Patterns of physician retirement and pre-retirement activity: a population-based cohort study

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ABSTRACT

BACKGROUND: Knowing when physicians retire and how they practise in the pre-retirement years is important information for health human resource planning. We identified patterns of retirement for physicians in British Columbia and the determinants of when and how physicians retire.

METHODS: For this population-based retrospective cohort study, we used administrative data to examine activity levels and to identify retirements among BC's practising physicians. We included all physicians who were at least 50 years of age as of March 2006 and who had received payments for clinical services in at least 1 year between 2005/06 and 2011/12. We defined retirement as a permanent drop in monthly payments to less than $1667/month ($20 000/yr). We examined the patterns and timing of retirement by age, sex, specialty and location using linear and logistic regression models.

RESULTS: Of the 4572 physicians who met the inclusion criteria, 1717 (37.6%) retired during the study period. The average age at retirement was 65.1 (standard deviation 7.8) years. Controlling for other demographic and practice characteristics, we found that women and physicians working in rural areas retired earlier, by 4.1 (95% confidence interval [CI] −4.9 to −3.2) years and 2.3 (95% CI −3.4 to −1.1) years, respectively. We found no dif-

ference in retirement age by specialty. We identified 4 patterns of pre-retirement activity: slow decline, rapid decline, maintenance and increasing activity. About 40% of physicians (440/1107) reduced their activity levels by at least 10% in the 3 years preceding retirement.

INTERPRETATION: During the study period, physicians in BC — particularly women and those in rural areas — retired earlier than indicated by licensure and survey data. Many physicians reduced their practice activity in the pre-retirement years. These trends indicate that forecasts relying on licensure "head counts" are likely overestimating current and future physician supply.

Physician supply is a perennial preoccupation in Canada. Effective and accurate physician workforce planning requires data on how many physicians are being trained and in what specialties, combined with information on physicians' clinical activity over the work life cycle, particularly as they are nearing retirement.[1] These data are also relevant for clinicians themselves. Retirement represents a complex transition for physicians, who are balancing financial considerations with workload, work identity, personal health, spousal employment and a sense of responsibility to their panels of patients.[2,3] Heavy workload and burnout are commonly cited as reasons for early retirement, whereas ongoing financial obligations may

delay the transition to retirement.[4] Furthermore, early retirements may increase the pressure on those not retiring to take on additional patients or provide additional services. This, in turn, may affect rates of physician burnout and the ability to maintain an appropriate work–life balance.

Although substantial attention has been directed toward physician supply more broadly, there has been relatively little research examining retirement patterns or pre-retirement clinical activity. Most existing evidence relies on surveys, in which physicians are asked about their intention to retire within a set future period of time.[5–8] Data from 2013 suggested that 15% of Canadian family physicians and 12% of other specialists (repre-

senting 53% of physicians aged 65 or older) intended to retire between 2014 and 2016.[9] An additional 30% of all physicians surveyed planned to reduce their hours, and 13% planned to reduce their scope of practice.[9]

There is limited empiric evidence about the relation between these self-reported intentions and actual changes in clinical activity. Where such evidence exists, it suggests that self-reporting projects a substantially higher rate of retirement (and at an earlier age) than has been observed using licensure data.[10,11] However, where self-reporting may overestimate retirements, licensure data may underestimate them, either because of a lag in obtaining up-to-date information[12] or because physicians may maintain active licences without delivering any substantial quantity of clinical care.[10,11]

Understanding what physicians are doing in the years leading up to retirement is also important, and literature in this area is similarly limited. Survey data suggest that 90% of physicians would prefer to retire gradually, reducing clinical workload over time, rather than stopping work completely.[13] This is consistent with a recent analysis of payment data, which suggested that physicians' workloads decline and scopes of practice narrow after age 65.[10]

In this study, we analyzed physician retirements and pre-retirement activity using payment data, which addresses the shortcomings of both self-reported and licensure data by measuring actual practice activity. We identified the patterns and determinants of retirement and pre-retirement activity among all physicians 50 years of age or older practising in British Columbia.

Methods

Data sources

In this population-based, retrospective cohort study, we used administrative data to describe physician retirements and pre-retirement activity. We used physician payment files from BC's Medical Services Plan for fiscal years 2005/06 to 2011/12 to track fee-for-service payments at the physician level.[14] We also incorporated data from the BC Ministry of Health's Alternative Payment Program database, which tracks non–fee-for-service payments to physicians, including salary, service contracts, sessional fees and other forms of payments.[15] These 2 data sets together encompass 100% of the clinical payments made to physicians in the public health system during the study period. To focus on changes in levels of activity, we removed the effects of fee changes by valuing all fee-for-service payments to physicians at 2012 fee levels. We adjusted payments from the Alternative Payment Program to 2012 dollars using the consumer price index.

Data in the physician payment files are recorded as unique combinations of physician, patient, service and date. Data in the Alternative Payment Program database, by contrast, are recorded on an annual basis at the physician level. To estimate monthly payment amounts from the Alternative Payment Program, we divided each physician's payments from that program by the number of months they were active in the Medical Services Plan data set. For physicians who had no fee-for-service payments but were still active within the Alternative Payment

Program database, we divided their annual payments by the number of months they maintained an active practice licence.

We obtained demographic information about physicians — including age, sex, specialty and practice location — from the College of Physicians and Surgeons of British Columbia.[16] We classified practice location as rural-dominated (health service delivery area having no city with population > 75 000 or having less than 75% of the population in a defined census metropolitan area[17]), urban-dominated (health service delivery area having at least 1 city with population > 75 000 and in which at least 75% of the population lives in a census metropolitan area) or metropolitan (health service delivery area in which > 90% of population lives in census metropolitan area with population > 75 000).

Study population

We started with the complete population of physicians in BC who received any income through fee for service or the Alternative Payment Program for clinical practice in at least 1 year between 2005/06 and 2011/12 and who were aged 50 years or older as of Mar. 31, 2006. Age 50 was selected as the cut-off to ensure we were not introducing an upward bias into our calculated average retirement age by choosing a cut-off that was too close to "normal" retirement age. We also wanted to ensure that we could examine physicians' activity levels in the years that preceded a retirement transition. We excluded individuals who practised out of province or had opted out of public practice, as well as those whose licences were suspended and those who died.

Identification of retirement

We conceptualized retirement as the cessation of substantial clinical activity, not necessarily the complete absence of clinical activity and income. From this perspective, we assumed that a physician who billed for very few patient consultations was effectively retired. We tested a variety of payment thresholds to identify retirement events, varying the threshold between $0 and $40 000 annually ($0 to $3333 per month). Correlations among the different payment thresholds tested was high (r^2 range 0.86 to 0.93), and varying the threshold changed only slightly the number of physicians identified as retiring and did not affect either the direction or significance of the regression results.

Given these threshold-invariant preliminary results, we elected to use the moderate threshold of $20 000 as our retirement definition: if and when a physician's monthly payments fell and remained below $1667 ($20 000 annually) for the rest of the study period, that physician was flagged as having retired in that month.

Pre-retirement activity trajectories

To examine patterns of practice in the years preceding retirement, we refined our cohort to include only those individuals for whom we had 3 full years of practice activity (payments greater than $0). We computed the average slope of billing activity in those years and identified 4 mutually exclusive and exhaustive patterns: increase (an increase in activity of 10% or greater), maintenance (limited change in activity [± <10%]), slow decline (a decline in activity of 10% to <25%) and rapid decline (a decline

in activity of 25% to <90%). We found no frequently occurring patterns of pre-retirement activity that did not fit within 1 of these 4 categories.

Statistical analysis

We examined whether the propensity to retire differed by specialty grouping (primary care, medical specialty, surgical specialty or laboratory/imaging specialty) or physician demographic characteristics (sex, age, rurality of practice location, training location) using χ^2 tests. We modelled propensity to retire using a multivariable logistic model, including the same list of clinical and demographic covariables.

For physicians who retired during the study period, we used a multivariable linear regression to determine the association between age at retirement and physician sex, specialty, training location and practice location.

Finally, we examined the frequency of pre-retirement activity patterns within the subgroup of physicians for whom we had 3 years of activity, and explored the relation between identified trajectories and clinical and demographic characteristics.

Ethics approval

This study was approved by the University of British Columbia Behavioural Research Ethics Board.

Results

A total of 4854 physicians met the initial inclusion criteria. We excluded a total of 282 individuals, which left a final cohort of 4572 physicians (Figure 1). Of the final cohort, 3658 (80.0%) were men, 2193 (48.0%) were aged 65 or over by the end of the study period, and 518 (11.3%) were aged 75 or over by the end of the study period (Table 1). Annual all-source clinical payments averaged $270 000 in 2012 Canadian dollars. A total of 2976 physicians (65.1%) practised in metropolitan centres, and 2925 (64.0%) had trained within Canada.

Retirement

A total of 1717 (37.6%) of the physicians retired during the study period. An additional 486 (10.6%) dipped below the threshold of clinical activity before returning to active practice; of these, 226 (46.5%) remained inactive for at least 1 full year before their return.

Adjusting for other demographic and clinical characteristics, female physicians had 1.7 times greater odds of retiring during the study period (95% confidence interval [CI] 1.4 to 2.0) (Table 2). Physicians in older age categories had higher odds of retiring compared with those in the younger age groups (e.g., for age ≥ 75 v. 56–59 yr, odds ratio [OR] 12.0, 95% CI 9.3 to 15.4). Physicians with a medical specialty (OR 1.2, 95% CI 1.0 to 1.4)
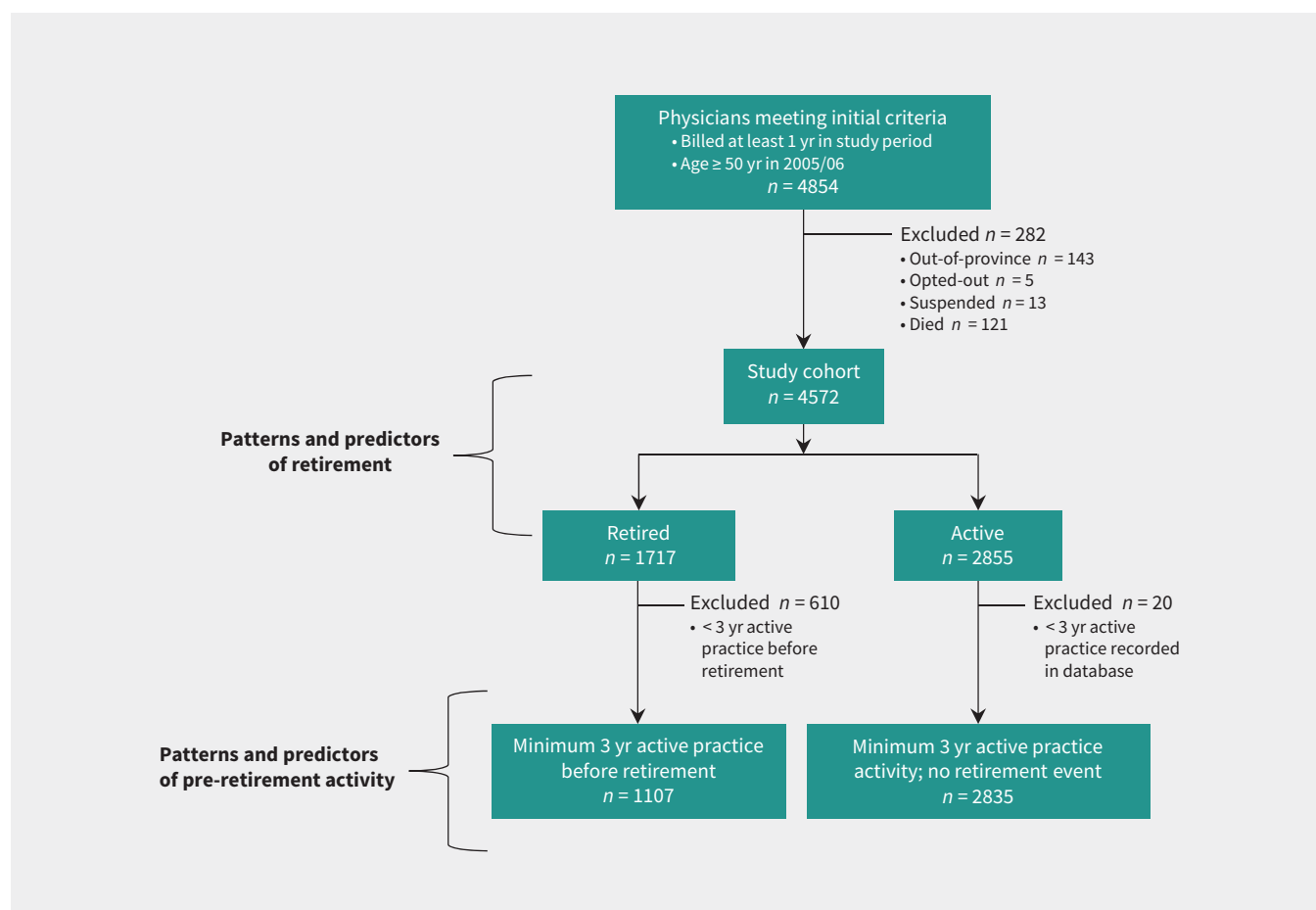
Figure 1: Cohort selection for a study of physician retirement and pre-retirement activity.

and those with a laboratory or imaging specialty (OR 1.9, 95% CI 1.5 to 2.5) had significantly higher age-specific odds of retirement compared with family physicians. Physicians whose practices were located in rural areas also had higher age-specific odds of retirement compared with those located in metropolitan centres (OR 1.6, 95% CI 1.3 to 2.0). We found no difference in the odds of retirement by location of training (Canadian v. international).

Age at retirement

In our cohort, the average age at retirement was 65.1 (standard deviation 7.8) years. Controlling for the effects of physician specialty, age, practice location and training location, we found that female physicians retired 4.1 years earlier (95% CI –4.9 to –3.2 yr) than their male counterparts (Table 3). Physicians practising in rural areas retired 2.3 years earlier (95% CI –3.4 to –1.1 yr) than

those practising in large metropolitan centres, whereas those who trained outside Canada retired 2.3 years later (95% CI 1.6 to 3.1) than those who trained within Canada. We found no difference in retirement age across specialty groups.

Pre-retirement activity

We had a minimum of 3 complete years of data for 3942 (86.2%) of the 4572 physicians. Of these, 1107 (28.1%) had a recorded retirement event. The physicians for whom we did not have the minimum 3 years of follow-up all retired within the first 3 years of the study period.

Patterns varied among those physicians who were retiring relative to those who were not retiring (Table 4). Retiring physicians were significantly more likely than non-retiring physicians to show patterns of slow (18.7% v. 7.4%) or rapid (21.1% v. 0.6%) reductions in activity, whereas non-retiring physicians were more likely

Table 1: Cohort demographic characteristics and retirements

Characteristic	No. (%) in cohort	No. (%) of those in full cohort who retired	Age at retirement (of those who retired), yr, mean ± SD
Total	4572	1717 (37.6)	65.1 ± 7.8
Sex*			
Male	3658 (80.0)	1351 (36.9)	66.0 ± 7.7
Female	914 (20.0)	366 (40.0)	61.9 ± 6.7
Age group in 2012, yr†			NA
56–59	1033 (22.6)	243 (23.5)	
60–64	1346 (29.4)	361 (26.8)	
65–69	1120 (24.5)	423 (37.8)	
70–74	555 (12.1)	317 (57.1)	
≥ 75	518 (11.3)	373 (72.0)	
Specialty‡			
Primary care	2294 (50.2)	796 (34.7)	65.7 ± 7.3
Medical	1113 (24.3)	429 (38.5)	65.2 ± 7.9
Surgical	827 (18.1)	325 (39.3)	66.1 ± 7.6
Laboratory/imaging	338 (7.4)	167 (49.4)	65.1 ± 7.0
Practice rurality in 2012§¶			
Metropolitan	2976 (65.1)	1025 (34.4)	66.0 ± 7.5
Urban-dominated	992 (21.7)	377 (38.0)	65.4 ± 7.7
Rural-dominated	480 (10.5)	195 (40.6)	64.0 ± 7.2
Location of training**			
Canada	2925 (64.0)	1069 (36.5)	64.3 ± 7.3
International	1647 (36.0)	648 (39.3)	66.6 ± 8.0

Note: NA = not applicable, SD = standard deviation.
*χ^2 = 3.0 (p = 0.08), t = –10.1 ($p < 0.001$).
†χ^2 = 505.6 ($p < 0.001$).
‡χ^2 = 29.8 ($p < 0.001$), F = 2.7 (p = 0.04).
§Rurality data were missing for 124 physicians from full cohort and 120 physicians who retired.
¶χ^2 = 9.3 (p = 0.01), F = 5.8 (p = 0.003).
**χ^2 = 3.5 (p = 0.06), t = –6.0 ($p < 0.001$).

than retiring physicians to maintain their activity levels (77.7% v. 38.1%) (*p* < 0.001). Of the 1107 retiring physicians, 440 (39.7%) reduced their practice activity levels between 10% and 90% in the years preceding retirement. We found no significant differences in pre-retirement activity across demographic or clinical characteristics (Table 5).

Interpretation

In this study, we found that the average age at retirement among BC physicians was 65.1 years. Physicians who were female and those who were practising in rural areas tended to retire earlier. We also found that physicians who were within 3 years of retiring exhibited different activity patterns than those who continued to practise. Many reduced their activity levels in the years immediately preceding retirement, some quite substantially. This finding is consistent with survey-based evidence that most physicians would prefer to retire gradually.[13] The finding that many physicians reduced their activity levels in the years before retirement is of particular importance because it implies that physician resource plans relying on "head counts" of the physician population will overestimate "effective" or active physician supply.

Earlier retirement among rural physicians may be related to the higher rates of burnout observed in this population.[18] It may also reflect the lower cost of living in rural areas, which provides greater ability to save for retirement. Regardless of the reason, early retirement in these communities is of particular concern, given that many rural areas are known to have substantial difficulties recruiting and retaining physicians.[19,20] A smaller rural physician workforce could see increased rates of burnout and deterioration in the ability of those physicians to achieve work–life balance, while also exacerbating access issues for the residents of those communities.

Although there was a declining level of pre-retirement activity among many of the physicians who retired, we did not examine whether this decline was associated with a narrowing of clinical scope or merely a reduction in overall caseload. Other research has suggested that scope of practice for primary care physicians does narrow with age;[10] however, we could locate no studies that addressed this question for other specialties. A narrowed scope of practice among family physicians in particular could have a disproportionate effect in rural and remote communities.[21]

We examined a complete cohort of physicians who were actively practising within in a specified jurisdiction. We used administrative payment data, including non–fee-for-service payments, covering 100% of clinical payments to these physicians through the BC Medical Services Plan to identify retirements and characterize pre-retirement activity. This approach represents both an important methodologic strength and an improvement on the existing body of evidence in this area, which has thus far been dominated by self-report surveys. We are aware of only 1 prior study that used physician payment data, and its methods did not allow inclusion of physicians who were paid by non–fee-for-service methods.[10] This type of payment may be particularly important to consider, given that physicians may adjust their mix of professional activities (e.g., moving away from fee-for-service clinical practice) in their later active years.

Table 2: Logistic regression for odds of retirement	
Variable	**OR (95% CI)**
Sex	
Male	1.0 (ref)
Female	1.7 (1.4 to 2.0)
Age, yr	
56–59	1.0 (ref)
60–64	1.4 (1.1 to 1.7)
65–69	2.5 (2.0 to 3.1)
70–74	5.9 (4.6 to 7.4)
≥ 75	12.0 (9.3 to 15.4)
Specialty	
Primary care	1.0 (ref)
Medical	1.2 (1.0 to 1.4)
Surgical	1.2 (1.0 to 1.4)
Laboratory/imaging	1.9 (1.5 to 2.5)
Practice rurality	
Metropolitan	1.0 (ref)
Urban-dominated	1.3 (1.1 to 1.6)
Rural-dominated	1.6 (1.3 to 2.0)
Location of training	
Canada	1.0 (ref)
International	0.9 (0.8 to 1.1)

Note: CI = confidence interval, OR = odds ratio.

Table 3: Linear regression for age at retirement	
Variable	**Relative age at retirement, yr* (95% CI)**
Intercept	66.0 (65.3 to 66.7)
Sex, female	–4.1 (–4.9 to –3.2)
Specialty	
Medical	–0.2 (–1.1 to 0.7)
Surgical	0.4 (–0.6 to 1.4)
Laboratory/imaging	–0.7 (–1.9 to 0.6)
Practice rurality	
Urban-dominated	–0.5 (–1.4 to 0.3)
Rural-dominated	–2.3 (–3.4 to –1.1)
Location of training, International	2.3 (1.6 to 3.1)

Note: CI = confidence interval.
*Age at retirement is presented relative to the reference category for each variable, as follows: for sex, reference category was male; for specialty, primary care; for practice rurality, metropolitan; for training location, Canada.

Questions about physician retirement and pre-retirement activity are relevant to all jurisdictions in Canada and beyond. The methodology we have employed here could be deployed in other provinces with similar physician payment systems. Furthermore, we expect that physicians in general will have similar motivations for when and how to retire, and our results are therefore likely to be applicable to jurisdictions outside of BC. Indeed, there is some evidence to suggest similar patterns among physicians in Ontario.[22]

Table 4: Activity patterns for non-retired (active) physicians and physicians who retired during the study period

	Activity pattern*; no. (%) of physicians†				
Characteristic	Maintenance	Rapid decline	Slow decline	Increase	Total
Total‡	2624	251	417	650	3942
Active	2202 (77.7)	18 (0.6)	210 (7.4)	405 (14.3)	2835
Retired	422 (38.1)	233 (21.0)	207 (18.7)	245 (22.1)	1107

*Activity patterns were defined as follows: maintenance = limited change in activity (± <10%), rapid decline = activity decline of 25% to <90%, slow decline = activity decline of 10% to <25%, increase = activity increase ≥ 10%. The table includes only physicians with at least 3 years of data.
†Percentages are calculated across rows.
‡χ^2 = 833.8 (p < 0.001).

Table 5: Activity patterns for physicians who retired during the study period, in relation to various characteristics

	Activity pattern*; no. (%) of physicians†				
Characteristic	Maintenance	Rapid decline	Slow decline	Increase	Total
Sex‡					
Male	329 (37.9)	187 (21.6)	166 (19.1)	185 (21.3)	867
Female	93 (38.8)	46 (19.2)	41 (17.1)	60 (25.0)	240
Age group in 2012, yr (%)§					
56–59	52 (34.9)	35 (23.5)	25 (16.8)	37 (24.8)	149
60–64	109 (41.4)	50 (19.0)	47 (17.9)	57 (21.7)	263
65–69	103 (34.7)	73 (24.6)	59 (19.9)	62 (20.9)	297
70–74	71 (35.0)	45 (22.2)	37 (18.2)	50 (24.6)	203
≥ 75	87 (44.6)	30 (15.4)	39 (20.0)	39 (20.0)	195
Specialty¶					
Primary care	206 (38.9)	102 (19.2)	91 (17.2)	131 (24.7)	530
Medical	111 (40.2)	54 (19.6)	50 (18.1)	61 (22.1)	276
Surgical	68 (34.2)	48 (24.1)	50 (25.1)	33 (16.6)	199
Laboratory/imaging	37 (36.3)	29 (28.4)	16 (15.7)	20 (19.6)	102
Practice rurality in 2012††**					
Metropolitan	271 (39.0)	135 (19.4)	139 (20.0)	149 (21.5)	694
Urban-dominated	91 (35.4)	52 (20.2)	47 (18.3)	67 (26.1)	257
Rural-dominated	43 (39.8)	29 (26.8)	16 (14.8)	20 (18.5)	108
Training ‡‡					
International	265 (37.4)	154 (21.8)	136 (19.2)	153 (21.6)	708
Canadian	157 (39.3)	79 (19.8)	71 (17.8)	92 (23.1)	399

*Activity patterns were defined as follows: rapid decline = maintenance = limited change in activity (± <10%), activity decline of 25% to <90%, slow decline = activity decline of 10% to <25%, increase = activity increase ≥ 10%. The table includes only physicians with at least 3 years of data.
†Percentages are calculated across rows.
‡χ^2 = 2.1 (p = 0.5).
§χ^2 = 13.1 (p = 0.4).
¶χ^2 = 16.2 (p = 0.06).
**Rurality data were missing for a total of 48 retired physicians.
††χ^2 = 7.22 (p = 0.3).
‡‡χ^2 = 1.22 (p = 0.8).

Limitations

Although the use of administrative payments data represents a methodologic advantage of this study, we did not measure factors shaping retirement decisions, such as job satisfaction and burnout, feelings of responsibility for patients, personal or family medical issues, psychologic distress, financial obligations and spousal workforce participation.[3,4] Furthermore, because our data were limited to clinical activity, we could not examine whether physicians who left clinical practice did so to move on to other forms of employment, such as research or teaching positions.

Conclusion

Retirement and pre-retirement activity represent complex decisions for physicians, and pose challenges for decision-makers charged with health human resources planning. We found that BC physicians are retiring earlier than licensure data would imply, and many are reducing their practice activity in the years preceding retirement. Current planning efforts that rely on physician licensure data are vulnerable to overestimation of physician supply, because they do not account for physicians who are maintaining an active licence while no longer practising or the reduction in workload associated with the pre-retirement years.

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