Trends in the Utilization of Specific Health Care Services among Older Manitobans: 1985 to 2000

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RÉSUMÉ

Cet article porte sur les tendances 16 années en matière d'utilisation des hôpitaux et des services médicaux par des Manitobains âgés de 75 ans ou plus. Les données ont été tirées du Manitoba Population Health Research Data Repository. Les tendances sont étudiées en fonction de cinq mesures relatives aux services hospitaliers (les congés des hôpitaux, les séjours de courte durée, les séjours de longue durée, les opérations de la cataracte ainsi que les remplacements de la hanche ou du genou) de même que de deux mesures relatives aux soins prodigués par des médecins (le nombre global de consultations ainsi que la proportion de personnes qui ont sept consultations ou plus). Les résultats démontrent des changements, au cours du temps, dans l'utilisation de ces services par les personnes âgées vivant au Manitoba, l'étendue de ces changements variant selon le service étudié, l'âge et le lieu de résidence. Des différences autrefois considérables en matière d'utilisation sont en train de diminuer, notamment le taux d'opérations de la cataracte selon les régions ainsi que la fréquence des visites chez le médecin selon l'âge. Pour d'autres services, notamment le taux de remplacements de la hanche ou du genou, les différences entre les régions sont en train de s'accroître. Les résultats indiquent que les généralisations relatives à l'impact des personnes âgées sur le système de santé peuvent être remises en question, puisque les différences entre les régions et entre les groupes d'âge (75 à 84, 85 ou plus) peuvent être considérables.

ABSTRACT

This paper examines 16-year trends in the utilization of hospital and physician services by Manitobans aged 75 and more, using data from the Manitoba Population Health Research Data Repository. Trends are examined across five measures of hospital services (separations, short-stay days, long-stay days, cataract surgeries, and hip/knee replacements) and two measures of physician care (overall visit rate, and proportion having seven or more visits). Results show changes in the utilization of these services among older adults living in Manitoba over time, with the extent of change varying with the service under consideration, age, and location of residence. Previously large utilization differentials are shown to be shrinking; for example, cataract surgery rates across regions and physician visit rates by age. For other services, such as the rates of hip or knee replacement surgery, the differences across regions are increasing. Findings indicate that global generalizations about the impact of older adults on the health care system are subject to question, as regional differences and differences between age groups (75–84, 85+) can be significant.

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Introduction

For over 20 years there has been discussion and debate about the implications of an aging population on health care utilization; for example, primary care, specialist services, and acute, chronic, and long-term care. Some authors have argued that the growing number of older adults, an aging baby boomer cohort, and more expensive health care services will ultimately break the Canadian health care system if no action is taken (Robson, 2001). Others have suggested that improvements in the health status of the older population and the increasing evidence supporting the compression of morbidity hypothesis mean that the impact of the aging population on the health care system will be more gradual (Barer, Evans, & Hertzman, 1995; Chen & Millar, 2000; Doblhammer & Kytir, 2001; Hubert, Bloch, Oehlert, & Fries, 2002).

This paper examines differences in health care utilization between 1985 and 2000, by region and age, among Manitobans aged 75 to 84, and 85 and over, in order to contribute to a longitudinal analysis to the literature on the impact of population aging on health care use. People aged 75 years and older were selected for this study because they are the heaviest users of health care services (Menec, MacWilliam, Soodeen, & Mitchell, 2002) and because their relative size in the population has grown substantially during this 16-year period. People aged 75 years and over represented only 3.3 per cent of the total Manitoba population in 1985, but approximately 5.5 per cent by 2000 – an increase of slightly more than 65 per cent. Patterns of growth of the group aged 75 and over in Manitoba are similar to what has been seen in most other Canadian provinces (Statistics Canada, 2004). The time period (1985–2000) was selected for study because it encapsulates a series of important health care delivery changes, for example, hospital bed closures, increasing emphasis on primary care and day surgeries, and the shift to regional health authorities. These changes also occurred in the majority of other Canadian provinces within this time frame. Consequently, by investigating this age group and period, this paper explores how the rapid increase in the relative numbers of the heaviest users of health care (i.e., those 75+), influenced rates of utilization in one Canadian province. By considering health care use in this population regionally, this paper also provides an opportunity to examine the accuracy of global generalizations of the impact of population aging on health care use.

Literature Review

The use of health care services among older adults is known to be influenced by factors such as age, sex, residential location (e.g., rural versus urban), socioeconomic status, the nature of social support, and health related factors (e.g., functional status, presence of specific diseases, self-rated health). Utilization of hospital and physician services among older adults has been examined in a wide variety of ways in the literature, for example, intensity of use (e.g., number of visits in a specified period, length of stay), length of time since the most recent visit, or simple use versus non-use over a specified period (Blazer, Landerman, Fillenbaum, & Horner, 1995; Chi, Brayne, Todd, & Pollitt, 1995; Schwarz, 2000; Wolinsky, Stump, & Johnson, 1995). Regardless of how the service is measured, overall research shows that utilization is influenced by both age and sex. These influences occur cross-sectionally as well as over time, although the nature of the relationships varies by the type of service under consideration.

Younger age (within the 65+ group) has been found to be associated with higher volume of hospital admissions, if other factors such as insurance and previous hospitalizations are not considered (Wolinsky et al., 1995), while older age has been linked to greater physician utilization (Black, Roos, Havens, & MacWilliam, 1995; Dansky, Brannon, Shea, Vasey, & Dirani, 1998). Using Manitoba data, the work of Black et al. (1995) examined trends in utilization and found that the relative increase in use over time was greatest for persons over the age of 85. When considering the influence of sex on utilization, Blazer et al. (1995) found that older females were less likely to receive outpatient treatment in a hospital setting, while Lum et al. (1999) found that being male was associated with greater hospital use. Trend studies of hip and knee arthroplasties have generally found that women are more likely to receive these surgeries, but when men receive them, the surgeries are done at a younger

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age (Balasegaram, Majeed, & Fitz-Clarence, 2001; Madhok et al., 1993).

Residence location, which has been used as a proxy for socio-economic status as well as a measure of proximity to health care resources, has also been examined in numerous studies of the use of health care services among older adults. Older persons in rural areas in the United States have been found to have lower rates of utilization of both hospitals and physicians, compared to their urban counterparts, using measures of hospital days and physician office visits (Dansky et al., 1998), and of outpatient care in a hospital setting, ambulatory visits, and single nights in a hospital (Blazer et al., 1995). Other researchers found that urban residents were more likely than their rural counterparts to use physician services for their arthritis care (Saag et al., 1998). In only one study was the rural–urban utilization finding going in the opposite direction. An Irish study found that older persons in rural areas were more likely to receive total hip arthroplasties than their urban counterparts (Willis, Kee, Beverland, & Watson, 2000). Research in the United States focusing on knee replacements has shown steady increases in the rates of these surgeries over time, but that the relative increases vary significantly across regions (Katz et al., 1996). No rural–urban pattern differences were identified. Across all of these studies examining rural–urban differences in utilization, it is unclear whether the differences found are a function of resource proximity, availability of individual socio-economic resources (which often vary by region), or their interaction.

Based on this literature, and the types of data available in the Manitoba Population Health Research Data Repository, this research focused on the use of hospital-related services, selected high-profile surgical procedures, and physician utilization. Specifically, we examined hospital separations, days for short hospital stays (<30 days), days for long hospital stays (≥30 days), cataract extraction, hip and knee replacements, total physician visits per person, and the proportion of the population having seven or more physician visits in one year. These services were selected because the literature suggests that they are the ones that have been significantly influenced by changes over time in technology, the accepted thresholds for treatment, and overall professional practice patterns (Black et al., 1995; Dada & Sindhu, 1999; Madhok et al., 1993). In addition, they are services that are known to be influenced by age, sex, and residence location (Blazer et al., 1995; Dansky et al., 1998; Lum et al., 1999; Wolinsky et al., 1995).

The questions guiding our analyses were: Do changes in the utilization of services over the past 16 years among people aged 75 and over who are living in Manitoba vary as a function of age group or region? Overall, have there been any significant changes in the utilization of these services over the past 16 years among older Manitobans? Together, these two questions provide the opportunity to examine whether the rapid increase in the relative numbers of the heaviest users of health care (i.e., those 75+) influenced rates of health care utilization, and if global generalizations regarding the impact of population aging on health care use can be empirically supported.

Methods

Data Sources and Definitions

The Manitoba Population Health Research Data Repository is a unique administrative data source that can be used to examine key population factors (e.g., age, sex) known to influence health services utilization as well as system factors such as regionalization. Study data were obtained from the following files of this repository: hospital separation abstracts, physician billing claims, and population registry. Approval for the research was obtained from the Health Research Ethics Board, University of Manitoba. Approval was also obtained from the Manitoba Health Information Privacy Committee, in keeping with the protocol for the use of these data.

Three measures of hospital use were generated from hospital separation abstracts for fiscal years 1985/1986 to 2000/2001. The first was the rate of hospital separations – the number of hospital discharges per 1,000 population. This measure includes both inpatient hospitalizations and day surgeries, but does not include non-surgical outpatient health services. The next two measures were the rates of short-stay and long-stay hospital days (i.e., the number of days per person). To calculate these measures, each *inpatient* (i.e., day surgery cases were not included) hospital separation was defined as either a short-stay separation (less than 30 days in length) or a long-stay separation (30 days or more in length). Counts of the number of days were compiled for each type of separation. In-year days were calculated, rather than total days. In-year days are those days assigned to the year in which they were incurred, not the year in which the separation occurred (Roos et al., 2001). For example, if an individual had a total length of stay of 10 days, with 5 days occurring in 1 fiscal year and 5 in the following fiscal year, then 5 days would be apportioned to each of these years. Long-stay days are undercounted in the last year of the study period

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because data from the subsequent year (2001/2002) were not available for calculating in-year days for 2000/2001. Accordingly, in-year days for long-stay hospitalizations during 2000/2001 were excluded from the analysis.

Two measures of surgical procedure use were also included: rates of cataract and total hip or knee replacement surgical procedures (i.e., the number of surgical procedures per 1,000 population). In the 1991/1992 fiscal year, there were changes in the ICD-9-CM codes used to identify these surgical procedures. Therefore, to ensure the comparability of these measures over time, the data were compiled only for the period 1992/1993 to 2000/2001. The selected codes[1] were consistent with those adopted in other Manitoba studies (see Brownell, Roos, & Burchill, 1999; Roos & Mustard, 1997).

Two measures of physician use were developed from physician billing claims for 1985/1986 to 2000/2001. The first was the physician visit rate, that is, the number of physician visits (including both general/family physicians and specialists) per person. The second was the proportion of the population having seven or more visits in a given year; this measure focuses on intensive use of physician services. This measure was developed after empirically examining the frequency of physician visits in the population. Almost all individuals 75 years of age and older visit a physician at least once or twice each year, while approximately half had more than six visits. All fee-for-service physicians submit billing claims, and most salaried physicians submit parallel ''evaluation'' claims (Roos et al., 1993). Physician visits exclude inpatient hospital visits, but include virtually all other physician encounters (i.e., office visits, consultations, outpatient and emergency department visits, visits to patients in nursing homes, and visits to patients in their own homes).

The population registry, which captures all Manitoba residents eligible to receive insured health care services in the province, was used to obtain annual regional population counts to generate the denominator for each of the rates described above. Region of residence was defined using regional health authority (RHA) boundaries. Winnipeg is the largest RHA in Manitoba with a population of about 650,000, and the remaining 11 RHAs are in rural areas. The RHA of residence was defined at December 31 in each study year, using the most current boundary definitions. As a population-level analysis, it is important to note that the calculated rates do not track individuals over time or across regions over time. Rather, utilization rates are based on counts of use within a region at a given time.

Data Analyses

Regression techniques for correlated data were used to model rates of health care use for the population 75 years of age and older as a function of the predictor variables of age, sex, region, and year (Carrière, Roos, & Dover, 2000). The data were analysed from a generalized linear models (GLM) perspective, using generalized estimating equations (GEE) to account for the correlated structure of the data (Liang & Zeger, 1986). Under a GLM framework, the following are specified: the outcome and predictor variables, the distribution of the data, a link function that describes the relationship between the outcome and predictor variables, and a correlation structure.

The units of analysis were population strata defined by age, sex, and region of residence. The dependent variable was the rate of a health care event (e.g., long-stay day rate) in a stratum. The surgical procedure rates were modelled using the negative binomial distribution; this distribution is an appropriate choice for events that occur infrequently, but are highly variable across the population (Carrière et al., 2000). The physician use and hospital day rates were highly skewed, and therefore they were first transformed using a logarithmic function, and then modelled using the normal distribution. An exchangeable correlation structure was adopted, which assumes that measurements in successive years are equally correlated.

All regression models contained the main effects of age, sex, region, and year, as well as the age*year and region*year interactions. Age was entered into the regression models as a dichotomous variable, with categories of 75–84 years and 85 years and over. For the analyses of surgical procedure rates, region was a dichotomous variable, with categories of Winnipeg RHA and non-Winnipeg RHAs. For the analyses of the remaining rates of hospital and physician use, non-Winnipeg RHAs were further classified into three geographic regions: Northern (Nor-Man, Burntwood, Churchill RHAs), Central (Central, Interlake, Marquette, North Eastman, Parkland RHAs), and Southern (Brandon, South Eastman, South Westman RHAs). These three regions have very different population health status, using the premature mortality rate (PMR) as the index of health status. The Northern region exhibits the highest PMRs and the Southern exhibits the lowest (Roos et al., 2001).

Contrasts of the year regression coefficients were used to test for differences over time between age groups and regions. Specifically, interaction contrasts (Lix, Ekuma, Brownell, & Roos, 2004) were used to test whether the magnitude of the difference in health

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service use between two age groups or regions was the same for two periods of time. This is equivalent to a hypothesis of parallelism of slopes for two age groups or regions. In addition, linear contrasts were used to test for differences between two time periods for the entire province, and between two age groups or regions in one period. For the hospital and physician measures, the periods were 1985/1986–1991/1992 and 1992/1993–2000/2001. These 7- and 9-year periods were of interest because 1992/1993 was the year in which health reform resulted in a significant number of hospital bed closures in the Winnipeg RHA. For long-stay days, the second period was only 1992/1993 to 1999/2000 because of under-counting in 2000/2001 (see descriptions of counting in-year days, above). For the surgical measures, where data were available only from 1992/1993 to 2000/2001, temporal differences were tested between two 4-year periods of 1992/1993–1995/1996 and 1997/1998–2000/2001.

The interaction contrast results for testing differences in use between age groups and regions for the two periods are reported in tabular form. Exponentiation of an interaction contrast coefficient gives an estimate of the relative rate (RR), that is, the change in health care use between two periods for one age group or region relative to another. For example, if the rate of surgeries is estimated to increase by 30 per cent between two periods for region A, and 20 per cent higher for region B, then the RR for Region B is 1.08 using Region A as the reference group.

All significance tests were performed at $\alpha = .05$. To control the Type I error rate when multiple tests were performed for a single hypothesis, the Bonferroni multiple comparison procedure was adopted (Dunn, 1961). For example, $\alpha = .05/3 = .017$ when we tested for differences across the Southern, Central, and Northern regions of Manitoba.

For each outcome of interest, descriptive data on the rates of utilization per person or per 1,000 people have been included as Appendix 1 to this paper for those readers who are interested.

Results

Hospital Utilization

Hospital Separations

Rates of hospital separations (per 1,000 people) for the entire province as well as each region of the province for the 16-year study show that these rates were higher for populations of non-Winnipeg regions than for the population of Winnipeg RHA (see Appendix 1).

Regression analyses confirm that there was a small but statistically significant increase in utilization (RR = 1.03, $p < .0001$) for the entire province between the two study periods (1985/1986–1991/1992 and 1992/1993–2000/2001). However, there were regional variations. Non-Winnipeg regions experienced a statistically significant decrease in use between the two periods relative to Winnipeg (Table 1). For non-Winnipeg regions, compared to the Southern, both Northern and Central regions experienced a statistically significant decrease between the two periods. The Northern region also experienced a statistically significant decrease relative to the Central region.

Analyses also uncovered variability by age in that utilization was found to be significantly higher for the group older than 85 than for those 75 to 84 (RR = 1.32 for 1985/1986–1991/1992, $p < .0001$; RR = 1.35 for 1992/1993–2000/2001, $p < .0001$). However, there was no significant difference in the magnitude of the increase over time for the two age groups (Table 1).

Hospital Days

The average number of short-stay (<30 days) and long-stay (≥30 days) hospital days per person are reported for the entire province as well as each region of the province, in Appendix 2. There was a substantial decline in the rate of hospital days for both short- and long-stay separations across the province over time. The rate of long-stay days declined substantially between 1992/1993 and 1993/1994, when closures of Winnipeg hospital beds were initiated. However, it is evident that for both measures of hospital use, the decline began prior to bed closures.

Despite the overall decline in the rate of short-stay hospital days across the province, the rate was significantly higher for non-Winnipeg regional populations than for the Winnipeg RHA population for the entire 16 years of the study (RR = 1.76, $p < .0001$). For both measures the magnitude of the decrease between the two periods was non-significant for Winnipeg RHA populations compared to non-Winnipeg (Table 1). Among the populations of the non-Winnipeg RHAs, however, the decline in the rate of short-stay days between 1985/1986–1991/1992 and 1992/1993–2000/2001 was greater for the Northern region than for the Central region. It was also greater for the Southern than for the Central region. On the other hand, there were no differences between the population of the Northern region and either Central or Southern regions in the rate of long-stay hospital days (Table 1).

Short-stay day rates were significantly higher for the group aged 85 and more than for the 75–84 age group in both periods (RR = 1.44 for 1985/1986–1991/1992,

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Table 1: Regression results – Interaction contrast estimates of the relative rate (RR) of health service use[a]

	RR	χ^2	P[b]
Hospital Separations			
Non-Winnipeg (reference: Winnipeg)	0.93	14.75	.0001*
Northern MB (reference: Southern MB)	0.92	23.88	<.0001*
Central MB (reference: Southern MB)	0.96	8.64	.0033*
Northern MB (reference: Central MB)	0.95	6.66	.0100*
85+ years (reference: 75–85 years)	0.98	2.57	.1092
Short-Stay Hospital Days			
Non-Winnipeg (reference: Winnipeg)	0.97	0.87	.3504
Northern MB (reference: Southern MB)	0.91	18.08	<.0001*
Central MB (reference: Southern MB)	0.97	2.64	.1041
Northern MB (reference: Central MB)	0.94	6.13	.0133*
85+ years (reference: 75–85 years)	1.02	1.23	.2678
Long-Stay Hospital Days			
Non-Winnipeg (reference: Winnipeg)	1.03	0.64	.4238
Northern MB (reference: Southern MB)	0.97	0.40	.5265
Central MB (reference: Southern MB)	0.95	4.88	.0272
Northern MB (reference: Central MB)	1.02	0.13	.7165
85+ years (reference: 75–85 years)	0.98	0.33	.5657
Cataract Extraction			
Non-Winnipeg (reference: Winnipeg)	0.88	6.36	.0117*
85+ years (reference: 75–84 years)	1.04	0.57	.4512
Total Hip or Knee Replacement			
Non-Winnipeg (reference: Winnipeg)	0.89	6.68	.0098*
85+ years (reference: 75–84 years)	1.01	0.01	.9279
Average Number of Physician Visits			
Non-Winnipeg (reference: Winnipeg)	1.03	1.74	.1866
Northern MB (reference: Southern MB)	0.92	2.87	.0900
Central MB (reference: Southern MB)	0.94	3.88	.0487
Northern MB (reference: Central MB)	0.98	0.21	.6453
85+ years (reference: 75–85 years)	0.87	26.23	<.0001*
Proportion with Seven or More Physician Visits			
Non-Winnipeg (reference: Winnipeg)	0.99	0.32	.5709
Northern MB (reference: Southern MB)	0.94	2.73	.0987
Central MB (reference: Southern MB)	0.98	1.00	.3179
Northern MB (reference: Central MB)	0.96	1.05	.3064
85+ years (reference: 75–85 years)	0.94	9.77	.0018*

[a]The RR is presented for 1985/1986–1991/1992 and 1992/1993–2000/2001 for all measures, with the exception of cataract extraction and total hip or knee replacement, where the periods are 1992/1993–1995/1996 and 1997/1998–2000/2001.
[b]Results that are starred (*) are statistically significant.

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$p < .0001$; RR = 1.41 for 1992/1993–1999/2000, $p < .0001$). Long-stay day rates were also much higher for the group aged 85 and more than for the 75–84 group in both periods (RR = 2.74 for 1985/1986–1991/1992, $p < .0001$; RR = 2.69 for 1992/1993–2000/2001, $p < .0001$). However, there were no significant differences in the magnitude of the decrease over time for either measure of hospital days (Table 1).

Surgical Procedures

Rates of cataract and hip/knee surgeries performed between 1992/1993 and 2000/2001 per 1,000 people are provided in Appendix 3 for the entire province, and for Winnipeg and non-Winnipeg regions. These descriptive data reveal substantial increases for both age groups in Winnipeg and non-Winnipeg regions. The differences in procedure rates for Winnipeg and non-Winnipeg regions are more pronounced for cataracts, where they are substantially higher for Winnipeg, than for hip and knee replacements, where there is little difference between the two regions.

When examining variation across regions, the rate of these procedures was consistently lower for non-Winnipeg than for Winnipeg RHA populations. The change in the rate between the two periods was estimated to be significantly smaller for non-Winnipeg RHA populations than for the Winnipeg RHA population (Table 1).

While cataract rates were substantially higher for the younger age group than for the older age group, the increase in rates between the two periods was similar for both age groups. As a result, the magnitude of the difference in the rate of increase was non-significant (Table 1). For hip and knee replacements, rates were also higher for the younger age group than for the older, and again, the increase in rates between the two periods was similar for both age groups (Table 1).

Physician Utilization

The average number of physician visits per Manitoba resident aged 75 and more during the study period, and the per cent of people 75 and more who had seven or more physician visits, are provided in the Appendix 4 & 5. Descriptively, the 85+ group had greater contact with physicians than the 75–84 year old age group in all years. A greater proportion of the Winnipeg population than of the non-Winnipeg population make intensive use of physicians each year.

Regression analyses revealed that visit rates were estimated to have declined a statistically significant amount between the first and last study periods for the entire province (RR = .96, $p = .001$). The proportion of the population having seven or more visits increased by one per cent between the two periods ($p < .0001$). Although this is a statistically significant result, it is not likely to be clinically or practically meaningful.

Looking regionally, there were no significant differences in the magnitude of the change between the two periods for non-Winnipeg relative to Winnipeg regions for either the visit rate or the proportion of the population having seven or more visits (Table 1). Furthermore, for both measures there were no differences between the populations of the Northern and Central regions, Northern and Southern regions, or Central and Southern regions.

The group aged 85 and over exhibited a higher visit rate than those aged 75–84 in both the first (RR = 1.25, $p < .0001$) and second periods (RR = 1.08, $p < .0001$). However, the magnitude of the difference between the two age groups narrowed over time (Table 1). There was also a higher proportion of those aged 85 and over than 75–84 year olds having seven or more physicians per year in both the first (RR = 1.12, $p < .0001$) and second periods (RR = 1.05, $p = .006$). The magnitude of the difference for the age groups also narrowed over time (Table 1).

Discussion

The purpose of this paper was to contribute a longitudinal analysis to the literature on the impact of population aging on health care use and to examine the accuracy of global generalizations of the impact of population aging on health care use. Using data from the Manitoba Population Health Research Data Repository, we investigated whether any significant changes had occurred over the 16-year period of 1985 to 2000 among Manitobans aged 75 and over in seven measures of health care use. We also sought to determine whether changes had occurred in the utilization of services over time varied as a function of age or region.

Overall, the findings show changes in the utilization of health services by people 75 years and older, over 16 years. Furthermore, findings clearly show that examining utilization data at the provincial level for people in the same group masks important differences in the direction or the extent of change over time that emerges when regional or age group comparisons are made.

For the hospital stay variables, findings indicate that the overall use of hospitals for inpatient care has shown a substantial and consistent decrease over the 16 years of the study, with 53 per cent fewer long-stay days in 1999/2000 when compared to 1985/1986, and 25 per cent fewer short-stay days when comparing

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1985/1986 to 2000/2001. Age and time did not interact in the regression models, and therefore the magnitude of the decreases observed in hospital stays was consistent across individuals 75 to 84 and those 85 and over. In the same period, the rate of separations has increased significantly (15 per cent increase), with no significant trend differences by age. The opposite trends in separations (increase) and days stay (decrease) could reflect a number of factors, including changes in practice patterns (e.g., emphasis on primary care and availability of home care), hospital downsizing, an overall shift toward shorter stays for surgery (exclusive of outpatient surgery), and increased use of technology (e.g., diagnostic tools). Of note is the fact that the decreases in inpatient days started even before the permanent bed closures that occurred in Manitoba between 1992/1993 and 1993/1994. Thus, the decline cannot be attributed exclusively to downsizing.

In terms of regional differences in hospitalizations, older residents of the major urban area were found to have fewer short-stay hospital days in comparison to their non-urban counterparts, even though there were no differences observed for long-stay hospital stays. These findings could be a consequence of the greater bed supply in the rural areas, and therefore a greater willingness of physicians to keep older adults in a hospital for observation, specialized assessment or treatment, or waits prior to transfers or other admissions (e.g., transfer to Winnipeg hospital for surgery or for admission to a nursing home). In previous research, Dansky et al. (1998) found that older adults in rural areas used fewer hospital days than urban-dwelling older adults, and Blazer et al. (1995) reported similar findings. It appears that the findings of this study contradict these previous findings, although differences in health care policy (e.g., bed supply or payment policies), outcome measurement, sampling, study duration, and country of origin may be playing a role in these apparent differences.

Overall, the most substantial utilization changes over the study period have occurred for cataract surgery and hip/knee replacement surgery. Between 1992/1993 and 2000/2001, the rate of cataract procedures increased by 61 per cent while the rate of hip/knee replacement surgeries increased by 81 per cent. Two likely contributors to these increases are improved technology and changes in physician practice patterns. These hypotheses are consistent with the writings of Black et al. (1995), Dada & Sindhu (1999), and Madhok et al. (1993).

For the surgical outcomes examined in this study, both age and region played a role in understanding utilization as well as trends in utilization over time. Important age-related differences were found for rates of cataract surgery. Overall, the older age group (85+) had a rate for cataract surgery that was 70 per cent less than the younger age group. One potential explanation is that once cataract surgery is done, it is not typically redone. Further research is needed to determine if this hypothesis is supported if an individual's use of services is tracked over time. The rate of hip and knee replacement surgeries is 32 per cent less in the older age group than the younger one – perhaps reflecting the greater risk associated with these procedures. In addition to age-related differences, the surgical procedures discussed in this study also showed significant differences in the magnitude of change in utilization that was associated with location of residence, but for the two types of surgery the results were opposite. For cataract surgery, the Winnipeg versus non-Winnipeg gap was reduced by 12 per cent over time, while for hip and knee replacement surgery the gap expanded. A variety of factors could contribute to this finding, including availability of specialized facilities and physicians, access to follow-up services (e.g., rehabilitation services following orthopedic surgery), or differing priorities of regional health authorities.

While the physician visit rate did not show a significant increase over the time of the study, there has been a small but significant increase in the proportion of ''high-intensity users,'' which, for the purposes of this study, include those people who see a physician seven or more times a year. Furthermore, although the number of physician visits per person did not change overall, the data show that the rate for the population over 85 decreased, while it increased for those aged 75 to 84. In addition, while there has been steady growth in the proportion of high-intensity users, the greatest increase has been in the 75 to 84 year age group – with the increase in the older age group 6 per cent less than in the younger group. Together, these findings point to the importance of examining trends in utilization over time across age subgroups within the older population to increase the chances that key age-related program and policy decisions are fully informed.

Conclusion

The findings of this study demonstrate that significant changes have been occurring in the utilization of health care services among older adults living in Manitoba over the last 16 years. The nature and extent of utilization changes vary, depending on the health care service under consideration, age, and location of residence. Although each Canadian province has

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unique features in the provision of health care services to older adults, and has specific issues related to service access, availability, and funding priorities, this Manitoba study does offer two important but related messages. First, changes in health care utilization among older adults are service specific. Second, global generalizations about the impact of older adults on the health care system are subject to serious question. Against this backdrop, the findings presented point to the need to be sensitive to regional differences in population distribution, utilization patterns, and local health care priorities when planning health services to meet the needs of older adults in Manitoba and elsewhere in Canada.

Note

1 Cataract surgeries were identified from physician tariff codes 5611 and 5612, and procedure codes from hospital separations 13.11, 13.19, 13.41, 13.42, 13.59, 13.2–13.29, 13.3–13.39; total hip replacement, ICD-9-CM codes 81.51 and 81.53; total knee replacement, ICD-9-CM codes 81.54 and 81.55.

References

Balasegaram, S., Majeed, A., & Fitz-Clarence, H. (2001). Trends in hospital admissions of the hip and femur in England, 1989–1990 to 1997–1998. *Journal of Public Health Medicine*, *23*(1), 11–17.

Barer, M.L., Evans, R.G., & Hertzman, C. (1995). Avalanche or glacier? Health care and demographic rhetoric. *Canadian Journal on Aging*, *14*(2), 193–224.

Black, C., Roos, N.P., Havens, B., & MacWilliam, L. (1995). The rising use of physician services by the elderly: The contribution of morbidity. *Canadian Journal on Aging*, *14*(2), 225–244.

Blazer, D., Landerman, L., Fillenbaum, G., & Horner, R. (1995). Health services access and use among older adults in Northern Carolina: Urban vs. rural residents. *American Journal of Public Health*, *85*(10), 1384–1390.

Brownell, M., Roos, N.P., & Burchill, C. (1999). *Monitoring the Winnipeg hospital system: 1990–91 through 1996–97*. Winnipeg: Manitoba Centre for Health Policy and Evaluation.

Carrière, K.C., Roos L.L., & Dover, D.C. (2000). Across time and space: Variations in hospital use during Canadian health reform. *Health Services Research*, *35*(2), 467–487.

Chen, J., & Millar, W.J. (2000). Are recent cohorts healthier than their predecessors? *Health Reports*, *11*(4), 9–23.

Chi, L., Brayne, C., Todd, C., & Pollitt, P. (1995). Predictors of hospital contact of very elderly people: A pilot study of a cohort of people aged 75 years and older. *Age and Ageing*, *24*, 382–388.

Dada, V.K., & Sindhu, N. (1999). Management of cataract: A revolutionary change that occurred during last two decades. *Journal of the Indian Medical Association*, *97*(8), 313–317.

Dansky, K., Brannon, D., Shea, D., Vasey, J., & Dirani, R. (1998). Profiles of hospital, physician, and home health service use by older persons in rural areas. *Gerontologist*, *38*(3), 320–330.

Doblhammer, G., & Kytir, J. (2001). Compression or expansion of morbidity? Trends in healthy life expectancy in the elderly Austrian population between 1978 and 1998. *Social Science and Medicine*, *52*, 385–391.

Dunn, O.J. (1961). Multiple comparisons among means. *Journal of American Statistical Association*, *56*, 52-64.

Gentleman, J.F., Vayda, E., Parsons, G.F., & Walsh, M.N. (1996). Surgical rates in subprovincial areas across Canada: Rankings of 39 procedures in order of variation. *Canadian Journal of Surgery*, *39*(5), 361–367.

Hubert, H.B., Bloch, D.A., Oehlert, J.W., & Fries, J.F. (2002). Lifestyle habits and compression of morbidity. *Journals of Gerontology, Series A: Biological Sciences & Medical Sciences*, *57*(6), M347–M351.

ICES Practice Atlas. (1996). *Patterns of health care in Ontario, 1996*. Toronto: Author.

Katz, B.P., Freund, D.A., Heck, D.A., Dittus, R.S., Paul, J.E., Wright, J., Coyte, P., Holleman, E., & Hawker, G. (1996). Demographic variation in the rate of knee replacement: A multi-year analysis. *Health Services Research*, *31*(2), 125–140.

Liang, K.S., & Zeger, S.L. (1986). Longitudinal data analysis using generalized linear models. *Biometrika*, *78*, 13–22.

Lix, L.M., Ekuma, O., Brownell, M., & Roos, L. (2004). A framework for modelling differences in regional mortality over time. *Journal of Epidemiology and Community Health*, *58*(5), 420–425.

Lum, Y., Chang, H., & Ozawa, M. (1999). The effects of race and ethnicity on use of health services by older Americans. *Journal of Social Services Research*, *25*(4), 15–42.

Madhok, R., Lewallen, D.G., Wallrichs, S.L., Ilstrup, D.M., Kurkland, R.L., & Melton, L.J., 3rd. (1993). Trends in the utilization of primary total hip arthroplasty, 1969 through 1990: A population-based study in Olmstead County, Minnesota. *Mayo Clinic Proceedings*, *68*, 11–18.

Manitoba Bureau of Statistics. (2000). Winnipeg: Author. Manitoba Health Regions Population Projections June 1, 1998–June 1, 2025.

Menec, V.H., MacWilliam, L., Soodeen, R.A., & Mitchell, L. (2002). *The health and health care use of Manitoba's seniors: Have they changed over time?* Winnipeg: Manitoba Centre for Health Policy.

https://doi.org/10.1353/cja.2005.0046 Published online by Cambridge University Press

Robson, W.B.P. (2001). *Will the baby boomers bust the health budget? Demographic change and health care financing reform*. Ottawa: Renouf.

Roos, L.L., Fisher, E.S., Brazauskas, R., Sharp, S.M., & Shapiro, E. (1992). Health and surgical outcomes in Canada and the United States. *Health Affairs* (*Millwood*), *11*(2), 56–72.

Roos, L.L., Fisher, E.S., Sharp, S.M., Newhouse, J.P., Anderson, G., & Bubolz, T.A. (1990). Postsurgical mortality in Manitoba and New England. *Journal of the American Medical Association*, *263*(18), 2453–2458.

Roos, L.L., Mustard, C.A., Nicol, J.P., McLerran, D.F., Malenka, D.J., Young, T.K., & Cohen, M.M. (1993). Registries and administrative data: Organization and accuracy. *Medical Care*, *31*, 201–212.

Roos, N.P., & Mustard, C. (1997). Variation in health and health care use by socio-economic status in Winnipeg, Canada: The system works well? Yes and no. *Milbank Quarterly*, *75*(1), 89–111.

Roos, N.P., Shapiro, E., Bond, R., Black, C., Finlayson, G., Newburn-Cook, C., MacWilliam, L., Steinbach, C., Yogendran, M., & Walld, R. (2001). *Changes in health and health care use of Manitobans, 1985–1998*. Winnipeg: Manitoba Centre for Health Policy and Evaluation.

Saag, K., Doebbeking, B., Rohrer, J., Kolluri, S., Mitchell, T., & Wallace, R. (1998). Arthritis health service utilization among the elderly: The role of urban-rural residence and other utilization factors. *Arthritis Care and Research*, *11*(3), 177–185.

Schwarz, K. (2000). Predictors of early hospital readmissions of older adults who are functionally impaired. *Journal of Gerontological Nursing*, *26*(6), 29–36.

Statistics Canada. 2004. *CANSIM II table 0510001: Estimates of population, by age group and sex, Canada, provinces and territories*. Retrieved January 19, 2004, from, http://cansim2.statcan.ca/cgi-win/CNSMCGI.EXE

Willis, C.E., Kee, F., Beverland, D., & Watson, J.D. (2000). Urban-rural differences in total hip replacements: The next stage. *Journal of Public Health Medicine*, *22*(3), 435–438.

Wolinsky, F., Stump, T., & Johnson, R. (1995). Hospital utilization profiles among older adults over time: Consistency and volume among survivors and decedents. *Journal of Gerontology*, *50B*(2), S88–S100.

Appendices: Descriptive data

Appendix 1: Hospital separation rates (per 1,000 population for Manitoba residents 75+ years of age, 1985/1986–2000/2001)

	Winnipeg		Southern MB		Central MB		Northern MB		Province	
Year	75–84	85+	75–84	85+	75–84	85+	75–84	85+	75–84	85+
1985/86	342	419	586	763	635	811	893	1160	470	594
1986/87	356	415	560	804	614	822	803	1183	465	607
1987/88	363	426	566	733	627	844	792	1032	473	600
1988/89	349	444	541	792	616	864	798	1073	457	628
1989/90	357	451	551	801	605	818	739	983	459	622
1990/91	345	438	540	728	579	820	629	883	442	594
1991/92	366	471	561	774	622	842	730	885	469	627
1992/93	366	463	586	793	640	866	755	1004	478	634
1993/94	361	460	590	801	624	846	750	1098	472	630
1994/95	375	455	602	789	629	855	843	941	485	622
1995/96	389	466	580	767	625	840	736	935	485	621
1996/97	386	482	592	821	606	829	760	870	482	637
1997/98	389	472	584	779	651	841	750	931	490	624
1998/99	398	520	619	788	640	867	800	840	500	655
1999/00	396	501	630	819	624	772	656	1080	494	636
2000/01	387	498	595	789	601	802	748	891	478	629

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Appendix 2: Rates (days per person) of short- and long-stay hospital days for Manitoba residents 75+ years of age, 1985/1986–2000/2001

	Winnipeg		Southern MB		Central MB		Northern MB		Province	
Year	75–84	85+	75–84	85+	75–84	85+	75–84	85+	75–84	85+
Long-Stay Days										
1985/86	5.4	14.7	5.1	13.6	4.5	10.1	5.8	20.7	5.2	13.6
1986/87	5.2	14.8	4.8	12.1	3.6	11.0	6.5	21.6	4.8	13.4
1987/88	5.2	12.7	4.2	11.3	3.9	10.6	8.1	17.0	4.8	12.0
1988/89	4.5	13.6	4.4	11.0	3.3	9.9	6.2	16.8	4.3	12.2
1989/90	4.6	13.7	4.3	12.3	3.9	11.3	7.3	21.8	4.4	13.0
1990/91	4.4	12.5	4.0	9.8	3.3	10.0	7.9	25.4	4.2	11.6
1991/92	4.5	12.0	4.2	11.1	3.8	9.1	7.3	17.9	4.3	11.3
1992/93	4.2	12.6	3.7	9.4	3.8	9.6	6.0	18.8	4.1	11.3
1993/94	3.4	9.9	3.8	9.7	3.1	8.3	5.6	21.4	3.5	9.7
1994/95	4.0	9.1	3.5	9.8	2.7	7.8	6.7	21.2	3.7	9.2
1995/96	3.8	9.2	3.3	10.0	2.9	8.4	6.3	17.3	3.5	9.4
1996/97	3.6	8.3	3.4	9.9	2.7	7.5	5.3	15.2	3.4	8.6
1997/98	3.6	8.8	3.8	9.1	2.7	6.5	5.0	11.0	3.5	8.5
1998/99	3.6	9.5	3.8	8.7	2.9	6.7	4.3	12.7	3.5	8.8
1999/00	3.6	9.9	3.3	8.2	2.6	6.3	4.4	15.8	3.3	8.9
Short-Stay Days										
1985/86	2.7	3.3	4.5	5.9	4.6	6.3	6.9	10.1	3.6	4.7
1986/87	2.7	3.1	4.1	6.3	4.5	6.4	5.9	9.1	3.4	4.7
1987/88	2.6	3.2	4.0	5.6	4.5	6.5	5.3	6.9	3.4	4.5
1988/89	2.6	3.3	3.9	6.1	4.4	6.5	5.7	7.4	3.3	4.7
1989/90	2.5	3.3	3.9	6.1	4.3	6.2	5.2	6.1	3.3	4.6
1990/91	2.3	3.1	3.8	5.4	3.9	5.9	4.2	6.2	3.0	4.3
1991/92	2.4	3.3	3.7	5.7	4.1	5.9	4.9	6.1	3.1	4.5
1992/93	2.2	3.0	3.7	5.7	4.0	6.0	4.9	5.8	3.0	4.3
1993/94	2.2	2.9	3.6	5.3	3.7	5.5	4.7	6.9	2.9	4.1
1994/95	2.1	2.9	3.6	5.3	3.9	5.8	5.0	5.8	2.9	4.1
1995/96	2.1	2.8	3.3	5.1	3.6	5.3	4.7	5.9	2.7	3.9
1996/97	2.1	2.8	3.4	5.1	3.6	5.3	4.2	5.7	2.7	3.9
1997/98	2.1	2.9	3.3	5.1	3.7	5.3	4.1	6.3	2.7	4.0
1998/99	2.1	3.2	3.4	5.1	3.5	5.3	4.3	4.8	2.7	4.1
1999/00	2.1	3.0	3.4	5.3	3.5	4.7	3.4	5.2	2.7	3.9
2000/01	1.9	2.8	3.0	4.6	3.1	4.8	4.0	4.2	2.4	3.7

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Appendix 3: Rates of surgical procedures (per 1,000 population) for Manitoba residents 75+ years of age, 1992/1993–2000/2001

	Non-Winnipeg		Winnipeg		Province	
Year	**75–84**	**85+**	**75–84**	**85+**	**75–84**	**85+**
Cataract Extraction						
1992/93	26	25	42	39	35	32
1993/94	31	29	43	39	38	34
1994/95	36	29	46	43	41	37
1995/96	39	32	57	55	49	45
1996/97	33	30	52	48	43	40
1997/98	39	37	54	42	48	40
1998/99	44	40	53	44	50	42
1999/00	46	41	55	48	51	45
2000/01	51	41	56	50	54	46
Total Hip or Knee Replacement						
1992/93	6	3	5	4	6	4
1993/94	6	2	6	3	6	2
1994/95	8	4	7	3	7	4
1995/96	8	3	7	2	7	3
1996/97	8	4	9	5	8	4
1997/98	9	4	10	5	10	4
1998/99	11	4	10	5	11	5
1999/00	11	5	13	7	12	6
2000/01	10	4	10	5	10	5

Appendix 4: Average number of physician visits per Manitoba resident 75+ years of age, 1985/1986–2000/2001

	Winnipeg		Southern MB		Central MB		Northern MB		Province	
Year	**75–84**	**85+**	**75–84**	**85+**	**75–84**	**85+**	**75–84**	**85+**	**75–84**	**85+**
1985/86	9.5	14.2	7.9	10.6	8.0	10.4	8.4	11.8	8.8	12.5
1986/87	9.5	12.9	8.0	10.4	8.0	9.8	8.7	11.8	8.8	11.6
1987/88	9.1	11.8	7.7	9.4	7.9	9.3	8.6	12.1	8.6	10.7
1988/89	9.0	11.5	7.6	9.1	8.0	9.7	9.2	12.0	8.5	10.6
1989/90	9.0	11.4	7.8	9.1	8.1	9.4	9.0	11.5	8.5	10.4
1990/91	8.9	11.0	8.0	9.3	8.2	9.6	8.7	9.7	8.6	10.3
1991/92	9.2	11.2	8.0	9.4	8.5	9.6	8.4	10.3	8.8	10.4
1992/93	9.0	10.3	8.1	9.3	8.4	8.7	9.0	10.0	8.7	9.7
1993/94	9.0	10.1	8.1	9.3	8.4	8.3	8.4	10.9	8.6	9.6
1994/95	9.0	10.0	8.1	9.3	8.3	8.2	8.4	10.5	8.6	9.5

(*continued*)

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Appendix 4: Continued

	Winnipeg		Southern MB		Central MB		Northern MB		Province	
Year	75–84	85+	75–84	85+	75–84	85+	75–84	85+	75–84	85+
1995/96	8.9	9.8	8.0	8.7	8.0	7.7	8.1	9.6	8.5	9.1
1996/97	9.0	9.8	8.0	8.8	8.1	8.0	8.3	9.1	8.6	9.2
1997/98	9.3	9.8	8.2	8.8	8.5	8.3	8.4	9.2	8.9	9.3
1998/99	9.6	10.5	8.4	9.0	8.6	8.6	8.6	9.3	9.1	9.7
1999/00	9.8	10.5	8.9	9.5	8.9	8.5	8.5	9.1	9.4	9.9
2000/01	9.9	10.8	8.8	9.6	8.8	8.6	9.4	10.1	9.4	10.1

Appendix 5: Proportion of Manitoba residents 75+ years of age with 7 or more physician visits, 1985/1986–2000/2001

	Winnipeg		Southern MB		Central MB		Northern MB		Province	
Year	75–84	85+	75–84	85+	75–84	85+	75–84	85+	75–84	85+
1985/86	0.52	0.60	0.46	0.53	0.47	0.50	0.45	0.53	0.49	0.56
1986/87	0.54	0.60	0.47	0.55	0.48	0.51	0.45	0.59	0.51	0.57
1987/88	0.54	0.61	0.46	0.53	0.48	0.50	0.47	0.58	0.51	0.57
1988/89	0.54	0.62	0.46	0.54	0.48	0.53	0.51	0.55	0.51	0.58
1989/90	0.54	0.61	0.47	0.55	0.49	0.51	0.51	0.59	0.51	0.57
1990/91	0.55	0.62	0.48	0.53	0.50	0.50	0.49	0.54	0.52	0.57
1991/92	0.56	0.63	0.49	0.53	0.51	0.52	0.48	0.55	0.53	0.58
1992/93	0.55	0.62	0.50	0.53	0.51	0.51	0.49	0.57	0.53	0.57
1993/94	0.56	0.62	0.50	0.55	0.52	0.50	0.47	0.57	0.54	0.58
1994/95	0.56	0.61	0.50	0.55	0.52	0.50	0.48	0.56	0.54	0.57
1995/96	0.56	0.59	0.49	0.53	0.51	0.47	0.48	0.56	0.53	0.55
1996/97	0.56	0.60	0.49	0.54	0.51	0.50	0.51	0.52	0.54	0.56
1997/98	0.58	0.61	0.51	0.54	0.53	0.52	0.51	0.49	0.55	0.57
1998/99	0.60	0.65	0.52	0.57	0.54	0.53	0.53	0.52	0.57	0.60
1999/00	0.62	0.65	0.55	0.60	0.55	0.52	0.52	0.50	0.59	0.61
2000/01	0.62	0.67	0.56	0.60	0.56	0.54	0.57	0.54	0.60	0.62

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