on call every night. The proportions of time that Canadian mos spend on clinical duties (mean: 63%), research (mean: 16%), teaching (mean: 8%), and administration (mean: 12%) are consistent with the proportions reported by mos in other HICs. Treating all tumour sites was reported by 5% (3/58) of Canadian mos and by 14% (104/724) of other-HIC mos. The cancers most commonly treated by Canadian mos were reported to be breast (45%, 26/58), lung (29%, 17/58), gastrointestinal (41%, 24/58), and genitourinary (24%, 14/58) cancers.

Clinical Volumes

The median number of new consults per year was 175 for Canadian mos compared with 125 for other-HIC mos ($p = 0.006$, Table II). However, the proportions of mos seeing very low and very high volumes of patients were much greater for mos in other HICs. The proportions of mos having 100 or fewer consults per year or more than 300 consults per year were 3% (2/58) and 5% (3/58) in Canada compared with 31% (222/724) and 16% (116/724) in other HICs ($p < 0.001$ and $p = 0.023$ respectively). It is notable that 7% of mos in other HICs (52/724) reported more than 500 new consults per year. In the other-HIC group, clinical volumes varied substantially between countries (Figure 1). Median annual new consults per mo in the 16 HICs with 10 or more responses were Italy, 375; France, 275; Chile, 225; Hungary, 225; Slovenia, 225; Australia, 175; Canada, 175; Estonia, 175; Finland, 175; France, 175; Greece, 175; Portugal, 175; Sweden, 175; United Kingdom, 175; Spain, 125; and Japan, 75.

The median number of patients seen in a full-day clinic was 15 in Canada and 25 in other HICs ($p = 0.220$). The median wait time for a referred patient to be seen in consultation was 8–14 days in Canada and 4–7 days in other HICs ($p < 0.001$). Canadian mos reported spending a median of 55 minutes with each new patient (compared with the 35 minutes reported by mos in other HICs, $p < 0.001$) and 15 minutes with treatment patients (15 minutes in other HICs). The median percentage of patients with whom respondents discussed estimated survival or prognosis was 85% in Canada and 55% in other HICs ($p < 0.001$). Attendance at a minimum of 1 multidisciplinary case conference per week was reported by 93% of mos in Canada and in other HICs.

Satisfaction, Barriers, and Challenges

The median job satisfaction score on a 10-point Likert scale (higher scores represent higher satisfaction) was 8 in Canada and in other HICs. The most common barriers

to clinical care reported by mos in Canada compared with mos from other HICs included high clinical volumes [60% (35/58) vs. 64% (460/724), $p = 0.628$], limited access to

TABLE II Clinical care delivery and clinical volumes^a reported by respondents from Canada and other high-income countries (HICs) to a medical oncology workload survey

Variable	Respondent group		p Value
	Canada (n=58)	Other HICs (n=724)	
<i>Delivery of clinical care</i>			
Work week			
Work days (median)	5	5	0.576
Work hours (median)	51–60	41–50	0.200
Leave (median weeks)			
Annual vacation	6	5	<0.001
Annual conference leave	2	2	0.329
On-call duty			
On-call time per month (median days)	2	3	0.003
On-call duty every night [n (%)]	0	96 (13)	<0.001
Allocation of duties (mean %)			
Clinical duties	63	63	0.958
Research	16	14	0.181
Teaching	8	8	0.522
Administration	12	14	0.124
Disease sites [n (%)]			
All cancers	3 (5)	104 (14)	0.048
Breast	26 (45)	284 (39)	0.401
Lung	17 (29)	217 (30)	0.916
Gastrointestinal	24 (41)	294 (41)	0.892
Genitourinary	14 (24)	190 (26)	0.725
<i>Clinical volumes</i>			
Annual new consults ^b			
Median (n)	151–200	101–150	0.006
≤100 [n (%)]	2 (3)	222 (31)	
101–150 [n (%)]	9 (16)	149 (21)	
151–200 [n (%)]	25 (44)	104 (15)	
201–250 [n (%)]	13 (23)	83 (12)	
251–300 [n (%)]	5 (9)	44 (6)	
>300 [n (%)]	3 (5)	116 (16)	
Patients seen per clinic day ^b			
Median (n)	10–20	21–30	0.220
<10 [n (%)]	1 (2)	75 (10)	
10–20 [n (%)]	25 (43)	299 (42)	
21–30 [n (%)]	22 (38)	225 (31)	
31–40 [n (%)]	9 (16)	78 (11)	
41–50 [n (%)]	1 (2)	31 (4)	
>50 [n (%)]	0	12 (2)	

TABLE II Continued

Variable	Respondent group		p Value
	Canada (n=58)	Other HICs (n=724)	
<i>Clinical volumes continued</i>			
Time spent per patient (median minutes)			
New consult ^b	51–60	31–40	<0.001
Chemotherapy treatment patient ^b	11–20	11–20	0.332
Wait time for new consult (median days)	8–14	4–7	<0.001

^a Per full day of outpatient clinic.

^b For these questions, small amounts of data were missing (new patient consults, $n = 7$; new patients seen per day, $n = 4$; time spent for new consult, $n = 1$; time spent for chemotherapy patient, $n = 2$).

new treatments [36% (21/58) vs. 25% (181/724), $p = 0.061$], a shortage of nurses [22% (13/58) vs. 29% (212/724), $p = 0.266$], insufficient time for reading [19% (11/58) vs. 45% (327/724), $p < 0.001$], and a shortage of mos [17% (10/58) vs. 36% (264/724), $p = 0.003$].

DISCUSSION

In this study, we describe workload, infrastructure, and delivery of care for Canadian mos. For comparative purposes, we also present data for mos from 21 other HICs. Several important findings have emerged. First, the median number of new patients reported per year was 175 in Canada compared with 125 in other HICs. It is notable that, although the Canadian median workload aligns with the annual new consult load of 160–175 recommended by the Cancer Care Ontario task force in 2000³, half the respondents to our survey reported more than 175 new consults per year. Second, compared with other-HIC mos, Canadian mos see fewer patients per day, but spend more time with each patient. Third, compared with other-HIC mos, Canadian mos had more service extenders; a greater number of on-site colleagues; fewer inpatient beds; and greater access to on-site radiation, palliative care, and chemotherapy pharmacists. Finally, the greatest challenges to clinical care reported by Canadian mos are high clinical volumes and limited access to new cancer therapies.

We recently completed the first global analysis of the medical oncology workload and available infrastructure⁷. In our global analysis, we found striking differences in workload and delivery of clinical care between LMICs, upper-middle income countries, and HICs. The annual case volume was substantially higher in LMICs (median consults: 425, with 40% of respondents having >500 consults) than in upper-middle income countries (175, 14% >500) and HICs (175, 7% >500, $p < 0.001$).

We are aware of only three contemporary studies from other HICs that describe oncologist workload. In 2015, Balch *et al.*⁵ reported practice data for 589 hematologists or oncologists in the United States. In their cohort, the median annual consult load was approximately 260 for

office patients only, but rose to 350 per oncologist if hospital inpatients were included. In a 2009 Australian survey, Blinman *et al.*⁶ reported an annual new consult workload of 280 for 94 Australian mos. Finally, a 2009 survey of 32 mos by the New Zealand Working Group reported an annual consult load of 220⁴.

To our knowledge, this description of the medical oncology workload in Canada is the first since the release of the Cancer Care Ontario Systemic Therapy Task Force report in 2000³. The median new consult load reported by mos in Canada (175) aligns with the proposed target of 160–175. However, half of our respondents exceeded the 175 new consults per year metric, and one third exceeded 200 new consults per year. Given the expected future increase in cancer incidence within Canada, health systems will not only have to develop new models of care that make use of service extenders, but also to ensure continued growth in the medical oncology workforce.

The median annual consult workload of Canada mos exceeds the median annual workload in HICs. However, the distribution of clinical volume is more homogenous in Canada, where only a small number of mos are at the very low (≤ 100 consults/year) or very high (> 300 consults/year) ends of the workload spectrum. That observation likely highlights the marked heterogeneity of health care delivery in the other HICs and suggests some element of consistency in Canada; it might also relate to Canada's single-payer universal cancer care system. It is also notable that access to services extenders was greater for Canadian mos than for mos in other HICs. Our data are consistent with the 2014 Canadian Physician Survey, which reported that mos work 52.5 hours per week⁹.

The barriers to care put forth by mos in Canada offer important insights for future planning. Concern about high clinical volumes suggests that workforce planning exercises and new models of care might be required sooner rather than later, especially in light of the massive surge in new cases that is expected in the next decade. One third of mos in Canada report challenges in accessing new cancer therapies; those challenges further contribute to mo workload because substantial time and effort are required to gain "special access" to therapies that are not funded by provincial health plans.

Our study results should be considered in light of important methodologic limitations. Because of potential selection (volunteer) bias, it is possible that our results are not generalizable to all Canadian mos. Although our survey was distributed to all CAMO members, that association includes only 207 practicing mos in Canada. Current estimates suggest that there are approximately 596 mos in Canada¹⁰. Accordingly, the CAMO membership represents only a proportion of all mos in the country. The 28% of CAMO members who responded to our survey might therefore not be representative of all Canadian mos. The direction of the bias is uncertain, given that the highest-volume mos might be less likely to respond to a survey given other time pressures; alternatively, those mos might be more likely to respond if they believe the survey issues to be important and relevant. Within Canada, it is generally expected that, because of education and research commitments, mos at academic centres will have lower clinical volumes than

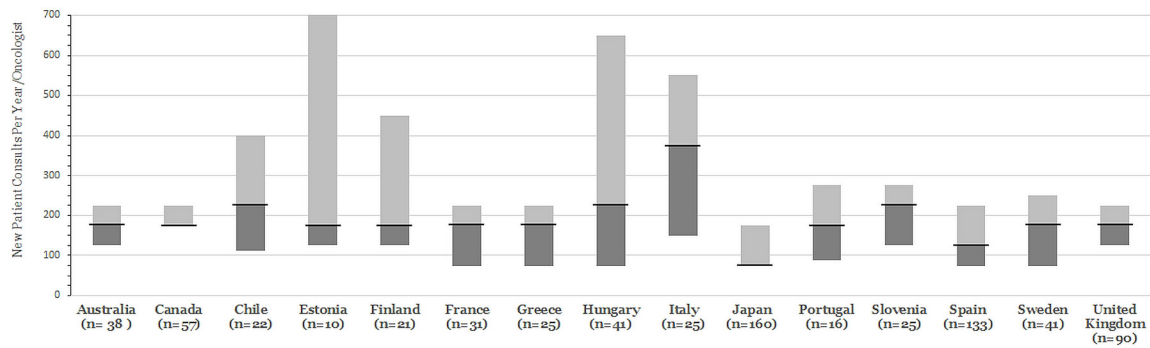


FIGURE 1 Median annual new patient consultations (with 25th–75th percentile) reported by survey respondents from Canada and other high-income countries to a medical oncology workload survey. Countries having fewer than 10 respondents are excluded (Ireland, $n=1$; Kuwait, $n=3$; New Zealand, $n=3$; Oman, $n=1$; Singapore, $n=5$; Saudi Arabia, $n=7$; Switzerland, $n=9$; Trinidad and Tobago, $n=1$; United Arab Emirates, $n=3$; United States, $n=3$).

community practitioners have. Although our survey did not explicitly ask if an individual mo's practice was academic, the fact that 81% of respondents reported having a mo training program at their centre suggests that our sample probably disproportionately reflects academic medical oncology in Canada. Our data also do not offer insights into the geographic distribution of mo respondents across Canada. Because our data are self-reported, they might or might not represent true clinical volumes, because respondents might overestimate workload. For comparative purposes, we included respondents from 21 other HICs. There is clearly substantial variation between the other HICs that renders comparisons with Canada difficult to interpret. Finally, the workload metric (new consults per year) is a crude marker of clinical workload because the work involved can vary substantially by cancer subtype and patient population.

CONCLUSIONS

Our study offers some insight into the medical oncology workload and delivery of clinical care in Canada. The recommended mo workload corresponds to the median workload reported by respondents, meaning that half the respondents exceeded the target; one third of respondents were well above the recommended target. Future work would benefit from using administrative health datasets explore mo workload and more accurately evaluate clinical activity in a broader population. As health policymakers and educators plan for future increases in oncology case volumes, more granular analysis of current workloads and alternative models of care are needed.

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CONFLICT OF INTEREST DISCLOSURES

We have read and understood *Current Oncology's* policy on disclosing conflicts of interest, and we declare that we have none.

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