

How many physicians does Canada need to care for our aging population?

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Abstract

Background: There is concern that the aging of Canada's population will strain our health care system. The authors address this concern by examining changes in the physician supply between 1986 and 1994 and by assessing the availability of physicians in 1994 relative to population growth and aging, and relative to supply levels in the benchmark province of Alberta.

Methods: Physician numbers were obtained from the Canadian Institute for Health Information. The amount of services provided by each specialty to each patient age group was analysed using Manitoba physician claims data. Population growth statistics were obtained from Statistics Canada. Age- and specialty-specific utilization data and age-specific population growth patterns were used to estimate the number and type of physicians that would have been required in each province to keep up with population growth between 1986 and 1994, in comparison with actual changes in the physician numbers. Physician supply in Alberta was used as a benchmark against which other provinces were measured.

Results: Overall, Canada's physician supply between 1986 and 1994 kept pace with population growth and aging. Some specialties grew much faster than population changes warranted, whereas others grew more slowly. By province, the supply of general practitioners (GPs) grew much faster than the population served in New Brunswick (16.6%), Alberta (6.5%) and Quebec (5.3%); the GP supply lagged behind in Prince Edward Island (-5.4%). Specialist supply outpaced population growth substantially in Nova Scotia (10.4%), Newfoundland (8.5%), New Brunswick (7.3%) and Saskatchewan (6.8%); it lagged behind in British Columbia (-9.2%). Using Alberta as the benchmark resulted in a different assessment: Newfoundland (15.5%) and BC (11.7%) had large surpluses of GPs by 1994, whereas PEI (-21.1%), New Brunswick (-14.8%) and Manitoba (-11.1%) had substantial deficits; Quebec (37.3%), Ontario (24.0%), Nova Scotia (11.6%), Manitoba (8.2%) and BC (7.6%) had large surpluses of specialists by 1994, whereas PEI (-28.6%), New Brunswick (-25.9%) and Newfoundland (-23.8%) had large deficits.

Interpretation: The aging of Canada's population poses no threat of shortage to the Canadian physician supply in general, nor to most specialist groups. The marked deviations in provincial physician supply from that of the benchmark province challenge us to understand the costs and benefits of variations in physician resources across Canada and to achieve a more equitable needs-based availability of physicians within provinces and across the country.

Résumé

Contexte : On craint que le vieillissement de la population du Canada n'impose des pressions sur notre système de soins de santé. Les auteurs abordent cette préoccupation en examinant les fluctuations des effectifs médicaux entre 1986 et 1994 et en évaluant la disponibilité des médecins en 1994 par rapport à la croissance et au vieillissement de la population, ainsi qu'aux niveaux des effectifs dans la province témoin, soit l'Alberta.

Méthodes : Les auteurs ont obtenu des statistiques sur les effectifs médicaux de l'Institut canadien d'information sur la santé. Ils ont analysé les services fournis par chaque spécialité aux patients de chaque groupe d'âge en se fondant sur les don-



Evidence

Étude

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nées relatives aux demandes de paiement des médecins du Manitoba. Ils ont obtenu de Statistique Canada des chiffres sur la croissance de la population. Ils ont utilisé des données sur l'utilisation selon l'âge et la spécialité et les tendances de la croissance de la population selon l'âge pour estimer le nombre et le type de médecins qu'il aurait fallu dans chaque province pour suivre l'évolution de la population entre 1986 et 1994, comparativement aux changements réels des effectifs médicaux. Les auteurs ont utilisé les effectifs médicaux de l'Alberta comme point de comparaison pour mesurer les effectifs d'autres provinces.

Résultats : Dans l'ensemble, les effectifs médicaux au Canada ont suivi la croissance et le vieillissement de la population entre 1986 et 1994. Dans certaines spécialités, les effectifs ont augmenté beaucoup plus rapidement que ne le justifiaient les changements démographiques, tandis qu'ils augmentaient plus lentement dans d'autres. Par province, le nombre des omnipraticiens (OP) a augmenté beaucoup plus rapidement que la population desservie au Nouveau-Brunswick (16,6 %), en Alberta (6,5 %) et au Québec (5,3 %), mais il a augmenté plus lentement à l'Île-du-Prince-Édouard (-5,4 %). L'offre de spécialistes a dépassé de beaucoup la croissance de la population en Nouvelle-Écosse (10,4 %), à Terre-Neuve (8,5 %), au Nouveau-Brunswick (7,3 %) et en Saskatchewan (6,8 %), mais elle a tiré de l'arrière en Colombie-Britannique (-9,2 %). Lorsqu'on utilise l'Alberta comme point de comparaison, l'évaluation est différente : Terre-Neuve (15,5 %) et la Colombie-Britannique (11,7 %) enregistraient d'importants excédents d'OP en 1994, tandis que l'Île-du-Prince-Édouard (-21,1 %), le Nouveau-Brunswick (-14,8 %) et le Manitoba (-11,1 %) connaissaient des pénuries importantes. Le Québec (37,3 %), l'Ontario (24,0 %), la Nouvelle-Écosse (11,6 %), le Manitoba (8,2 %) et la Colombie-Britannique (7,6 %) présentaient d'importants excédents de spécialistes en 1994 tandis que l'Île-du-Prince-Édouard (-28,6 %), le Nouveau-Brunswick (-25,9 %) et Terre-Neuve (-23,8 %) enregistraient d'importantes pénuries.

Interprétation : Le vieillissement de la population du Canada ne risque pas d'entraîner de pénurie d'effectifs médicaux au Canada en général, ni dans la plupart des spécialités. Les écarts marqués entre les effectifs médicaux des provinces et ceux de la province repère nous mettent au défi de comprendre les coûts et les avantages des variations des effectifs médicaux au Canada et d'établir dans les provinces et dans l'ensemble du Canada des effectifs médicaux fondés davantage sur l'équité et sur les besoins.

In an attempt to control health care spending, federal and provincial governments in Canada have begun to manage growth in physician numbers. After an all-time high growth rate in the 1980s, the annual rate of growth of both general practitioners (GPs) and specialists has slowed to about 2%, with even lower rates in most surgical specialties.¹ For the first time in almost 30 years the number of physicians is decreasing relative to the Canadian population.²

Debate concerning how many physicians Canada needs remains unresolved.¹⁻⁶ In 1982 the Federal/Provincial/Territorial Advisory Committee on Health Manpower estimated that there would be an overall surplus of 6000 physicians by the year 2000, but the committee cautioned that most of the excess would be among GPs and medical specialists, with shortages expected in surgical and laboratory specialties.⁷ A later report recommended a reduction in medical school enrolment by 10%;³ although

this recommendation met with criticism, enrolment went from 1894 in 1980-81 to 1610 in 1994-95, a decrease of 15%.⁴ Dr. Stephen Brown, president of the Canadian Association of Internes and Residents, recently predicted that there will be a 40% unemployment rate among new radiation oncologists over the next 4 years because of the previous overexpansion of training programs.⁸

The management of physician numbers and specialties in Canada is complex. Although the federal government and national medical bodies establish overall policy, there is an increasing devolution of financial control to the provinces. Debate continues over how many physicians and which specialties each province needs to maintain current levels of service, amid physicians' concerns about the methods of calculation used and the mechanisms being put in place to manage their workforce.

One persistent concern is that the aging of Canada's population will strain our health care system. Although it is



generally acknowledged that the demand for pediatricians is diminishing, for example, the question remains whether there will be sufficient orthopedic surgeons to “set all those broken hips” down the road.⁹ Several studies have suggested that the demographic effects of an aging population are exaggerated; increased services provided to elderly individuals, rather than increased numbers of elderly people per se (an overwhelming “wave of grey”), are driving the changing utilization patterns.^{10,11} Both internationally and in Canada studies have shown that there is no relation between population age structure and health care expenditures.^{12,13} Others even suggest that, in Canada, the fear of our aging population potentially bankrupting the health care system is political rhetoric designed to convince the general public of the need to contribute more for their increasingly expensive health care services.¹¹ Despite assurances from academics that the aging of the population will not stretch our physician supply beyond reasonable limits, physicians themselves and the public remain unconvinced.

It cannot be disputed that Canada’s population is aging and that older people consume a disproportionate amount of medical resources relative to younger people.^{14,15} Our greying population will probably need a health care system with a new complexion, since older people require the services of some types of caregivers more than others.

In this article we examine recent growth in the number of physicians by specialty across Canada, analyse which age groups are served by different types of physicians and compare growth in physician supply with population growth patterns in order to ascertain whether recent growth has kept pace with population changes. We also examine alternative approaches to estimating the adequacy of physician supply using a technique that is gaining acceptance — benchmarking — whereby a province with a low physician supply and a healthy population is used as a yardstick for other provinces. Our analysis calculates physician surpluses and deficits in each province using both population growth and aging data, and using age-adjusted physician:population ratios based on the benchmark province, in an attempt to gain some perspective on the remarkable “play” in estimates of physician resource needs.

Methods

We obtained data on physician numbers by specialty and province for the years 1986 through 1994 from the Canadian Institute for Health Information (CIHI) and calculated growth rates during that period. We excluded data for the Yukon and Northwest Territories because there were so few specialists.

To determine utilization of services by specialty and patient age group, we analysed claims submitted by fee-

for-service and salaried physicians to Manitoba Health in 1994. (We estimated that 90% to 98% of physician activity in Manitoba was captured through the fee-for-service payment scheme or through shadow billing.¹⁶) Although billings are not a perfect representation of the relative time and skill devoted to specific services, they are a reasonable, frequently used proxy, at least within specialty groups.¹⁷ The representativeness of the age-specific utilization patterns in Manitoba was confirmed by comparing the Manitoba claims data with those for specialists in BC and Quebec.

Using age-specific population data from Statistics Canada for 1986 and 1994 for all provinces,¹⁸ we calculated the rates of growth in the following age groups: less than 15 years, 15–64, 65–74, and 75 and over. We then combined age-specific utilization rates for the different specialties and age-specific population changes to predict what the need would have been for additional physicians in each specialty and province by 1994 in order to continue to serve the population at the same level as in 1986. For example, if ophthalmologists deliver 40% of their care to people 75 and older, and this age group grew by 23% between 1986 and 1994, then the ophthalmology supply would need to have increased by 9% to keep up with an aging population ($0.40 \times 0.23 = 0.09$; the actual calculations take into account growth across all age groups). By comparing the *predicted* supply of physicians by 1994 with the *actual* supply in 1994, we were able to calculate physician deficits and surpluses in each specialty that developed relative to population growth by 1994. This represents a utilization-based approach to physician resource planning.¹⁹

Benchmarking has recently been suggested as an alternative approach to physician resource planning.²⁰ Areas are identified that have low levels of deployment of clinically active physicians, but “without a measured loss of patient welfare,” after adjustments for age and sex. In Canada, Saskatchewan and Alberta offer reasonable benchmarks for assessing the adequacy of the other provinces’ physician resource supplies. The populations of both provinces score reasonably well on indicators of population health; that is, they have low age-standardized mortality rates and medium to low PYLLs (potential years of life lost — an indicator that gives greater weight to deaths in the youngest age group), despite the fact that Saskatchewan has a relatively high infant mortality rate and a low proportion of residents rating their health as fair or poor (Appendix 1). These scores are reasonably good despite the 2 provinces’ generally conservative supplies of physicians: Saskatchewan has 136.6 physicians per 100 000 residents and Alberta has 146.2. Much higher physician supplies exist in British Columbia, Ontario, Quebec and Nova Scotia (Fig. 1).

We decided to use Alberta instead of Saskatchewan as the benchmark because it seemed to be an appropriate yardstick, even for provinces such as BC, Ontario and Quebec: it has 2 medical schools, a strong medical research capacity supported by the Heritage Fund and the capability of delivering transplant and other subspecialist care. Also, since Saskatchewan's physician supply was lower than Alberta's, we intentionally chose the higher benchmark.

Given Alberta's atypically young population, we ad-

justed the benchmark ratio according to each province's age structure. Using these age-adjusted ratios, we then estimated for each province how many physicians would have been needed in 1994 (and thus how much the physician supply would have changed from that in 1986) to provide the same level of service as in Alberta. We also compared these benchmark numbers with the actual physician supply in 1994 and calculated the surpluses and deficits.

Results

Physician growth

According to the CIHI data, the number of physicians practising in Canada grew by 2.5% (1012) each year from 1986 to 1994 (Table 1).

The supply of GPs grew slightly faster than the supply of specialists (2.8% v. 2.3% annually). Large variations in growth patterns existed among the specialty groups. The greatest rates of growth were in neurology, dermatology, other medical (which includes general internal medicine, geriatrics, cardiology and all medical specialties and subspecialties not otherwise identified), psychiatry and plastic surgery; whereas very slow growth (or even decline) occurred in obstetrics-gynecology, general surgery, neurosurgery, ophthalmology, otolaryngology, orthopedics and urology (Table 1). This pattern is similar to that reported for an earlier period.²¹

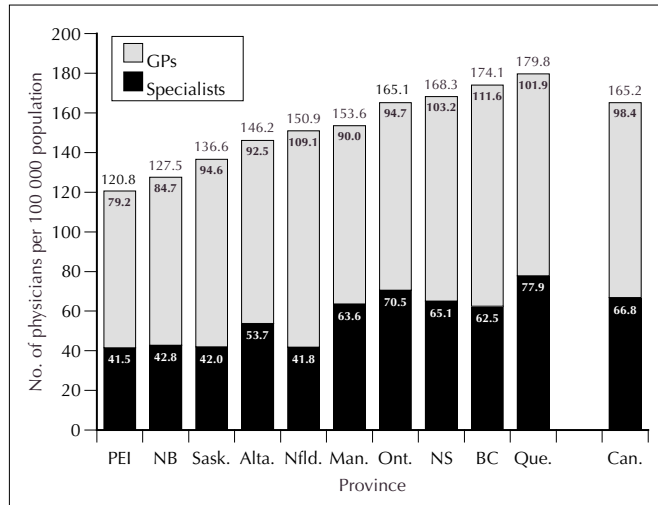


Fig. 1: Number of general practitioners and specialists per 100 000 population in Canada in 1994, by province.

Table 1: Annualized change in physician supply in Canada from 1986 to 1994 by specialty and region

Specialty	Province; annual % change (and no. of physicians*)						
	Canada	Saskatchewan and Manitobab	BC	Alberta	Ontario	Quebec	Atlantic provincest
Neurology	4.2 (19)	0.6 (1)	3.5 (2)	6.0 (2)	3.4 (6)	3.0 (5)	0.7 (2)
Dermatology	3.2 (12)	0.0 (0)	2.1 (1)	5.6 (1)	2.8 (4)	3.9 (5)	7.1 (1)
Other medical‡	3.0 (131)	0.7 (2)	3.1 (14)	4.5 (14)	3.6 (58)	2.4 (33)	3.7 (9)
Pediatrics	2.4 (39)	0.4 (1)	1.4 (3)	1.5 (2)	3.3 (21)	2.7 (11)	1.2 (1)
Psychiatry	3.8 (102)	2.2 (3)	4.9 (15)	4.1 (7)	4.3 (52)	2.8 (21)	0.2 (0)
Obstetrics-gynecology	0.4 (6)	-0.7 (0)	1.6 (2)	-0.6 (0)	0.5 (3)	0.0 (0)	1.0 (1)
General surgery	-0.9 (-20)	-0.7 (-1)	-2.1 (-5)	-1.4 (-2)	-1.1 (-9)	0.0 (0)	-1.3 (-2)
CVT surgery	2.8 (6)	0.7 (0)	4.9 (1)	2.3 (0)	6.1 (4)	0.7 (0)	-0.7 (0)
Neurosurgery	1.5 (3)	-0.9 (0)	1.0 (0)	4.2 (1)	1.2 (1)	3.2 (2)	-1.4 (0)
Ophthalmology	1.7 (16)	0.6 (0)	1.0 (2)	3.2 (2)	1.6 (6)	1.8 (5)	3.4 (2)
Otolaryngology	1.2 (7)	-1.8 (0)	0.2 (0)	2.9 (1)	1.0 (2)	1.7 (3)	3.3 (1)
Orthopedics	2.1 (19)	1.8 (1)	2.1 (3)	2.4 (2)	2.4 (8)	2.5 (6)	4.4 (2)
Plastic surgery	4.5 (14)	4.4 (1)	5.4 (2)	2.7 (1)	5.6 (6)	3.1 (3)	6.9 (1)
Urology	2.1 (10)	1.1 (0)	0.4 (0)	0.7 (0)	3.3 (6)	1.5 (2)	4.0 (2)
All specialists§	2.3 (364)	0.7 (7)	2.0 (40)	2.5 (30)	2.6 (168)	2.0 (97)	2.2 (23)
GPs	2.8 (648)	0.7 (12)	4.2 (127)	3.4 (67)	2.7 (232)	2.8 (168)	1.8 (38)
All physicians§	2.5 (1012)	0.7 (19)	3.4 (167)	3.0 (97)	2.7 (400)	2.4 (265)	2.0 (62)

Note: CVT = cardiovascular and thoracic, GP = general practitioners.

*Numbers may not add up because of rounding.

‡Provinces have been combined because of small numbers in some specialties.

‡Includes general internal medicine and all medical subspecialties other than neurology and dermatology.

§Includes only specialties listed in this table.



By province, the highest rates of growth were in BC (particularly among GPs), Alberta, Ontario and Quebec; the lowest rates were in Saskatchewan and Manitoba (Table 1).

Age-specific utilization

As described earlier, we used 1994 Manitoba physician claims data to estimate the proportion of services each specialty group provided to different patient age groups (Table 2). Specialists in Manitoba provided most of their

Table 2: Utilization of physician services, as indicated by proportion of billings by patient age group, in Manitoba in 1994

Specialty	Patient age group, yr; % of physician billings			
	< 15	15-64	65-74	≥ 75
Neurology	5.3	65.8	14.4	14.5
Dermatology	11.1	66.7	12.0	10.1
Other medical	4.1	53.8	21.8	20.4
Pediatrics	92.3	7.7	0.0	0.0
Psychiatry	3.5	87.9	4.9	3.6
Obstetrics-gynecology	0.4	94.5	3.0	2.1
General surgery	4.0	56.3	20.4	19.3
CVT surgery	2.6	39.7	37.0	20.7
Neurosurgery	7.8	65.8	15.3	11.1
Ophthalmology	3.0	30.4	27.2	39.4
Otolaryngology	22.9	59.8	10.0	7.3
Orthopedics	10.0	57.2	15.2	17.6
Plastic surgery	9.5	71.2	10.2	9.1
Urology	5.1	47.3	27.1	20.5
All specialists*	12.9	59.0	13.1	15.0
GPs	12.3	60.5	11.4	15.8

*Includes only specialties listed in this table.

services (71.9%) to people under 65 years of age, 13.1% to those aged 65-74 and 15.0% to those aged 75 and over. (These utilization patterns for specialists were similar overall to those in BC and Quebec, although the proportion of services provided to people 75 and older was 2.2% lower among BC specialists and 3.4% lower among Quebec specialists.) The figures for GPs in Manitoba were similar: 72.8% of total billings were for services to people under 65, 11.4% to those aged 65-74 and 15.8% to those 75 and older.

The age-specific utilization rates varied by specialty, with pediatricians, psychiatrists and obstetricians-gynecologists providing relatively few of their services (less than 10%) to those over 65 (Table 2). Medical specialists and general surgeons provided about 20% of their care to those aged 65-74 and 19% to those 75 and over. Among the surgical specialists, the ophthalmologists, cardiovascular and thoracic surgeons, and urologists provided a significant amount of their services to people aged 65 and over (66.6%, 57.7% and 47.6% respectively), whereas neurosurgeons, otolaryngologists, plastic surgeons, dermatologists and neurologists provided relatively few of their services to the elderly.

Population changes

The Canadian population grew by 1.9% each year between 1986 and 1994. The largest increases were in BC (3.1%), Ontario (2.5%), Alberta (1.8%) and Quebec (1.4%). Very small increases (less than 1% each year) occurred in New Brunswick (0.8%), PEI (0.8%), Manitoba (0.7%), PEI (0.6%) and Newfoundland (0.3%);

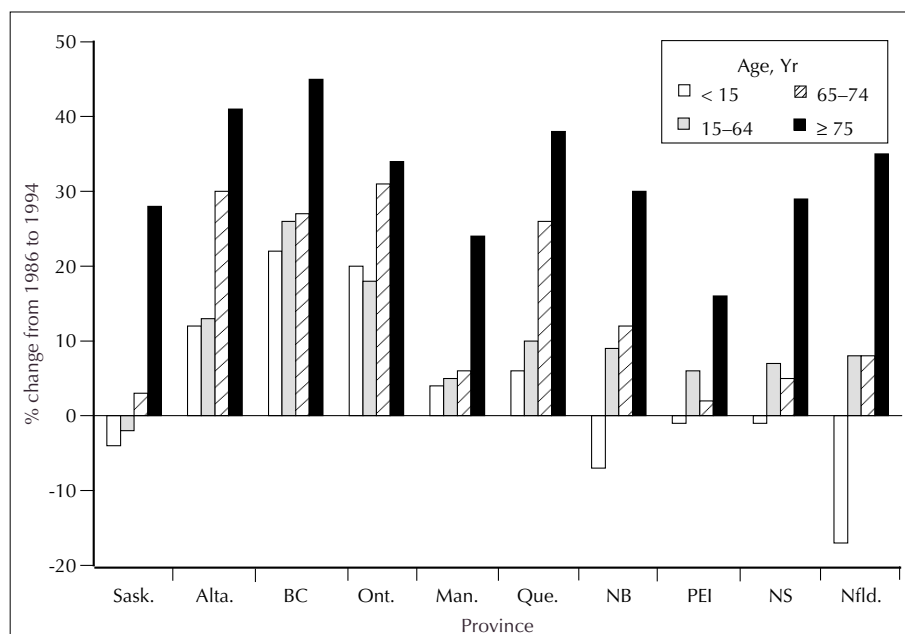


Fig. 2: Change in provincial populations between 1986 and 1994, by age group.

Saskatchewan had a very small decrease (-0.1%). During this period the fastest growing age group, in Canada as a whole and in each province, was that of people aged 75 and over: it grew by 36% overall; the provincial increases ranged from 45% in BC to 16% in Prince Edward Island (Fig. 2). The number of children decreased in 5 provinces (by almost 20% in Newfoundland), whereas it increased by about 20% in BC and Ontario.

Adequacy of growth in physician supply

Table 3 shows the actual growth in each specialty group for Canada as a whole; it also shows the predicted growth in each specialty based on the age-specific utilization rates and the population growth in those age groups. Accordingly, most of the medical specialties (especially neurology and psychiatry), the GPs and the specialists as a whole grew faster than warranted by population changes. None of the surgical specialties except cardiovascular and thoracic surgery and plastic surgery kept pace with what was predicted on the basis of population changes.

Table 4 applies the same technique used to assess the adequacy of growth in each specialty to each province's supply of specialists and GPs. As described in Methods, we used Alberta's physician supply in 1994 as the benchmark (146.2 physicians [53.7 specialists, 92.5 GPs] per 100 000 population) and calculated the growth that would

have been required from 1986 to 1994 to meet this benchmark. Because Alberta had the youngest population in Canada, age adjustment moved the benchmark up slightly for each province, depending on their age mix.

Table 4: Annualized actual and predicted changes in physician supply from 1986 to 1994 by province

Province; physician group*	Annual % change (and no. of physician†)				
	Actual		Predicted to meet population growth		Predicted to meet Alberta benchmark‡
Saskatchewan					
Specialists	1.2	(5)	0.3	(1)	7.0 (27)
GPs	0.7	(6)	0.4	(3)	1.9 (17)
All physicians	0.8	(11)	0.4	(5)	3.4 (44)
Alberta					Benchmark
Specialists	2.5	(30)	2.4	(29)	
GPs	3.4	(67)	2.4	(48)	
All physicians	3.0	(97)	2.4	(77)	
BC					
Specialists	2.0	(40)	3.5	(69)	1.0 (20)
GPs	4.2	(127)	3.5	(107)	2.5 (74)
All physicians	3.4	(167)	3.5	(176)	1.9 (94)
Ontario					
Specialists	2.6	(168)	2.8	(179)	-0.3 (-19)
GPs	2.7	(232)	2.8	(239)	3.2 (273)
All physicians	2.7	(400)	2.8	(418)	1.7 (254)
Manitoba					
Specialists	0.4	(3)	0.9	(6)	-0.6 (-4)
GPs	0.6	(6)	1.0	(9)	2.3 (22)
All physicians	0.5	(9)	0.9	(16)	1.1 (17)
Quebec					
Specialists	2.0	(97)	2.0	(98)	-1.9 (-95)
GPs	2.8	(168)	2.0	(121)	2.1 (128)
All physicians	2.4	(265)	2.0	(219)	0.3 (33)
New Brunswick					
Specialists	2.3	(6)	1.3	(4)	7.4 (20)
GPs	3.6	(18)	1.3	(7)	6.4 (32)
All physicians	3.1	(24)	1.3	(10)	6.8 (52)
PEI					
Specialists	0.2	(< 1)	0.7	(< 1)	5.4 (3)
GPs	0.0	(0)	0.7	(1)	3.4 (4)
All physicians	0.1	(< 1)	0.8	(1)	4.1 (6)
Nova Scotia					
Specialists	2.5	(13)	1.1	(6)	0.9 (5)
GPs	1.5	(13)	1.2	(10)	1.1 (9)
All physicians	1.9	(26)	1.2	(16)	1.0 (14)
Newfoundland					
Specialists	2.0	(4)	0.9	(2)	6.6 (14)
GPs	1.3	(8)	1.1	(7)	-0.6 (-3)
All physicians	1.5	(12)	1.1	(8)	1.3 (11)
Canada					
Specialists	2.2	(363)	2.3	(380)	0.0 (4)
GPs	2.8	(648)	2.3	(546)	2.7 (630)
All physicians	2.5	(1011)	2.3	(926)	1.6 (635)

Table 3: Actual and predicted changes in Canada's physician supply from 1986 to 1994 by specialty

Specialty	No. of physicians			% growth/decline from 1986 to 1994	
	Actual 1986*	Predicted 1994†	Actual 1994*	Actual	Predicted
	Neurology	451	536	601	33.3
Dermatology	378	444	476	25.9	17.5
Other medical	4299	5196	5346	24.3	20.9
Pediatrics	1648	1837	1961	19.0	11.5
Psychiatry	2705	3127	3522	30.2	15.6
Obstetrics-gynecology	1491	1717	1535	3.0	15.2
General surgery	2066	2490	1910	-7.5	20.5
CVT surgery	217	266	266	22.6	22.6
Neurosurgery	188	222	211	12.2	18.1
Ophthalmology	921	1156	1048	13.8	25.5
Otolaryngology	544	633	598	9.9	16.4
Orthopedics	881	1052	1032	17.1	19.4
Plastic surgery	309	362	420	35.9	17.2
Urology	473	574	554	17.1	21.4
All specialists‡	16 571	19 612	19 480	17.6	18.4
GPs	23 533	27 903	28 719	22.0	18.6
All physicians‡	40 104	47 515	48 199	20.2	18.5

*Source: Canadian Institute for Health Information.

†Expected number needed in 1994 given the number of physicians in 1986, the growth of the populations served by that group and the age-specific utilization rates.

‡Includes only specialties listed in this table.

*Specialist group refers only to specialties listed in previous tables.

†Numbers may not add up because of rounding.

‡See Methods for details.



For Manitoba, a province with an older population, the benchmark became 160.1; for the others it was closer to Alberta's. Because the provinces vary so greatly in size, we included both the annual percent change in physician supply and the number of physicians that this represents.

Provincial surpluses and deficits

Table 5 summarizes the information from Table 4 in the form of surpluses and deficits of physicians in each province in 1994 relative to (a) the aging (and growth) of the province's population between 1986 and 1994, and (b) the benchmark 1994 physician supply in Alberta.

Compared with the actual physician supply in 1986, some provinces' supplies grew faster than warranted by their population growth (both specialists and GPs in New Brunswick, specialists in Saskatchewan, Nova Scotia and Newfoundland, and GPs in Alberta and Quebec), and some did not keep up with population growth (specialists in BC and GPs in PEI).

The use of Alberta as a benchmark suggested different conclusions (Table 5). For example, although BC appeared to have a deficit in the specialist supply (the growth in supply was 9.2% less than expected to keep up with an aging population), its specialist supply was 7.6% higher than the Alberta benchmark. Other provinces (e.g., Newfoundland) whose specialist supply grew faster than the population were in a deficit position with reference to the benchmark. Except for Nova Scotia, all of the Atlantic provinces had a much lower supply of specialists than Alberta (suggesting a deficit), and Quebec and Ontario had a far greater supply (suggesting a substantial surplus). The Alberta benchmark identifies Saskatchewan as having a deficit of both specialists and GPs; however, given Saskatchewan's healthy population, its lower physician supply could also serve as a benchmark, providing little rationale for identifying it as having a physician deficit.

Interpretation

After numerous interviews and analyses Barer and Stoddart³ concluded that "an optimal number of physicians cannot be defined by purely technical means. Ultimately this is a social rather than a technical judgement." They found no compelling reason for physician growth to exceed population growth. By identifying how much service each specialty group delivers to each age group, we have been able to assess more accurately the effect of a changing demographic profile on physician requirements by both specialty group and province.

The benchmarking technique provides an alternative method for deciding where there are surpluses and deficits. Recommendations by experts asked to establish

appropriate levels of physician resources reinforce the use of this benchmark: they have recommended physician supply levels much closer to our Alberta benchmark than to the levels in BC, Ontario and Quebec. In 1994 the Saskatchewan Physician Resource Planning Task Force recommended a series of planning ratios that would result in 142 physicians per 100 000 population.²² In the mid-1980s the Federal/Provincial/Territorial Advisory Committee on Health Manpower suggested slightly lower planning ratios, 132 per 100 000.²³ The Alberta benchmark we used is more generous, 146 per 100 000.

In constructing physician supply benchmarks it may be important to adjust for other factors that affect population health, such as socioeconomic status.²⁴ However, this may be more important intraprovincially than across provinces. Across provinces, there is no relation between what is spent on health care and the health of the population, or the proportion of elderly people, or the socioeconomic risk factors of the population.¹³ Saskatchewan has achieved a reasonable level of population health despite a low supply of physicians and higher than average socioeconomic risk (Appendix 1). Socioeconomic differences, which may influence the need for health care within a province, are not a plausible explanation for different levels of physician supply across the provinces.

Despite warnings that "the sheer growth in the absolute number of elderly people, especially those 75 and over, will present a major challenge to the people responsible for providing health care,"²⁵ we found no evidence in our analysis that the aging of the population will overburden Canada's physicians. In recent years modest growth in the physician supply has kept pace with large increases in the elderly population.

Some specialties were clearly more affected than others. The remarkable decrease in the number of general surgeons is again highlighted in this analysis. Between 1986 and 1994 their numbers failed to keep up with the growing elderly population, in part because of high rates of retirement. This is of particular concern because general surgeons are key to the delivery of surgical care in rural centres. Although we have shown that estimates of the need for general surgeons based on recommended surgeon:population ratios tend to overstate supply problems because many of their procedures are also performed by other types of specialists,²⁶ the question remains of who is being trained to perform tomorrow's appendectomies, gallbladder surgery and hernia repairs?

The supply of ophthalmologists has also been growing more slowly than the population it serves. Although this may potentially pose a problem, there seems to be no relation between, for example, a province's supply of ophthalmologists and the rates of cataract procedures available to their population.¹⁷ The rapid growth in pediatrics,

neurology, dermatology, plastic surgery and psychiatry present, on the other hand, a potential problem on the surplus side.

Assessments of supply using the Alberta benchmark suggest that concerns about the levelling off of growth in

Canada's physician supply and the potential for increased physician retirements over the next decades are probably misplaced for now. Given the strong impact staffing patterns at health management organizations in the US are having on reducing the need for specialists in the US, the

Table 5: Provincial surpluses and deficits in physician supply in 1994

Province; physician group*	No. of physicians in 1994	% change (and no. of physician†)	
		Surplus/deficit in 1994 with reference to 1986–94 population growth and aging calculations‡§	Surplus/deficit in 1994 with reference to 1994 age-adjusted Alberta benchmark¶
Saskatchewan			
Specialists	422	6.8 (27)	-29.8 (-179)
GPs	949	2.5 (23)	-8.2 (-85)
All physicians	1 371	3.7 (49)	-16.2 (-265)
Alberta			
Specialists	1 454	0.5 (7)	Benchmark
GPs	2 507	6.5 (154)	
All physicians	3 961	4.2 (161)	
BC			
Specialists	2 268	-9.2 (-231)	7.6 (160)
GPs	4 048	4.1 (159)	11.7 (423)
All physicians	6 316	-1.1 (-72)	10.1 (581)
Ontario			
Specialists	7 711	-1.2 (-90)	24.0 (1 494)
GPs	10 359	-0.6 (-58)	-3.0 (-325)
All physicians	18 070	-0.8 (-148)	6.9 (1 169)
Manitoba			
Specialists	714	-4.0 (-30)	8.2 (54)
GPs	1 010	-2.7 (-28)	-11.1 (-126)
All physicians	1 724	-3.3 (-58)	-4.1 (-73)
Quebec			
Specialists	5 670	-0.1 (-6)	37.3 (1 539)
GPs	7 421	5.3 (372)	4.5 (316)
All physicians	13 091	2.9 (366)	16.5 (1 855)
New Brunswick			
Specialists	323	7.3 (22)	-25.9 (-113)
GPs	639	16.6 (91)	-14.8 (-111)
All physicians	962	13.2 (112)	-18.9 (-224)
PEI			
Specialists	55	-3.5 (-2)	-28.6 (-22)
GPs	105	-5.4 (-6)	-21.1 (-28)
All physicians	160	-5.3 (-9)	-24.2 (-51)
Nova Scotia			
Specialists	604	10.4 (57)	11.6 (64)
GPs	958	2.4 (22)	2.9 (27)
All physicians	1 562	5.3 (79)	6.2 (91)
Newfoundland			
Specialists	243	8.5 (19)	-23.8 (-76)
GPs	635	1.3 (8)	15.5 (85)
All physicians	878	3.2 (27)	1.0 (9)
Canada			
Specialists	19 480	-0.7 (-132)	17.5 (2 897)
GPs	28 719	2.9 (816)	0.7 (201)
All physicians	48 199	1.4 (684)	6.9 (3 098)

*Specialist group refers only to specialties listed in previous tables.

†Numbers may not add up because of rounding.

‡Bolded numbers indicate that the surplus or deficit represents more than 5% of the supply in 1994.

§Percentages represent the surpluses/deficits as a proportion of the predicted 1994 supply (not shown).

||Percentages represent the surpluses/deficits as a proportion of the 1994 supply required to meet the Alberta benchmark (not shown).



traditional flow of Canadian-trained specialists south of the border may well be reversed. Some US specialty certification boards are withholding or are considering withholding certification from Canadian-trained specialists.²⁷ Although half of the neurosurgeons trained in Canada have traditionally gone to the US, as of July 1997 those entering Canadian training programs will not have their credentials recognized (Dr. Norman Hill, Chair, Manpower and Resources Committee, Canadian Neurosurgical Society: personal communication, 1997). This potential doubling of the number of Canadian neurosurgeons entering our physician workforce every year, combined with the block-funding mechanism that provinces such as Manitoba and Saskatchewan are beginning to use whereby caps are set on monies going to specialty groups such as neurosurgery, could create a surplus situation such as that faced by radiation oncologists.⁸

Very different estimates of physician surpluses and deficits result from the 2 assessment approaches used. There is no "correct" or absolute "needed" numbers of physicians. Both approaches used in our analysis offer valuable information to planners. It is clear that the aging of our population per se has not been a problem in terms of the growth of our physician supply in the past decade, and there is no obvious reason for it to be a problem in the future. The results of the benchmarking assessment challenge us to understand the costs and benefits of the marked variations in physician resources across Canada, and to achieve a more equitable and needs-based availability of physicians within provinces and across the country.

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Appendix 1: Indicators of population health status and of factors known to influence a population's need for health care										
Indicator	Sask.	Alta.	BC	Ont.	Man.	Que.	NB	PEI	NS	Nfld.
Indicator of health status										
Age-standardized mortality rate per 100 000 population, 1992 ²⁸	466	491	485	500	511	517	524	538	551	566
PYLL (potential years of life lost) before age 70 per 100 000 population, 1993 ²⁹	38.4	38.9	40.5	36.5	40.4	41.9	41.0	41.4	41.7	35.8
Self-rated health 1994-95, % rating health as fair or poor ²⁸	10	9	9	10	12	10	13	13	17	10
Annualized infant mortality rate per 1000 live births, 1991-93 ²⁸	7.9	6.9	6.2	6.1	6.8	5.7	6.5	5.8	6.3	7.6
Indicator influencing high health needs										
Education: % of population over 20 yr of age with less than high school, 1994-95 (age-standardized) ²⁸	32	22	17	23	32	32	32	33	29	40
Treaty Indian status: % of population with status, 1995 ³⁰	9.2	2.7	2.7	1.2	8.1	0.6	1.3*	1.3*	1.3*	1.3*
Income: % of population below 1992 poverty level (adjusted) ²⁸	13	13	11	11	17	16	12	10	13	16
Age: % of population > 65 yr, 1991 ³¹	14.2	9.1	12.9	11.7	13.4	11.2	12.2	13.2	12.6	9.7

*Figure of 1.3 is for Atlantic provinces.

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