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Assessing Quality of Care in Manitoba Personal Care Homes by Using Administrative Data to Monitor Outcomes

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The Manitoba Centre for Health Policy and Evaluation

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Executive Summary

Introduction

Manitoba Health licenses Personal Care Homes (PCHs) and is responsible for ensuring that these facilities provide an appropriate standard of care. In 1990/91, the province spent almost $217M on PCH care.

Manitoba's long term care policies over the last two decades have successfully reduced the number of PCH beds per 1000 elderly aged 75 or more by enabling the elderly to remain longer in the community through home care support. Consequently, PCH residents are older and more dependent. Their greater vulnerability has increased the importance of ensuring the delivery of good quality care.

Therefore, Manitoba Health asked the Manitoba Centre for Health Policy and Evaluation to undertake a study to assess whether the administrative data routinely collected by Manitoba Health could be used to monitor the quality of PCH care. As a result of a literature review and suggestions from the staff of Manitoba Health, the outcome indicators chosen for this study were mortality rates and the rates of the following diagnoses: decubitus ulcers (bed sores), urinary tract infections, influenza, pneumonia, anemia, dehydration, and gangrene. The study used four years of data (87/88 to 90/91).

In the absence of a gold standard against which to compare rates of death and of the diagnoses of interest, the study examined variations across the eight Regions of the province and across three types of PCHs (non-proprietary juxtaposed to a hospital, non-proprietary but freestanding, and proprietary) while taking account of the characteristics of PCH residents (their age, gender and level of dependency).

Limitations of the Study

The use of outcomes as quality of care indicators for PCHs is relatively recent and must still be regarded as experimental. Some of the materials and methods used in the analyses are new and not yet tested elsewhere.

Results

Variations in Levels of Care Distribution and Health Care Use

- Despite their higher proportion of Level 1 residents, Regions 4 and 7 PCH residents were hospitalized at a rate similar to or higher than most other Regions. Region 8 consistently had the lowest hospitalization rate despite having the highest proportion of heavy care residents. Although the number of residents involved were small, the hospitalization rates in Region 6 were high and its residents were readmitted to hospital much more often than residents in other Regions.
- Almost all PCH residents (90% - 98%) in all the Regions except Regions 5 and 6 were seen by a physician each year. The average number of physician visits each year ranged from about 9 in some Regions to about 18 in others. This variability is not explained by the higher proportion of persons requiring heavy PCH care.
- Proprietary PCHs consistently had the highest proportion of heavy care residents but their residents were hospitalized less often and fewer received physician visits.
- Non-proprietary PCHs, both juxtaposed and freestanding, had the highest proportion of light level residents, but the residents of juxtaposed facilities had the highest hospitalization rates and the highest average number of physician visits.

The findings raise three concerns:

- The distribution of levels of care in the province's Regions shows that a surplus of beds relative to other Regions, as is the case in Region 7, can lead to their greater use by persons requiring low level care. Since Level 1 admissions are likely to remain in the PCH for 14-16 years, the availability of beds for future admissions is reduced.

- The comparatively high rate of hospitalizations and physician use in juxtaposed facilities is troubling. Studies in British Columbia and Manitoba report similar findings.
- Why were PCH residents in Region 6 rehospitalized more frequently than those in other Regions?

Quality of Care Outcome Indicators

This study breaks new ground in its selection of outcome indicators and in its use of secondary data. Therefore, the findings which follow must be interpreted with caution. Indicators of comparatively poorer care must be regarded as "triggers" which show a need for Manitoba Health to have a closer look.

- Given that the average age at admission is 85 and that about 60% of Manitoba's PCH residents require the heaviest levels of care, it is not surprising that 45.4% of them died over the four-year period. The age and characteristics of the residents were by far the greatest contributors to death. Overall it is reassuring that quality of care problems resulting in death do not appear to be an issue. There were no significant differences across types of PCHs and only one Region (Region 5) had an elevated mortality rate.

Other outcome measures suggest problems which warrant further investigation:

- Residents of proprietary PCHs have a lower overall hospitalization rate than other types of PCHs but this lower rate does not appear to reflect better care. In fact, because of their lower hospitalization rate, one might have expected to find fewer residents with trigger diagnoses. However, their residents are at increased risk of having falls, fractures, dehydration and pneumonia.
- Residents in Region 5 died at a higher rate than those in Region 8.
- Residents in Regions 3, and 4&6 combined had a higher risk of having a gangrene diagnosis. Particular attention needs to be focused on the Regions with excessive

gangrene cases relative to Region 8 because, although the number of cases is relatively small, the consequences are serious.

- All Regions except Region 1 had a higher risk of having a hospital diagnosis of pneumonia relative to Region 8.
- Are these comparatively poor outcomes in the non-Region 8 regions the result of a propensity to hospitalize because of the generally generous supply of acute beds and their low occupancy rates rather than a reflection of PCH quality of care? Is the issue unnecessary hospitalizations or PCH quality?

Conclusions

- The advanced age and high dependency level of Manitoba's PCH residents entail a major responsibility for government to ensure the delivery of good quality care. At the same time, further research here and elsewhere is needed to test the approach used and to identify other outcome indicators. Such investigations could also contribute to the development of a consensus on those which are most useful.
- In the absence of definitive outcome standards, secondary data may provide a useful and comparatively inexpensive starting point. Secondary data can also be used by Manitoba Health to identify the specific facilities (either the Region or in the particular type of PCH) which are the main contributors to comparatively poor outcomes. Those so identified could then be followed up with direct inspection by the Long Term Care Branch of the Department.
- The usefulness of secondary data for monitoring outcomes could be enhanced by making available: 1) the full 4-digit ICD9-CM diagnostic codes which physicians currently provide on their claims form in the medical file rather than extracting only the first three digits; and 2) the data gathered annually on each PCH residents' function in regards to the activities of daily living (ADL) and cognitive status.

It is, therefore, recommended that Manitoba Health:

- Use its data to identify the specific PCHs which are contributing to the poor outcomes identified by this investigation and follow up with direct contact if warranted to improve quality of care.
- Address the comparatively high use of physician and hospital services by residents of juxtaposed PCHs.
- Improve the usefulness of its data base for assessing quality of PCH care by including 4-digit ICD9-CM diagnostic codes in its medical file and by including data collected annually on each resident's ADL and cognitive function along with the level of care designation in the PCH file. If the ADL and cognitive functioning data collected annually by the Long Term Care Branch cannot be incorporated into the PCH file at this time, it should be computerized by registration number so that it can be merged with the data in the PCH file.

Assessing Quality of Care in Manitoba Personal Care Homes by Using Administrative Data to Monitor Outcomes

Background

Besides individual co-payments totalling about $70M, Manitoba spent almost $217M on Personal Care Homes (PCHs) or an average of $25,735 per bed in 1990/91. The province is responsible for the licensing and standards of care in these facilities. Over the last two decades, Manitoba's long term care policies have enabled the province to reduce the number of PCH beds per 1,000 elderly aged 75 or more by providing community care, thus restricting admissions to persons who cannot be safely or economically maintained at home. As a result, PCHs have been accommodating an increasingly higher proportion of very elderly persons who require heavy care and/or continuous supervision. The greater vulnerability of current PCH residents and the increased expenditures associated with providing more heavy care suggest a need for greater vigilance by the province to ensure that PCHs deliver good quality care.

Therefore, as part of its contract with Manitoba Health, the Manitoba Centre for Health Policy and Evaluation (MCHPE) agreed to assess the usefulness of routinely-collected Manitoba Health data for monitoring the quality of care in PCHs. If these data could be used to develop outcome indicators, quality of care could be monitored at a comparatively low cost.

Introduction

Quality of care indicators for long term care can be divided into three categories: 1) structure (e.g., building, environment, and staffing levels); 2) process (e.g., activity level, protection of individual and group rights); and 3) outcome evaluation. Studies have identified key criteria for assessing structure and process but the development of outcome indicators has proved both expensive and elusive.

The reasons advanced for the difficulties in assessing outcomes are: the heterogeneity of residents, the complexity of their medical histories, the preponderance of chronic conditions, and the uncertainty surrounding the prognoses of many residents (Gomez, 1988). Added to these problems are the longer time horizon of nursing home residency, differences in technologies and personnel case-mix and the difficulty in establishing patient-specific goals. Having measurable goals is an essential prerequisite to assessing the extent to which they have been achieved (Kane, 1988). The 1986 Report on Improving the Quality of Care in Nursing Homes by the Institute of Medicine agreed that developing quality indicators was important but observed that "part of the problem . . . is a lack of consensus on what data is necessary".

Cherry's recent study (1991) suggests that secondary data may offer a useful and relatively inexpensive way to assess quality of care. The purpose of this study was, therefore, to select a number of potential outcome indicators from Manitoba's administrative data base and to use these indicators to assess the degree to which secondary data can provide insights into the quality of care in PCHs. The MCHPE decided to focus on mortality rates and diagnostic-related outcome indicators. The selection of diagnoses was made by reviewing the literature and by consulting professionals in the field. The diagnoses selected from the literature were decubitus ulcers (bed sores), urinary tract infections and other infections such as influenza and pneumonia. The diagnoses added as a result of suggestions from the staff of Manitoba Health were anemia, dehydration and gangrene. Others added as a result of previous Manitoba research were falls and fractures.

In the absence of a gold standard against which to compare death rates and diagnoses, the study examined variations in the indicators across the eight regions of the province and by three types of PCHs: non-proprietary juxtaposed to a hospital (NPJ), non-proprietary freestanding (NPF), and proprietary (P). To avoid possible short-term fluctuations in

rates and to adjust to the longer time horizon in PCHs, the study used four years of data (1987/88 to 1990/91).

The use of outcomes as indicators for assessing PCH quality is in the early, preliminary stages of development. Much of the materials and methods used in this study to evaluate outcomes is new and untested elsewhere. Consequently, differences in outcomes should not be taken to be definitive indications of differences in quality of care, but should be viewed as "triggers" which warrant a decision to take a closer look at the regions or types of PCHs which appear to deliver poorer quality of care than others.

Materials and Methods

To provide a context for the subsequent analyses, data from each year of the four years studied were first examined to identify the level of care of all PCH residents and their annual use of hospital and physician services by region and by type of PCH. Levels of care range from Level 1, the lightest level of care, to Level 4, the heaviest, depending primarily on the amount of nursing care or supervision required. Because provincial payments for Levels 3 and 4 are the same, these levels of care were combined for all the analyses.

The mean number of hospitalizations for each fiscal year included only admissions which took place that year. Hospital stays included only the days spent in a facility during the year. Physician visits included both visits by physicians to a PCH resident and visits made by residents to physicians' offices, but not physician visits to hospitalized PCH residents. Excluded were hospitalizations and medical visits which took place during the year but before the individuals entered a PCH.

Analyses of the relationship between individual characteristics, region of residency, type of PCH and each outcome indicator were then undertaken to identify differences in quality of care. The analytic methodology is fully described in Appendix A.

Results

Regional Variations in Levels of Care and Health Care Use

Table 1 shows the regional distribution of PCH beds and PCH residents in 1987/88 and 1990/91. While the number of beds rose by only 2.1%, Regions 2, 5 and 7 had the largest increase (4.5% or 4.6%).

The trend over the four years studied (Figure 1) was for all regions to have fewer residents at Level 1 and more residents at Level 3-4. Despite a similar trend towards fewer Level 1 residents, Regions 4 and 7 consistently had a higher proportion of such residents than the other regions. Region 8 was consistently among the regions with the highest proportion of Level 3-4 residents. The trend in Region 6 was unstable because the number of residents (and beds) in this region is small.

The use of hospital and medical services by PCH residents in each region over the last of the four years is shown in Table 2. The previous three years are shown as Tables 2A, 2B and 2C in Appendix B. Region 8 consistently had the lowest hospitalization rates each year, despite being one of the two regions with the highest proportion of heavy care residents. On the other hand, Regions 4 and 7, with the highest proportion of Level 1 residents, had hospitalization rates similar to or higher than those in the other regions except for Region 6. The hospitalization rates in Region 6 varied considerably from year to year but even in years with comparatively high hospitalization rates, the number of residents hospitalized was small. However, Region 6 consistently had by far the highest mean number of hospital admissions. This is a disturbing finding because it denotes repeated hospital readmissions at a substantially higher rate than is the case among

Table 1

Distribution of PCH Beds and PCH Residents by Region 1987/88 and 1990/91

	1987/88		1990/91	
Region	N Beds	N Persons	N Beds	N Persons
1	734	881	751	910
2	433	565	453	579
3	519	630	504	635
4	136	155	130	154
5	425	501	444	524
6	26	50	26	53
7	1440	1671	1505	1621
8	4532	5354	4598	5494
Total	8239	9807	8411	9970

Figure 1

Distribution of Levels of Care Across Regions

Percent PCH Residents in Each Level, 1987-88 - 1990-91

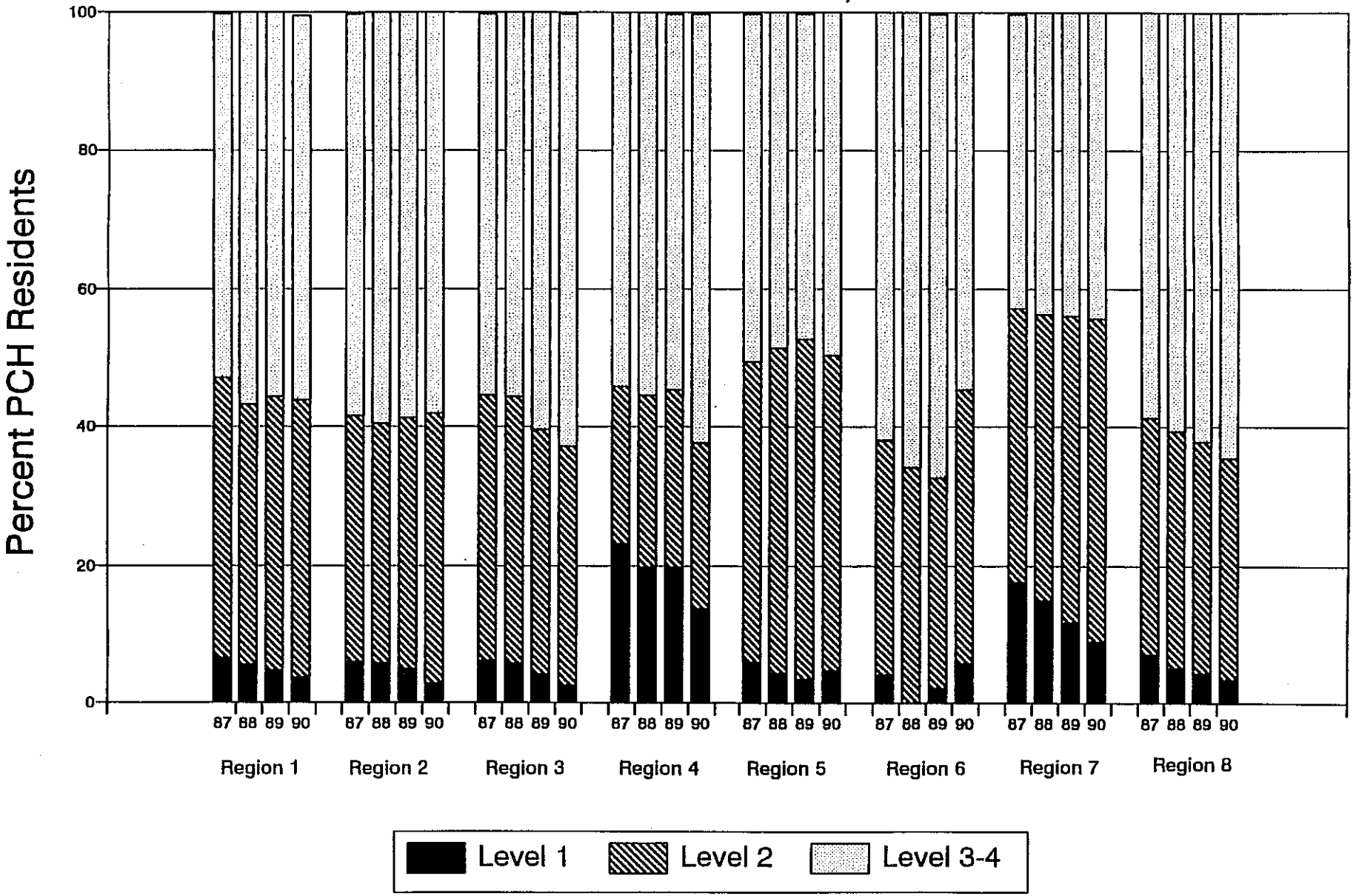

Table 2

Percentage Hospitalized, Percentage with Physician Visits, Mean Hospital Days, Mean Physician Visits by Region 1990/91

Region	Percentage Hospitalized	Mean Hospital Admissions	Mean Hospital Days	Percentage with Physician Visits	Mean Physician Visits
1	21.1	1.4	16.8	95.4	10.8
2	24.2	1.4	12.9	93.1	12.4
3	27.7	1.5	11.9	86.6	15.2
4	28.6	1.5	12.4	90.9	9.2
5	25.0	1.6	12.4	91.6	9.5
6	34.0	4.2	13.6	88.7	9.2
7	24.1	1.5	10.7	97.8	13.2
8	18.5	1.3	13.3	97.1	16.1

residents in other regions. There appeared to be no discernible regional trend over time in the average number of hospital days used by PCH residents but their hospital stays were long, ranging from 11 to 17 days during 1989/90 and 90/91.

Between 90% and 98% of PCH residents of almost all the regions were seen by a physician each year (physician contacts associated with a hospitalization were excluded). The reason for the consistently lower rate of physician visits in Region 5 is unknown but it may reflect the use of sessional, rather than fee-for-service, payments for physician services in Region 5, since Manitoba Health data are based on physician claims for fee-for-service payments. The reason for the comparatively low rate of physician visits in Region 6 may also be the greater use of sessional payments, but it may also reflect less access to physician services in PCHs located in more geographically isolated parts of this region.

The mean number of physician visits each year in the regions ranged from about 9 in some regions to about 18 in others. This variability is not explained by the higher proportion of heavy-care people in some regions. For example, Region 7 had the lowest proportion of Level 3-4 PCH residents in the last two years, but a higher mean number of physician visits than other regions with more Level 3-4 residents. On the other hand, Region 8, with a high proportion of heavy care residents, consistently had the highest average number of visits. The comparatively high number of mean visits in some regions warrants a closer look by Manitoba Health.

Variations by Type of PCH in Levels of Care and Health Care Use

Table 3 shows the distribution of PCH beds and PCH residents by type of PCH in the first and last year of the study. While the number of proprietary PCH beds decreased by 1.9%, the largest growth in beds was in the non-proprietary, juxtaposed PCHs (6.2%) with the non-proprietary, freestanding PCH beds increasing by 3.2%.

Table 3

Distribution of PCH Beds and PCH Residents by Type of PCH 1987/88 and 1990/91

	1987/88		1990/91	
Type of PCH	N Beds	N Persons	N Beds	N Persons
Non-Proprietary, Juxtaposed	871	1088	925	1122
Non-Proprietary, Freestanding	5013	5869	5175	5962
Proprietary	2355	2850	2311	2886
Total	8239	9807	8411	9970

Figure 2 indicates that the two types of non-proprietary PCHs consistently had the highest proportion of light level care residents. As expected, proprietary PCHs consistently had the highest proportion of Level 3-4 residents since many of them were built for and prefer to care for more dependent residents.

The percentage of residents hospitalized each year was highest in the fastest growing type of PCH, the non-proprietary, juxtaposed facilities (Tables 4 and 4A). This is a surprising finding because these facilities are in the same building as hospitals so one would expect fewer transfers to hospital. This type of PCH also had the highest mean number of physician visits (about 18 visits a year).

Residents in proprietary PCHs consistently had the lowest hospitalization rate. The mean number of hospital admissions and days used in all three types of PCHs were roughly similar.

Proprietary PCHs also consistently had the lowest proportion of residents with physician visits, although the mean number of visits by doctors was quite similar to that of the other types of facilities. Juxtaposed facilities consistently had the highest average number of physician visits.

Quality of Care Indicators

Given that the average age at admission is 85 and that about 60% of Manitoba's PCH residents require the heaviest level of care, it is not surprising that 45.4% of these residents died over the four-year period (Table 5). The characteristics of the residents (Model I) were by far the greatest contributors to death. Being male, older and more dependent all significantly increased the risk of death. Type of PCH (Model II) made no difference. Only Region 5 had an excess of deaths relative to Region 8 when all other factors were taken into account (Model IV).

Figure 2

Level of Care of Residents in Different Types of PCH
Percent of Residents in Each Level of Care, 1987-88 - 1990-91

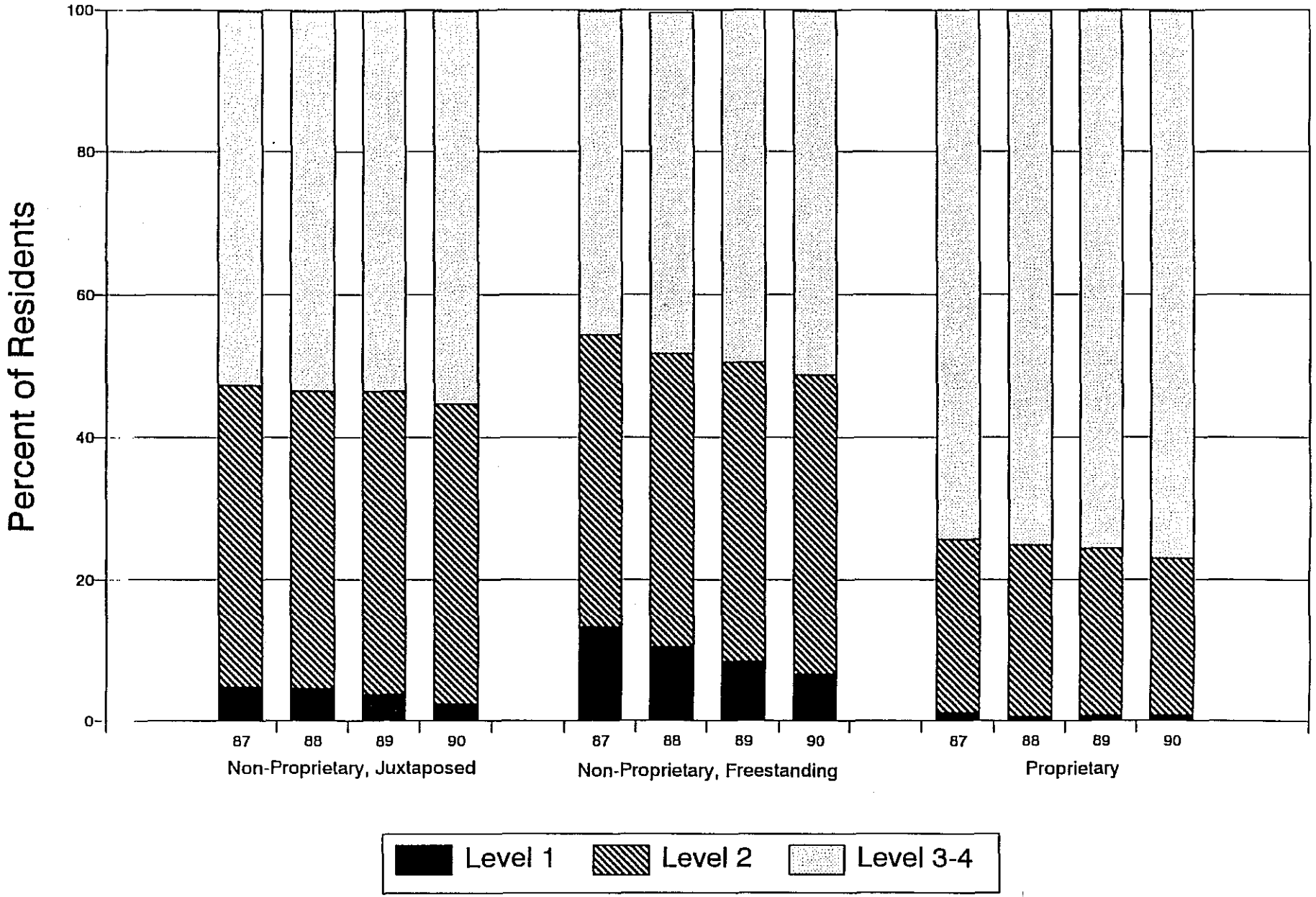

Table 4

Percentage Hospitalized, Percentage with Physician Visits, Mean Hospital Days, Mean Physician Visits by Type of PCH 1989/90 and 1990/91

TYPE PCH	Percentage Hospitalized	Mean Hospital Admissions	Mean Hospital Days	Percentage Physician Visits	Mean Physician Visits
1989/90					
Non-Proprietary, Juxtaposed	25.1	1.6	11.5	97.7	18.8
Non-Proprietary, Freestanding	21.4	1.5	14.0	96.1	14.6
Proprietary	19.7	1.3	12.7	95.7	15.1
TOTAL					
1990/91					
Non-Proprietary, Juxtaposed	24.2	1.5	12.0	97.0	18.4
Non-Proprietary, Freestanding	21.2	1.5	13.4	96.0	13.9
Proprietary	19.9	1.3	12.4	94.8	13.7
TOTAL					

Table 4A

Percentage Hospitalized, Percentage with Physician Visits, Mean Hospital Days, Mean Physician Visits by Type of PCH 1987/88 and 1988/89

TYPE PCH	Percentage Hospitalized	Mean Hospital Admissions	Mean Hospital Days	Percentage Physician Visits	Mean Physician Visits
1987/88					
Non-Proprietary, Juxtaposed	24.9	1.5	11.0	98.0	18.7
Non-Proprietary, Freestanding	22.2	1.5	14.7	96.7	15.5
Proprietary	21.3	1.4	14.0	94.8	17.4
TOTAL					
1988/89					
Non-Proprietary, Juxtaposed	24.9	1.6	12.8	98.1	18.6
Non-Proprietary, Freestanding	22.4	1.5	13.3	96.5	15.3
Proprietary	19.3	1.3	13.6	95.2	16.0
TOTAL					

Table 5

Cox's Proportional Hazard Model Estimates of Relative Hazard of Death (1987/88 - 1990/91

VARIABLES/REFERENCE CATEGORY	MODEL I	MODEL II	MODEL III	MODEL IV
Male/Female	1.67***	1.67***	1.67***	1.67***
Current Age	1.04***	1.04***	1.04***	1.04***
Care Level 2/1	1.95***	1.94***	1.95***	1.94***
Care Level 3-4/1	3.67***	3.67***	3.69***	3.67***
NPJ/NPF		NS	-	NS
Prop/NPF		NS	-	NS
Region 1/Region 8			NS	NS
Region 2/Region 8			NS	NS
Region 3/Region 8			1.10*	NS (p.=.07)
Region 4&6/Region 8			NS	NS
Region 5/Region 8			1.15**	1.15*
Region 7/Region 8			NS	NS
Chi. Square	1782.42	1785.77	1794.23	1794.78
Degrees of freedom	4	6	10	12
P-value	<.0001	<.0001	<.0001	<.0001

N = 15,501
Cases = 7,035 (45.4%)

NS Not significant
* Level of Significance ≤ .05
** Level of Significance ≤ .01
*** Level of Significance ≤ .001

The final models (Model IV) for anemia, dehydration, pneumonia and urinary tract infection are shown in Table 6. There were 399 (2.5%) hospitalizations with a diagnosis of anemia over the four years. Being male and older were very significant factors in leading to an increased risk of being diagnosed with anemia, but level of care and residency in a specific type of PCH made little difference. While Model III (not shown) indicated that PCH residents in Regions 3, 5 and 7 were at significantly lower risk of having an anemia diagnosis relative to Region 8 when hospitalized, only Region 7 maintained this advantage when the types of PCHs were included in the final model.

For the 2.8% of the cases with a diagnosis denoting dehydration, male gender, advanced age and higher levels of care were significant risk factors. Residents of proprietary nursing homes were also at higher risk of having a diagnosis denoting dehydration when hospitalized than residents of non-proprietary, freestanding PCHs. The regional location of the PCH was not a significant contributor to the risk of dehydration.

There were no cases of hospitalization with a diagnosis of influenza, but 9.1% of the hospitalized PCH residents had a diagnosis denoting pneumonia. All factors studied, i.e., individual characteristics, type of PCH and region of residence, were important risk factors. Being male, older and requiring the heaviest levels of care were highly significant contributors to increasing the relative risk of pneumonia. Residency in proprietary relative to non-proprietary PCHs and residency in all regions except Region 1 relative to Region 8 had a significantly increased relative risk of having this serious respiratory condition.

Over the four years, 6.6% of PCH cases had urinary tract infections when hospitalized. In contrast to some of the other diagnoses, gender and age did not pose an increased risk of having a urinary tract infection, but the need for the highest levels of care increased vulnerability to having such an infection. Non-proprietary, juxtaposed facilities did better

Table 6

Cox's Proportional Hazard Model Estimates of Relative Hazard for Anemia, (2859), Dehydration(2765), Pneumonia (480-486), Urinary Tract Infection (5990), 1987/88-1990/91

VARIABLES/REFERENCE CATEGORY	ANEMIA	DEHYDRATION	PNEUMONIA	URINARY TRACT INFECTION
Male/Female	1.56***	1.64***	2.47***	NS
Current Age	1.03***	1.02***	1.02***	NS
Care Level 2/1	NS	3.31**	NS	1.34*
Care Level 3-4/1	NS	6.70***	1.52***	1.67***
NPJ/NPF	NS	NS	NS	0.60***
Prop/NPF	NS	1.38**	1.27***	NS
Region 1/Region 8	NS	NS	NS	NS
Region 2/Region 8	NS	NS	1.31*	NS
Region 3/Region 8	NS	NS	1.39***	0.60**
Region 4&6/Region 8	NS	NS	1.69**	1.46*
Region 5/Region 8	NS	NS	1.41**	NS
Region 7/Region 8	0.67*	NS	1.18*	NS
Chi. Square	63.39	120.97	398.56	58.61
Degrees of freedom	12	12	12	12
P-value	$<.0001$	$<.0001$	$<.0001$	$<.0001$
N	15,841	15,848	16,506	16,432
Cases	399 (2.5%)	442 (2.8%)	1,504 (9.1%)	1,081 (6.6%)

NS Not significant
* Level of Significance $\leq .05$
** Level of Significance $\leq .01$
*** Level of Significance $\leq .001$

than non-proprietary, freestanding PCHs; Region 3 did better and Regions 4&6 did worse relative to Region 8.

Table 7 shows the final models (Model IV) for gangrene, falls, fractures and decubitus ulcers. There were 197 (1.2%) hospitalizations with a diagnosis of gangrene. Male gender and greater functional dependency increased the relative risk of gangrene. Especially vulnerable were persons requiring Level 3 and 4 care, whose risk was over 9 times that of PCH residents needing a low level of care. The type of PCH did not affect the risk of gangrene. However, PCH residents in both Regions 3 and Regions 4&6 were at significantly greater risk of having gangrene than those in Region 8. The relative risk was particularly high (3.3) in Regions 4&6.

Since both Regions 4&6 have a higher proportion of Native Canadians with a higher than average prevalence rate of diabetes, further analyses were undertaken to compare the percentage of hospitalizations with a diagnosis of both gangrene and diabetes in Regions 4&6 with that of the other regions. A diagnosis of diabetes accompanied 61.5% of the hospitalizations for gangrene in Regions 4&6 and 66.5% of the hospitalizations for gangrene in the other regions, ruling out the higher prevalence of diabetes as a significant factor in accounting for the higher incidence of gangrene in Regions 4&6.

Falls were associated with 7.7% of hospitalizations. On the basis of individual characteristics alone, age and being female significantly increased the risk of a serious fall, while the highest levels of functional dependency actually decreased the risk, probably because these individuals are less mobile, more closely supervised and receive more help. However, when all factors were taken into account, only being older, female and residency in a proprietary PCH significantly increased the relative risk of a serious fall.

Table 7

Cox's Proportional Hazard Model Estimates of Relative Hazard for Gangrene (7854), Falls (E880-888),Fractures (800-869), Decubitus Ulcers (6826), 1987/88-1990/91

VARIABLES/REFERENCE CATEGORY	GANGRENE	FALLS	FRACTURES	DECUBITUS ULCERS
Male/Female	2.05***	0.84**	0.80**	NS
Current Age	NS	1.03***	1.03***	0.98*
Care Level 2/1	4.75*	NS	NS	NS
Care Level 3-4/1	9.63***	NS	0.76*	NS
NPJ/NPF	NS	NS	NS	NS
Prop/NPF	NS	1.20**	1.20**	NS
Region 1/Region 8	NS	NS	NS	NS
Region 2/Region 8	NS	NS	NS	NS
Region 3/Region 8	1.76**	NS	NS	2.28*
Region 4&6/Region 8	3.33***	NS	NS	NS
Region 5/Region 8	NS	NS	NS	NS
Region 7/Region 8	NS	NS	NS	NS
Chi. Square	98.69	110.17	107.58	14.85
Degrees of freedom	12	12	12	12
P-value	<.0001	<.0001	<.0001	.25
N	15,650	16,626	16,569	15,581
Cases	197 (1.2%)	1,281 (7.7%)	1,230 (7.4%)	95 (0.6%)

NS Not significant
* Level of Significance ≤ .05
** Level of Significance ≤ .01
*** Level of Significance ≤ .001

Since a fall resulting in a hospitalization is commonly associated with a fracture, it is not surprising that the percentage of cases with fractures (7.4%) is similar to that of a fall and that the same factors, being female, older and residency in a proprietary home, increased the risk, whereas requiring heavy care decreased the risk of having a fracture.

Only 95 (0.6%) of the PCH residents hospitalized were identified as having decubitus ulcers over the four-year period. The analyses, based on this small number of cases, indicated that younger residents and those in Region 3 were at increased risk of having bed sores, but this result must be viewed with some caution because of the rarity of this diagnosis during a hospitalization.

Discussion

Several aspects of the data on Manitoba's PCHs and their residents' use of other health care services merit scrutiny.

PCH beds are not evenly distributed throughout the province. The distribution of levels of care in the province's regions shows that a surplus of beds relative to other regions as is the case in Region 7, can lead to their greater use by persons requiring low level care. This is especially likely to happen when the number of persons awaiting admission in the area is limited and all beds in a new facility are opened at the same time. Since Level 1 admissions are likely to remain in the PCH for 14-16 years, the availability of beds for future admissions is reduced (Shapiro & Tate, 1988).

With a population of such an advanced age and in such poor health, the utilization of hospital and physician services reported here may not be excessive. However, the data raise several concerns. Especially troubling is the comparatively high rate of hospitalizations and physician visits in non-proprietary, juxtaposed PCHs. Do low hospital occupancy rates in the hospitals to which these facilities are attached encourage

transfers to hospital when both facilities are in the same building or are other factors involved? For example, Lomas et al. (1990) found that residents in British Columbia's long term care units which were attached to hospitals were twice as likely to undergo surgery and routine diagnostic procedures than those in freestanding facilities although the latter were older and sicker. In regards to the greater number of physician visits in juxtaposed versus freestanding institutions, this study reinforces the results of a recent internal review by Manitoba Health of hospital patients panelled and awaiting transfer to PCH. This review also found that hospital patients while awaiting PCH transfer received more physician services than residents already in PCHs. Hospital and physician use in juxtaposed facilities merits attention by both the Capital Planning Branch and the Long Term Care Branch of Manitoba Health.

Equally troubling is the finding that Region 6 consistently had a far higher frequency of multiple admissions to hospital by PCH resident than other regions. Are the PCH beds located in an isolated area where access to physicians is limited, making hospitalization the only alternative? Are PCH residents being discharged from hospital too early, i.e., when their clinical condition is still unstable? Is the PCH staff too prone to hospitalize? This also bears further investigation by Manitoba Health.

Although it is generally agreed that outcome evaluations are an essential component in assessing quality of care in long term care facilities, no consensus has yet emerged on how to do such evaluations. Also, attempts by others to measure specific outcomes by following up each individual resident in facilities has proved to be expensive and inconclusive. Therefore, in common with most other jurisdictions, the current monitoring of quality of PCH care by Manitoba Health relies almost exclusively on structural and process indicators.

Analyses of secondary data are far less costly but both their use and their scope has been limited. This study, therefore, breaks new ground in three ways: 1) it expands the use of secondary data; 2) it expands the number and type of outcome indicators; and 3) its methodology permits an assessment of the differential importance of resident characteristics, region of residency and PCH type. Since there is no available standard against which to compare outcomes, the results of the analyses are presented in comparative, rather than definitive, terms.

The study tried to minimize the uncertainty surrounding the choice of indicators by referring to the literature, by consulting with professionals and by using diagnostic codes which reflect conditions which are either preventable or at least amenable to treatment in a long term facility with good quality care. The data available for analysis had limitations. The use of diagnostic data from medical visits would have been useful but, as indicated earlier, 3-digit codes used on claim forms are insufficient to identify some of the specific diagnoses of interest.

Dependence on hospital diagnoses means that PCH residents in regions or in types of facilities with lower hospitalization rates might be less likely to be identified as having a diagnosis of interest. However, despite the lower hospitalization rates of proprietary PCHs, in four of the eight comparisons, proprietary PCHs showed significantly higher rates of indicator conditions when their residents were hospitalized than non-proprietary PCHs. Nevertheless, the findings must be interpreted with caution. Results which suggest the possibility that comparatively poorer care is being provided must be treated only as "triggers" indicating a need for a closer look. Besides, not all PCHs of a given type or in a given region may score poorly on specific quality of care indicators.

Despite its limitations, the results of this study suggest that, in the absence of definitive outcome standards, secondary data may provide a useful starting point for comparing

overall quality of care delivered in different locations and in different types of facilities. The next step would require Manitoba Health to use the same data to identify the specific facilities (either in the region or in a particular type of PCH) which are the main contributors to comparatively poor outcomes. Those so identified could then be followed up by the Long Term Care Branch of the Department. This three-tiered approach has several advantages. It is cheaper than monitoring all residents of PCHs to evaluate outcomes since the first two steps can be accomplished using secondary data. Staff of Manitoba Health could then concentrate on inspecting the PCHs triggered by the results of the analyses. This approach could also provide the opportunity to assess the validity of the outcome indicators selected, particularly if inspection was also made of a few PCHs not targeted by this approach and these non-targeted homes were found more problem-free.

Mortality rates are an important outcome indicator for PCHs. Although they are a relatively crude measure of quality of care, the rate of deaths occurring over the four-year period is far more substantial than the rates at which the specific diagnoses of interest occur. Overall, it is reassuring that quality of care problems resulting in death do not appear to be an issue. There were no significant differences across types of PCHs and only one region (Region 5) had an elevated mortality rate.

However, other outcome measures suggest that there are problems which warrant further investigation. Residents of proprietary PCHs have a lower hospitalization rate than other types of PCHs but this lower rate does not appear to reflect better care. In fact, because of their lower hospitalization rate, one might have expected to find fewer diagnoses of interest. Yet their residents are at increased risk of having falls, fractures, dehydration and pneumonia. Manitoba's proprietary PCHs are comparatively well compensated since they receive the median per diem of the non-proprietary homes but they only have to meet the minimum government-prescribed standards. It would, therefore, appear

appropriate for Manitoba Health to use the secondary data to identify which PCHs contribute to the comparatively poor outcomes. Each outcome triggered may be confined to a few proprietary facilities. It may even be that the same PCHs do less well than others on all four outcome measures. In any case, a follow up via a direct inspection of the specific facilities identified could determine if changes are necessary to improve performance on these measures. The changes required may vary. For example, falls and fractures may reflect inadequate staffing, poor supervision, inadequate environmental safeguards such as poor lighting or a combination of all three.

A closer look at specific problems at the regional level is also warranted. Residents in Region 5 died at a greater rate than those in Region 8. Residents in Regions 3 and 4&6 had a higher risk of having a gangrene diagnosis and all regions except Region 1 had a higher risk of having a hospital diagnosis of pneumonia relative to Region 8.

Again, as in the case of proprietary PCHs, a closer look using secondary data can determine whether the poorer outcomes reflect the quality of care provided by the PCHs in the region or by a few PCHs regardless of type. Another possibility is that the generally generous supply of acute beds and low occupancy rates of non-Region 8 hospitals encourage a propensity to hospitalize. In such cases, the issue may not be poorer outcomes but unnecessary hospitalizations. In either case, further action is warranted. Particular attention needs to be focused on the regions with excessive gangrene cases because, although the number of cases is relatively small, the consequences are serious.

Conclusion

The advanced age and high dependency level of Manitoba's PCH residents entail an increasing responsibility for government to ensure the delivery of good quality care. This means that the possible quality of care problems which are identified in this study should

trigger a follow-up by Manitoba Health. At the same time, further research here and elsewhere is needed to test the approach used here and to identify other outcome indicators. Such investigations could also contribute to the development of a consensus on those which are most useful.

This study also indicates that secondary data can be a useful and relatively cheap starting point in monitoring quality of care. Treating poorer outcomes as "triggers" for closer inspection rather than as firm indicators of quality can determine if changes are needed to improve performance and what types of changes should be made.

Finally, the usefulness of secondary data for monitoring outcomes could be enhanced by including: 1) the full 4-digit ICD9-CM diagnostic codes which physicians currently provide on their claims form in the medical file rather than extracting only the first three digits; and 2) the data gathered annually on each PCH residents' function in regards to the activities of daily living (ADL) and cognitive status.

It is, therefore, recommended that Manitoba Health:

- Use its data to identify the specific PCHs which are contributing to the poor outcomes identified by this investigation and follow up with direct contact if warranted to improve quality of care.
- Address the comparatively high use of physician and hospital services by residents of juxtaposed PCHs.
- Improve the usefulness of its data base for assessing quality of PCH care by including 4-digit ICD9-CM diagnostic codes in its medical file and by including data collected annually on each resident's ADL and cognitive function along with the level of care designation in the PCH file. If the ADL and cognitive functioning data collected annually by the Long Term Care Branch cannot be

incorporated into the PCH file at this time, it should be computerized by registration number so that it can be merged with the data in the PCH file.

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Appendix A: Methodology

Appendix A

These analyses are based on the characteristics of each PCH resident during a window of observation from April 1, 1987 to March 31, 1991. On April 1, 1987 8,025 Manitobans were residents of PCHs. Each year about one quarter of all PCH beds become available largely through deaths and are filled. This results in about 2,000 new admissions (residents) each year over the four-year period. The four-year database contains 15,437 persons. 103 persons were excluded because they were in a chronic psychiatric facility, 9 because no match was found for them when files were merged and 29 because they were admitted to and discharged from a PCH the same day. Twelve persons were added because they were found to be alive although classified in the PCH data file as deceased. Of the 15,308 individuals left, 193 persons were discharged and readmitted, resulting in 15,501 PCH residents available during the four-year period for the analyses.

Time under observation and status at the end of observation for each resident was determined for each indicator as the number of days from admission to PCH for those residents admitted between April 1, 1987 to March 31, 1991 or from April 1, 1987 for those already resident in a PCH at that date to the earliest of: date of outcome indicator, date of discharge from PCH, or March 31, 1991. Events beyond March 31, 1991 were not analyzed and hence observation beyond that point is censored. Also, admission times and indicators prior to April 1, 1987 before the beginning of the observation window are not used. Left truncation of the data could pose a problem due to lead time bias if we were analyzing survival time. However, we are estimating the effects variables have on the relative rate of death or on the relative rate of hospitalization for the indicator diagnoses during our window of observation.

A similar method was used to determine observation time and status for analysis of hospitalizations, with two exceptions. A resident admitted to hospital with the particular diagnosis of interest was considered a new PCH admission upon hospital discharge and

hence was at risk for a subsequent admission with the same or different diagnosis. A resident was not considered at risk for the particular diagnosis of interest during the time the resident was hospitalized for a different diagnosis.

Survival analysis techniques (Kalfleisch and Prentice, 1980) were used in examining the data. We used the Cox proportional hazard model (Cox, 1972) to estimate the independent effect each variable has on the rate of the endpoint indicator. BMDP PC Version 1990 software (module 2L) run on an MS-DOS IBM compatible 486 computer was used to estimate the coefficients of the Cox models. From each model fit, exponentiation of the coefficient for a variable provides an estimate of the relative hazard or relative rate for each indicator. A 95% confidence interval for each relative hazard was calculated in all models.

The independent variables were the resident's characteristics (age, sex and level of care designation), region in which the PCH is located and type of PCH (NPJ, NPF or P). The level of care is known at admission to PCH and all residents are reassessed in January each year. Additional entries for level of care throughout the year may therefore appear in the file if a resident's care status changes. This variable was, therefore, defined to accommodate changing level of care for an individual, and was modelled as a time dependent covariate in our survival models. Because Regions 4&6 are contiguous and have comparatively few PCH residents, these two regions were combined in the proportional hazards models.

The dependent variables were death and the hospital diagnoses selected as outcome indicators. The specific ICD9-CM-coded diagnoses were: anemia (2859); pneumonia (480-486); influenza (487); dehydration (2765); urinary tract infection (5990); gangrene (7854); fall (E880-888); decubitus ulcers (6826); and fractures (800-869). Since the purpose of the study was to identify the presence of a condition rather than factors

precipitating the hospitalization, up to eight hospital diagnoses recorded in the hospital discharge abstract were included in the search for each diagnosis of interest.

Analyses of indicator diagnoses were restricted to hospitalizations since the diagnostic detail necessary to identify the target conditions were not available from the medical claims (they only contain a 3-digit diagnoses whereas most of the indicators required 4-digit codes).

For each indicator, four models were fit. Model I, the base model, assesses the effect of the residents' characteristics (age, sex and level of care designation) on each outcome variable. After controlling for the impact of resident characteristics, the effect of the type of PCH (Model II) and region of province (Model III) are examined. In Model IV we assess the combined effects of individual characteristics, type of PCH and region on each outcome. Caution must be exercised when interpreting the relative rate of an indicator associated with any particular region. The choice of a reference category was arbitrary, and while the overall fit of a model is unaffected by this choice, the coefficient associated with a region must be interpreted relative to that reference. Similarly, the effect of the type of PCH must be interpreted relative to its reference category. Since a PCH resident, when hospitalized with a specific diagnosis, was treated as a new individual when returned to the PCH, the number of cases in each analysis may be larger than the total number of residents.

Appendix B: Additional Tables

Appendix B

Table 2A

Percentage Hospitalized, Percentage with Physician Visits, Mean Hospital Days, Mean Physician Visits by Region 1989/90

Region	Percentage Hospitalized	Mean Hospital Admissions	Mean Hospital Days	Percentage with Physician Visits	Mean Physician Visits
1	21.5	1.5	12.5	94.3	10.5
2	24.9	1.6	11.6	95.0	14.3
3	24.9	1.5	11.6	88.5	14.5
4	24.3	1.5	12.4	91.4	16.5
5	27.7	1.6	12.6	93.9	9.5
6	26.5	5.4	16.5	95.9	9.7
7	24.9	1.5	14.3	97.2	12.4
8	18.7	1.3	13.8	97.5	17.5

Table 2B

Percentage Hospitalized, Percentage with Physician Visits, Mean Hospital Days, Mean Physician Visits by Region 1988/89

Region	Percentage Hospitalized	Mean Hospital Admissions	Mean Hospital Days	Percentage with Physician Visits	Mean Physician Visits
1	21.8	1.5	12.8	94.3	9.9
2	26.2	1.5	12.7	93.7	15.5
3	25.6	1.6	13.2	87.5	14.2
4	29.4	1.6	12.6	92.8	19.8
5	25.9	1.5	11.6	93.7	10.4
6	48.9	6.3	15.4	95.7	12.2
7	26.1	1.5	12.8	98.0	12.6
8	18.8	1.3	14.0	97.7	18.5

Table 2C

Percentage Hospitalized, Percentage with Physician Visits, Mean Hospital Days, Mean Physician Visits by Region 1987/88

Region	Percentage Hospitalized	Mean Hospital Admissions	Mean Hospital Days	Percentage with Physician Visits	Mean Physician Visits
1	22.1	1.6	16.1	95.3	11.2
2	22.1	1.5	17.3	92.7	14.3
3	27.1	1.6	15.1	87.5	14.0
4	31.0	1.7	15.1	95.5	20.8
5	25.1	1.5	12.3	91.6	10.7
6	32.0	3.1	11.4	90.0	10.1
7	26.6	1.5	11.8	98.1	13.8
8	19.7	1.3	14.2	97.8	18.9

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