

First Nations' hospital readmission ending in death: a potential sentinel indicator of inequity?

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ABSTRACT

In this study, we focused on readmissions for Ambulatory Care Sensitive Conditions (ACSC) ending in death, to capture those admissions and readmissions that might have been prevented if responsive primary healthcare was accessible. We propose this as a sentinel indicator of equity. We conducted analyses of Manitoba-based 30-day hospital readmission rates for ACSC which resulted in death, using data from 1986–2016 adjusted for age, sex, and socio-economic status. Our findings show that, across Manitoba, overall rates of readmissions ending in death are slowly increasing, and increasing more dramatically among northern First Nations, larger First Nations not affiliated with Tribal Councils, and in the western region of the province. These regions have continuously been highlighted as disadvantaged in terms of access to care, suggesting that the time for action is overdue. Rising rates of readmissions for ACSC ending in death suggest that greater attention should be placed on access to responsive primary healthcare. These findings have broader implications for territorial healthcare systems which purchase acute care services from provinces south of them. As an indicator of quality, monitoring readmissions ending in death could provide territorial governments insights into the quality of care provided to their constituents by provincial authorities.

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Background



Canada's Indigenous peoples have been repeatedly reported to have higher rates of hospitalisation [1–3] compared to their national counterpart. Numerous studies have documented substandard care resulting in increased morbidity and premature mortality [4,5], and uneven geographical distribution of outcomes among Manitoba First Nations (FN) [4, Lavoie, 3, 6].

In this paper, we analyse hospital readmission for conditions treatable in primary healthcare (PHC). Hospitalisation for Ambulatory Care-Sensitive Conditions (ACSC) has been used in a number of studies around the world as an indicator of the accessibility, adequacy and responsiveness of PHC services [7–12]. ACSC is defined as diseases or conditions that are less likely to lead to hospitalisation if managed in a timely and effective manner through PHC services [9,13–15].

We looked at those hospital admissions for ACSC that occurred between 1986 and 2016 which resulted in a readmission within 30 days ending in death. We drew on studies demonstrating that timely access to PHC after discharge can prevent readmission [16–19].

We also drew on studies showing that premature voluntary discharge can result in higher rates of readmission and death [20] and that PHC-based interventions can prevent readmissions [21]. Our study aimed to answer the following questions: 1) are readmissions for ACSC ending in death more prevalent in Manitoba FN communities, compared to other Manitoban communities; and 2) are there regions and/or Tribal Council areas where readmissions for ACSC ending in death are more prevalent for FN.

We believe that this study is important. It is well documented that FN's socio-economic status (SES) is considerably lower than that of other Manitobans [4]. While we agree that improving FN's SES will likely have an important impact on health status, FN in Manitoba has repeatedly reported receiving substandard care [22,23], at times culminating in premature death [24]. As an indicator, readmissions ending in death can provide invaluable insights. Indicators that can inform the performance of the whole system, especially for populations that have historically been underserved or poorly served, are critical and have been the focus of

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much of our empirical work to date [3, 25; 26, 27, Lavoie, Phillips-Beck, Kinew, 11, 28, 29]. Expanding on the set of indicators that can be used to inform the provisions of more responsive care is important.

The context

Healthcare delivery to FN communities across Canada is complicated by the multiple agencies involved. All provincial health-care systems include a number of publicly funded providers and organisations: family physicians and specialists providing services often through their own private practice; hospitals which may operate under the guidance of their own board of governors; Regional Health Authorities (where they exist) which manage priority setting, budgeting and regional system management on behalf of the provincial government, and the non-profit sector, which fills gaps in services, through a patchwork of provincial, federal and at times philanthropic funding programmes [30]. In addition, a majority of FN communities manage their own local primary health-care services (some partially, other in totality) with funding from the federal government [31]. The provincial and federally funded systems operate largely independently of each other. Divergences in federal and provincial priorities and perspectives on areas of responsibility have historically and continue to leave large and shifting gaps in services and unmet needs [32,33].

The FN jurisdictional patchwork described here is not unique. In Canada, the Yukon, Northwest territories and Nunavut are vast sparsely populated jurisdictions. The territories deliver a complement of community-based primary healthcare to their constituents. Secondary care is available in each territory's capital; however, the distances between communities and the capital, and the possibility that a patient might require more advanced care than what can be accessed at the territorial hospital, has resulted in substantial secondary and most tertiary care being purchased by the territories from provincial authorities. Consequently, all three territories spend a considerable amount of their own health-care budget in patient transportation and housing for care provided out of the territory. A similar relationship exists between Greenland and Denmark [34]. Ensuring the responsiveness of these fragmented systems requires the development of indicators that inform on the impact of policies adopted in one part of the healthcare system (early discharge policies, for example, which in Canada became the norm in the 1990s, for cost containment) on the system as a whole and on patients' outcomes.

In this paper, we focus on readmissions for ACSC occurring within 30 days of discharge and ending in death. Our hypothesis is that a disproportional number of readmissions ending in death will be to FN peoples. This is consistent with recent studies showing that FN bear We chose the benchmark of 30 days based on a study by Heggstad and colleagues [35] who examined the length of time between discharge and readmission, estimating that at 30 days, 72% of the readmissions were related to the conditions for which the patient had originally been discharged. While this percentage increased to 81 when the interval is reduced to 10 days, the number of actual readmissions was considerably smaller. Interestingly, we were unable to find studies that examined the length of readmission for ACSC with an outcome of death: all critical studies to date have focussed on the time interval between discharge and readmission.

The literature reflects some ambivalence towards readmissions ending in death as a marker of quality of care. Some researchers acknowledge that it is reasonable to assume that a shorter length of stay, followed by a readmission within 30 days ending in death suggests premature discharge [36]. Others emphasise that readmissions within 30 days of discharge (not focusing on those ending in death) equally reflect on the quality of care in the community as well as home support and other factors [37,38]. Other suggests that while readmission reflects a poor outcome, it may not reflect poor care in a hospital or in the community, because the quality of care is only one component of many prognostic factors [35]. While we agree, we also know that FN peoples living on-reserve have repeatedly reported having poorer access to care [31,39–42]. Further, differential care as a result of racism remains very much present [43–45].

In this paper, we conceptualise that disproportionate rates of readmissions for ACSC conditions ending in death (when compared to all Manitoba) reflect a number of systemic and structural factors, including premature discharge, unresponsive and differential treatment, barriers to access necessary PHC in the community, as well as other contextual factors (poorer housing, crowding, etc.) which can interfere with convalescence and precipitate readmission.

Methods

The *Innovation in Community-based Primary Healthcare (CBPHC) Supporting Transformation in the Health of First Nation and rural/remote communities in Manitoba (iPHIT)* project is a five-year partnership between university-based researchers from the University of Manitoba, the First Nations Health and Social Secretariat of

Manitoba (hereafter, FNHSSM), and eight FN communities in Manitoba. The overall objective of this innovative, strength-based programme of research is to learn from FN and rural and remote communities that have developed effective community-based PHC. Numerous papers have already been published from this programme of research [23,26,27,46–49], as well as presentations at many national and international conferences.

This study is a retrospective case-controlled examination of episodes of hospitalisations for ACSC which resulted in readmission within 30 days, and hospital readmissions ending in death. For our study, a hospitalisation episode can be both a hospitalisation and a readmission. All hospitalisation episodes from an ACSC category are checked to see if another hospitalisation episode from the same ACSC category occurs within 30 days after discharge. Ethical approval was obtained from the University of Manitoba's Bannatyne Campus Research Ethics Board (August 2013). Access to the Manitoba health administrative data was secured through the Manitoba Health Information Privacy Committee (September 2013). We report data by Regional Health Authority/Tribal Council area and type of community in Manitoba, primarily because these categories have policy relevance. For the analysis presented in this paper, we used administrative health data (1986–2016) from the Manitoba Population Research Data Repository housed at the Manitoba Centre for Health Policy, University of Manitoba. The Repository is a comprehensive collection of the administrative, registry, survey, and other data that includes the vast majority of residents of Manitoba including residents of FN communities. The data used for this study included vital statistics files; the population health registry file for the provincial-insured population; the hospital discharge abstract; and census data files. The study included all Manitoba residents eligible to receive health benefits under the Manitoba Health Services Insurance Plan. Six-digit postal codes were used to identify the population associated with each community. Registered members of FN represent 96.6% of the overall on-reserve population, others are non-status, Métis or non-indigenous individuals who depend on the same services [3].

For this study, we used three dependent variables: episodes of hospitalisations for ACSC which resulted in readmission within 30 days, length of stay (LOS), and hospital readmissions ending in death. We eliminated readmissions that were not urgent and readmissions to palliative care. Our rationale for this choice was that many scheduled readmissions reflect planned time-limited discharges motivated by a patient's wish to be home. Likewise, a readmission to palliative care

generally reflects a need for care and an expectation of death in a relatively short period of time.

Our definition of ACSC is based on definitions created by the Canadian Institute for Health Information [50,51] and by the Victorian Government Department of Human Resources division [52], adapted for the Manitoba First Nation population based on their epidemiological profile [3] as recommended by Caminal and colleagues [9]. Twenty-nine ACSC defined using 3, 4 and 5-digit International Statistical Classification of Disease codes (ICD-9-CM and ICD-10-CM) allowed cross-sectional and longitudinal comparison of hospitalisation rates among communities. The categories of ACSC explored in this study included: acute, chronic, vaccine-preventable and mental health conditions. We added mental health-related ACSC in this study, in answer to requests from First Nation communities, who see mental health as an integral part of PHC [23]. Specific conditions are shown in Table 1.

Data was analysed by calculating the LOS for initial admissions and readmission in days. To explore the relationships between the first episode of hospitalisation and the readmission, we used generalised estimating equation (GEE) models, controlling for age, sex, and socioeconomic status (postal codes were used as an ecological measure using the census data, described above), to identify trends (changeover time from 1986 to 2016) and differences in hospitalisation rates for ACSC and LOS for ACSC. GEE was used as a way to deal with correlated data over time. Repeated measures that are taken from the same community, sex and age group cluster will be correlated. These repeated measures are no longer independent, and the GEE uses the data to estimate the correlation between a cluster response and provides a correlation estimate of each effect's variance. Trends of ACSC hospitalisation rates by residents living on First Nation reserves were identified from 1986 onward in Manitoba. In Manitoba, where this study is located, we have adopted a practice of reporting results of studies by Regional Health

Table 1. Categories of ACSC explored in this study.

Categories of ACSC	Conditions
Chronic conditions	Diabetes; Diabetes with complications; Hypertension; Asthma; acute Bronchitis; Chronic Obstructive Pulmonary Disease (COPD), Pneumonia; Epilepsy; Angina, Heart Failure and Pulmonary Oedema; Iron Deficiency Anaemia
Acute conditions	Dental Conditions; Cellulitis; Severe Ear, Nose, and Throat infections (ENT)
Mental health	Schizophrenia and mood disorder
Vaccine preventable conditions	Hepatitis A and B; Influenza; Haemophilic Influenza; Measles; Mumps; Rubella; Meningitis; Tuberculosis; Tetanus; Rubella; Poliomyelitis; Pertussis
All ACSC	All conditions combined

Authorities and by Tribal Council areas, to support decision-making.

Results

Of the 362,256 hospital admissions for ACSC we reviewed for this study, 2,073 resulted in a readmission which ended in death (0.57%). Our final tally included 1,728 (0.48%) readmissions ending in death, between 1986 and 2016. Of these, 50 readmissions (2.89%) were for acute ACSC conditions, 1642 (95.02%) were for chronic ACSC conditions, 8 (0.46%) were for vaccine-preventable conditions and 28 (1.62%) were for mental health-related conditions. Looking at FN readmission ending in death, 11 (5.61%) of all readmissions was for acute conditions and 182 (92.86%) were for chronic conditions. The balance (1.53%) was for vaccine-preventable and mental health ACSC conditions. The number of readmissions ending in death from ACSC conditions that are vaccine-preventable or related to mental health was less than 5 each so the actual numbers are not shown. The most prevalent reasons for readmission are shown in Table 2, below.

The LOS of the first admission spanned 0 to 4,318 days, whereas the LOS of readmissions spanned 0–719 days. The variation in LOS is partially due to the difference in patterns of hospital admission/readmission for populations that live in urban versus those in rural/remote locations.

We looked for variations in the geographical (based on residence) distribution of readmissions ending in death, using the provincial Regional Health Authorities' definition of regions. Table 3 shows that readmissions ending in death occur disproportionately among FN in all regions. This is particularly evident in the Interlake area where 30.06% of all hospital admissions and 24.83% of the readmissions ending in death were to FN, who collectively represent only 8.9% of the population in that region. As evident in Table 4, the vast majority of readmission to a tertiary facility that ended in death was to residents from urban areas.

We also looked at trends in readmissions ending in death by Tribal Council areas. As shown in Table 5, results were shown to be decreased (1.92% change, $p = 0.05$) for those communities affiliated with the Swampy Cree Tribal Council. Northern First Nation communities not affiliated with a Tribal Council showed the highest increase (4.60% change, $p = 0.0349$). Both areas report a premature mortality rate (PMR, calculated as death <75 years of age) that is twice that of the province. In contrast, Manitoba showed an overall modest increase over time (0.47%, $p < 0.0001$), while urban municipalities showed an overall decline in rates of

Table 2. Most prevalent diagnoses for readmission ending in death, in percentage.

ICD-9 codes and definition	FN	R&R	R&NR	RM	Urban
436 Acute, ill-defined cerebrovascular disease				2.51	2.11
486 Pneumonia, organism unspecified		2.68	6.83	2.15	1.87
496 Chronic airway obstruction	6.56	12.05	8.7	11.11	9.7
2504 Diabetes with renal manifestations	6.01				1.37
2507 Diabetes with peripheral circulatory disorders	3.83				2.24
4101 Acute myocardial infarctions of other anterior wall		2.68			0.75
4109 Acute myocardial infarction, unspecified site	6.56	3.13		3.23	1.87
4148 Other specified forms chronic ischaemic heart disease				2.15	1.87
4275 Cardiac arrest		2.68			1.12
4280 Congestive heart failure	13.66	24.55	18.63	22.94	20.52
4281 Left heart failure		3.57			1.24
4912 Obstructive chronic bronchitis			4.35	5.73	3.61
5188 Other diseases of the lung	3.83	3.13	4.35		1.62
7855 Shock without mention of trauma				2.15	1.12
All other diagnoses	59.56	45.54	57.14	48.03	48.99
Total	100.00	100.01	100.00	100.00	100.00

FN: FN; R&R: rural remote communities; R&NR: rural communities that are not remote; RM: rural areas that are not organised as municipalities.

readmissions ending in death. Other results were not statistically significant.

Discussion

This paper reports on rates of readmissions ending in death for FN in Manitoba. We conducted a detailed geographical analysis, in an attempt to generate policy-relevant findings. Our analysis shows that FN living on-reserve is proportionally more likely to experience a readmission ending in death when compared to other Manitobans. We were able to determine that rates of readmissions ending in death are decreasing for the Swampy Cree communities (1.92, $p = 0.05$). Rates are however increasing for FN not affiliated with a Tribal Council (4.60, $p = 0.0349$) and for all Manitobans (0.47, $p = 0.0001$). We were unable to identify statistically significant trends in all other populations, suggesting minimal progress if any.

Our results likely reflect the fact that urban residents are discharged with a higher level of acuity and medical fragility when compared to residents from rural and remote communities because opportunities for an expedient readmission is more readily available. There is also a difference in the availability of beds, with lower

Table 3. Frequencies and percentages of ACSC readmissions ending in death by Regional Health Authority (RHA) and type of community (population), 1986–2016.

	IE Interlake-Eastern RHA		NO Northern Health Region		SO Southern Health-Santé Sud		WE Prairie Mountain Health		WP Winnipeg RHA	
FN living on-reserve as % of RHA population	8.9%		41.0%		2.2%		3.3%		0	
% of All Initial ACSC Hospitalisations within each discharging hospital RHA that were for patients from FN Communities	30.06%		48.13%		16.00%		18.46%		5.55%	
Community Type (of patient)	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
FN Communities	37	24.83	76	49.67	s	s	37	9.84	28	3.26
Rural Communities that are also remote	28	18.79	30	19.61	40	19.51	130	34.57	9	1.05
Rural Communities that are not considered remote	21	14.09	32	20.92	81	39.51	24	6.38	14	1.63
Rural municipalities/Local Government Districts (rural sparsely populated area with few services)	52	34.90	s	S	62	30.24	107	28.46	53	6.18
Urban Communities	11	7.38	s	S	s	s	78	20.74	754	87.88

S = number suppressed because N < 5.

Table 4. Frequencies and percentages of ACSC readmissions ending in death by Re-Admission Hospital Type and type of community (population), 1986–2016.

Facility type	Tertiary		Urban Community		Major Rural		Intermediate Rural		Small Rural		Long term Care Facility	
Community Type (of patient)	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
FN Communities	42	9.29	s	s	77	20.59	26	14.53	34	22.08	7	17.95
Rural Communities that are also remote	16	3.54	17	3.15	46	12.30	92	51.40	49	31.82	17	43.59
Rural Communities that are not considered remote	11	2.43	s	s	154	41.18	s	s	0	0.00	0	0.00
Rural municipalities/Local Government Districts (rural sparsely populated area with few services)	22	4.87	40	7.41	89	23.80	55	30.73	65	42.21	15	38.46
Urban Communities	361	79.87	468	86.67	8	2.14	s	s	6	3.90	0	0.00

S = number suppressed because N < 5.

Table 5. Readmissions ending in death by Tribal Council and municipalities, 1986–2016.

Tribal Council*	PMR	Readmissions ending in death		
		% change (different than 0)	Direction	P value
Dakota Ojibway	7.35	1.36	Increasing	0.25
Independent North	7.46	4.60	Increasing	0.03*
Independent South	5.76	1.50	Increasing	0.58
Swampy Cree	7.34	1.92	Decreasing	0.05*
West Region	5.98	3.89	Increasing	0.34
General population				
Rural municipalities/Local Government Districts (rural sparsely populated area with few services)	3.00	0.53	Increasing	0.56
Rural Communities that are not considered remote	3.65	0.30	Increasing	0.70
Rural Communities that are also remote	3.76	0.23	Decreasing	0.79
Urban Communities (communities with populations over 8000 inhabitants)	3.07	0.67	Decreasing	0.08
All Manitoba (ACSC)	3.57	0.47	Increasing	<.0001*

Interlake Reserve, Island Lake, Keewatin, and Southeast Resource Rev Council were excluded because of low numbers.

bed occupancy in rural hospitals resulting in less pressure to discharge patients.

There are a number of limitations to this study. To begin, little conceptual work has been done to define the variable “readmission ending in death”. Attention has been focussed

on the span of time between the first admission and the readmission ending in death [35]. The LOS of the original admission in our study spanned 0–4318 days, with the median being 12.19 days for all Manitoba and 8.75 days for FN. We anticipated that a readmission for an ACSC ending in death with a brief LOS may be more readily attributable to a premature discharge, and inadequate/unresponsive/inaccessible primary health-care services, than a readmission ending in death after a hospitalisation of multiple months or even years [53]. Previous work has documented that differential treatment is an ongoing concern for FN [54,55].

We had hoped to be able to benchmark a definition of early discharge, based on LOS of the first admission and outcome of the readmission. While the 30 day readmission benchmark has been defined empirically, benchmarks associated with LOS are lacking. Our limited sample size prevents us from benchmarking an empirically defined time frame for the original admission and readmission. More conceptual work is required in areas where a larger sample size is available. This work is however hampered by structural limitations: linkages between Electronic Medical Records (EMRs) from Family Physicians and hospital data do occur currently but this is limited, voluntary, and includes only 20% and 25% of the Manitoba population.

Our findings suggest that FN in Manitoba is more likely to experience an emergency readmission for an

ACSC within 30 days of discharge that ends in death. We also show that across Manitoba, rates of readmissions ending in death are slowly increasing and that the same rates are increasing more dramatically among northern unaffiliated FN. Finally, our findings show that these results are not evenly distributed across all nations, but rather impact more readily northern FN communities not affiliated with a Tribal Council.

While we acknowledge that additional work is needed, these findings nevertheless suggest that access to responsive primary healthcare appears to be eroding and that the numbers of Manitobans discharged to primary healthcare that fails to respond to their healthcare needs is increasing slowly. Our results also suggest that FN is disproportionately impacted, pointing out at least in part to differential care in the health-care system. Finally, our study shows that FN in the northern and western part of the province are particularly disadvantaged. Similar results have already been reported, suggesting that action is overdue.

This study suggests that readmissions ending in death is a useful indicator of inequity. As an indicator, it shed light on inequities that may be the result of discharge planning appropriate in one jurisdiction, given other health-care resources, but that might result in premature mortality when applied to patients who live in other jurisdictions. We believe that this indicator might be particularly helpful to arctic contexts, where acute and complex care is often accessed in another jurisdiction.

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