Monitoring the Winnipeg Hospital System: 1990/91 through 1996/97

March 1999

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ACKNOWLEDGEMENTS

The authors wish to acknowledge the contributions of the many individuals whose efforts and expertise made it possible to produce this report. We thank the following, and apologize in advance for anyone that we might have overlooked:

- Marina Yogendran and Leonard MacWilliam who conducted the quality of care and population health analyses, respectively;
- Colleagues who provided additional data and analytic and conceptual support: Ruth Bond, K. C. Carriere, David Friesen, Evelyn Shapiro, Carmen Steinbach, Bob Tate, Fred Toll, Sandra Peterson and Randy Walld;
- Eileen Pyke for her careful attention to detail in the preparation of the manuscript, including the numerous figures and tables;
- Richard Glazier and Pierre Tousignant, for their detailed and insightful external reviews;
- Michael Moffatt, and Milton Tenebein, Murray Kesselman and Lindsay Duval for their advice regarding paediatric utilization;
- Jan Currie at the Winnipeg Hospital Authority who provided feedback on the report;
- Colleagues who provided feedback on earlier drafts of this report: Charlyn Black, Carolyn DeCoster, Norm Frohlich, Verena Menec, Fred Toll.

We acknowledge the financial support of the Department of Health of the Province of Manitoba. The results and conclusions are those of the authors and no official endorsement by Manitoba Health was intended or should be inferred. This report was prepared at the request of Manitoba Health as part of the contract between the University of Manitoba and Manitoba Health.

THE MANITOBA CENTRE FOR HEALTH POLICY AND EVALUATION

The Manitoba Centre for Health Policy and Evaluation (MCHPE) is a unit within the Department of Community Health Sciences, Faculty of Medicine, University of Manitoba. MCHPE is active in health services research, evaluation and policy analysis, concentrating on using the Manitoba Health data base to describe and explain patterns of care and profiles of health and illness.

Manitoba has one of the most complete, well-organized and useful health data bases in North America. The data base provides a comprehensive, longitudinal, population-based administrative record of health care use in the province.

Members of MCHPE consult extensively with government officials, health care administrators, and clinicians to develop a research agenda that is topical and relevant. This strength, along with its rigorous academic standards and its exceptional data base, uniquely position MCHPE to contribute to improvements in the health policy process.

MCHPE undertakes several major research projects, such as this one, every year under contract to Manitoba Health. In addition, MCHPE researchers secure major funding through the competitive grants process. Widely published and internationally recognized, they collaborate with a number of highly respected scientists from Canada, the United States and Europe.

TABLE OF CONTENTS

LIST OF TABLES

APPENDIX TABLES

LIST OF FIGURES

EXECUTIVE SUMMARY

Introduction

As part of the downsizing of the acute hospital sector, major bed closures began in the Winnipeg hospitals in 1992/93. By the end of fiscal 1996/97 731 acute beds (or 24%) had been closed in Winnipeg hospitals. When Manitoba Health began downsizing the hospital sector, the MCHPE agreed to monitor the effects of the bed closures. This is the third in a series of reports that monitors the impact of hospital bed closures in Winnipeg. This report examines data up to the end of fiscal 1996/97. Where available, we have added results using 1997/98 data. In each of the reports the key questions addressed are: have the bed closures adversely affected 1) Manitobans' access to care? 2) the quality of care delivered? or 3) the health of the population?

Findings

Access

Access by Winnipeg residents to hospital services, as measured by the number of patients treated, has not been adversely affected. Indeed, hospital efficiency appears to have improved considerably: just as many patients were cared for in 1996/97 as prior to bed closures, with fewer resources. This was accomplished by a shift in the way care is delivered:

- the number of days patients spent in hospital decreased dramatically. Days per 1000 for short-stay cases dropped by over 19% between 1991/92 and 1996/97.
- Winnipeg residents received more surgery in 1996/97 than they did in 1991/92, with more outpatient and fewer inpatient surgical procedures performed, and significantly shorter stays for surgical inpatients. Although adult inpatient procedures dropped by 21% in the six-year period, outpatient procedures increased by 33%, resulting in an overall increase of adult surgical procedures of 5%. Access to specific procedures such as coronary artery bypass, cataract surgery and knee replacement increased dramatically between 1991/92 and 1996/97, by as much as 118% in the case of knee replacement surgery. Concerns about bed closures leading to a rationing of surgical care appear to be unfounded.

- although there was an 8% decrease in the number of medical patients between 1991/92 and 1996/97, medical lengths of stay in 1996/97 were almost identical to those in 1991/92. For those medical patients who were the sickest and required the most complex levels of care, there were no changes in utilization.
- children were much less likely to be admitted to hospital in 1996/97 compared to 1991/92 (there were 23% fewer discharges); this decrease appears to be the result of changes in practice patterns and utilization management and not limited access for these patients to hospital services.
- Non-Winnipeg residents also retained high rates of access to Winnipeg hospitals over this period of downsizing. There was no decrease in the number of cases treated, despite a large drop in days. Access to tertiary care if anything improved. That is, the rate of very high intensity admissions (including those such as coronary artery bypass) actually increased for rural patients over this period.
- restraining the increase in the number of cataract procedures in the public sector in 1996/97 was related to an increase in the number of procedures performed in the private sector. This pattern reversed in 1997/98 with greater growth in public sector procedures.
- increased availability of beds in long-term care facilities and personal care homes resulted in more appropriate placement of long-stay patients and a drop in length of acute hospital stay for patients awaiting placement in personal care homes.

Quality of Care

Our assessment of quality of care over this period suggests that for the most part, quality of care did not deteriorate. When judged by mortality rates, quality of care appeared to improve. When judged by whether discharged patients are turning up more frequently in emergency rooms and doctors offices we found no evidence of premature release. When judged by readmission rates, using data up to 1996/97 we found increases over time for a few of the patient categories studied although none of these seemed to be related to shorter lengths of stay. In 1997/98 for all but one of these categories the readmission rates dropped to pre-downsizing levels. Since in more than half the conditions studied we found some Winnipeg hospitals have much higher rates of readmissions than others, it might be an opportune time for the new Winnipeg Hospital Authority to review indicators of quality

across the system to see if institutions with high readmission rates can learn from those with low readmission rates.

- mortality rates within 30 days of discharge from hospital decreased significantly for two of the three patient categories examined.
- for 5 of 13 patients categories studied, readmission rates within 30 days of discharge increased significantly between 1991/92 and 1996/97 (for one category, readmission rates decreased significantly). When 1997/98 data are added, for only 1 of 13 categories do readmission rates increase significantly between 1991/92 and 1997/98. We found significant differences in readmission rates across hospitals for nine of the 13 categories studied in 1996/97 and for 10 of 13 in 1997/98.
- there was no increase in the frequency of physician or emergency room visits within 30 days of discharge from hospital for the three patient categories examined.

Health Status

- The health of Winnipeg residents remained stable between 1991/92 and 1996/97 with one exception. For those from the lowest income neighbourhoods there was an increase in premature mortality rates. Because access to hospital services for this group did not change during the same period, the increase does not appear to be the result of bed closures. The marked gradient in mortality rates according to income level suggests that forces other than hospital bed numbers are affecting health status.

Limitations

- Our results appear to contradict reports by both health care professionals and patients about the stress on the hospital system. Our data allow us to look at long-term health effects, and issues of access and quality of care from a system-wide perspective. We are unable to look at specific difficulties within hospitals and explore reports of problems such as patients having to receive treatment in hallways when no beds are available. We acknowledge the stress these conditions impose on both patients and caregivers and recognize the importance of finding creative and flexible solutions to these problems as the hospitals undergo fundamental changes.

1. INTRODUCTION

In 1991,[1] Manitoba, along with other Canadian provinces, began to restrain health care spending, mainly by downsizing the acute hospital sector. By the end of fiscal 1996, a total of 731 acute beds (or 24%) had been closed in Winnipeg hospitals (Table 1). The most substantial cuts occurred in 1992 and 1993, when 515 (over 17%) of the acute care beds were removed from the system. At that time, in order to answer public, institutional, and practitioners' concerns, government officials asked the Manitoba Centre for Health Policy and Evaluation (MCHPE) to monitor and report on the effects of downsizing. In order to respond expeditiously should problems occur, a first report was requested immediately following the first year of major bed closures (1992), with the understanding that these results would be preliminary. *Monitoring the Winnipeg Hospital System: The First Report* (Roos and Shapiro, 1994), found that downsizing appeared to have little impact on access to hospital care, quality of care or the health of the population.

Table 1: History of Acute Bed Closures at Winnipeg Hospitals
Acute Bed Change
1990-1996

	1990	1991	1992	1993	1994	1995	1996
Total Acute Beds at Start of Fiscal Year	3,042	3,042	3,013	2,707	2,498	2,460	2,384
Net Changes by Type of Hospital							
Teaching	0	(29)	(279)	(54)	(25)	(17)	(60)
Other	0	0	(27)	(155)	(13)	(59)	(13)
Total	0	(29)	(306)	(209)	(38)	(76)	(73)
Change (% decrease)	0	(1.0)	(10.2)*	(7.7)*	(1.5)	(3.1)	(3.1)

* These values represent the loss of available acute beds. However, many acute beds were occupied by non-acute patients. At the same time that the 306 acute beds closed in 1992, 75 non-acute beds were added to the system; in 1993 when a further 209 acute care beds closed, 24 non-acute beds were added. The net increase in non-acute beds between 1991 and 1996 was 59 beds.

[1] By 1991, we are referring to the 1991/92 fiscal year. All data in this study were analyzed by fiscal years. The fiscal year runs from April 1 to March 31.

An update report was necessary not only because of the preliminary nature of *The First Report*, but in order to explore concerns expressed by a number of groups about the potential effects of bed closures that were not reviewed in *The First Report*. As part of the update report, therefore, we repeated all analyses contained in *The First Report*, and conducted additional analyses in an attempt to explore the concerns expressed following the release of *The First Report*. *Monitoring the Winnipeg Hospital System: The Update Report 1993/94* (Brownell and Roos, 1996) focussed on a subsequent year of data (1993) as requested by government officials. *The Update Report 1993/94* confirmed the findings of *The First Report*: the rate of hospitals separations including inpatient care and outpatient surgery changed little; more procedures were performed on an outpatient basis, patients were discharged following shorter stays, particularly the least sick patients; access to Winnipeg hospitals by non-Winnipeg residents was unaffected by bed closures; the reductions in use of hospitals were not made at the expense of the poorest populations; there was no evidence that bed closures and increased financial pressures negatively influenced the quality of care delivered to patients; mortality rates, hospital readmission rates, and the rate at which individuals contacted physicians within 30 days after hospital discharge changed little; no adverse impact on the health of Winnipeg's population was observed.

Because downsizing continued and because several years of data provide a more complete picture of the impact of these bed closures, this second update report was requested. This report examines data up to the end of fiscal 1996/97. A preliminary version of this report was delivered to Manitoba Health in July 1998. Since that time and prior to the public release of this report, data from the 1997/98 fiscal year became available for analysis. We have done preliminary analyses using these data on the key figures in this report and the 1997/98 findings are summarized herein.

2. METHODS

2.1 Study Period and Population

This report analyzes data from the Manitoba Health data base for the fiscal years 1990/91 (and where available 1989/90) through to 1996/97, and to some extent 1997/98. A population-based approach was used to study the use of Winnipeg hospitals. This approach involves categorizing patients according to their area of residence, regardless of where they received their care. For example, many rural residents receive care in Winnipeg hospitals; in this report they would be classified as rural residents and would not be included in figures showing hospital use by Winnipeg residents. Unless otherwise specified, all analyses are based on Winnipeg residents' use of hospitals, since over this period the Winnipeg hospitals were the primary site of bed closures. Population figures are taken from the Manitoba Research Data Base registration files and are based on the Manitoba population in December of the year in question. Information on region of residence was obtained from the municipal code on the Manitoba Health registry file except in the case of reported Treaty Indians.[2] Municipal code information alone cannot be used for the location of residence for these individuals because Manitoba Health assigns the region of residence as the First Nation of origin. Postal code information from the registry file was used in combination with municipal code to assign the region of residence. Manitoba population figures can be found in the Methods Appendix.

2.2 Statistical Analysis

Because hospital utilization patterns began changing prior to hospital reform (e.g., decreasing lengths of stay), the most recent year of “pre-downsizing” data, 1991, is used for statistical comparisons. We have applied the standard normal theory for studying any significant changes in rates of events over the six-year period (1991 to 1996). Because the longitudinal data are from one Manitoba population, we used the normal test for a single population. For

[2] The designation 'Treaty Indians' refers to a specific group of the aboriginal population who have certain rights and privileges under the Indian Act of Canada.

example, when comparing the 1996 rates to the 1991 rates, we assumed that the 1991 rates are the population parameters and the 1996 rates are their estimators. With large datasets, there is practically no chance of making a type II error (the probability of wrongly pronouncing equality of rates when in fact they are not) while type I error rate (the probability of wrongly concluding inequality of rates when in fact they are equal) is controlled at a preset level, traditionally at 5%, in any test. Since multiple comparisons are made, we have adjusted the significance level using the Bonferroni method.

2.3 Clinical Significance

As the number of participants in a study increases, progressively smaller differences in rates will be found to be statistically significant. With very large numbers of participants, such as in this report, differences that are found statistically significant may be so small that they may be clinically unimportant. Clinical significance is much more difficult to assess than statistical significance because there is no standard formula or generally agreed upon level of difference, as is the case for statistical significance. Although clinical significance could very well be context specific, it is possible to arbitrarily state *a priori* levels of differences that would meet clinical significance criteria. A commonly used approach suggests that proportional differences of 10% or more be considered clinically significant where the baseline rates are lower than 10%, and that proportional differences of 20% or more be considered clinically significant where the baseline rates are 10% or higher. We invite the reader to keep these guidelines in mind when reviewing the results of this report.

2.4 Study Measures

Population Based Rates

The numerator for rates was calculated by counting or summarizing events (i.e., separations) over each fiscal year for individuals identified as residents of Winnipeg regardless of where the hospitalization took place. Denominators were based on counts of individuals resident in Winnipeg as of December that year. Rates are expressed per 1,000 Winnipeg residents.

Age- and sex-standardized rates of indicators were developed to permit comparisons across time periods. The elderly population aged 75 and over of Winnipeg grew 12% between 1991 and 1996 (19% between 1989 and 1996). The age and sex structure of the population is recognized as contributing to different requirements for hospital resources, and hence as factors that ultimately influence patterns of care delivered. Unless otherwise indicated, rates presented in this report have been age- and sex-adjusted using the December 1992 Manitoba population and a direct method of standardization. This procedure mathematically removes the effects of different population structure that influence overall rates of use of health care. These 'adjusted' rates provide an indication of the use of care in one year relative to use in another, after the effects of changes in population structure have been removed.

Number of Separations counts the number of hospital discharges (separations) during the year for Winnipeg residents. It is a function of both the number of persons hospitalized and the number of times they are hospitalized; it is the most commonly used measure of hospital utilization. Rates of separations were developed using the number of separations in the numerator and the Winnipeg population in the denominator.

Number of Days of Hospital Care counts the total number of days spent in hospital by residents. This measure is a function of the number of separations and the length of stay. It provides a useful estimate of the total resources used to provide inpatient hospital care to residents during one year versus another. Rates of days were developed by using the number of days of hospital care in the numerator and the Winnipeg population in the denominator.

Length of Stay measures the average number of days of care for inpatient hospitalizations. Zero day stays for surgical outpatient care are therefore not included in the calculation. This measure has been used to assess the efficiency of hospital use of days, after controlling for such factors as severity of cases (Brownell and Roos, 1992). It is not a population-based measure because the denominator is the number of hospitalizations; consequently it has not been age- and sex-adjusted in the analyses.

Inpatient Hospital Care refers to all separations in which patients had hospital stays of one or more days. It has been further classified into: short-stay inpatient care, comprising all admissions with 1 to 59 days length of stay; and long-stay inpatient care, comprising admissions lasting 60 days or longer.[3] The term acute care is used interchangeably with the term short-stay inpatient care. Long-stay inpatient care which occurred in acute Winnipeg hospitals is distinguished from care at long-term care and rehabilitation institutions[4] - contrary to how this was reported in our first Utilization of Hospital Resources (Black et al., 1994) report. The current analyses therefore focus mainly on long-stay patients in acute care institutions.

Outpatient Surgical Care refers to day surgery cases. These were defined as outpatient cases (day care with zero day length of stay) for surgical care recognized as falling into a surgical DRG category (Averill, 1991).[5] The analyses excluded outpatient contacts which occurred for purposes other than major day surgery procedures. Hospitals are not required to report on these activities and, therefore, there is variation in the way they are recorded across hospitals, making them unreliable for analysis.

Additional study measures, pertaining to specific tables and graphs in this report can be found in the Methods Appendix.

[3] The first 59 days of a long stay admission are included in the long stay rather than the short stay analyses.

[4] These institutions include Deer Lodge Centre, Riverview Health Centre and Manitoba Adolescent Treatment Centre.

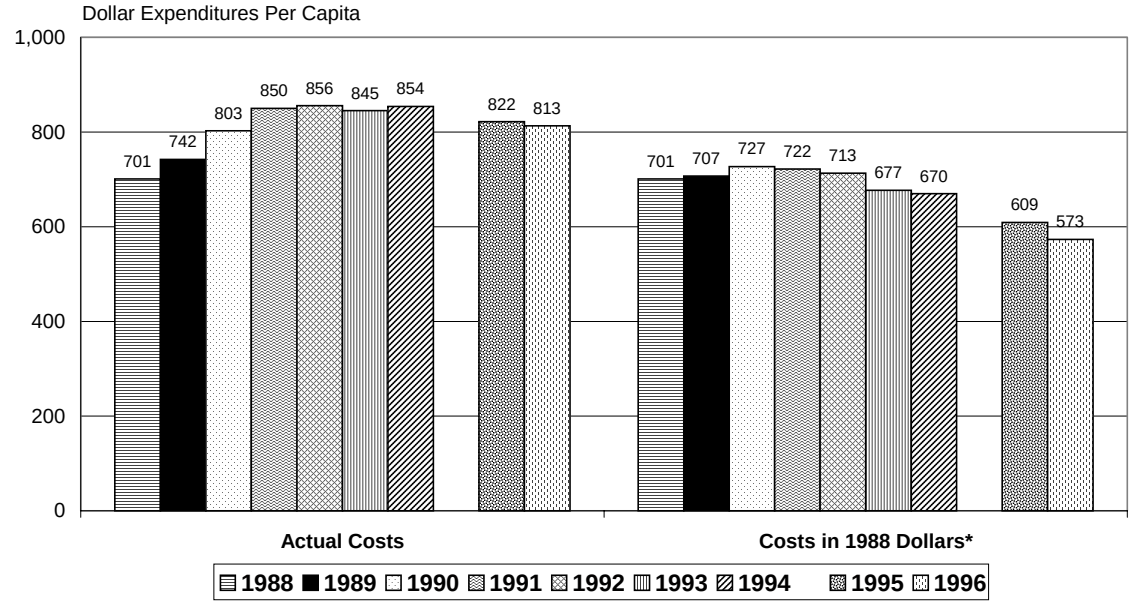
[5] The DRG program classifies hospital care into homogenous groups with respect to clinical and resource consumption and is used as a tool in the United States to pay hospitals. Since having a surgical procedure is one of the major factors contributing to higher resource use (costs) during a hospital stay, the program partitions care into surgical or nonsurgical. It therefore permits identification of hospitalizations involving surgery, for either inpatient or outpatient care.

3. RESULTS AND DISCUSSION

Hospital Expenditures

Expenditures per capita on hospitals from 1988 to 1996 are illustrated in Figure 1. Downsizing clearly occurred: expenditures per capita (after adjusting for inflation) declined by 7.2% between 1991 and 1994, with additional decreases in 1995 and 1996. The largest decrease in expenditures (in 1988 dollars) occurred between 1992 and 1993 (5.0%), corresponding to the largest decrease in bed numbers.

Figure 1: Changes in Insured Hospital Services: Costs Per Capita in Manitoba 1988 - 1996*



* Values for 1988-1994 are not comparable to those in 1995 and 1996 because in the latter two years, Manitoba Health transferred the reporting of medical costs in hospitals and community health centres from the hospital to the medical program. This resulted in a shift of almost $60 million (or 6% of the total hospital expenditures if these medical costs were kept in hospital expenditures) in 1995.

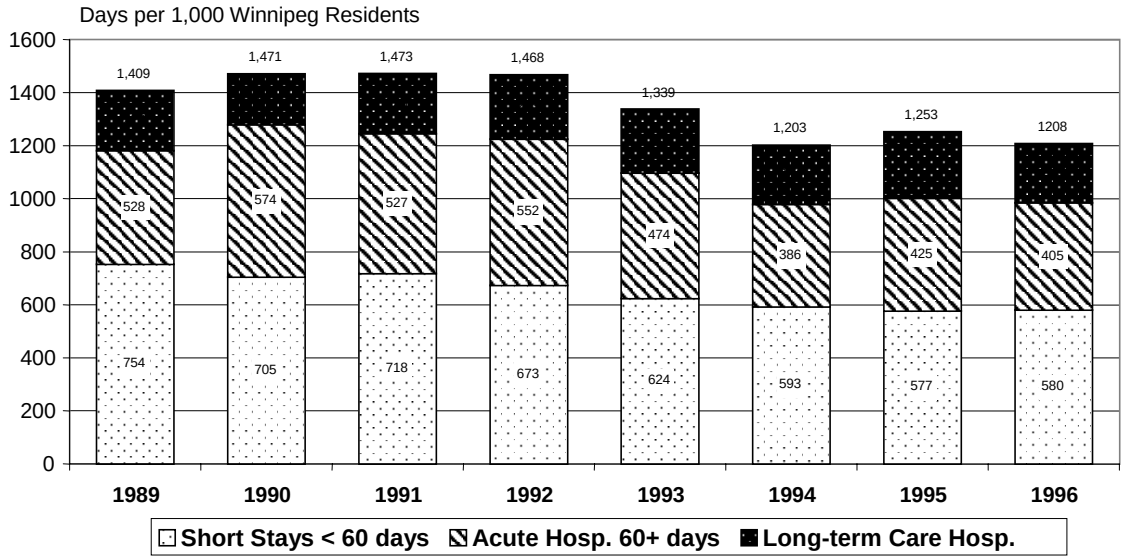
3.1 Access to Care

Hospital Utilization

Figure 2 tracks the changing use of hospital days per 1000 Winnipeg residents. Days spent in hospital per 1000 residents decreased prior to downsizing and this trend continued during downsizing. Between 1991 and 1996, during which time 731 (24.0%) of the Winnipeg

hospital beds were closed, the overall drop in days was 18%, with a 19.2% drop in short-stay days (admissions which resulted in stays of less than 60 days). Consistent with findings elsewhere in Canada (Anderson, 1997), the decrease in days was uneven across age groups, with elderly patients experiencing less of a decrease than did younger patients.

Figure 2: Changing Use of Hospitals:
Winnipeg Days
1989-1996



Days for long-stay cases (60+ days) in acute hospitals also decreased by 23.1% between 1991 and 1996, with a 30.1% decrease between 1992 and 1994 and a 4.9% increase between 1994 and 1996. The large decrease between 1992 and 1994 was due, at least in part, to the opening of 99 non-acute care beds in the long-term care facilities and 288 Personal Care Home (PCH) beds in Winnipeg, at the same time as the large decrease in acute hospital beds. Many of the long-stay patients moved from the acute care hospitals to long-term care facilities[6] and PCHs. In 1995, 40 of the non-acute beds and 47 of the PCH beds were

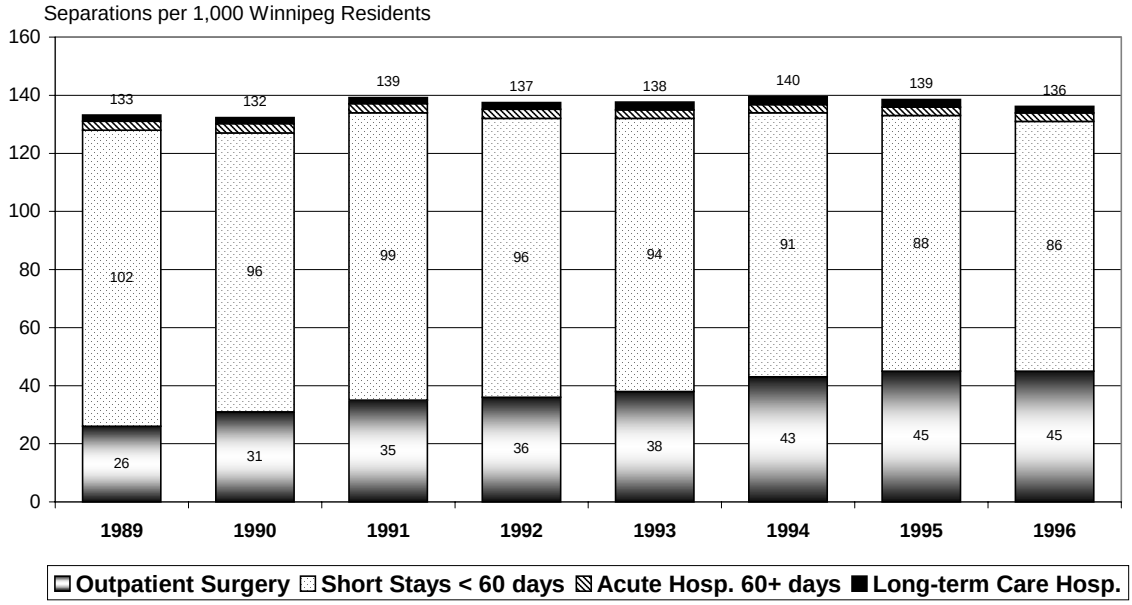
[6] The reason we do not see a corresponding increase in days for long-stay facilities, due to this movement of patients from acute to non-acute beds, is because we only capture days for those patients who have separated, and many of these patients are still in the long-stay facilities.

removed from the system, which may explain the increase in long-stay patient days (10%) in acute care hospitals in the same year.

Despite the drop in days, access to hospital services, in terms of number of patients treated, was not compromised. Figure 3 tracks separations per 1000 Winnipeg residents according to where care took place. Overall, no statistically significant decrease in the rate of separations occurred. This means people were just as likely to be treated in hospital in 1996 as they were in previous years (even after taking into account the aging of the population). The pattern of increased outpatient surgery, begun prior to downsizing, continued during downsizing with an increase of almost 29% between 1991 and 1996. The increase in the rate of outpatient surgery since 1989 has been a remarkable 73%. The rate for short-stay inpatient care decreased by more than 15% during the same time period, with a decrease of over 13% since 1991. Once again, consistent with other Canadian data (Anderson, 1997) the changes in utilization differed across different age groups, with greater increases in outpatient surgery and lesser decreases in inpatient separations with increasing age.

Between 1996 and 1997 there was little (less than 1%) drop in overall days; however the pattern of change for separations continued with an almost 7% increase in outpatient separations and a 3.5% decrease in short-stay inpatient separations between the two years.

**Figure 3: Changing Use of Hospitals:
Winnipeg Separations
1989-1996**



Non-Winnipeg residents' use of Winnipeg hospitals shows essentially the same pattern observed for Winnipeg residents: a large drop in days spent in Winnipeg hospitals, little change in overall cases treated, with a large increase in outpatient surgery and a decrease in short-stay inpatient admissions. The greatest decrease in short-stay inpatient separations from Winnipeg hospitals for non-Winnipeg residents was evidenced at the urban community hospitals (29.54 separations per 1000 residents in 1991 compared to 24.93 separations per 1000 in 1996). While there was also a decrease in short-stay inpatient separations from the Winnipeg teaching hospitals for non-Winnipeg residents (27.8 separations per 1000 residents in 1991 compared to 24.90 separations per 1000 residents in 1996) there is no evidence that downsizing jeopardized rural residents' access to tertiary care. Access for very high intensity admissions (including those such as coronary artery bypass) actually increased for rural patients (6.21 separations per 1000 residents in 1991 compared to 6.71 separations per 1000 residents in 1996; in 1997 this value rose to 7.0).

Changes in Utilization by Type of Care

Whereas overall rates of hospital use appear to have changed little between 1989 and 1996, patterns of care did change. As shown in Table 2, adult Winnipeg residents received more surgery in 1996 than they did before bed closures. Between 1991 and 1996, inpatient surgery dropped by 21% whereas outpatient surgery increased by 33%. The mean length of stay for surgical inpatients decreased steadily, dropping 14% between 1991 and 1996, with the largest drop (7.2%) between 1992 and 1993 (from 7.65 days to 7.10 days). The shorter stays for surgical inpatients, coupled with the shift from inpatient to outpatient surgery, explains the 33% decrease between 1991 and 1996 (39% decrease between 1989 and 1996) in surgical days per 1000 residents. The pattern of decreasing inpatient surgical separations and increasing outpatient separations, as well as decreasing surgical days continued in 1997.

Table 2: Changing Utilization by Type of Care
Winnipeg Residents (Adult), Short-Stay (<60 days)
1989-1996

Type of Care	1989	1990	1991	1992	1993	1994	1995	1996	Ratio 1996/1991	Ratio 1996/1989
Separations per 1000 Residents										
Surgery										
Inpatient	31.37	28.07	29.37	28.28	26.46	25.26	24.56	23.11	0.79	0.74
Outpatient	19.80	24.60	27.93	29.34	30.42	34.91	37.07	37.15	1.33	1.88
Total	51.17	52.67	57.30	57.62	56.88	60.17	61.63	60.26	1.05	1.18
Medical	39.15	37.06	38.41	37.02	36.91	36.55	35.01	35.34	0.92	0.90
Obstetrics	19.06	19.38	19.12	19.06	19.56	19.41	18.90	18.44	0.96	0.97
Psychiatry	3.15	3.22	3.42	3.59	3.26	3.26	3.55	3.45	1.01	1.10
Mean Length of Stay										
Surgical	8.32	8.41	8.09	7.65	7.10	6.90	6.73	6.98	0.86	0.84
Medical	8.24	8.21	8.19	8.09	7.91	7.77	7.84	8.10	0.99	0.98
Obstetrics	3.36	3.13	3.11	3.04	2.73	2.58	2.58	2.57	0.83	0.76
Psychiatry	18.89	18.89	18.59	17.94	18.43	17.72	17.95	18.25	0.98	0.97
Days per 1000 Residents										
Surgical	265.91	240.92	240.49	218.33	189.10	175.22	165.49	161.09	0.67	0.61
Medical	328.55	309.31	318.29	301.80	293.16	283.01	274.21	284.58	0.89	0.87
Obstetrics	64.02	60.58	59.29	57.82	53.27	50.03	48.73	47.27	0.80	0.74
Psychiatry	60.77	61.51	64.45	64.70	60.37	58.13	63.29	62.66	0.97	1.03

The pattern for adult medical patients differs markedly from surgical patients. Between 1991 and 1996, medical separations decreased by 8%. The 1997 data show a 2.3% increase in medical separations over the previous year. In contrast to surgery, the mean length-of-stay changes for medical patients were not dramatic: the shortest length-of-stay for medical patients was 7.77 days in 1994, which was only 5.1% lower than the 1991 stay (8.19 days), and by 1996 the length-of-stay for medical patients had climbed back up to 8.1 days, which was not significantly different from the 1991 stay; the 1997 stay has dropped to 7.89 days, 3.7% lower than the length of stay in 1991. Between 1991 and 1996 the medical days per 1000 residents decreased 11%, due mainly to the decrease in separations for medical patients.

The rate of obstetric separations was not significantly different in 1996 than in 1991; however both the length of stay and the days per 1000 residents decreased significantly during this time period (17% and 20% respectively). There were no significant changes for psychiatry patients with separations, lengths of stay and days per 1000 residents staying fairly constant between 1991 and 1996.

Changes in Type of Patient Admitted to Hospital

Hospitalization rates for short-stay inpatients who were very ill (i.e., with two, three or more comorbid conditions known to increase the risk of death) did not change significantly between 1991 and 1996 (Table 3). Rates for those requiring complex care (those with a high level of comorbidity or complications) remained stable between 1991 and 1994; however the 1996 rates were significantly lower than those for 1991. Further exploration of these changes revealed that these changes were evident for surgical but not medical patients. Driving this was the shift of some cases with a high level of comorbidity or complication from inpatient to outpatient settings. The days of care per 1000 residents dropped significantly for all groups of patients with the most substantial decreases in days for the least sick patients. 1997 data show essentially the same patterns.

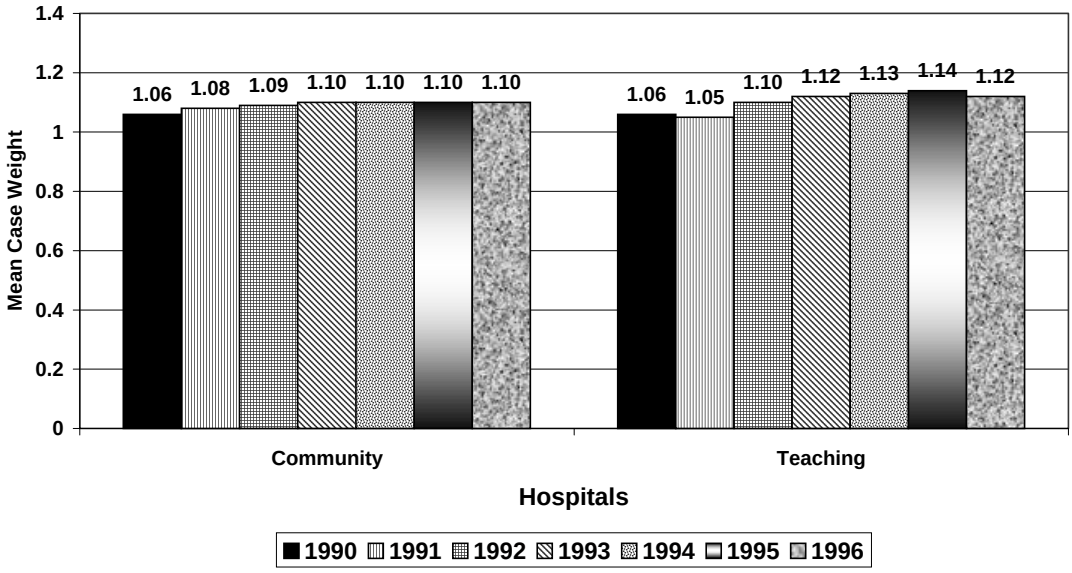
Table 3: Changes in Types of Short Stay Patients Admitted to Hospital
Winnipeg Residents
1989-1996

	1989	1990	1991	1992	1993	1994	1995	1996	Ratio 1996/1991	Ratio 1996/1989
Separations per 1000 Residents										
Level of Co-morbidity and Complications										
Low	70.63	67.30	69.13	65.84	64.53	62.13	59.90	58.31	0.84	0.83
Moderate	21.22	19.65	20.46	20.13	19.36	19.45	19.17	18.54	0.91	0.87
High	10.13	9.38	9.82	9.94	9.88	9.80	9.33	9.29	0.95	0.92
Number of Co-morbid Conditions										
None	77.19	73.35	74.74	71.38	69.54	67.76	65.21	63.17	0.85	0.82
1	11.04	10.05	11.25	10.76	10.47	10.25	10.15	10.06	0.89	0.91
2	7.27	6.70	7.04	7.32	7.41	7.23	6.93	6.87	0.98	0.94
3+	6.48	6.24	6.39	6.46	6.35	6.14	6.12	6.04	0.95	0.93
Days per 1000 Residents										
Level of Co-morbidity and Complications										
Low	383.16	359.95	367.24	331.87	308.28	287.76	280.90	280.34	0.76	0.73
Moderate	207.84	191.55	194.05	186.05	171.27	166.26	162.21	165.42	0.85	0.80
High	162.51	153.37	156.54	154.77	144.37	139.26	134.33	134.29	0.86	0.83
Number of Co-morbid Conditions										
None	476.99	448.57	451.80	417.07	383.28	358.17	348.72	348.35	0.77	0.73
1	112.14	98.29	108.55	102.43	94.97	95.84	95.66	94.90	0.87	0.85
2	79.33	74.59	75.67	72.28	68.87	65.02	61.82	62.03	0.82	0.78
3+	85.05	83.42	81.80	80.91	76.79	74.25	71.23	74.76	0.91	0.88

Since health care providers at the teaching hospitals stated that they perceived an increased acuity of the medical patients treated after downsizing, we examined this using case weights, which measure the level of resource intensity required for a given case. Mean case weights for typical medical patients at both teaching and community hospitals increased between 1990 and 1996 (Figure 4).[7] The increases at the teaching hospitals were greater and appear to coincide with the bed closures, supporting the perceptions of those at these institutions that they are treating sicker patients.

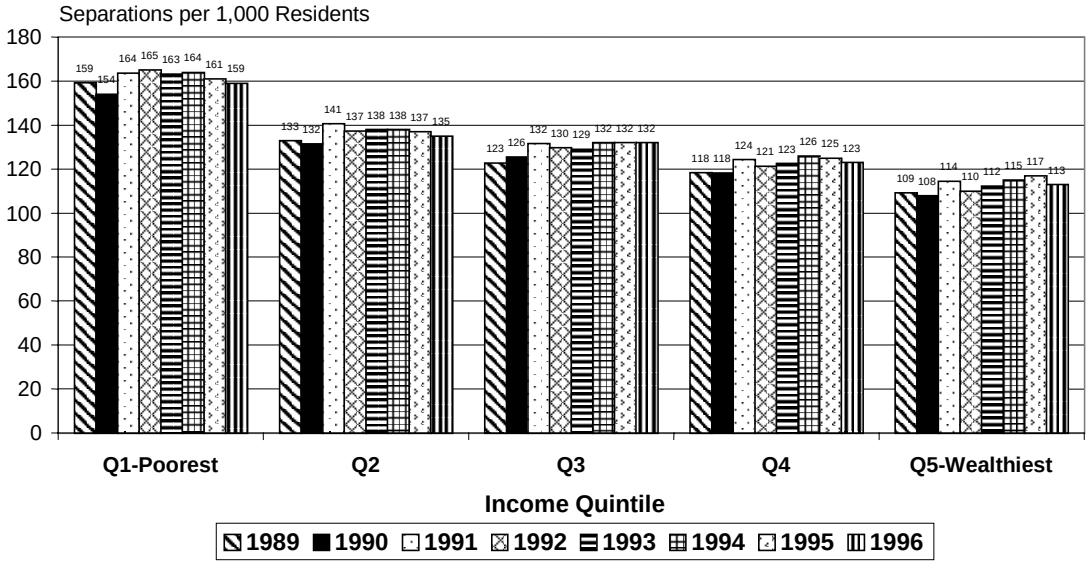
[7] Not surprisingly, given the shift of lower intensity patients from inpatient to outpatient surgery, mean case weights for surgical inpatients also increased during the same time period, at both teaching and community hospitals.

**Figure 4: Change in Resource Intensity
Of Typical Medical Patients
(Winnipeg Residents, Adults Only)
1990-1996**



Previous research indicated that lower income groups are at higher risk for poor health and hospitalization (Frohlich and Mustard, 1994). Figure 5 demonstrates a strong relationship between separations and income level: the lower the income group the higher the rate of admission to hospital. None of the five income groups had poorer overall access to acute hospital services following bed closures, in terms of the number of patients treated. Overall separation rates (including short-stay inpatients and outpatient surgery) did not change significantly between 1991 and 1996 for any of the income groups; there was also no change in 1997. When surgical and medical separations are examined separately, however, we find that medical separations decreased significantly for all income groups. Although outpatient surgical separations have steadily increased for all income groups, the overall surgical separation rate has increased only for the two highest income groups.

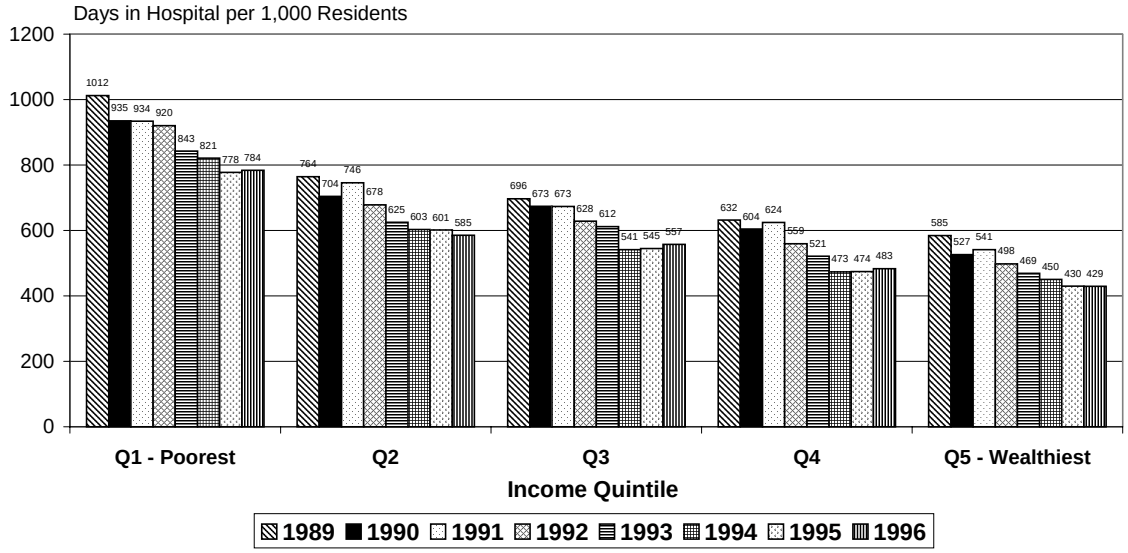
Figure 5: Hospital Separations by Income Quintile: Winnipeg Residents (Short Stay <60 Days and Surgical Outpatients) 1989-1996



Q1 = 20% of population resident in Winnipeg neighbourhoods with lowest household incomes.

All income groups used fewer days of hospital care in 1996 compared to 1991, with the lowest income group having the smallest proportional decrease overall (Figure 6). For all income groups the decreases in days were significant for both medical and surgical care; however the decreases in surgical days were considerably greater than those for medical days.

Figure 6: Days in Hospital by Income Quintile: Winnipeg Residents (Short Stay <60 Days) 1989-1996



Q1 = 20% of population resident in Winnipeg neighbourhoods with lowest household incomes.

Once again it is important to note the marked differences in hospital use across income groups. In 1996, middle income residents spent 30% more days in hospital (per 1,000 population) than those living in the wealthiest neighbourhoods. The lowest income group spent 41% more days in hospital than the middle income group. Research at the Centre (DeCoster, Peterson and Kasian, 1997) suggests that these gradients in hospital use across socioeconomic status reflect real differences in the health of these groups, not differences driven by social causes of admissions. Patients admitted to Winnipeg hospitals from the lowest income neighbourhoods were just as likely to meet criteria suggesting that acute care was required as were patients admitted from middle income or even from the highest income neighbourhoods.

Anderson (1997) found that gradients in utilization observed across income groups narrowed during a period of restructuring in Ontario, raising questions about changes in the equity of health-care delivery. Given our findings above regarding the health differences of the different income groups a narrowing gradient would suggest those in the poorest health are not receiving adequate services. Contrary to Anderson, we found very little change across

years in the gradient between income groups. Further exploration, however, revealed a widening gradient for medical separations and a narrowing gradient for surgical separations. We also found that for any given year the gradient for surgical separations was considerably less than that for medical separations: in 1996 Winnipeg residents from the poorest neighbourhoods had 87% more medical separations from hospital than those from the wealthiest neighbourhoods, whereas the difference for surgical separations was only 10%. Previous research at the MCHPE has found surgery and specialist services less responsive to population health needs than medical admissions and contacts with general practitioners (Roos and Mustard, 1997).

Access to Paediatric Care

Between 1992 and 1996, 64 paediatric beds (37%) were closed in the Winnipeg hospital system. Between 1991 and 1996, paediatric utilization decreased dramatically, with separations dropping by 23% and days falling by 34% (Table 4). Mean length of stay during this time remained fairly stable.

Table 4: Characteristics of Paediatric Use of Hospitals For Short Stay and Outpatient Care Winnipeg Residents, 0-14 1989-1996

	1989	1990	1991	1992	1993	1994	1995	1996	Ratio 1996/1991	Ratio 1996/1989
Separations per 1,000 Residents										
Inpatient	41.02	37.89	40.28	35.30	33.50	31.40	28.31	26.05	0.65	0.64
Outpatient Surgery	12.70	13.69	16.36	15.65	16.46	17.17	18.98	17.51	1.07	1.38
Total	53.72	51.57	56.63	50.94	49.96	48.57	47.29	43.56	0.77	0.81
Mean Length of Stay	3.63	3.78	3.80	3.67	3.62	3.70	3.77	3.86	1.02	1.06
Days per 1,000 Residents	147.85	142.64	152.19	129.06	120.65	116.29	106.71	100.76	0.66	0.68

To further investigate the decrease in paediatric utilization we conducted a number of additional analyses. When separations were examined by income group, we found that all

income groups showed significant decreases, with the lowest income groups having the smallest decreases. Surgical separations showed greater decreases than medical separations. Paediatric patients who were the least ill showed greater decreases than those who were the most ill. Paediatric patients who were the most ill (with two, three or more comorbid conditions known to increase the risk of death) showed no decreases between 1991 and 1996 either in separations or days. For those paediatric patients requiring the most complex care (those with a moderate or high level of comorbidity and complication) separations decreased significantly, but as was found with adults, this was the case for surgical patients only, and therefore was most likely due to procedures shifting from an inpatient to an outpatient setting.

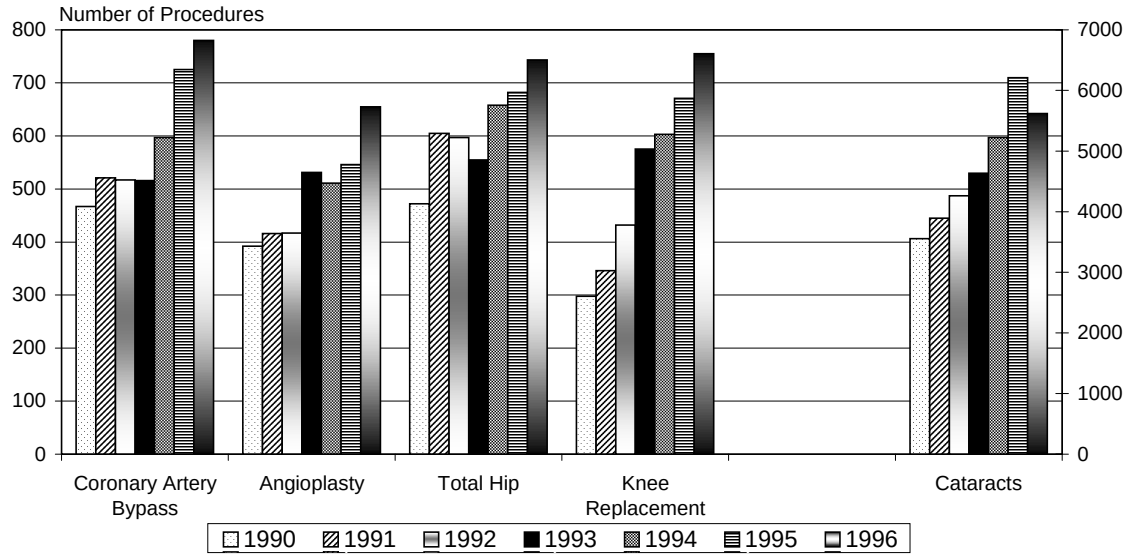
We further examined paediatric separations by patient category, focussing on those categories that showed decreases, to explore other possible explanations for the observed decrease in paediatric utilization. There were substantial decreases in Ear Nose and Throat procedures, particularly for Tonsillectomy and Adenoidectomy procedures (31% decrease), and much of this coincided with the introduction of new clinical guidelines for these procedures in 1996 (Black et al., 1996**)**. Other changes in practice patterns contributed to the decline in separations, with a 94% decrease in laryngotracheitis, a 42% decrease in circumcisions, and a 44% decrease in seizure and headache. Admissions for bronchitis and asthma dropped by 53%, and this was likely, at least in part, due to the development of an Observation Unit in the Children's Hospital Emergency Department. A more detailed examination of these categories would help determine whether other factors were contributing to the observed decline in paediatric separations, and whether patient outcomes have been compromised.

Access to Specific Procedures

Access to certain types of procedures, either because they offer considerable benefits in terms of quality of life or because they have been noted in the popular press as potentially rationed in Canada, are of particular interest. Figure 7 presents data for several of these procedures,

showing the numbers performed before, during and after the 1992 downsizing for all Manitobans.

Figure 7: Access to High Profile Procedures: Number of Procedures Performed All Manitoba 1990-1996



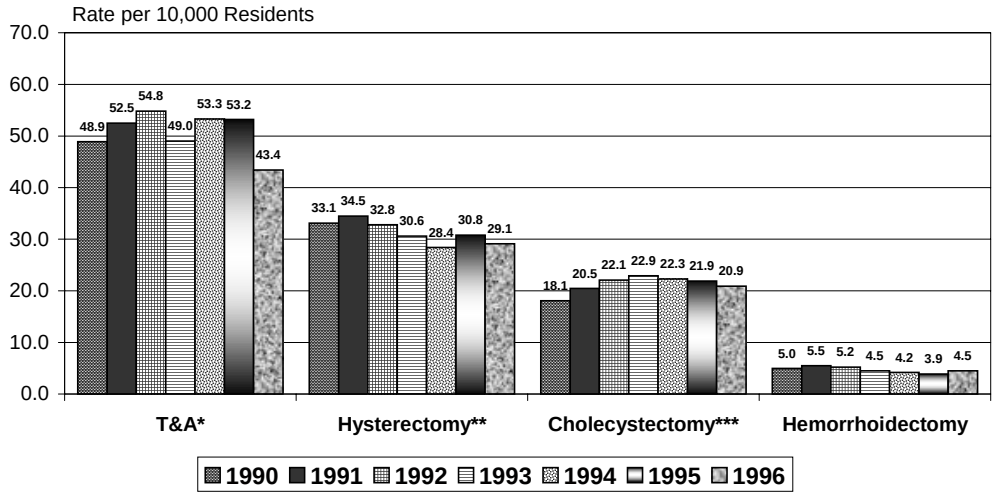
Between 1991 and 1996, the number of these high profile procedures increased dramatically. Angioplasty and cataract surgeries increased by 57% and 44% respectively. While these increases can be attributed to increases in outpatient procedures, the three procedures performed on an inpatient basis also showed dramatic increases between 1991 and 1996: bypass surgeries increased by 50%, total hip replacements increased by 23%, and knee replacement surgery went up by 118%. Some of these procedures, particularly cataract surgery, primarily benefit the elderly, whose numbers are increasing; however, age-adjusted rates for cataract procedures also show substantial increases: 31% for Winnipeg residents and 42% for non-Winnipeg residents between 1991 and 1996. For three of the procedures (cataracts, bypass and angioplasty) the increases in rates for non-Winnipeg residents have been more substantial than those for Winnipeg residents; however the rates for Winnipeg residents were much higher to begin with. For hip and knee replacement procedures the rates

for non-Winnipeg residents have tended to be slightly higher over the years than those for Winnipeg residents; the increases in rates have been similar to those experienced for Winnipeg residents.

In 1997 the numbers of procedures and age-/sex- adjusted rates continued to increase for both Winnipeg and non-Winnipeg residents for all procedures except for angioplasty. The adjusted rate for knee procedures increased 22.5% for Winnipeg residents and 23.5% for non-Winnipeg residents between 1996 and 1997. The adjusted rate for angioplasty for Winnipeg residents dropped by 8.2% between 1996 and 1997 and for non-Winnipeg residents this decrease was 4.2%. The 1997 rates for both Winnipeg and non-Winnipeg residents for angioplasty were still significantly higher than the rates in 1991.

Figure 8 plots the seven-year rates for Winnipeg residents who have undergone four common surgical procedures that have been the subject of critical reviews in the literature because of potential overuse: tonsillectomy and adenoidectomy, hysterectomy, cholecystectomy and hemorrhoidectomy (Bernstein et al., 1993; Scott and Black, 1991; Roos et al., 1977; The Lancet, 1975). Tonsillectomy (T & A) rates dropped by 18.4% between 1995 and 1996, most likely not in response to downsizing but as a result of a report on tonsillectomy patterns in the province (Black et al., 1996) and the development of clinical guidelines for tonsillectomy. Decreases were also observed for hysterectomy (15.7% between 1991 and 1996) and hemorrhoidectomy (18.2% between 1991 and 1996), however the pressures on the system caused by downsizing appear to have had little impact on cholecystectomy (2.0% increase since 1991). The 1997 data find no change in the rate of cholecystectomy.

Figure 8: Common Surgical Procedures Considered to be Sometimes Discretionary: Winnipeg Residents 1990-1996



* per 10,000 age 17 and younger
** per 10,000 females
*** includes only those cholecystectomies (laparoscopic and open) that were primary procedures

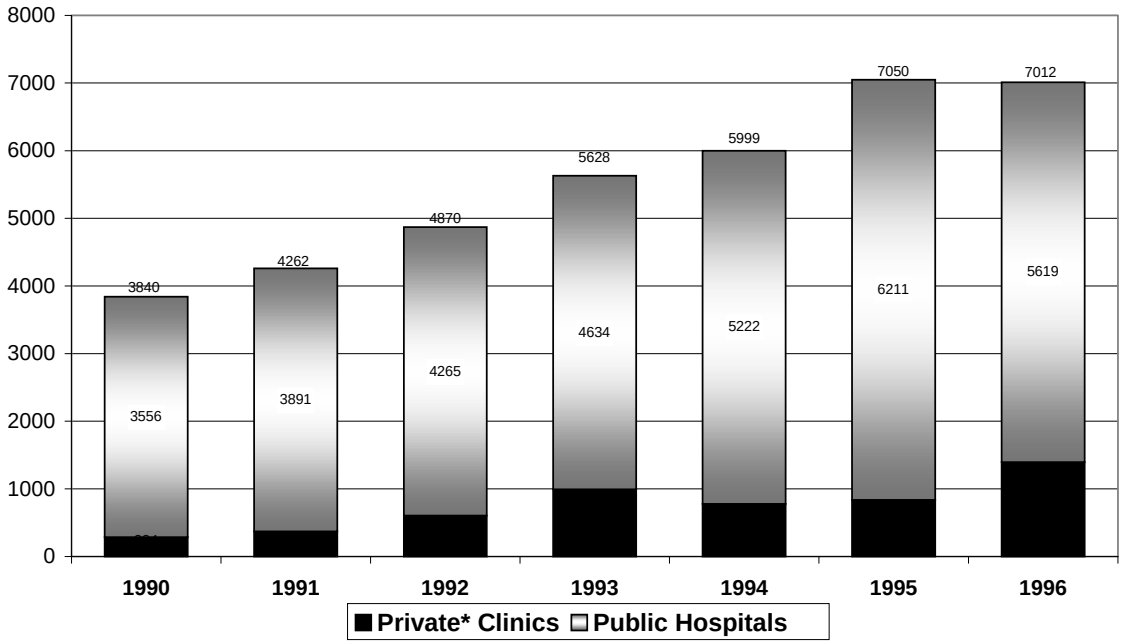
Downsizing and Growth in Private Clinics

One of the major concerns about downsizing has been the assumption that less investment in health care inevitably means an inferior public system and the development of a private sector to permit people who have the money to jump the inevitable long waits for surgery. Figure 9 tracks the growth in cataract surgery for Manitoba residents over the downsizing period, combining information on the numbers performed in private clinics with the numbers performed in the publicly funded system. The Manitoba government recently (January, 1999) announced new legislation that prohibits private clinics from charging their patients extra fees. Prior to this legislation, and during the study period of this report, the Manitoba private clinics required patients to pay a fee of $1000 to $1200 per eye; the province paid the surgeon's fee even though the operation occurred outside the public system.

Between 1991 and 1996, there was both a major increase in public caseloads, up 1728 procedures (from 3891 to 5619, or 44%), and rapid growth in the private sector, increasing by more than 1000 procedures (from 371 to 1393 procedures, or 275%) (Figure 9). The most

dramatic increase in private clinic activity occurred between 1995 and 1996 (66% increase), during the same period that the number of public procedures decreased by 10%. According to officials at Manitoba Health, a budgetary cap was enforced in 1996; this appears to have limited the number of procedures performed in the public system. The overall number of cataract procedures performed on Manitobans remained constant between 1995 and 1996 (7050 and 7012 procedures respectively). In 1997, the number of public procedures increased by almost 6% (323 procedures) whereas the number of private procedures increased almost 4% (54 procedures), for an overall increase of 5.4% over the previous year.

Figure 9: Growth in Private Clinic* and Public Hospital Caseloads Cataract Surgery 1990-1996



* These include private clinics located in Manitoba and Gimbel Clinic (1993-1996 only) in Alberta.
Surgical fees are paid by Manitoba Health; facility fee is paid by patients.

Long-stay Inpatient Care in Acute Hospitals

Concurrent with the large number of acute care bed closures in 1992 was the opening of 75 long-term care beds; in1993, 234 Personal Care Home (PCH) beds were opened in

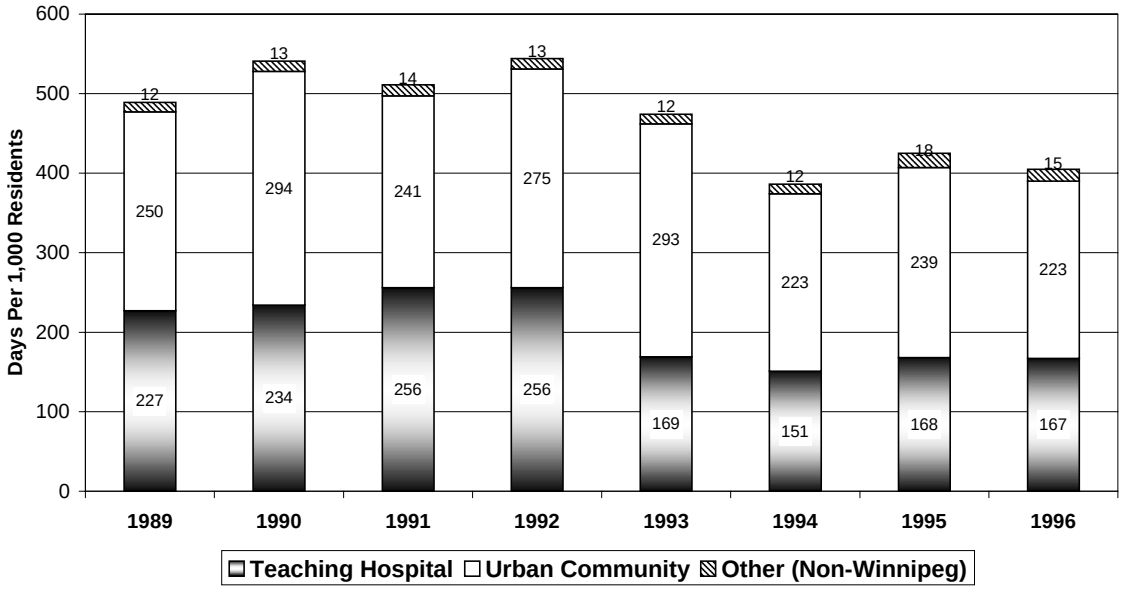
Winnipeg. Between the beginning of 1991 and the end of 1996 there was a net increase of 327 PCH beds (or 7.1%) and 9 long-term care beds (or 1.2%). These beds were added with the intention of shifting non-acute patients from acute hospital to long-term care and PCH beds, and this appears to have occurred (Table 5). The rate of separations for long-stay inpatient care in acute hospitals decreased by 6% between 1991 and 1996, and the days fell by 23%.

Table 5: Changing Use of Long Stay Inpatient Care (60+ Days)
In Acute Hospitals
Winnipeg Residents
1989-1996

	1989	1990	1991	1992	1993	1994	1995	1996	Ratio 1996/1991	Ratio 1996/1989
Persons hospitalized per one thousand residents	2.95	3.12	3.00	3.04	2.86	2.65	2.77	2.82	0.94	0.96
Hospital separations per 1,000 residents	3.05	3.22	3.09	3.15	2.96	2.77	2.87	2.90	0.94	0.95
Average length of stay	171.41	177.44	169.94	174.57	160.49	139.40	147.83	139.50	0.82	0.81
Hospital days per 1,000 residents	527.76	573.77	527.11	551.67	473.90	385.55	424.64	405.22	0.77	0.77

The teaching hospitals showed the greatest decrease in days for long-stay patients (Figure 10). Between 1992 and 1993, when the majority of the teaching hospital beds were closed (see Table 1), long-stay days decreased by 34% at the teaching hospitals. The decrease in days for long-stay patients at the Winnipeg community hospitals has not been as dramatic: less than 8% between 1991 and 1996, with the largest decrease (almost 24%) occurring after the largest decrease in bed numbers at these hospitals (in 1993).

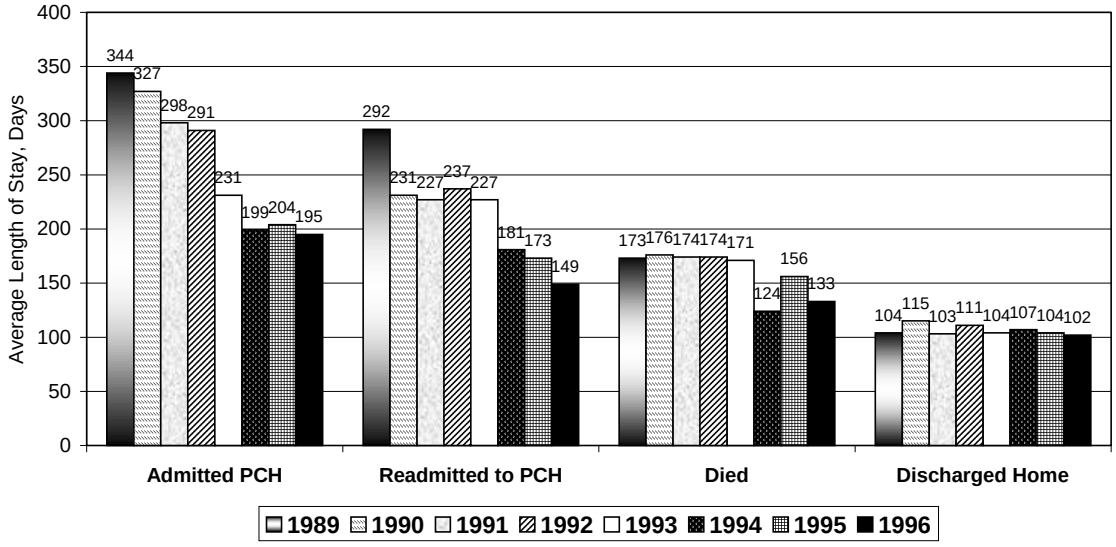
Figure 10: Where Long Stay Inpatient Care In Acute Hospitals Took Place Winnipeg Residents 1989-1996



While there are still a large number of days used in the acute hospital system by patients awaiting first placement in PCHs, the waiting time itself has decreased substantially (Figure 11). The average length of stay in hospital prior to admission to PCH decreased almost 35% between 1991 and 1996, with the greatest decreases occurring between 1992 and 1993 (almost 21%). This is most likely due to the addition of the 234 PCH beds in Winnipeg in 1993. The average length of stay for patients readmitted to PCH also fell, with a decrease of 34% between 1991 and 1996. To determine whether these patients were being sent back to PCHs before they were ready, we examined their mortality and readmission rates. Mortality rates for PCH patients hospitalized for AMI, hip fracture or cancer surgery showed no change over the eight-year period, 1989 to 1996. When we examined readmission rates per 100 cases for PCH patients hospitalized for four high-frequency categories (simple pneumonia, AMI, heart failure and digestive disorders), however, we found that for two of these categories (AMI and digestive disorders) there was a significant increase in readmissions (AMI: 1991 - 4.0, 1996 - 13.51; digestive disorders: 1991 - 10.53, 1996 - 19.64). For AMI, the length of stay in 1996 did not differ significantly from the length of

stay in 1991, and the readmission rates tended to fluctuate from year to year, making it difficult to draw the conclusion that shorter stays in hospital were contributing to the increase in readmissions. For digestive disorders, length of stay declined steadily between 1991 and 1996, with the 1996 length of stay in hospital for PCH patients being significantly shorter than that in 1991, suggesting that the increased readmission rate for these patients may be related to the shorter hospital stays.

Figure 11: Average Length of Stay Of Long Stay Patients By Final Placement Upon Discharge From Acute Winnipeg Hospitals: Winnipeg Residents 1989-1996



Personal Care Home Utilization

Because a substantial proportion of the individuals admitted to PCHs in Winnipeg are discharged directly from hospital, the availability of nursing home beds can influence how the hospital system can respond to downsizing. Between 1991 and 1996 there was a 50% increase in the rate of admissions per 1000 residents aged 75 and over (Table 6). According to Manitoba Health records (Manitoba Health, 1998) the frequency of deaths in PCHs was greater in 1996 than in 1991, and this, along with the additional PCH beds in the system, has contributed to the increase in admissions. The average age of PCH residents increased over

the time period, as did the proportion of residents requiring higher levels of care (Manitoba Health, 1998) and this is reflected in a slight decrease in the expected length of stay of these residents (Table 7).

**Table 6: Changing Utilization of PCH Resources:
Winnipeg Residents Age 75+
1989-1996**

	1989	1990	1991	1992	1993	1994	1995	1996	Ratio 1996/1991	Ratio 1996/1989
Population (age 75+)	34,455	35,398	36,488	37,493	38,073	39,215	40,252	41,256	1.13	1.20
PCH Beds per 1000**	133	130	128	126	130	126	122	119	0.93	0.89
Residents per 1000*	129	128	128	127	132	128	128	126	0.98	0.98
Admissions per 1000*	21	23	24	25	33	28	32	36	1.50	1.71
Number of Admissions*	729	828	895	932	1,260	1,095	1,307	1,492	1.67	2.05
Days of Care per capita	33	38	37	37	37	37	37	36	0.97	1.09

* All rates and frequencies are based on the population aged 75 and older
** Bed numbers counted at end of fiscal year

Waiting time for admission to PCH dropped dramatically between 1991 and 1996 (Table 7). The median length of stay in hospital before discharge to a PCH dropped over 37% between 1991 and 1996. The median length of waiting time for admission to PCH after panelling dropped 28% during the same time period. This latter group of patients includes those admitted from both the community and hospital; the large decrease in waiting time for these patients suggests that the quicker access to PCHs by hospital patients did not occur at the expense of those patients waiting in the community.

Table 7: Changing Characteristics of Patients Admitted to Nursing Home: Winnipeg Residents Age 75+ 1989-1996

	1989	1990	1991	1992	1993	1994	1995	1996	Ratio 1996/1991	Ratio 1996/1989
Expected Length of Stay (years)	3.9	4.0	4.0	3.9	3.9	3.9	3.8	3.8	0.95	0.97
Median Length of Waiting Time (days) *	155	154	150	145	130	121	114	108	0.72	0.70
Median Length of Stay in Hospital *	266	257	211	222	146	160	154	132	0.63	0.50
Admit from Hospital (%)	40	47	46	51	48	38	38	35	0.76	0.88
Total Number Admissions	729	828	895	932	1,260	1,095	1,307	1,492	1.67	2.05

* The median is the midpoint, or the value below which half of the values fall. For example, in 1990 half of the people admitted to PCH waited 154 days or less between panelling and admission.

3.2 Quality of Care

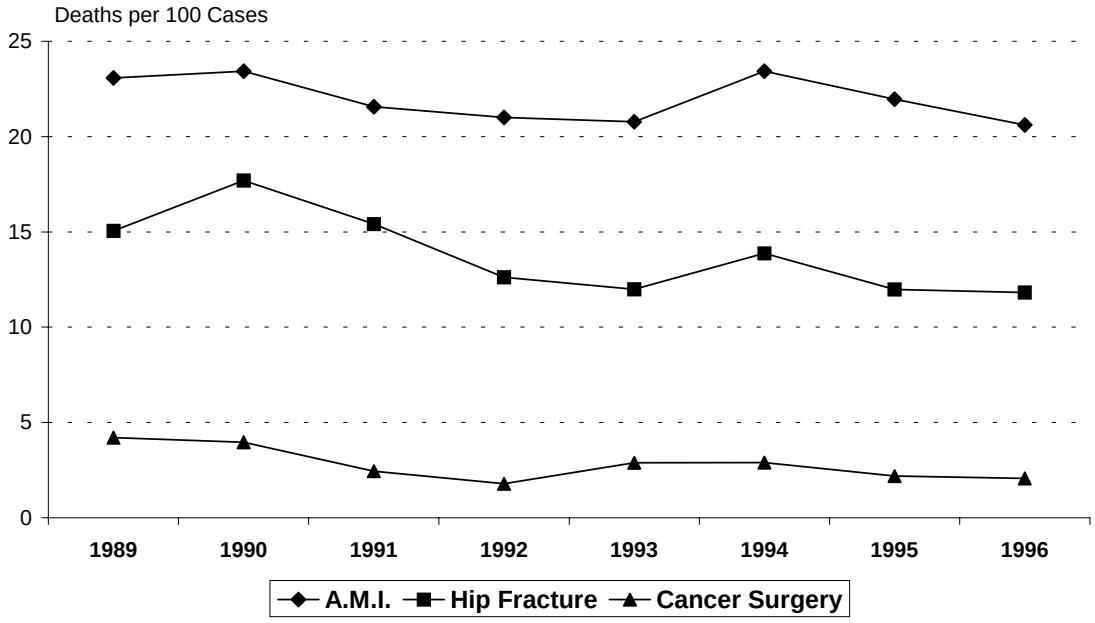
Health care professionals expressed concern about the potential negative impact that downsizing was having on quality of care. They observed problems that they felt were caused by the bed closures and budgetary constraints. While such incidents cannot and should not be discounted, it is important to determine whether there were actually more problems with quality of care following downsizing, whether there were fewer problems, or whether the occurrence of problems remained unchanged.

A number of different quality of care indicators were examined. These indicators represent an important set of outcome measures for the hospital and health care system, providing a view of system-wide patterns often unavailable to professionals working within a specific institution.

Mortality

Mortality rates have been widely used as measures of quality of hospital care and have played an important role in efforts to improve quality of care (Hannan et al., 1994; Hannan et al., 1995). We examined mortality rates within 30 days of discharge from hospital over the period 1989 - 1996 for Winnipeg residents who were treated for one of three common conditions: acute myocardial infarction (AMI), hip fracture, and cancer surgery (Figure 12). All deaths, whether they occurred in hospital or after discharge, were included in the analysis. Although mortality rates within 30 days of discharge are generally sufficient when using this measure as an indicator of hospital performance (Garnick, DeLong and Luft, 1995), we also examined mortality rates within 60 and 90 days of discharge as well as age- and sex-adjusted population mortality rates for the three different time frames (30, 60 and 90 days). For all methods and conditions, no significant increases in mortality were observed. In fact, for both hip fracture and cancer surgery, significant decreases in mortality rates were observed across the eight years studied.

Figure 12: Quality of Care - Rate of Death Within 30 Days of Discharge Winnipeg Residents 1989-1996



Mortality rates for elderly patients hospitalized for AMI, hip fracture, and cancer surgery were examined separately, because the elderly may be particularly vulnerable to negative aspects of bed closures since they are high users of the hospital system.[8] No increases across the years in mortality were evident for elderly patients with any of the three conditions. The pattern for elderly patients for hip fracture was the same as for all patients, with a significant trend toward lower mortality rates (30-day mortality rates per 100 cases for 75+ years: AMI, 1991 - 35.6, 1996 - 32.2; cancer surgery, 1991 - 3.8, 1996 - 3.7; hip fracture, 1991 - 18.4, 1996 - 13.6).

Readmission

Another concern expressed by physicians and nurses was that fewer beds would result in pressure to discharge patients before they were stable, leading to higher rates of complications. If, under pressure from downsizing, patients were discharged from hospital too soon, one might expect increased rates of readmission. Readmission rates are commonly used as a measure of quality (Brook and Lohr, 1987; Corrigan and Martin, 1991; Epstein, Bogen, Dreyer and Thorpe, 1991; Gooding and Jette, 1985; Riley and Lubitz, 1986; Thomas and Holloway, 1991). We therefore examined readmission rates between 1989 and 1996 for patients treated for 13 medical, surgical and obstetric categories in Winnipeg hospitals. These categories were chosen because they were high frequency and spread out fairly evenly across the seven Winnipeg hospitals. Readmissions within 30 days of discharge were captured regardless of whether the patient returned to the same Winnipeg hospital where the initial treatment took place or to any other hospital in Manitoba.

Of the seven medical and obstetric categories studied, there were significant increases in readmission rates for two groups of patients, those with digestive disorders and normal newborns, as well as a significant decrease in readmission rates for patients with bronchitis/asthma (Figure 13). Because there was a concern with premature discharge, we examined the outcomes of patients with digestive disorders and normal newborns at each

[8] Those from the poorest neighbourhoods may also be particularly vulnerable; however the small number of deaths in each of these categories for this group precluded a separate examination.

Winnipeg hospital to determine if patients treated at those hospitals with longer stays were less likely to be readmitted to hospital than those discharged from hospitals with shorter lengths of stay.

Figure 13: Rate of Readmission to Hospital Within 30 Days of Discharge For Common Types of Medical/Obstetric Patients: Winnipeg Hospitals 1989-1996

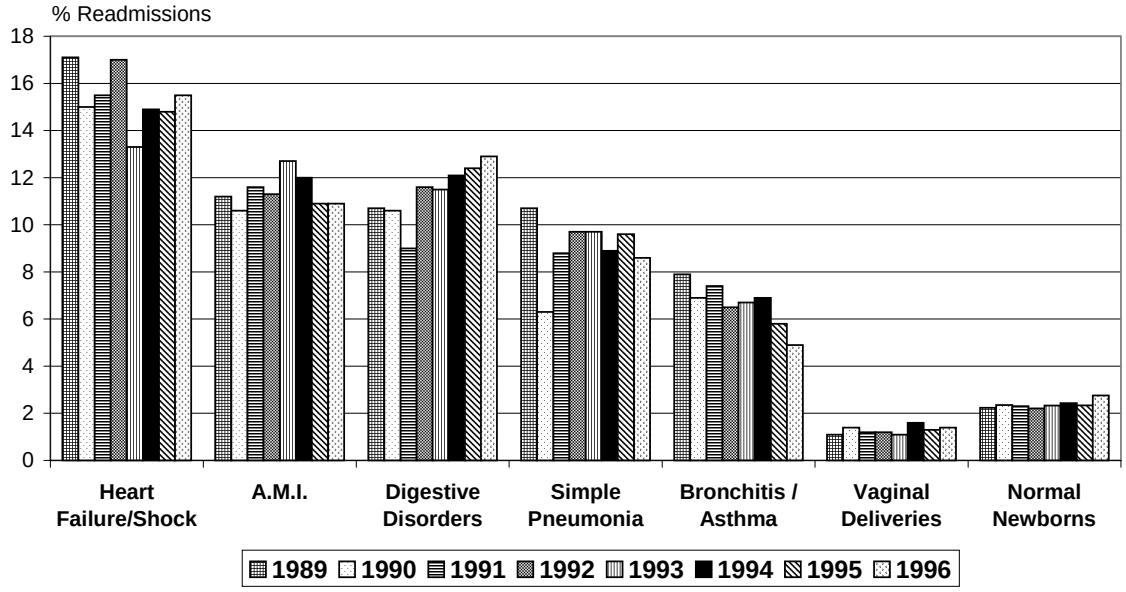
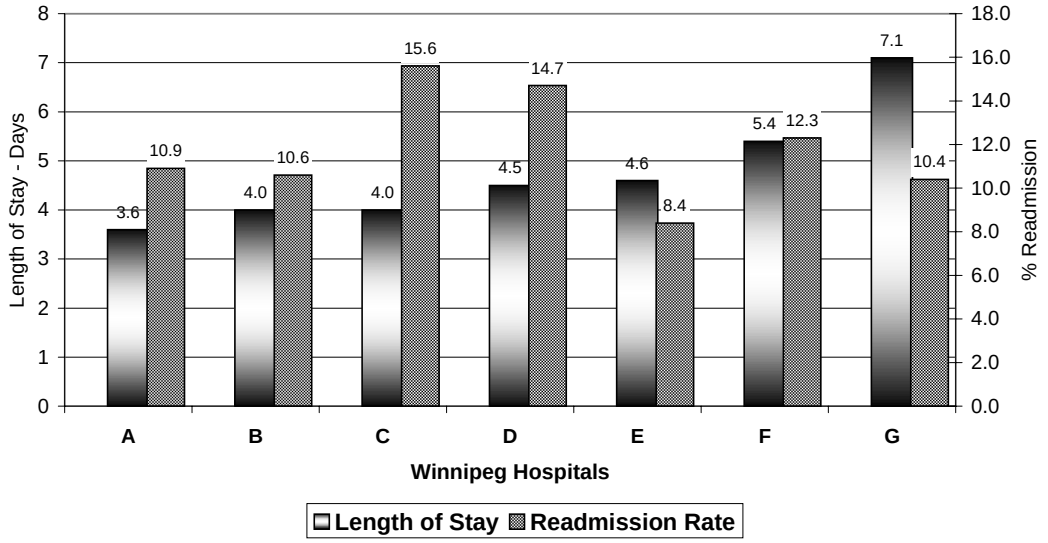


Figure 14 shows average length of stay and readmission rate for hospitals according to how long they kept their patients with digestive disorders in hospital. No relationship between length of stay and readmission rates is evident. The striking characteristic in Figure 14 is the almost twofold variation in readmission rates from hospital to hospital, ranging from 8.4% at hospital E to 15.6% at hospital C. (The increase in the proportion of patients readmitted to hospital over the period of hospital downsizing was from 9.0% in 1991 to 12.9% in 1996.) The number of patients being treated for digestive disorders in Winnipeg hospitals decreased by 15% between 1991 and 1996, while the proportion of these patients who were sicker (as measured by level of complexity) increased. Because sicker patients are more likely to be readmitted, this change in practice pattern for patients with digestive disorders may be one

reason for the increased readmission rate. In 1997, the readmission rate for patients with digestive disorders continued to increase. Both the increased readmission rates and the significant differences in readmission rates across Winnipeg hospitals warrant more careful examination.

Figure 14: Comparison of Length of Stay And 30 Day Readmission for Digestive Disorders On First Admission: Winnipeg Hospitals 1996

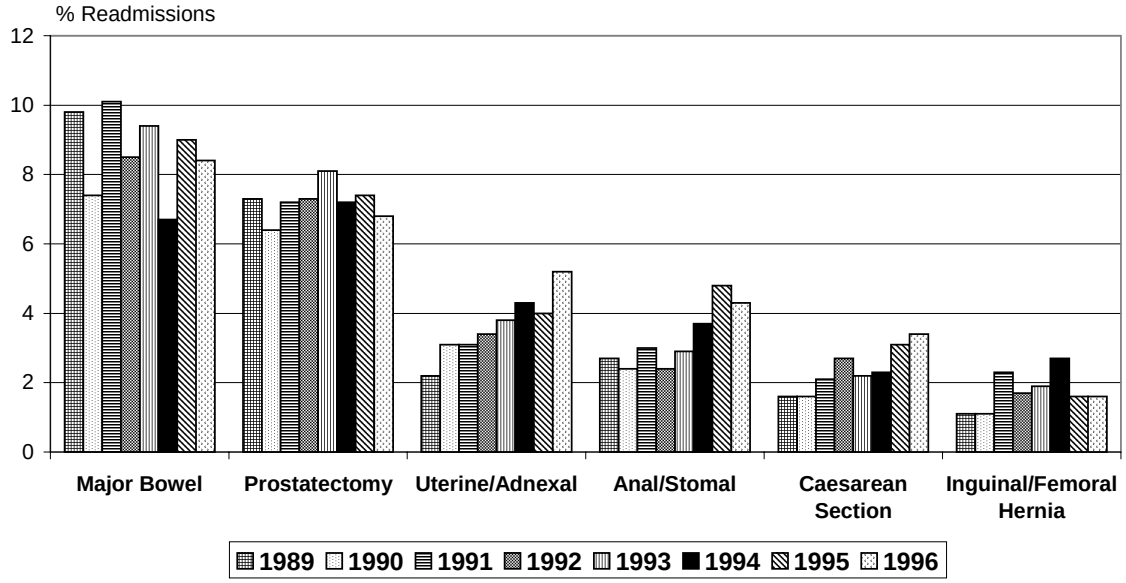


There was also no significant relationship between length of stay and readmission rate found for normal newborns. In fact, when we examined whether readmissions were related to shorter or longer stay patients we found the opposite of what was expected: those who were readmitted had on average longer stays than those who were not readmitted. As with patients with digestive disorders, we found significant differences across hospitals in readmission rates for normal newborns. In 1997, the readmission rate for normal newborns dropped and was no longer significantly different than the 1991 rate.

Readmission rates for six different surgical procedures were also examined between 1989 and 1996 (Figure 15). Although the readmission rates tend to vary from year to year for

many of the categories, for three categories (uterine/adnexal procedures, anal/stomal procedures and caesarean section) there were significant increasing trends across the years. For each of the three categories we investigated further to determine whether readmission rates were highest for the shortest stay hospitals. There was no relationship between hospital stays and readmission rates (see for example Figure 16). There were, however, significant differences in readmission rates according to the hospital in which the patient was treated. Those discharged from hospital C were much more likely to be readmitted than those discharged from hospital A. Once again, for each of the categories we found those who were readmitted tended to have longer stays than those who were not readmitted. Research elsewhere (Thomas, Guire and Horvat, 1997) has found poor quality of care associated with *longer* rather than shorter lengths of stay.

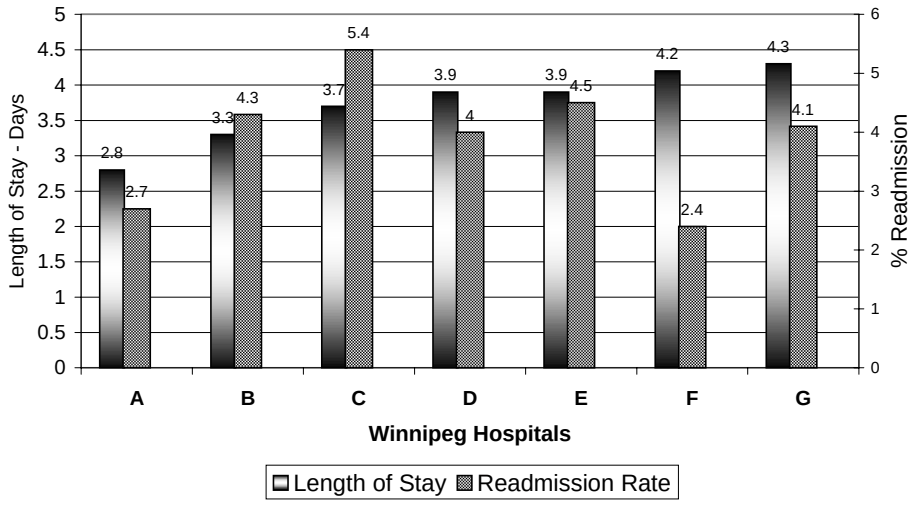
Figure 15: Rate of Readmission to Hospital Within 30 Days of Discharge For Common Types of Surgical Patients: Winnipeg Hospitals 1989-1996



In 1997, the readmission rates for these three categories dropped and were no longer significantly higher than the 1991 rates (nor did any of the other surgical categories have

higher readmission rates in 1997 than in 1991). Interestingly however, the significant differences between hospitals remained in 1997.

Figure 16: Comparison of Length of Stay And 30 Day Readmission For Uterine-Adnexal Procedures On First Admission: Winnipeg Hospitals 1996



The focus of health care professionals and the media has been on possible increases in readmissions associated with the shortened stays accompanying downsizing. Observed differences across Winnipeg hospitals in the likelihood of patients being readmitted to hospital in the 30 days following discharge have been largely ignored. In 1996, there were significant differences in readmission rates across hospitals for nine of the 13 categories studied. In 1997, 10 of the 13 categories had significant differences in readmission rates across hospitals. While these differences may be due, in part, to differences in patient characteristics, such as age, they are clearly not explainable by the length of time patients are kept in hospital. These differences across hospitals suggest the need for a more careful examination of what is driving these differences in readmission rates, whether it be differences in patient types, quality of care received at different hospitals or some other factor.

Readmission rates were also examined for two groups which might be more vulnerable to any negative effects of downsizing: the elderly and residents of the poorest neighbourhoods. Both of these groups tended to have higher readmission rates than others for all years examined (1989 through 1996). For all categories studied, with one exception, there was no difference in rates between 1991 and 1996 for either the elderly or those from the poorest neighbourhoods. For digestive disorders, those from both the poorest and the wealthiest neighbourhoods showed significant increases in readmission rates per 100 cases, whereas those from the three middle income groups showed no significant changes (Q1, 1991 - 9.38, 1996 - 14.49; Q5, 1991 - 4.59, 1996 - 10.96). Also for digestive disorders, those from the 85 to 89 year-old-category showed increased readmission rates between 1991 and 1996 (1991 - 3.77, 1996 - 15.79), whereas elderly both above and below this age category showed no significant changes in readmission rates.

When interviewed about their concerns with reforms affecting acute hospitals, physicians and nurses predicted that patients prematurely discharged might show up more frequently in doctors' offices or in emergency rooms. To explore this concern we tracked contacts with physicians within 30 days of hospital discharge for patients with three of the high-frequency medical conditions examined in the readmission analysis: AMI, bronchitis/asthma, and digestive disorders. Visits were counted if they occurred in the physician's office, emergency room[9] and/or outpatient clinics. There was no change in the mean frequency of these physician contacts within 30 days of discharge between 1990 and 1996 for any of these three conditions (AMI, 1991 - 2.03, 1996 - 1.96; bronchitis/asthma, 1991 - 1.74, 1996 - 1.68; digestive disorders, 1991 - 1.63, 1996 - 1.72). For bronchitis/asthma, but not the other two disorders, there was a significant decrease in the percent of patients making at least one visit within 30 days of discharge from hospital (AMI, 1991 - 90.5%, 1996 - 90.8%; bronchitis/asthma, 1991 - 85.3%, 1996 - 81.6%; digestive disorders, 1991 - 74.8%, 1996 - 75.4%).

[9] Emergency room contacts include contacts at Health Sciences Centre and St. Boniface Hospital only. Emergency room physicians at community hospital emergency departments in Winnipeg did not file evaluation claims during the period of this report and therefore such activity was not included in this analysis.

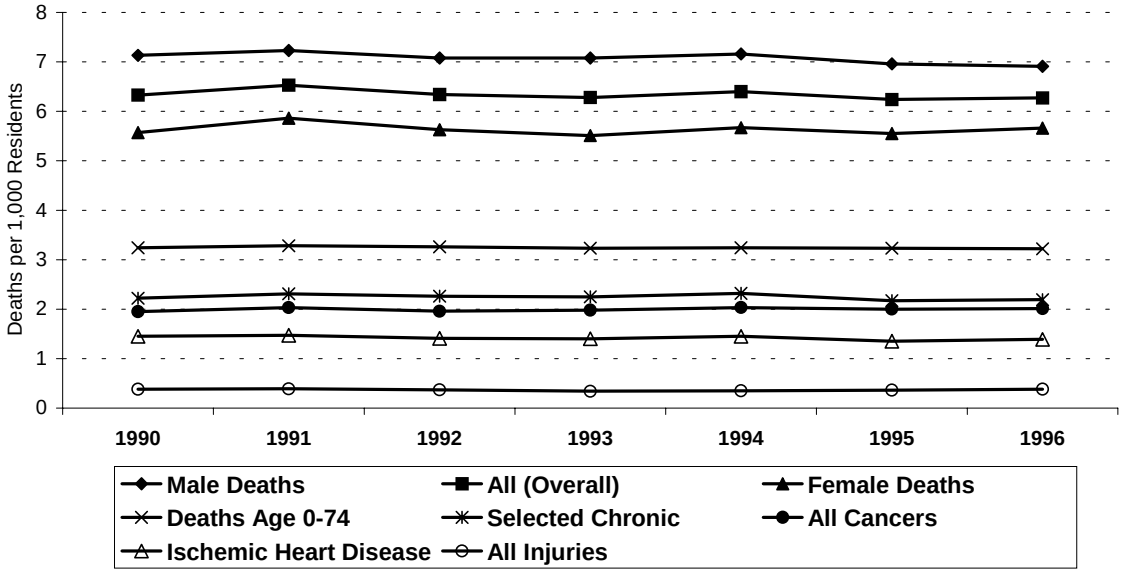
3.3 Health of Winnipeg Residents

Did the closure of hospital beds have a negative impact on the health of Winnipeg residents? Physicians' concerns that "increased morbidity and mortality" would result from bed closures prompted us to examine a number of health status measures. These measures, selected from those developed as part of the Population Health Information System (Cohen and Macwilliam, 1994; 1995), were chosen because they are among some of the most commonly used to assess population health. Focussing on population health allows us to look at "the big picture" in terms of the impact of hospital downsizing.

All-age mortality indicators for males and females, cause-specific mortality measures (deaths from chronic disease, cancer, and injuries), and deaths among residents aged 0 to 74 years showed essentially no increases between 1990 and 1996 (Figure 17). Preliminary 1997 data show the same patterns. The overall mortality rates, and mortality rates for males and for deaths due to chronic diseases actually decreased significantly between 1991 and 1996; however due to the very large sample sizes it is debatable whether these decreases are clinically meaningful[10] (please see discussion on clinical significance in section 2.3 in this report).

[10] For example, although the decrease in overall deaths from 6.35 deaths per 1,000 in 1991 to 6.27 in 1996 was statistically significant, the magnitude of this decrease was so small it was clinically insignificant.

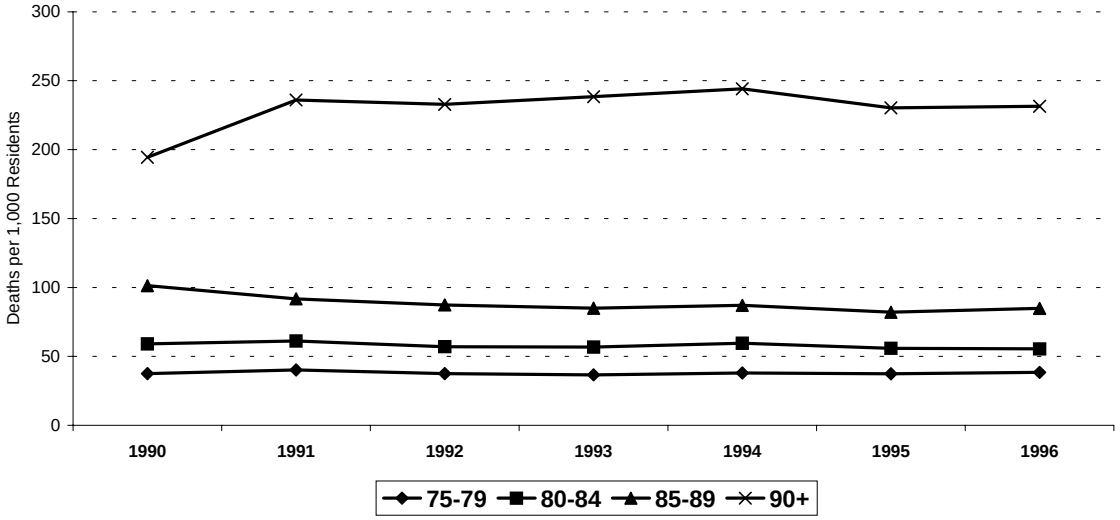
Figure 17: Changes in Ill-Health of Population
Mortality Rate Indicators:
Winnipeg Residents 1990-1996*



* For each year shown the mortality rates are calculated by combining data from that year and the previous year. For example, rates shown for 1993 are actually rates for 1993 and 1992 combined.

Because the elderly are at greatest risk for poor health and are the heaviest users of hospitals, we also tracked age-specific mortality rates for those aged 75 years and older (Figure 18). The data show that only for the very oldest residents has there been an increase in mortality rates between 1990 and 1996, and this increase occurred between 1990 and 1991, prior to the bed closures.

Figure 18: Changes in Mortality Rate Among The Very Elderly Population: Winnipeg Residents 1990-1996*

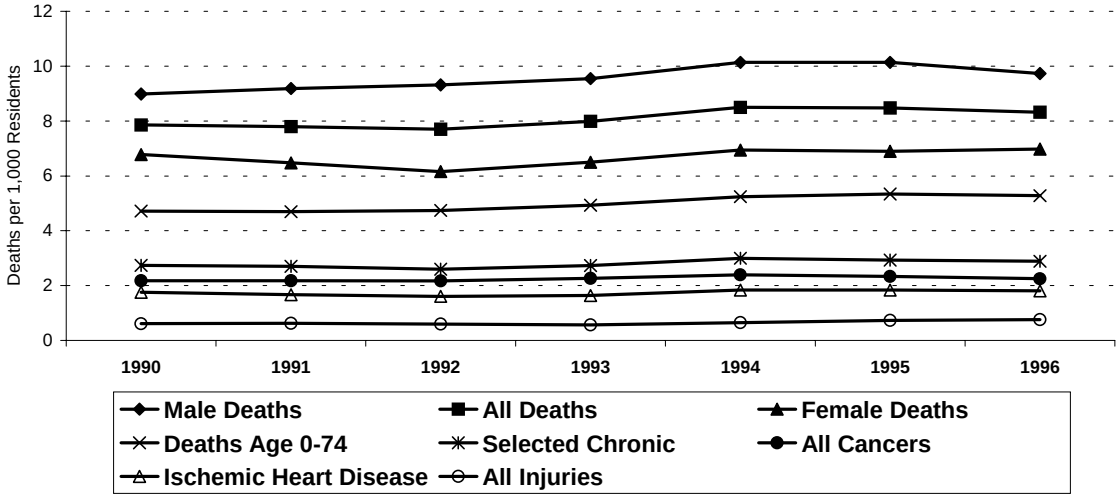


* For each year shown the mortality rates are calculated by combining data from that year and the previous year. For example, rates shown for 1993 are actually rates for 1993 and 1992 combined.

These same indicators (mortality rates) were used to track whether there was a negative impact on the health status associated with the bed closures among the poorest, most vulnerable population group (i.e., those living in neighbourhoods with the lowest mean household incomes) (Figure 19). For two of the indicators, the mortality rates have increased significantly between 1991 and 1996: all deaths and deaths for those 0 to 74 years increased for residents of neighbourhoods in the lowest income group. The change in mortality rates for those 0-74 years for this income group met not only the criterion for statistical significance but also that for clinical significance (1991 - 4.70; 1996 - 5.28). Preliminary data show the premature mortality rate decreased slightly in 1997, but remained significantly higher, both statistically and clinically, than the 1991 rate. Although not shown in Figure 19, residents of neighbourhoods in the other four income groups did not show similar increases. These results are of concern: they suggest that for those members of society who already have the highest premature mortality rates, these mortality rates are increasing. Because there are so many different forces, such as changing economic conditions, which can have an impact on these measures of population health, it is difficult to determine what, if any, role

the bed closures have had on the health of the Winnipeg residents from the poorest neighbourhoods. When we examined access separately for this group we found that access to hospitals had not changed overall (Figure 5), although medical inpatient admissions did decrease for all income groups. Although the days spent in hospital have decreased dramatically for all income groups since 1991 (Figure 6) the decrease for those from the poorest neighbourhoods has been proportionally less than for those from the other income groups. Likewise, when mortality rates and readmission rates for certain high-frequency conditions were examined separately for those from the lowest income group, no increases were found, with the exception of an increased readmission rate for those with digestive disorders. We checked deaths within 30 days of discharge from hospital for digestive disorders and found that the numbers were very small (30 deaths in 1991 and 29 deaths in 1996) and therefore would not have had an impact on population mortality rates.

Figure 19: Changes in Ill-Health Of Most Vulnerable Population Residents of Neighbourhoods in the Lowest Income Quintile: Winnipeg Residents 1990-1996*

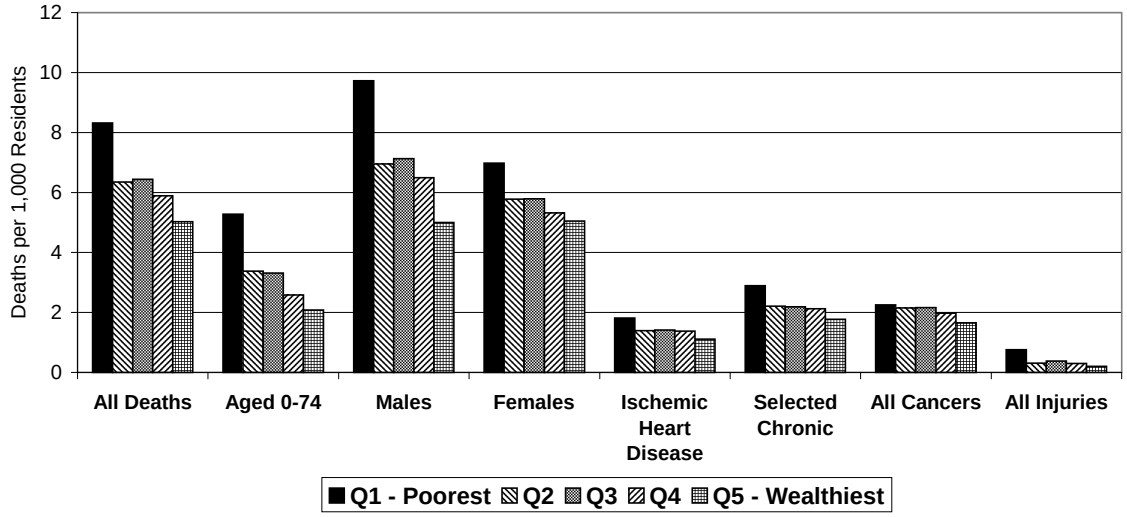


* For each year shown the mortality rates are calculated by combining data from that year and the previous year. For example, rates shown for 1993 are actually rates for 1993 and 1992 combined.

Figure 20 shows a marked gradient in mortality rates according to neighbourhood of residence at one point in time. It is clear from this figure that forces other than hospital bed

numbers have a dramatic impact on health status. Regardless of the year of data chosen, we have consistently found that, in general, individuals from the middle income neighbourhoods have poorer health status (as measured by these indicators) than do individuals residing in the highest income neighbourhoods; those residing in the poorest neighbourhoods demonstrate the worst health status. Indeed, for the most recent year of data (Figure 20), the overall mortality rate for those from the poorest income group was 65% higher than those from the wealthiest income group; the premature mortality rate (aged 0 to 74 years) for those from the lowest income group was fully 154% higher than those from the highest income group. A shift in focus is in order: investments in understanding social and environmental determinants of health could help identify ways of reducing hospital use, much more than simply providing more health care. Compelling arguments have been made regarding the importance of early childhood development on later health (Cyander, 1994; Hertzman, 1994). Manitoba programs such as "Baby First" and "Early Start", which are being piloted by the Children and Youth Secretariat, and the "Healthy Start for Mom and Me" program funded by Health Canada, should be carefully evaluated to determine empirically whether there is a connection between early positive developmental experiences and increased health status.

Figure 20: Health Characteristics Of the Winnipeg Population According to Relative Affluence of Neighbourhood of Residence, 1996*



* Two years of mortality data are combined to calculate rates.

4. LIMITATIONS

A population-based approach, using administrative data, provides a system-wide perspective of how changes to the acute care system in Winnipeg have affected access, quality of care and the health status of Winnipeg residents. The advantage to such an approach is that it makes it possible to review all care delivered rather than focussing on an individual case. Focussing on an individual case, which no doubt represents a particular problem to the patient, is not necessarily very informative regarding whether care is getting better or worse. No health care system is ever free of problems. A recent letter to the editor of the Free Press (May 3, 1998) highlighted a series of mishaps: a two-day stay in the observation unit without food and with limited fluids, discharged too early without homecare supports; a dying patient having to lie in the hallway on a stretcher for hours and then pressured to leave the hospital because the bed was needed. These sound like recent horror stories, but the dates given were 1983 and 1987, periods of rapid growth and expansion in the acute hospital sector.

The assessment methods we use also have limitations. While the number of patients gaining access to hospitals across the eight years studied did not decrease, the location of some patients within hospital may have differed. There has been a great deal of concern expressed that because hospital inpatient wards are so full, patients are spending too long (sometimes their entire stay) in Observation Units (OU). We are unable to systematically distinguish between patients cared for on an inpatient ward and patients remaining in the OU.

The system-wide outcome measures of mortality and readmission rates are used widely in the literature to describe quality of hospital care; however, missing from this discussion is information on the quality of life patients experience once discharged, and patient and family satisfaction with hospital care. These are clearly quality of care issues that deserve attention. While they were not within the scope of this report, MCHPE recognizes the importance of monitoring these aspects of quality of care, and was an active collaborator with the Manitoba Health Reform Impact Study (1996). This study included interviews with patients, health care providers and ordinary Manitobans regarding downsizing. Samples from two high-risk populations (the elderly and recently hospitalized patients) were carefully monitored in terms

of their health status, utilization of services, and their perceptions of the quality and availability of services. Interestingly, elderly residents hospitalized after bed closures expressed more confidence in the system than those who had not been hospitalized (Shapiro et al., 1996).

The absence of routinely collected data on home care services creates a major gap in the information available for monitoring downsizing of the Winnipeg hospital system. Data from the Manitoba Health Annual Reports (1991/92, 1992/93, 1993/94, 1994/95, 1995/96, 1996/97) show that there has been an 83% increase in expenditures on home care between 1991 and 1996. Whereas the number of persons registered increased over 18% between 1991 and 1996, the expenditures per person registered increased over 52%. Thus, more patients are receiving home care services and the cost per patient has increased dramatically. What is missing from these data is the ability to determine who is receiving these services. We do not know whether home care services are being used for patients who are discharged early from hospital to recover in the community, and/or whether home care services are actually being used for less sick patients to prevent hospital admission in the first place. Also lacking is information on the personal costs of shifts from the hospital to the community, such as drug costs to patients being cared for at home rather than in the hospital, and potential costs to family members assisting with care at home. These are all aspects of evaluating downsizing that we hope to be able to assess in the near future. A study on home care done is Saskatchewan (HSURC, 1998) suggests that home care is less costly than hospital care for patients with comparable needs. This same study also found equivalent outcomes in terms of patient health, and patient and caregiver satisfaction, and that the costs (in terms of hours and expenses) to unpaid family caregivers were similar regardless of whether the patient was in hospital or enrolled in home care.

In any study such as this, one has to be cautious in attributing changes in outcomes to any single factor. This project examines the effects of bed closures on stipulated outcomes: access to care, quality of care and the health of the population. Each of the outcomes refers to a complex set of issues and indicators that not only could be related to bed closures but also to a multitude of other factors aside from bed closures. For example, a change in the

economy (which was not measured in this study) could have a greater impact on population health than hospital bed closures. Consequently, it is impossible to attribute with certainty any measured change to bed closures, since changes could be the result of any number of unmeasured factors or combination of factors.

5. CONCLUSIONS

Since the first major bed closures occurred in Winnipeg's acute hospitals in 1992, we have monitored the impact of these closures on access to health care, quality of care, and the health of the population. Based on data up to 1996, the following conclusions are evident:

- Overall access by Winnipeg residents to hospital services, as measured by the number of patients treated, was not adversely affected. Indeed, hospital efficiency appears to have improved considerably: just as many patients were cared for in 1996 as in 1991, with fewer resources. Nurses, physicians and other hospital workers should be commended for their impressive efforts towards greater efficiency

- There has been a shift in the way hospital care is delivered.
  - Patients spent far fewer days in hospital in 1996 compared to 1991.
  - Winnipeg residents received more surgery in 1996 than they did in 1991, with more outpatient and fewer inpatient surgical procedures performed, and significantly shorter stays for surgical inpatients. Access to specific procedures such as coronary artery bypass, cataract surgery and knee replacement increased dramatically between 1991 and 1996. While the trend toward increased surgery, particularly outpatient, began prior to downsizing, concerns about bed closures leading to a rationing of surgical care appear to be unfounded.
  - In contrast to surgical care, there was an 8% decrease in medical separations over the same time period. A decrease in the number of patients admitted to acute hospital does not necessarily indicate that care is being compromised or rationed. A study by Centre researchers (DeCoster et al., 1996) found that although only 2% of the medical admissions in 1993 required no care, almost one-quarter were assessed as requiring alternate services, such as long-term institutional care, home care, or outpatient care. Reassuringly, in the current study we found that the sickest and most complex medical patients retained the same level of access across the study years. We found that separations at long-term care institutions increased by almost 25% between 1991 and 1996; however our ability to determine whether outpatient and home care have

increased for medical patients is limited due to the lack of computerized data. The increased expenditures on home care and number of registered patients suggests an increase in home care services, however we are unable to determine who is receiving these services. This absence of routinely collected data on home care services creates a major gap in the information available for monitoring downsizing of the health care system. As patient care shifts from hospital to the community the need to fill this gap becomes critical. Manitoba Health has recognized this gap and has asked MCHPE to take on a major project that will result in the incorporation of homecare data in the health research database. Our next monitoring report will attempt to fill this serious gap.

- Also in contrast to findings for surgical care, stays for medical patients were no shorter in 1996 than in 1991. DeCoster et al. (1996) found that as many as two-thirds of the days used by medical patients in acute care hospitals in Manitoba could potentially be treated in settings other than that of an acute care ward. A critical look at lengths of stay for medical patients would be useful to determine whether efficiency of management could be improved in this area.
- Large decreases in both separations and days for paediatric patients appear to be due to changes in practice patterns and more efficient clinical management of patients. A careful examination of the changes that have occurred to the delivery of paediatric care and the outcomes of these changes could help inform those responsible for improving the efficiency of adult care delivery, particularly for medical patients.

- We found in 1996, that restraining the number of cataract procedures in the public sector was related to an increase in the number of procedures performed in the private sector. This appears to have been reversed in 1997, with greater increase in the public cataract surgery. Previously, when procedures were performed at a private clinic, Manitoba Health paid the surgeons' fees and residents paid an additional fee out of their own pockets, and it is not just those from middle and higher income neighbourhoods who pay for these procedures at private clinics (DeCoster and Brownell, 1997). The Manitoba government has recently (January, 1999) passed legislation that prohibits private clinics from charging their patients extra fees. The extra fees contravene the Canada Health Act

and for this reason Manitoba was being fined $68,000 per month. Prior to passing the legislation Manitoba Health stated that once the private clinics were prohibited from charging extra fees, Manitoba Health "would negotiate an arrangement with the facilities to help defray their costs." Given that the public sector appears to have the capacity to perform more cataract procedures than it is currently doing the new legislation makes sense and may provide an opportunity to reassess the role of private clinics for cataract surgery.

- Several indicators suggest that for the most part the quality of care delivered by Winnipeg hospitals has not deteriorated. Mortality within 30 days of discharge decreased for two of the three patient categories examined, there was a decrease in readmission rates for patient with bronchitis and asthma and no change for seven other patient groups examined. Furthermore, there was no indication that patients were contacting their doctors more frequently in the period right after discharge or showing up in emergency rooms. For five of the 13 categories of patient studied, rates of readmission to hospital did increase significantly in 1996; however, readmission rates tend to fluctuate and in 1997 only one category showed a higher readmission rate than that found in 1991. For this same category (digestive disorders), the readmission rates for some elderly patients, for low income and for PCH patients also increased. A closer examination of this category could help determine what is contributing to these increases and whether patient care is being compromised. Our analyses also point up the remarkable differences in readmission rates across the Winnipeg hospitals. In some cases two-fold differences are apparent. While some of these may be due to patient mix at the different hospitals, it is difficult to see how these might be attributed to downsizing. With the new Winnipeg Hospital Authority assuming responsibility for the delivery of care across the system, it is an ideal time to review indicators of quality at all institutions.

- The increased availability of beds in both long-term care facilities and PCHs has resulted in more appropriate placement of long-stay patients and a drop in length of acute hospital stay for patients awaiting placement in PCHs.

- The health of Winnipeg residents remained stable between 1991 and 1996 with one exception. For those from the lowest income neighbourhoods there has been an increase in premature mortality rates. Given that access to hospital services for this group did not change during the same period, it is unlikely that bed closures are responsible for the increase in mortality rates. Indeed, the marked gradient in mortality rates according to income level suggests that forces other than hospital bed numbers are affecting health status. The increase in mortality rates for the lowest income group is of great concern: it suggests that for those members of society who already have the poorest health, things are not improving.

- Our results appear to contradict reports by both health care professionals and patients about the stress on the hospital system; however we do not deny that psychological stress on health care professionals and patients may be very real. Our findings indicate that there are apparently few, if any, long-term health effects or access to services effects of hospital bed closures, despite what may be real short-term tensions for those adjusting to fewer beds in the system.

- There are remarkable opportunities for improving the health of the population which require investments other than in the health care sector. Downsizing health care expenditures may in fact be a prerequisite to funding programs which will be more effective in achieving health gains. More attention should be focused on programs aimed at the broader determinants of health, including early child development. Well-designed evaluation studies of projects that focus on investments in early child development could help identify ways of reducing use in the acute hospital sector. Since we have demonstrated that individuals from middle and low income neighbourhoods spend more time in hospitals than residents of high income neighbourhoods, investments in early childhood should have long-term pay-offs in reduced acute care requirements.

METHODS APPENDIX

Population Information

Table A1: Population Numbers 1989-1996

	1989	1990	1991	1992	1993	1994	1995	1996
Population								
Winnipeg	648,783	651,964	655,135	653,428	653,087	660,852	659,723	655,074
Non-Winnipeg	487,288	484,727	485,271	484,577	486,152	491,799	494,258	495,972
Manitoba	1,136,071	1,136,691	1,140,406	1,138,005	1,139,239	1,152,651	1,153,981	1,151,046

Additional Study Measures:

Number of Comorbid Conditions

Comorbidity refers to medical conditions that exist in addition to the main reason for hospitalization (usually recorded as the "most responsible diagnosis" on hospital discharge abstracts). The type and number of comorbid conditions provide an indication of the health status (and risk of death) of patients (Charlson et al. 1987). We used counts of comorbid conditions. Cases (patients) were classified as having none, one, two, or three or more, of the comorbid conditions known to increase risk of death.

Level of Comorbidity and Complications

Comorbidity, together with complications of care affect the complexity of hospital care required to treat given patients. The RDRG (Refined DRG) program (Fetter and Freeman, 1989) classifies cases into levels of severity and complexity based on the impact that they are likely to have on use of hospital resources. We used the RDRG program (version 9) to classify patients into three groups of complexity: those where comorbidity and complications were likely to have no or only minor impact on hospital resource use (low); those in which comorbidity and complications were likely to have a moderate impact; and those where comorbidity and complications were likely to have a major impact (high). The final category

also included a catastrophic category for surgical cases, where, for instance, a patient had an acute myocardial infarction while undergoing surgery.

Intensity of Resource Use

Resources used to provide hospital care vary across cases.[11] We used two different measures of resource intensity. First, to define high intensity admissions (see section on "Hospital Utilization" under "3.2 Access to Care") we used DRG weights[12] to classify hospital care into three levels of intensity of resource use. Each hospital separation was assigned a DRG weight and all cases were ranked from lowest to highest intensity of resource use. Three levels were then defined to classify rates of hospital care received by regional residents: the lowest ten percent of cases - including separations for false labour, paediatric tonsillectomy and/or adenoidectomy, and other cases requiring few resources - were classified as very low intensity; the highest 5% of cases included separations for coronary artery bypass procedures, craniotomy and other major cases requiring intense hospital treatment, were called "very high" intensity admissions. Because this high intensity care is typically obtained by rural residents in Winnipeg hospitals their access to such care was tracked over the period.

Second, to compare resource intensity across hospitals (see section on "Changes in Type of Patient Admitted to Hospital" under "3.2 Access to Care") we used Relative Case Weights (RCWs), which reflect the expected resource use of hospital patients. The RCWs were developed for the Hospital Case Mix Costing Project (Shanahan et al., 1994; Shanahan, 1996) and are based on Maryland cost data and length of stay data from Manitoba hospitals. They are based on RDRG categories which provide greater differentiation of levels of comorbidity and complications than DRG categories. We applied the RCWs to typical medical patients. Typical patients are defined as those whose hospitalization had a normal length of stay, whose treatment was completed in a single acute care facility, whose course of treatment did not end in death, and whose hospitalization did not include days classified as

[11] Resources used by hospitals include labour and non-labour inputs such as drugs, equipment, food and fuel. Resource inputs vary in terms of price, volume and mix (Black and Frohlich, 1991).

[12] DRG weights describe resource use for different types of care in relation to an arbitrarily defined standard case. While they were developed exclusively with United States cost data, they correlate well with similar intensity weights (CMG) developed from U.S. data for Canadian applications.

non-acute (extended care or panelled). Medical patients are those who did not undergo a surgical procedure. The same set of weights was applied to all years of data.

Measuring Health of the Population

For this report, we have developed health status indicators from administrative data and Vital Statistics death information. We selected a subset of the 102 indicators reported for the entire Manitoba population as part of the Population Health Information System 1991 (Cohen and MacWilliam, 1994). Using administrative data to assess health status has the major advantage over surveys in that the measures can be readily repeated over time (i.e., annually).

Since the number of deaths is small for some conditions, in order to have a stable assessment of mortality rates, two years of vital statistics data were used (calendar years 1989 and 1990 for 1990; 1990 and 1991 for 1991; 1991 and 1992 for 1992; and so on). The numerator and denominators for all rates were determined by counting individuals identified as residents of Winnipeg.

Description of Health Status Indicators

Death Rates for Males and Females. Mortality rates for all causes of death for Winnipeggers were calculated separately for males and females of all ages.

Deaths Among Those Aged 0-74. In this ratio, only deaths for persons aged 0-74 years are counted and only the population who are 0-74 years of age are included in the denominator. British researchers (Carstairs & Morris, 1989) as well as a group at McMaster (Birch & Eyles, 1991) have suggested that the standardized mortality ratio for this younger population is the best single indicator of health status capturing a population's need for health care. The Scottish Health Authorities have used a similar ratio for allocating funds for health care.

Cancer Deaths. In Canada, cancer accounts for about one-quarter of all deaths (Bisch et al., 1989) with lung cancer, breast cancer and cancer of the colon accounting for the most cases and deaths. Other cancers such as bladder and kidney are associated with occupational exposures (Andersen et al., 1987). We report rates of death for which cancer was reported as

the primary cause, over this period (the following ICD-9-CM codes were used to define this group - 140-239).

Selected Chronic Disease. For adults in the mid years, chronic diseases are the main causes of death and disability, particularly heart disease, stroke, and diabetes. For the elderly, heart disease, stroke, chronic obstructive lung disease (emphysema), and diabetes are among the leading causes of death (McGinnis et al., 1992). If an individual's cause of death was any of the following chronic diseases, they were counted in this group; asthma (493) ischemic heart disease (410-414), diabetes (250), hypertension (401-405), emphysema (492-496) and vascular complications (430-437).

Ischemic Heart Disease. Ischemic Heart Disease is the biggest single contributor to deaths in the chronic disease category. Given the importance of this disease, separate indicators are presented (ICD-9-CM 410-414).

All Injuries. Injuries including suicides are the highest cause of death for adolescents and young adults. Most unintentional injuries are attributable to motor vehicles. Deaths associated with seven different types of injuries are included; motor vehicle (E810-E819), vehicular non-traffic (E820-E829) fire (E890-E899), falls (E880-E888), suicide (E950-E959), drowning (E910-E915), homicide, poisoning (E850-E869) as well as the other injuries category.

Income Quintiles

Public-Use Census Files. Data from the 1991 Canadian census are available for public use, aggregated to the geographic unit of the enumeration area. In Winnipeg, there are approximately 800 enumeration areas containing residential households, with an average population of 700 people. These residential areas can be characterized by several demographic and economic indicators, including mean household income, mean educational level of women and labour force participation. A measure of the mean household income for a given enumeration area was used in this study (Mustard, 1991).

These enumeration areas were ranked from poorest to wealthiest and they were grouped into five population quintiles. Each Winnipeg resident was linked to an enumeration area by postal code, and a quintile income rank (with Quintile 1 being the poorest) was assigned.[13]

Quality of Care

30 Day Mortality Rate. Adverse outcomes of care have long been recognized as important in evaluating health care delivery. Since 1986, the U.S. Health Care Financing Administration has encouraged comparison of rates of adverse events across hospitals by publishing death rates for institutions. We identified all deaths which occurred within 30 days of discharge for patients treated with three common conditions. Because a death in hospital is counted as a discharge, in-hospital deaths were also captured as deaths within 30 days of discharge. Garnick, DeLong and Luft (1995) found that 30 days after discharge was sufficient when using mortality as an indicator of hospital performance. Mortality rates within 60 and 90 days of discharge were also analyzed in this report. For the above analyses the number of deaths was the numerator and the number of patients hospitalized for each of the three conditions was the denominator. We also calculated age/sex adjusted population rates using the same numerator but population figures in the denominator. The population based rates were calculated within 30 days of discharge and within 60 and 90 days of admission.

Readmission Rates. Readmissions (to any hospital across Manitoba, not just Winnipeg hospitals) which occurred within 30 days of discharge from Winnipeg hospitals were also examined. For the cross-hospital comparisons, we excluded the sickest patients (those having comorbidities or complications expected to have a major or catastrophic impact on length of stay as identified using the RDRG software, Fetter and Freeman, 1989) and the most vulnerable patients (those known to have higher readmission rates including aboriginal and core area residents). The lengths of stay for the cross-hospital comparisons were based on the initial admission. For the over-time analysis, the sickest and most vulnerable patients were included to ensure all readmissions would be detected.

[13] Data in Figures 21 to 24 may differ from those published in previous reports (Brownell and Roos, 1996; Roos and Shapiro, 1994) because 1991 census data are used instead of 1986, and because previously all Manitobans living in urban areas (e.g., residents of Brandon) were inadvertently included as Winnipeg residents.

Contacts with Physicians. All contacts with physicians which occurred outside the hospital within 30 days of discharge were examined. The sickest and most vulnerable patients were included in this set of analyses. Emergency room contacts include contacts at Health Sciences Centre and St. Boniface Hospital only. Emergency room physicians at community hospital emergency departments in Winnipeg did not file evaluation claims during the period of this report and therefore such activity was not included in this analysis. All claims for oral surgery, dental, and periodontal contacts have been excluded from analyses. Services provided by chiropractors or optometrists and obstetric/gynaecologic records for prenatal and post-partum care are also excluded. Special call claims, which are filed in addition to the regular ambulatory visit claim, are excluded.

Vulnerable Groups. Where possible we attempted to reanalyze quality of care measures focussing specifically on groups of patients who may be most vulnerable to changes in care delivery, namely the elderly and the poor. Elderly patients were defined as those aged 75 years and older in these analyses. The poor were defined using the lowest level from the neighbourhood income quintiles described in the previous section. Because our quality of care measures such as mortality rates and readmission rates focus on rare events, small numbers prevented us from focussing on additional vulnerable groups such as residents of Winnipeg's core area and aboriginal patients.

Personal Care Home Use

Region of Residence. For numerator data, (i.e., PCH use data) region of residence was based on the location of the PCH. For non-PCH residents, region of residence is identified from the Manitoba Health population registry.

Residents. Residents are all persons who lived in a personal care home at some time during the fiscal year.

Admissions. Admissions to nursing homes include all first-time admissions.

Expected Length of Stay (ELOS) for Admissions. Every admission was assigned an Expected Length of Stay (ELOS) based on the person's age, sex and level of care,[14] (Shapiro and Tate, 1988) and these numbers were used to derive mean expected lengths of stay, based on data from 1985-1995. If standards of admission varied markedly over our study period (i.e., if in some years facilities tended to admit younger, healthier individuals), this would be reflected in variations in ELOS for individuals admitted.

From Hospital. We classified an admission "from hospital" if that person was admitted to a PCH within 7 days of a separation from hospital. For people not admitted from hospital, we checked the "fromcode" in the PCH file. For those admitted from Mental Health Centres or unspecified in the PCH file, we created an "Other" category. Residents who did not fall into either of these two categories were considered to be admitted from the Community.

Length of Stay (LOS). For all residents admitted from hospital, the length of stay in hospital was calculated. We report median LOS because the mean is skewed by outliers. The median is the mid-point. For persons admitted to PCH from the hospital, if all of their lengths of stay in hospital were arranged from the briefest to the longest, the median is the mid-point of that range. In other words, half of the people admitted to PCH from hospital had hospital stays that are shorter than the median LOS, and half of them had hospital stays that are longer than the median LOS.

Length of Waiting Time (LWT) after assessment. For each admission, the date when the person was panelled for acceptance to PCH is recorded. The difference between the admission date and panelling date is the LWT. As for length of stay, because of outliers, the median rather than the mean LWT is reported.

The LWT reported here does not take into account the number of days that occur for administrative reasons after panelling, i.e., the number of days required to transmit the panel's decision to both the individual and the nursing home. We also do not adjust for

[14] All nursing home residents are assessed at one of four levels of care, depending on the number of nursing hours they require per day.

people who may be temporarily removed from the Waiting List because of an acute illness requiring hospitalization. LWT is also sensitive to the availability of Continuing Care in the community, especially in remote areas of the province. For all these reasons, LWT should be viewed with some caution.

It should be noted that, because not all Home Care data are computerized, we were unable to determine how many people died or were admitted to hospital after panelling prior to admission.

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