

Growing Old Together: The Influence of Population and Workforce Aging on Supply and Use of Family Physicians

Diane E. Watson,¹ Robert Reid,² Noralou Roos,³ and Petra Heppner¹

RÉSUMÉ

Les Canadiens ont exprimé des préoccupations quant à la diminution rapide de l'accès aux médecins de famille (MF). Pourtant, la proportion de MF par rapport à la population est restée relativement stable au cours de la dernière décennie. Par ailleurs, il y a dix ans, les gens avaient l'impression qu'il y avait un surplus de médecins, du moins dans les milieux urbains. Nous avons étudié les changements démographiques parmi les patients et les MF, ainsi que la quantité de soins fournis et reçus au cours de cette période, afin de déterminer si cela avait contribué à ce paradoxe. Compte tenu du rapport entre l'âge et les visites chez les MF au cours de l'exercice 1991/1992, le vieillissement de la population aurait dû engendrer une augmentation de 2 p. 100 des visites chez le médecin en 2000/2001. De même, compte tenu du rapport entre l'âge des médecins et les charges de travail en 1991/1992, ce vieillissement des effectifs aurait dû engendrer une augmentation de 12 p. 100 dans la prestation de services dix ans plus tard. Pourtant, la fréquence des visites et la charge de travail moyenne des MF n'ont pas changé. Il y a eu une augmentation du nombre de visites chez les MF pour les personnes âgées et une diminution de la fréquence des visites chez les plus jeunes, ainsi qu'une augmentation de la charge de travail propre à certains groupes d'âge, les MF les plus âgés fournissant beaucoup plus de services que leurs prédécesseurs (30 p.100) tandis que les plus jeunes MF en fournissaient beaucoup moins (20 p. 100). Du point de vue de l'incidence sur les besoins à venir en matière de MF, les changements liés au taux de consultations par catégorie d'âge et les changements dans la productivité des MF selon leur âge prennent tous les deux le dessus sur le vieillissement de la population à titre de facteurs fondamentaux.

ABSTRACT

Canadians have expressed concern that access to a family physician (FP) has declined precipitously. Yet FP-to-population ratios remained relatively stable over the last decade, and there were perceptions of physician surpluses, at least in urban centres, 10 years ago. We evaluated whether demographic changes among patients and FPs, and in the volume of care received and provided over the period, contribute to this paradox. Given the relationship between age and FP use in fiscal year 1991/1992, an aging population should have been associated with a 2 per cent increase in visits by 2000/2001. Likewise, given the relationship between FP age and workloads in 1991/1992, an aging workforce should have been associated with a 12 per cent increase in service provision a decade later. Yet visit rates and average FP workloads remained unchanged. There was an increase in age-specific rates of FP use among older adults and a decline in rates among the young, and an increase in age-specific workloads such that older FPs provided many more services than their predecessors (30%) and younger FPs provided many fewer (20%). In terms of impact on future requirements for FPs, both changes in age-specific rates of use, and changes in age-specific patterns of FP productivity, trump population aging as key drivers.

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Introduction

Over the last several decades, the age structures of the population, and the physicians who serve that population, have changed. The baby boomer generation will be reaching the age of 65 between 2010 and 2030, and doomsday predictions regarding the increased demands an aging population will place on the health care system are commonplace (Gee & Gutman, 2000). Receiving far less attention is the fact that family physicians (FPs) are also, for the most part, part of the boomer generation, and the FP workforce is aging. If the age structure of the population influences the rate at which physician services are needed and used, and the age structure of the workforce influences the rate at which services are provided, both factors must be taken into account in assessing requirements for FPs. The purposes of this paper are to describe changes over the last decade in the demographics and utilization patterns of an aging population, and in the demographics and workload patterns of an aging FP workforce; and to estimate the relative impact of different demographic-related determinants of access to and availability of FP services.

In 2001, older adults comprised 12 per cent of the Canadian population and by 2020 are expected to represent roughly 20 per cent (National Advisory Council on Aging, 2002). An aging population, coupled with the observation that older people use more health care services than those who are younger, has prompted some to question the sustainability of universal access to Canadian health care. Research evidence has consistently shown that it is not demographic changes per se that are the primary drivers of increasing health care use; rather, it is because physicians are doing much more to (and for) older adults that the proportion of visits attributable to this population has increased so dramatically. Indeed, age-specific per capita use of FP services in Canada has increased for older adults since the 1970s (Barer, Evans, & Hertzman, 1995; Black, Roos, Havens, & MacWilliam, 1995; Demers, 1996; Eyles, Birch, & Newbold, 1995), and none of this increase is attributable to changes in gender mix (Watson,

Bogdanovic et al., 2003). Accordingly, it is critical to take account of trends in age-specific rates of FP use when making predictions about future utilization (Evans, McGrail, Morgan, Barer, & Hertzman, 2001).

At the same time, Canadians are expressing increasing concern that access to primary care is deteriorating (Conference Board of Canada, 2001), and the nation's health ministers have publicly committed to enhancing access to primary care (Health Canada, 2003). The medical profession and a number of health system review committees point to critical shortages of FPs and recommend increasing the number of undergraduate and postgraduate physician training positions (College of Family Physicians of Canada [CFPC], 2001, 2002; Expert Panel on Health Professional Human Resources, 2001; Standing Senate Committee on Social Affairs, Science and Technology, 2002). Meanwhile, academic health centres are experiencing increasing problems in attracting medical graduates into family practice residency positions (Branswell, 2003; Picard, 2003). Paradoxically, current views of acute physician shortage come close on the heels of widespread perceptions expressed 10 years ago of surpluses, particularly in urban jurisdictions. Shifts from perceptions of surpluses to shortages contradict empirical measures of supply indicating that FP-to-population measures have declined only slightly over the decade (Canadian Institute for Health Information [CIHI], 2000; Chan, 2002; Kazanjian, Reid, Pagliccia, Apland, & Wood, 2000). Clearly, something other than minimal declines in the numbers of physicians per capita underlies these dramatically altered perceptions of access and the adequacy of FP supply.

Changes in the age structure of the FP workforce over the past decade have resulted in an increased proportion of FPs being in their most productive years (CIHI, 2001). Research indicates that the relationship between physician age and workloads (i.e., age-specific workloads) is an inverted U-shape, such that doctors are most productive in mid-career (CIHI, 2001; Chan, 2002; Kazanjian et al., 2000). If anything, therefore, one might have expected increases in aggregate workforce productivity over

this period due to an aging population of FPs. However, these increases did not materialize (Watson, Roos, Katz, & Bogdanovic, 2003). By comparison, changes in the gender structure of the workforce, with an increasing proportion of women, may have thwarted available supply, since females tend to have lower workloads than males (Expert Panel on Health Professional Human Resources, 2001; Norton, Dun, & Soberman, 1994).

These facts and trends, taken together, suggest that the availability of FP services, now and in the future, is a complex function of temporal changes in the size of the population and workforce, the age and gender structure of the population and workforce, the relationship between patient age/gender and utilization, and the relationship between physician age/gender and workloads. Any realistic attempts to estimate future patterns of use, or requirements for FP services, must simultaneously consider temporal changes in all these factors.

To illustrate how expectations of future utilization and supply might vary with changes in these determinants, we present three hypothetical scenarios. In *all* scenarios, we assumed the following: (a) the population aged, (b) age-specific rates of use among seniors increased, since research documents these trends in prior periods, and (c) physician-to-population ratios remain stable – as has been the case in Canada over the last decade. In the first scenario, use of services increases as a result of an aging population and service intensification among older adults (increased demand), but the demographic structure of the workforce remains unchanged. In the second scenario, both use and delivery of services increase as the result of an aging population and workforce. In this scenario, we assume that the gender structure of the workforce remains unchanged. And in the third scenario, use increases as the result of an aging population coupled with service intensification among older adults, and effective supply decreases as the result of an increasing proportion of female physicians. In this scenario, we assume that the age structure of the workforce is unchanged (Table 1). Other scenarios are possible, and indeed likely, but these illustrate the main points.

In the first scenario we consider demographic shifts among patients while holding FP-to-population ratios and demographic characteristics of physicians constant. If the proportion of the population aged 65 or more and age-specific rates of FP use among older adults increases (scenario 1, Table 1), then one would expect increased service use over time. But

such increased service use can occur only if the practice patterns of FPs make it possible. Otherwise, one might expect patients to experience reduced access and use (e.g., wait-lists, fewer than expected visits) or reductions in service levels per encounter with a FP (e.g., less time per visit). Alternatively, one segment of the population might “lose” in relation to others (e.g., younger vs. older patients).

In scenarios 2 and 3, we relax the assumptions about stable FP workforce demographics. Should the workforce age (no change in gender mix) such that the largest cohort of FPs enters their most productive years, one might expect an increase in effective supply (scenario 2, Table 1). Recall that the relationship between physician age and workload reveals an inverted U-shape such that doctors are most productive in their 40s and 50s (CIHI, 2001; Chan, 2002; Kazanjian et al., 2000). Should the workforce increasingly comprise female FPs (no change in age structure), one might expect a decline in effective supply (scenario 3, Table 1), since female physicians tend to carry lighter workloads than their male counterparts (as measured by full-time equivalents, services per year, total billings, or total hours of work) (CIHI, 2001; Norton et al., 1994; Woodward & Hurley, 1995). Of course, the last two scenarios are based on assumptions that age-specific and gender-specific measures of workload documented in cross-sectional analyses hold true for physicians (particularly the boomer generation cohort of FPs) over time.

One can envision other scenarios in which the size of the population or workforce increases or declines and under conditions of differing magnitudes of demographic change. Our key point is that any attempts to project utilization trends depend on expected changes in the make-up of the prospective patient population and temporal changes in supply. Furthermore, these scenarios are based solely on demographic profiling and do not consider temporal patterns in health and need for care, advances in treatments, changes in scope of practice, and/or shifts in the use of substitute or alternative providers. Health care workforce planning must consider all these important determinants.

In this paper, we examine data from Winnipeg, MB, over the fiscal years 1991/1992 to 2000/2001, in an effort to ascertain the relative importance of demographic factors that could underlie perceptions of current and future access pressures on FP services. During this period, FP-to-population ratios declined only slightly, and the average age of the population and workforce increased in the city. Similar

Table 1: Shifts in the age/gender structure of the physician workforce – Three scenarios

Scenarios	Potential Sources of Shifts in the Population				Potential Sources of Shifts in Physicians				Expectations of Demand and Supply
	Size of Population	Age/Gender Structure	Age-Specific Use Rates*	Gender-Specific Use Rates	Size of Workforce	Age/Gender Structure	Age-Specific Workloads**	Gender-Specific Workloads	
1	Stable relative to physician supply	Aging population	Service intensification among older adults	Stable	Stable relative to population	Stable	Stable	Stable	Demand increases, supply stable
2	Same as Scenario 1				Same as Scenario 1	Aging physicians	Same as Scenario 1		Demand increases, supply increases
3	Same as Scenario 1				Same as Scenario 1	Increased proportion of females	Same as Scenario 1		Demand increases, supply decreases

*The relationship between age and utilization of FP services is U-shaped: younger children and older adults use more care than other age groups.

**The relationship between FP age and workloads is an inverted U-shape: physicians between 49 and 60 are more productive than other age groups.

trends have been documented elsewhere in Canada (CIHI, 2001; Chan, 2002).

Methods

We used anonymized administrative data for people who resided in Winnipeg, and for Winnipeg FPs (practitioners whose patients resided primarily in Winnipeg). Winnipeg residents represent roughly two thirds of the population of the province of Manitoba, and live in the only large metropolitan area in the province. The majority of FPs practise in this capital city, and their services are covered under a universal health plan that has no deductible or co-payment. All measures were derived from billing data from physicians who worked on a fee-for-service (FFS) basis or who received alternative types of remuneration and submitted "evaluation claims" (roughly 7% of FPs in 2000/2001 and 2% of total billings, versus 5% of FPs in 1991/1992). The registry of patients and providers in the province has been previously validated for its completeness and accuracy (Roos, Mustard, et al., 1993).

Measures of service utilization were derived from encounter data between Winnipeggers (including residents of continuing care facilities) and FPs whose services were covered under Manitoba's universal health plan. Measures of physician workload were derived from encounters between Winnipeg FPs and any person, irrespective of the geographic residence of the patient. Although we report here on the first and last years, measures of use and supply were analysed for fiscal 1991/1992 to 2000/2001 (Watson et al., 2003). In a companion paper in this issue (Watson et al., 2003) we examine in more detail the changes in rates of FP and specialist use among older adults.

The count of visits per population was calculated by dividing the sum of all visits received by residents during a fiscal year by the number of residents. Visits include any face-to-face ambulatory care contacts that may have occurred in physician offices, personal care homes, outpatient departments, or at either of the two largest emergency departments. While fewer FPs now provide inpatient services, the total volume of inpatient (or outpatient) FP care has remained relatively stable over the period, suggesting that these particular shifts in practice patterns are unlikely to affect findings. Visits for prenatal and postnatal care were not included, as a result of data limitations. We report visit rates to FPs that are age standardized (direct method), using the 1991/1992 population of Winnipeg residents as the standard.

To gauge temporal changes in workloads, we counted the number of visits provided by FPs in

each fiscal year, divided by the number of FPs, stratified by physician age groups. Changes over time in the relationship between FP age and workload were gender standardized (direct method) to isolate the effect of age and account for temporal increases in younger female FPs. In order to compare how FP workloads changed over time, we also estimated the total expected visits provided in 2000/2001, using the age and workload relationship of 1991/1992, and compared it to the actual number of visits delivered in 2000/2001 (not gender standardized).

Findings

Temporal Shifts: Demographics of the Winnipeg Population and Their Use of FP Services

The size of the Winnipeg population according to our registry remained stable over the 10-year study period ($N = 653,452$ in 1991/1992; $n = 654,930$ in 2000/2001), but the age structure changed in important ways. The proportion less than 44 years of age declined 8 per cent, whereas the proportion aged 45 to 64 years (i.e., baby boomers) increased 25 per cent. The proportion of older adults aged 65 to 74 declined 6 per cent, yet the proportion aged 75 to 84 years grew 19 per cent. The proportion aged 85 or more grew 42 per cent.

Between 1991/1992 and 2000/2001, age-specific visit rates to FPs increased among older adults but declined among those less than 45 years of age. The largest increase occurred among those aged 65 to 74 years, while the largest decline occurred among children and adolescents (Figure 1). While females visited FPs more often than males did, gender-specific rates of use were stable over the period. Despite increases in the number of older adults and their high (and increasing) rates of FP use, if age-specific rates of use in 1991/1992 were used to predict use of FP services in 2000/2001, we would have expected a modest two per cent increase in use attributable to population aging. However, we found that actual FP visit rates across all age groups declined three per cent. In other words, actual visits in 2000/2001 were somewhat fewer than what we would have expected if age-specific rates of use in 1991/1992 had been applied to the population of Winnipeggers 10 years later.

Temporal Shifts: Demographics of FP Population and Their Workloads

The size of the population of Winnipeg FPs changed little between 1991/1992 and 2000/2001, but the age structure and age-specific workloads changed substantially. In 2000/2001, the number of Winnipeg FPs was 605 (5% relative decline from 1991/1992),

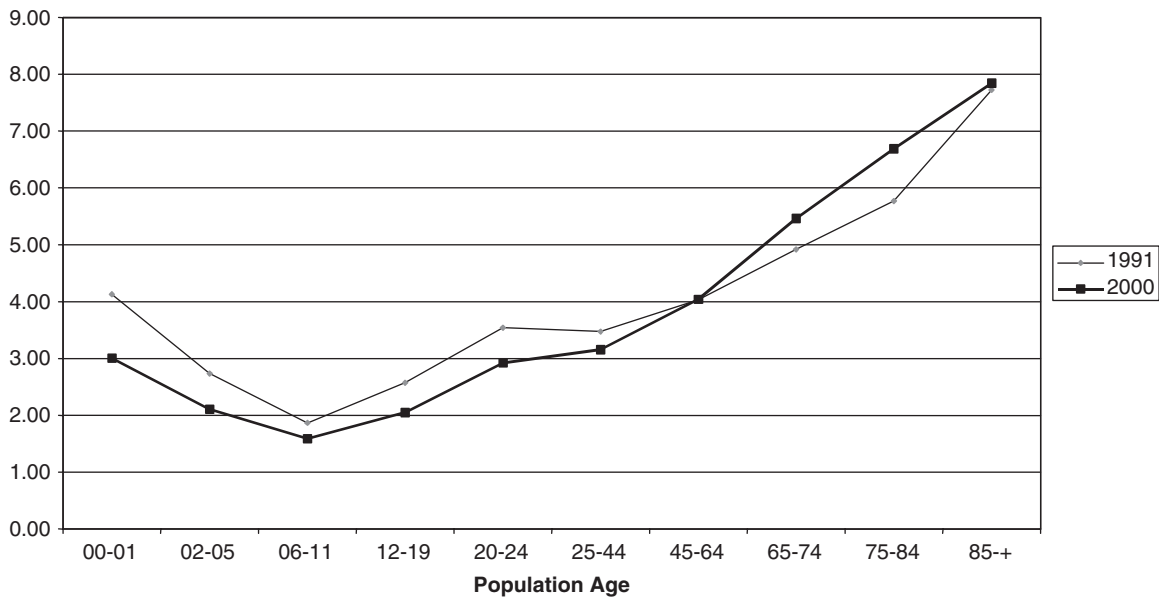


Figure 1: FP visits per annum per Winnipeg resident, 1991/1992 and 2000/2001

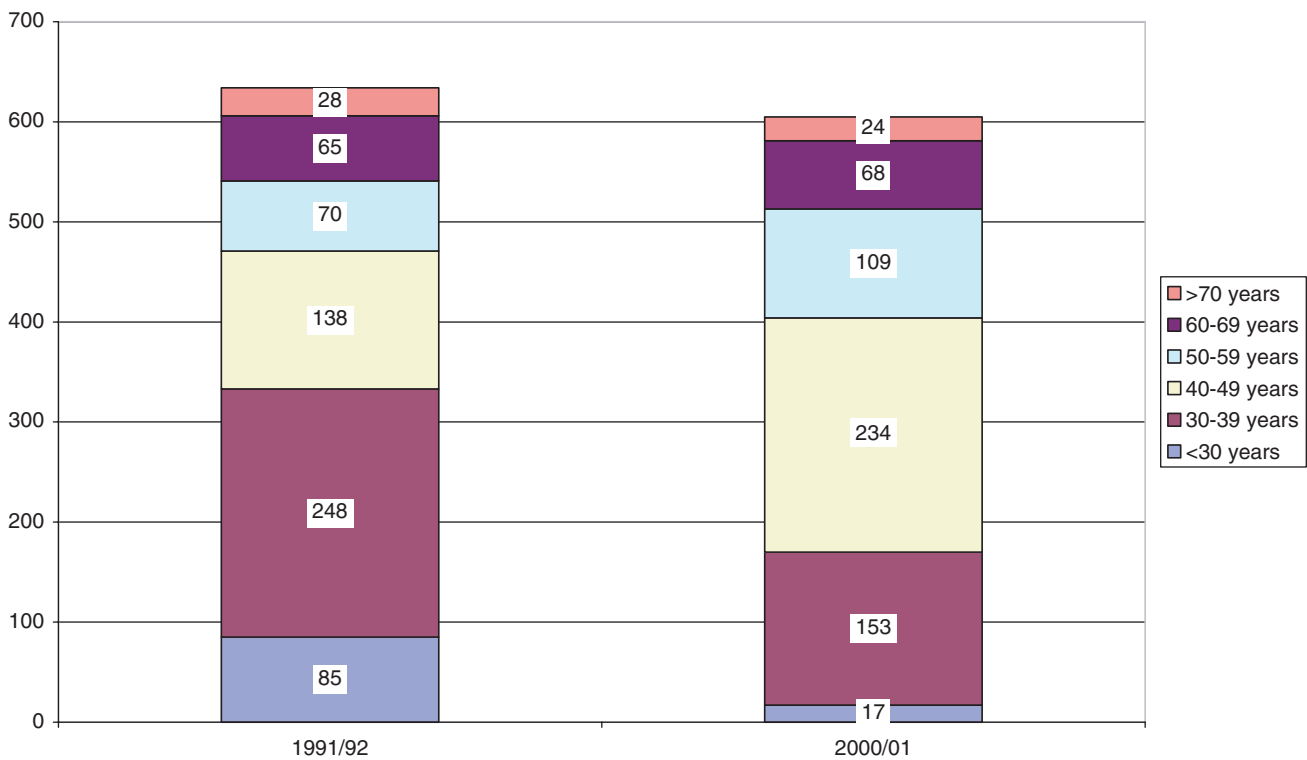


Figure 2: Number of practising Winnipeg FPs, by age category, 1991/1992 and 2000/2001

and FP-to-population ratios were 92 per 100,000 population (5% relative decline from 1991/1992). The number of FPs younger than 40 years old declined substantially, while baby boomer FPs (i.e., 40 and 59 years) increased substantially (Figure 2). Over the period, average age of FPs increased from 42.6 to 46.4 years.

The relationship between FP age and workloads was an inverted-U shape. However, the shape of the relationship changed substantially over the period (Figure 3). In 2000/2001, FPs between the age of 30 and 49 years provided approximately 20 per cent fewer visits per annum than their same age peers did in 1991/1992. FPs aged 50 to 59 years provided 5 per

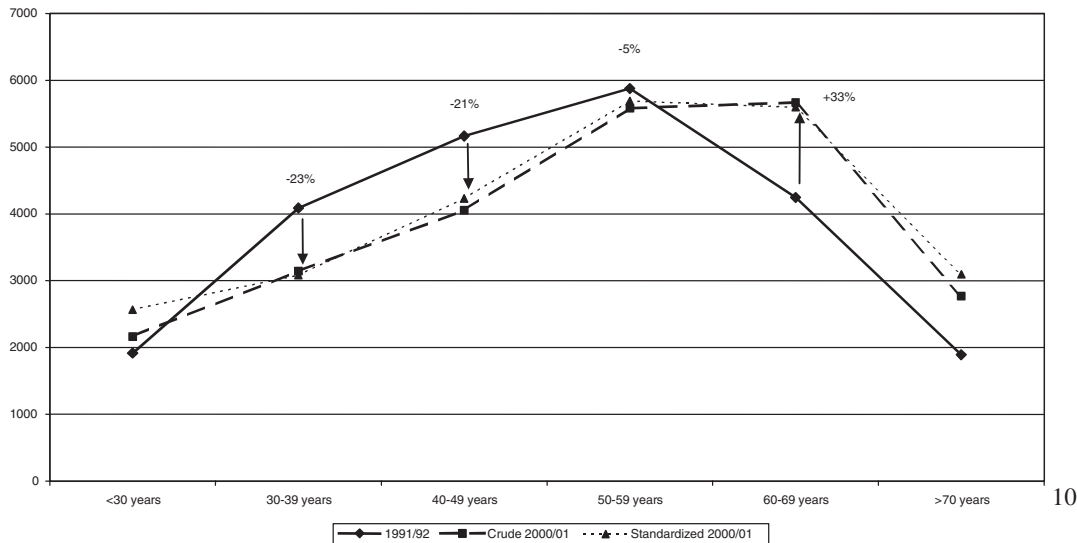


Figure 3: Mean visits per annum for Winnipeg FP, by age, 1991/1992 and 2000/2001

cent fewer visits, FPs aged 60 or more provided 33 per cent more visits, and FPs aged 70 or more provided 46 per cent more visits in 2000/2001 than did FPs of the same age in 1991/1992. This pattern of reductions in workload among younger FPs in 2000/2001, relative to their same age peers in 1991/1992, was true for both male and female FPs (a gender-neutral phenomenon).

While these findings point to differences between same-age cohorts, workloads within each generation of FPs remained stable. Consider the generation of FPs aged 30 to 39 years in 1991/1992 who became 40 to 49 years in 2000/2001. At the beginning and end of the decade this cohort delivered roughly the same number of visits per annum (roughly 4,000 in both periods). The generation of FPs aged 40 to 49 in 1991/1992 who became 50 to 59 years in 2000/2001 provided only slightly more visits per annum over the decade (roughly 5,500 in 2000/2001). Last, FPs aged 50 to 59 in 1991/1992 who became 60 to 69 years in 2000/2001 provided slightly fewer visits per annum over the decade (roughly 5,500 in 2000/2001).

We found no significant temporal changes in the gender structure or gender-specific workloads of Winnipeg FPs. The proportion of females FPs increased only slightly from 29 to 31 per cent. The workloads of females FPs were approximately 80 per cent that of their male counterparts, and the relationship between gender and workload held constant over the decade.

Discussion

We found that a combination of circumstances described in the scenarios in Table 1 materialized in

Winnipeg between 1991/1992 and 2000/2001: the FP-to-population ratio remained relatively stable, age-specific rates of FP use among older adults increased, both the population and FP workforce aged (scenario 2), and the FP workforce included more females (scenario 3). The net effect was a relative homeostasis in aggregate and average FP supply and use between 1991/1992 and 2000/2001. Barer et al. (2004) document similar stability in aggregate-level measures of physician services in British Columbia between 1985/1986 and 1996/1997. Perhaps the most intriguing result to emerge from our analyses was that, despite aggregate stability, dramatic shifts in age-specific patterns of “who” is delivering “how many services” and “who” is receiving “how many services” (Watson et al., 2004).

As the average age of the workforce increased as the result of aging of baby boomer FPs, most of the workforce were in, or moved into, their most productive years by the end of the period. If age-specific measures of workload in 1991/1992 were used to predict “effective” supply in 2000/2001, we would have expected a 12 per cent increase over the period – even with no change in the absolute number of FPs. However, these gains did not materialize; instead, the number of visits generated by Winnipeg FPs declined 3 per cent (despite the 2% expected increase predicted from an aging patient population). In essence, the use of cross-sectional, age-specific measures of workload to predict effective supply would have resulted in substantial overestimates. Such overestimations relate to the dramatic temporal shifts in age-specific rates of service provision. While others have documented the importance of accounting for temporal trends in age-specific rates of FP

use when predicting utilization (Evans et al., 2001), we document evidence of the importance to simultaneously account for trends in age-specific workloads to predict future service supply.

Contrary to popular perceptions that a majority of FPs are on the brink of retirement, the number and proportion of FPs aged 60 or more was stable. But temporal trends indicate that FPs aged 60 or more are assuming an increasing burden of service delivery. This important finding, coupled with persisting increases in age-specific patterns of use among older adults, is potentially alarming. We found FPs aged 60 to 69 years (11% of the workforce) to be providing, on average, 1.5 times the number of services relative to FPs aged 30 to 39, and shouldering the heaviest workload. Each retiring FP will likely be unable to find a younger replacement willing to carry an equivalent workload. Additionally, since older physicians tend to serve patients who are older than those served by their younger colleagues (Monette et al., 1993), an increasing numbers of older adults can be expected to be seeking such younger FPs when their current physicians retire.

Should trends in age-specific workloads persist following retirement of the oldest cohort of FPs, we expect substantial declines in the availability of FP services in the coming years. Given the long lags between some changes to physician supply policy and changes in effective supply (e.g., to the result of the length of time to train physicians), current perceptions of FP shortages and complaints of high workloads are likely, on the basis of this analysis, to get worse before they get better. That is not to say that the situation is hopeless. The use of alternative primary care providers, or other mechanisms to enhance the efficiency of FP patterns of service delivery, will be required to compensate for the trends exposed here. We do know that physicians have discretion over the comprehensiveness of care provided (Chan, 2002) and the frequency of care provided to certain patients (Roos, Carrière, & Friesen, 1998). Additionally, research increasingly points to methods of service delivery that can improve the accessibility and efficiency of primary care (Murray & Berwick, 2003; Pinnock et al., 2003).

We expected a two per cent increase in FP use as the result of population aging. If we used average workloads of a full-time FP in 1991/1992 to forecast the number of practitioners required to provide the same aggregate service levels in 2000/2001, an additional seven full-time FPs would have been needed for Winnipeg's population of 650,000. This finding of a relatively trivial effect of an aging population on future requirement for physicians

parallels earlier estimates, and provides further evidence to support the weight of evidence that the aging population will not place undue pressure on physician services (Demers, 1996; Denton, Gafni, & Spencer, 2001; Evans et al., 2001). We document the fact that population aging and persisting increases in age-specific rates of use among older adults has coincided with substantive reductions in use among the young. The importance of this discovery is discussed in a companion article in this issue (Watson, Heppner, Reid, Bogdanovic, & Roos., 2004).

An important limitation of our study is that it is a case study of one urban city in Canada, and the external validity of our findings to other jurisdictions is unknown. Indeed, analyses of temporal trends in age-specific workloads among urban (or rural) FPs (or specialists) have not been conducted elsewhere. Clearly, the magnitude of the trends we document in Winnipeg warrant investigation elsewhere.

Physician resource planning requires simultaneous consideration of all of the demographic determinants of use noted in this paper as outlined in Table 1. We have discovered that it is misleading to presume that (a) aging of the population is the demographic factor of primary concern, (b) aging of the physician workforce is the demographic factor of primary concern on the supply side, or (c) FP-to-population ratios are the best metric to monitor or project physician resources. It is clear that changes in age-specific rates of use, and changes in age-specific patterns of FP productivity, will trump population aging as key drivers of future requirements for FPs.

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