

Utilization of a rural hospital in Ontario, Canada: Understanding reasons for repeat emergency department visits and multiple admissions over a fourteen-month period

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Abstract

Purpose: This study highlights the most common reasons for repeat emergency department (ED) visits and diagnoses of repeat hospital admissions at the Smooth Rock Falls Hospital, located in a rural community in Northern Ontario, Canada. The aim of this study was to help hospital administrators identify patients at high risk of frequent hospital resource utilization (ED visit or admissions) so that if appropriate, they may be redirected to alternative services available in the community. Therefore, the two main research questions for this study were: (1) Which types of patients are more prone to having repeat ED visits and hospital admissions; and (2) What types of services could help improve the health of these patients?

Method: A secondary analysis was conducted using a hospital database created from a retrospective review of patient records. Inclusion criteria were all patients with eleven or

more ED visits, or three or more inpatient hospital admissions within the evaluation period of April 1, 2015 to May 31, 2016.

Results: Twenty-six patients met the criteria for repeat ED visits (65% female; mean age 52 years) and accounted for a total of 623 ED visits. Seventeen patients met the criteria for repeat admissions (41.2% female; mean age 73 years) and accounted for 69 repeat hospital admissions. Three patients met the criteria for both repeat ED visits and admissions. The most common reason cited for repeat ED visits was dressing changes and the most common reason cited for repeat admissions was chronic obstructive pulmonary disease (COPD).

Discussion: These analyses led directly to the identification of an opportunity for: (1) home visits by nurses from the Community Care Access Centre for dressing changes and antibiotic treatments; (2) home visits by paramedics practicing community paramedicine, and (3) remote patient monitoring for patients with COPD, congestive heart failure, and other chronic diseases.

Conclusion: This study identified the most common reasons for repeat patient ED visits and repeat hospital admissions, and the findings led to a productive dialogue about optimizing health services to meet the needs of patients in one rural NE Ontario community. It is possible that other small rural hospitals could benefit from initiating

similar data-driven quality improvement initiatives in order to optimize health care services for the communities they service.

1. Introduction

The healthcare system in Canada faces a burden due to an aging population that will present a growing demand on healthcare and emergency services.^{1, 2} Between 2011 and 2016, the Canadian and Ontarian population of seniors over the age of 65 increased from 14.8% to 16.9% and 14.6% to 16.7% respectively.^{3, 4} For a large number of elderly patients, their poor physical health increases their chances of visiting the ED.⁵ Older patients also have increased odds of visiting the ED⁶ or being admitted⁷ due to chronic illness.⁷⁻⁹

Many studies have determined the risk factors for repeat emergency department (ED) visits¹⁰⁻¹⁶ and there have been multiple studies that have examined risk factors for hospital readmissions.¹⁷⁻²¹ However, there is a need to understand the reasons for repeat visits in order to reduce inappropriate utilization and optimize patient care.^{11, 22} There is also a need to further understand this in less populated areas in Ontario, since the accessibility of health care in rural, remote and northern communities is a long-standing issue.²³

Many rural communities lack adequate services related to health care that meet the needs of special populations such as seniors and people with disabilities.²⁴ Compared to urban centres, residents in rural Ontario have additional challenges related to access to services and resources; inter-sectoral and cross-jurisdictional coordination; transportation; and patient-care planning.²³ Rural communities also face problems with the lack of availability and an uneven distribution of physicians and other regulated health care providers.^{24, 25}

Repeat ED visits made by a small number of patients account for a large proportion of the total number of visits.^{6, 7, 9, 14, 15, 26-28} In their 2010 literature review of frequent ED users, LaCalle and Rabin⁷ found that 4.5-8.0% of ED patients accounted for 21.0-28.0% of all ED visits, across various EDs in the United States. Three other studies also found that patients with 4 or more ED visits over a 12-month period made up 5.5-22.9% of patients seen, despite accounting for 22.0-48.0% of the total ED visits.^{9, 15, 24} Similarly, another study found that 0.3% of patients visited the ED 12 or more times in one year, with that group of patients accounting for 3.5% of all ED visits.¹⁴ However, there is still great variability on what defines a frequent ED user, since two other studies defined frequent ED as those having more than six visits to the ED in a 12-month period.^{27, 28} These studies found that patients having six or more visits in one year consisted of 5.7 to 7.2% of all ED patients and they accounted for 21.1% to 31.3% of all ED visits, respectively.^{27,28}

A qualitative study on patient perspectives by Howard et al²⁹ found three common reasons for repeat ED usage by patients at three urban American hospitals in Ohio, USA: (1) inability to obtain an appointment with their primary care provider, (2) referral to the ED by the primary care provider's staff, and (3) faster access to immediate care. Other studies found similar findings, where patients presented to the ED because their primary care provider was unavailable,^{7, 22, 30} referred them to the ED,³¹ or practiced at the hospital associated with the ED.⁸

The definition of a repeat ED visit varies widely between studies, ranging from 4 to 20 or more ED visits in a 12-month period.^{9, 15, 27, 28, 32-37} The definition of a repeat hospital admission patient also varies between studies, and can be defined as a patient being admitted within 30 days of being initially discharged or having an unplanned admission within 14 days of initial discharge.^{38, 39} Patients that have been seen in the ED, or are admitted to a hospital multiple times within 72 hours, are often colloquially referred to as “bounce-back” patients.³²

Multiple studies have mentioned a need for interventions to reduce frequent ED visits.^{6, 8, 14} These interventions target patients with comorbid conditions⁶ or specific populations at risk for frequent ED visits.⁸ While a decrease in health status often leads to patients frequently attending the hospital,⁵ the cost associated with this utilization is a substantive burden on the health care system. In comparison to outpatient services, Pines et al⁸ indicated that an increase in hospital admissions leads to greater health care

expenditures; thus, patients who frequently attend the ED and are admitted to the hospital may represent one of the highest cost groups. Frequent visits can also lead to increased wait times, delayed diagnosis and treatment, and reduced availability of acute care beds.^{40,41} By identifying specific populations and reasons for repeat ED use, it may be possible to reduce frequent ED visits,⁸ or redirect patients to appropriate community health services that are more cost-effective.⁴² As such, this study conducted a utilization review to understand the most common reasons for repeat ED visits and most common diagnoses of frequent admissions to a rural hospital in north east (NE) Ontario. The aim of this study was to help hospital administrators identify patients at high risk of frequent hospital resource utilization (ED visit or admissions) so that if appropriate, they may be redirected to alternative services available in the community. Some of the alternative services that will be proposed include Health Links (HL),⁴³ Community Care Access Centres (CCACs),⁴⁴ and community paramedicine (CP).⁴⁵

2. Method

Our study involved a secondary analysis of patient records obtained from a hospital in a rural community in NE Ontario, Canada. The database of records was originally accessed under a quality improvement initiative, and subsets of de-identified data were analyzed. The data were analyzed descriptively to identify frequencies and trends related to reasons for repeat ED and hospital readmissions.

2.1 Setting

The hospital is located in Smooth Rock Falls, a small rural community in NE Ontario, Canada with a population of 1,330.⁴ Thirty-five percent of the residents in the community are over the age of 60 and the population is predominantly Francophone (64.7%).⁴ This community has one hospital containing 14 acute care and 23 long-term care beds. The Smooth Rock Falls Hospital (SRFH) ED provides two examination rooms, one fracture room, one minor surgery room, and one trauma room. The hospital is also supported by laboratory, physiotherapy, and diagnostic imaging departments. However, patients requiring other advanced services or specialist appointments must travel to the nearest urban hospital, which is over 100 kilometers by road.

The local health clinic is adjacent to the hospital, and it provides primary care services to patients by appointment only. There is one physician present in the community at a time, and this physician is responsible both for responding to ED visits and for running a family practice in the health clinic during weekdays.

The nursing staff is comprised of approximately 40 nurses, this includes full- and part-time registered nurses and registered practical nurses. On a daily basis, there is one registered nurse working in the ED, one registered nurse working in acute care, and one registered practical nurse working in long-term care. The hospital also has access to telemedicine services and is affiliated with the local HL. The HL is a relatively new

initiative in Northern Ontario involving a diverse team of providers focused on developing care plans for patients with complex needs.⁴³

2.2 Study Population

The evaluation period was from April 1, 2015 to May 31, 2016 (14 months). The original intention for this study was to include patients presenting to the ED 20 or more times, as well as patients admitted five or more times, in a twelve-month period. These original criteria were selected by the hospital studied and the local HL as a common target population that would include the 5% of the population of Ontario who are responsible for 65% of health care use, which also overlapped with high cost users, included patients with high needs, and patients with four or more chronic/high cost conditions.⁴³ However, this only yielded 16 patients. Thus, to increase sample size, the study period was expanded to 14 months, and the inclusion criteria were modified to include patients: (1) presenting to the ED 11 or more times; or (2) admitted three or more times within the study period. The Chief Executive Officer of SRFH worked with the research team to refine the criteria to ensure clinical and contextual relevance.

2.3 Data Collection

Hospital staff conducted a retrospective review of patient records to identify patients matching the inclusion criteria. All personal identifying information was removed and

replaced with a unique patient identifier prior to analysis by the research team. Data fields extracted from the database were: sex, age, dates (ED visit, admission, and discharge), reason for the ED visit or diagnosis of admission provided by the physician.

2.4 Data Analysis

ED and hospital admission data were analyzed separately in Microsoft Excel to identify frequencies and trends related to patients with repeat ED visits and with multiple admissions. The principal investigator categorized all reasons for ED visits and diagnoses for admission; this classification was then verified and approved by a nurse from the hospital.

Age and sex trends were also analyzed. Patients aged 64 and under were compared to those aged 65 and older, as local data on ambulance use shows that hospital utilization increases dramatically for those aged 65 or older.⁴⁶

2.5 Ethics Approval

Ethics approval (Appendix A) was granted on October 28, 2016 from the Laurentian University Research Ethics Board (REB #6009551).

3. Results

During the 14-month evaluation period, there were a total of 1,382 unique patients, 3,437 ED visits, and 251 admissions at the SRFH. The inclusion criteria resulted in a total of 43 patient records available for analysis: twenty-six patients were found to have 11 or more ED visits, 17 had three or more admissions; three patients met the criteria for both.

3.1 Frequent Emergency Department Visits

The 26 patients with repeat ED visits made up only 1.9% of the 1,382 unique patients seen during the study period, however they accounted for 18.1% (n=623) of the total ED visits. The mean age of the frequent ED patients was 52 years and 57.7% (n=15) were female (Table 2-1).

Table 2-1 – Frequent ED utilization by sex and age

	Male	Female	Age 64 or younger	Age 65 or older
Number of patients (n =26)	11 (42.3%)	15 (57.7%)	20 (76.9%)	6 (23.1%)
Total number of ED visits (n=623)	287 (46.0%)	336 (54.0%)	449 (72.1%)	174 (27.9%)
Mean number of ED visits per patient per year	22.4	19.2	19.2	24.9

In Table 2-2 the top five reasons for all ED visits by sex and age for the 26 high frequency ED patients are shown. The need for dressing changes was the most frequent reason, accounting for one-third of all visits and affecting 38.5% (n=10) of frequent ED users. This was the most frequent reason across age and sex categories.

The second most common reason for repeat ED visits for all patients was the need for nebulizer treatments, however 87.5% (n=42) of these were females aged 64 years or younger (Table 2-2). Illnesses that required antibiotic treatments were the third most common reason for repeat ED visits, however 97.8% (n=45) of these ED visits were for male patients. The fourth most common reason for repeat visits was for pain-associated incidents. The fifth most common reason for repeat ED visits were for wart removals, despite these being entirely associated with female patients under the age of 65.

However, it is important to note that the International Classification of Diseases, Tenth Revision, (ICD-10-CM)⁴⁷ coding was not used for every ED patient visit. Therefore, specific diagnoses may not have been properly charted. For example, a patient could initially present with a wound that is charted as cellulitis which would then require intravenous antibiotics and frequent dressing changes. It is possible that the initial ED visit is charted as either a wound or cellulitis and then the follow-up ED visits are charted as intravenous antibiotics or dressing changes, despite still being for cellulitis. To attempt to minimize the possibility of overlap, the principal investigator categorized all reasons

for ED visits and this classification was then verified and approved by a nurse from the hospital.

Table 2-2 - Top five reasons for frequent ED visits by sex and age[§]

Reason for ED visit	All patients		Males		Females		Age 64 and younger		Age 65 and older	
	Number of visits (Rank)	Percent of all visits	Number of visits (Rank)	Percent of all visits	Number of visits (Rank)	Percent of all visits	Number of visits (Rank)	Percent of all visits	Number of visits (Rank)	Percent of all visits
Dressing change	206 (1)	33.1	135 (1)	47.0	71 (1)	21.2	136 (1)	30.3	70 (1)	40.2
Nebulizer treatment	48 (2)	7.7	6 (†)	2.1	42 (2)	12.5	42 (3)	9.4	6 (†)	3.4
Injury/Illness requiring intravenous antibiotics	46 (3)	7.7	45 (2)	15.7	¶	---	46 (2)	10.2	¶	---
Pain	40 (4)	6.4	14 (5)	4.9	26 (5)	7.7	27 (†)	6.0	13 (4)	7.5
Wart removal	33 (5)	5.4	¶	---	33 (3)	9.8	33 (4)	7.3	¶	---
Wound	30 (†)	4.8	¶	---	29 (4)	8.6	30 (5)	6.7	¶	---
Pneumonia	18 (†)	2.9	18 (3)	6.3	¶	---	¶	---	18 (2)	10.3
Urinary tract infections	18 (†)	2.9	17 (4)	5.9	¶	---	18 (†)	4.0	¶	---
Cellulitis	17 (†)	2.7	¶	---	18 (†)	5.4	¶	---	17 (3)	9.8
Pelvic mass	17 (†)	2.7	17 (4)	5.9	¶	---	17 (†)	3.8	¶	---
Chronic obstructive pulmonary disease	8 (†)	1.3	7 (†)	2.4	¶	---	¶	---	8 (5)	4.6

†Denotes that the ranking was not in the top five most commonly reported diagnoses.

¶ Denotes that n<5 and thus data is suppressed to protect the identity of the patients.

§ International Classification of Diseases, Tenth Revision, (ICD-10) coding was not used for every ED patient visit therefore specific diagnoses may not have been properly charted. For example, a patient could initially present with a wound that is charted as cellulitis which would then require intravenous antibiotics and frequent dressing changes. It is possible that the initial ED visit is charted as either a wound or cellulitis and then the follow-up ED visits are charted as intravenous antibiotics or dressing changes, despite still being for cellulitis.

3.3 Frequent Hospital Admissions

During the study period, 17 patients were admitted to the hospital three or more times, with each admission lasting a minimum of one night. These 17 patients accounted for 27.5% (n=69, cumulative total of 582 inpatient days) of the total 251 admissions that the hospital had during the study period. Of all 69 repeat admissions, 8.7% (n=6) of these were within 72 hours of the initial admission. The mean age of frequently admitted patients was 73 years and 41.2% (n=7) were female. Seven of these patients (41.2%) died during the study period. In Table 2-3 the number of admissions, inpatient days, and mean number of admissions for the frequently admitted patients are displayed.

Table 2-3 - Frequently admitted patients by sex and age

	Male	Female	Age 64 or younger	Age 65 or older
Number of patients (n=17)	10 (58.8%)	7 (41.2%)	4 (23.5%)	13 (76.5%)
Total number of admissions (n=69)	40 (58.0%)	29 (42.0%)	15 (21.7%)	54 (78.3%)
Mean number of admissions per patient	4.0	4.1	3.8	4.2
Total number of inpatient days (n=582)	411 (70.6%)	171 (29.4%)	37 (6.4%)	545 (93.6%)
Mean number of inpatient days per patient	41.1	24.4	9.3	41.9

In some cases, patients were admitted with multiple diagnoses, resulting in a total of 104 diagnoses for the 69 admissions. The most common diagnosis was chronic obstructive pulmonary disease (COPD) for 18.8% (n=13) of admissions (Table 2-4). The remaining diagnoses of frequent admissions included: mental illness, congestive heart failure (CHF), chronic kidney disease (CKD), general pain, pneumonia, and edema (Table 2-4).

Table 2-4 - Diagnoses that caused the most frequent hospital admissions

Diagnosis†	Total number of admissions (N=69)
Chronic obstructive pulmonary disease	13 (18.8%)
Mental illness	12 (17.4%)
Congestive heart failure	7 (10.1%)
Chronic kidney disease	7 (10.1%)
General pain	6 (8.7%)
Pneumonia	6 (8.7%)
Edema	5 (7.3%)

† While these diagnoses are the most common, they are not exclusive. An individual may have had an admission with one or more of these diagnoses. (Example: A patient being admitted for COPD and pneumonia.)

While COPD was the most frequent diagnosis of a repeat admission (Table 2-4), CKD was the diagnosis that resulted in the greatest number of inpatient days, accounting for 30.8% of all inpatient days (Table 2-5). This is a significant finding considering that there are no dialysis services available in the community.

The most frequent causes of inpatient days for all 17 repeat admission patients were the same for male patients, patients over the age of 65, and for patients who died during the study period (Table 2-5). Additionally, 64.0% (n=16) of the inpatient days were from females under the age of 65, while only males aged 65 and older were admitted due to requiring alternate level of care. It is also interesting to note that only females were admitted for mental illness-related problems, despite the hospital not being a designated psychiatric facility. However, this could be the result of being in close proximity to the regional detoxification center.

Table 2-5 - Top five reasons for highest number of inpatient days by age and sex

Diagnosis	All patients (n=582 days)		Males (n=411 days)		Females (n=171 days)		Age 64 and younger (n=37 days) ‡		Age 65 and older (n=545 days)		Patients deceased during study period (n=307 days)	
	Inpatient days (Rank)	Percent of all visits	Inpatient days (Rank)	Percent of all visits	Inpatient days (Rank)	Percent of all visits	Inpatient days (Rank)	Percent of all visits	Inpatient days (Rank)	Percent of all visits	Inpatient days (Rank)	Percent of all visits
Chronic kidney disease	179 (1)	30.8	161 (1)	39.2	18 (3)	10.5	¶ (†)	---	179 (1)	32.8	179 (1)	58.3
Congestive heart failure	153 (2)	26.3	144 (2)	35.0	9 (†)	5.3	¶ (†)	---	153 (2)	28.1	126 (2)	41.0
COPD	100 (3)	17.2	76 (3)	18.5	24 (2)	14.0	¶ (4)	---	99 (3)	18.2	47 (3)	15.3
Edema	67 (4)	11.5	49 (4)	11.9	18 (3)	10.5	¶ (†)	---	67 (4)	12.3	41 (4)	13.4
Pneumonia	47 (5)	8.0	34 (†)	8.3	13 (5)	7.6	¶ (†)	---	47 (5)	8.6	¶ (†)	---
Alternate level of care§	39 (†)	6.7	39 (5)	9.5	¶ (†)	---	¶ (†)	---	39 (†)	7.2	39 (5)	12.2
Mental illness	25 (†)	4.8	¶ (†)	---	25 (1)	14.6	¶ (2)	---	9 (†)	1.7	¶ (†)	---
Pain	25 (†)	4.3	7 (†)	1.7	18 (3)	10.5	¶ (1)	---	7 (†)	1.3	¶ (†)	---
Shortness of breath	26 (†)	4.5	9 (†)	2.2	17 (4)	9.9	¶ (†)	---	26 (†)	4.8	¶ (†)	---
Lymphoma	¶ (†)	---	¶ (†)	---	¶ (†)	---	¶ (3)	---	¶ (†)	---	¶ (†)	---
Syncope	¶ (†)	---	¶ (†)	---	¶ (†)	---	¶ (4)	---	¶ (†)	---	¶ (†)	---

† Denotes that the ranking was not in the top 5 most commonly reported diagnoses.

¶ Data suppressed to protect the identity of the patients.

§ There was one record of alternate level of care that did not have the number of inpatient days recorded.

‡ There were only five unique diagnoses given for those aged 64 and under, with COPD and syncope both having the same number of inpatient days.

4. Discussion

It is well known that a small fraction of the total number of patients that visit EDs account for a large proportion of the total number of visits to EDs.^{6, 7, 9, 14, 26-28} Similarly, frequent users at the SRFH were only 1.9% of all ED patients seen during the study period, but they accounted for 18.1% of all ED visits. Dressing changes were the most common reason for repeat ED visits, and COPD was the most frequent diagnosis for admission. CKD accounted for the highest number of inpatient days.

4.1 Frequent Emergency Department Visits

Many studies have looked at determining the risk factors for repeat ED visits.¹⁰⁻¹⁵ In multiple studies, risk factors associated with repeat ED visits included being a male,^{11,15} living alone with several functional deficits related to daily living,^{11, 16} and having chronic conditions like COPD and chronic kidney disease.^{15,16,27} Another study found that patients presenting to the ED 12 or more times were often female, used more primary care and psychiatric services, and were middle-aged.¹⁴ However, our study found that male patients had more ED visits compared to female patients, which is consistent with previous studies^{11,15}, while the three most frequent diagnoses for patients with repeat admissions were COPD, mental illness, and CHF.

The results from our study are similar to those found by Gruneir et al.⁴⁸ Their study focused on obtaining population-based estimates of ED visits by long-term care residents and determined the most commonly reported reasons for the initial ED visit.⁴⁸ They concluded that nearly 25% of initial visits to the ED were classified as potentially preventable and included pneumonia, kidney or urinary tract infections, CHF, and COPD.⁴⁸ These diseases were classified as potentially preventable because there is a possibility that they could have been avoided if they were properly managed through primary care services at an earlier stage.⁴⁸ A more recent study by Gruneir et al.¹⁵ that examined repeat ED visits by nursing home residents also concluded that there was an increased risk of having a repeat visit if an individual was male, was between the ages of 65 and 75, had moderate activities of daily living dependence, and had chronic medical conditions such as COPD, congestive heart failure, diabetes, and chronic kidney disease. Similarly, in our study, pneumonia and urinary tract infection frequently resulted in repeat ED visits among males and patients aged 65 or older. Blank et al.²⁶ also found that pain-related conditions accounted for 27% of patients that presented to the ED 12 or more times, while Castillo et al.²⁷ found that frequent ED users often had a primary diagnosis of pain (33.9% of frequent ED users). However, in our study, pain was cited as the principle cause for only 4.3% of the repeat ED visits.

4.2 Frequent Hospital Admissions

Multiple studies have previously examined risk factors for hospital readmissions.¹⁷⁻²¹ A study by Bogaisky and Dezieck found that CKD, CHF, and COPD were associated with greater risk of readmission in community dwellers and nursing home residents.¹⁸ In our study, two of the three most common diagnoses for patients with repeat admissions were CHF and COPD, associated with 26.3% and 17.2% of all inpatient days respectively. As well, while not being one of the three most common diagnoses for repeat hospital admissions in terms of frequency, CKD resulted in the greatest number of inpatient days, accounting for 30.8% of all inpatient days. In particular for CKD, Bogaisky and Dezieck determined that hospital readmission for CKD in community dwellers was significantly higher than the risk of readmission for those in nursing homes (OR = 2.9, 95% CI = 1.9–4.6).¹⁸ Similar results were seen by Barnett et al., where 27.3% of patients with end-stage CKD were readmitted within 30 days of their initial admission.²⁰

Seven patients that were included in the study died during the study period. The cause of death was associated with CKD, CHF, or COPD, and these match the most frequent diagnoses of both admissions and inpatient days.

4.3 Health System Implications

The reasons for frequent ED visits and hospital admissions at SRFH are indicative of gaps in local community-based healthcare services (e.g. dressing changes) and preventable admissions for ambulatory care sensitive conditions.⁴⁸ Because this study had its origins in a quality improvement initiative, the findings led to discussions between researchers and SRFH administrators on reducing reliance on the ED for non-urgent care and improving patient care in the community. A systematic literature review by Moe et al. was performed in 2017 to evaluate the effectiveness of interventions targeting adult frequent ED users in reducing visit frequency and improving patient outcomes.⁴⁹ They found that interventions targeting frequent ED users were likely to effectively decrease ED visits, improve social outcomes, improve housing stability, and report costs savings.⁴⁹ It was also found that some studies reported a minor post-intervention decrease in hospital admissions.⁴⁹ Interestingly, it was also discovered that exposure to interventions often led to an increase in the use of outpatient services, rather than a decrease, indicating a potential linking of outpatient community services.⁴⁹ In particular for the community of Smooth Rock Falls, it was recognized that certain patients could benefit from the linkage of community health services¹⁴ such as HLs,⁴³ CCACs,⁴⁴ and CP.⁴⁵

HLs were introduced by Ontario's Ministry of Health and Long-Term Care to improve access to integrated, quality services for Ontario's complex patient population.⁴³ HLs were designed to "encourage greater collaboration and co-ordination between a patient's

different health care providers as well as the development of personalized care plans. This will help improve patient transitions within the system and help ensure patients receive more responsive care that addresses their specific needs with the support of a tightly knit team of providers” (p.3).⁴³ Our study contributed to early discussions among hospital administrators related to the development of a local HL in the region.

In Ontario, CCACs were designed as gatekeeping organizations that “coordinate services for seniors, people with disabilities and people who need health care services to help them live independently in the community”.⁴⁴ The finding that the highest number of ED visits was for dressing changes (33.1% of all ED visits) led to a consultation between the hospital and the regional CCAC provider. A contract was developed and signed for patients to begin receiving nursing services at their homes through CCAC without the need to visit the hospital. However, as of June 2017, CCAC services in this community are now being provided by the NE Local Health Integration Network.^{50,51}

CP is a model of care whereby paramedics apply their training and skills in non-conventional community-based environments, often outside the usual emergency response and transportation model.⁴⁵ In Ontario, recently-developed CP programs typically include four main components: home visits (HV), community referrals, wellness clinics (WC), and remote patient monitoring.⁵² Remote patient monitoring (RPM) includes telemedicine and telemonitoring services. Many similar versions of RPM have been reviewed in multiple studies as a potential option to help reduce hospitalizations and

manage the conditions of patients with COPD,⁵³⁻⁵⁸ CHF,⁵⁸⁻⁶¹ or diabetes mellitus.^{62, 63}

From our study, 14 patients were identified who would potentially benefit from RPM.

These patients were then assessed for RPM eligibility, and a few patients were subsequently enrolled in the service.

CP HVs are types of in-home care where paramedics visit patients in their place of residence, often on request from a physician or other providers, including post-hospital discharge planners. HVs often also have a health promotion focus, where paramedics might conduct home safety inspections or other wellness assessments. Implementation of CP HVs were recommended to the SRFH administrators, since several patients from our study were appropriate candidates for this service. Additionally, multiple studies on CP programs have shown reductions in calls to EMS,⁶⁴⁻⁶⁷ reductions in hospital ED visits and admissions,⁶⁷⁻⁶⁹ an improvement in the management of chronic conditions like high blood pressure,^{64,65,68} CHF, and COPD,⁶⁷ an improvement in health status and quality of life,^{65,70} and cost savings to the health care system.^{64,66,67,71}

With CKD identified as one of the most frequent reasons for repeat hospital admissions, and the greatest contributor to inpatient days, it was significant that there were no local dialysis services available in the community. Patients with CKD travelled approximately one-hour, multiple times per week, to the nearest hospitals in Timmins (101km away) or Kapuskasing (65km away) for their dialysis treatments. This finding encouraged health care providers to consider exploring opportunities to improve local care options to

support patients with kidney disease. According to the Ontario Renal Network, options include home dialysis, and support services from the CCAC.⁷² There are many reported benefits of home dialysis, including fewer and shorter hospital stays, longer life expectancy, increased independence of patients, decreased need to travel for treatment, and overall improved quality of life.⁷³

The results of this study led to the development of a *Quality Best Practice* program at the SRFH, an initiative to support standardized quality-based order sets (checklists) for different diagnoses. The goals of the *Quality Best Practice* program are to: (1) provide consistent quality care for patients, and (2) decrease likelihood of readmission.

4.4 Limitations and Future Research

There are certain limitations related to this study that require consideration; however, some are also opportunities for future research. First, the findings are limited to the hospital and community studied and possibly not generalizable to other small hospitals. However, the methodology of this study could be applied to other small rural hospitals when performing data-driven quality improvement initiatives in order to optimize health care services for the communities they service.

Second, our study was not able to confirm if the listed reason for the ED visit was the same as the diagnosis provided by the physician. Since International Classification of

Diseases, Tenth Revision, (ICD-10)⁴⁷ coding was not used for every ED patient visit, there may have been classification errors and it is possible that specific diagnoses may not have been properly charted. For example, a patient could initially present with a wound that is charted as cellulitis. This wound then requires intravenous antibiotics and frequent dressing changes. Thus, it is possible that the initial ED visit was charted as either a wound or cellulitis and then the follow-up ED visits were charted as intravenous antibiotics or dressing changes, despite still being for cellulitis. This could cause an overlap in some of the causes of frequent ED visits and created skewed results. In addition to misclassification, there could also be the possibility of upcoding in which billing codes are purposefully miscoded to result in a larger reimbursement.⁷⁴⁻⁷⁶

Third, it is also important to note that our study focused solely on determining the reasons for repeat ED visits or admissions, and we did not look at the overall utilization of hospital services or the impact of frequent users on ED wait times or other service availability. These are important variables identified by others, such as Doupe et al.⁹ in their study examining frequent ED users and should be replicated in a future study. Fourth, our study did not evaluate any economic impacts or patient satisfaction with hospital services. However, it would be interesting to determine if these high hospital utilization patients would prefer to be seen in a community health clinic or by a community health nurse, rather than in the ED.

Finally, this study was unable to differentiate between physician-initiated ED visits and patient-initiated ED visits. This is important because a case can be made that most of the physician-initiated ED visits would be for follow-up or non-urgent issues, and this could support the need for other health services in the community to reduce these types of visits. It also potentially reflects the fact that in this small rural community, a single physician covers both the ED and the clinic, and that the physician may prefer to see certain non-urgent patients in the ED because of the availability of space, equipment, staff, and other resources; as well there may be a motivation to reduce wait times for a clinic appointment.³⁰ For instance, it is possible that a physician advised patients to return to the ED for dressing changes or go to the ED for wart removal where procedural supplies are more readily available. Further research in this area could confirm this speculation.

5. Conclusion

This study identified the most common reasons for repeat patient ED visits and repeat hospital admissions, and the findings led to a productive dialogue about optimizing health services to meet the needs of patients in one rural NE Ontario community. Specifically, this study led to increased patient referral for CP services, data-driven HL planning in the region, and the signing of a contract with the CCAC to increase home care services targeting dressing changes and antibiotic treatments.

Future studies at the SRHF could determine whether: (1) the quality of care improved for any of the patients from our study who were diverted to alternative care services in the community; and (2) there are any utilization changes in terms of ED visits and hospital admissions. Other small rural hospitals could benefit from initiating similar data-driven quality improvement initiatives in order to optimize health care services for the communities they service.

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