Understanding Acute Care Usage by Adult Chronically Critically Ill Ventilated Patients: A Chart Review

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Objectives: *To better understand the rationale for acute care usage among long term care ventilated residents.* ***Background:*** *Chronically critically ill ventilated individuals experience complex health challenges, with many not surviving one year post initial hospitalization discharge. Recent research reports high acute care readmission rates for chronically critically ill patients, yet most studies have not examined the reasons patients are readmitted, nor the treatment and care provided during these stays.* ***Method:*** *A retrospective medical chart reviews of all emergency department visits and acute care admissions, occurring from August 2014 to August 2016, of chronically critically ill ventilated individuals living in a residential care facility in the province of British Columbia, Canada was conducted.* ***Results****: There were 49 emergency department visits and 56 acute care admissions over a 2 year period by 20 chronically critically ill ventilated residential care patients. The majority of acute care admissions were related to pneumonia, whereas the majority of emergency department visits were not specified.* ***Conclusion:*** *Chronically critically ill ventilated long term care residents are high users of acute care resources, frequently admitted for pneumonia.*

Keywords: chronically critically ill, readmission, sepsis, ventilated

BACKGROUND

The chronically critically ill (CCI) adult patient population is growing and will continue to grow, in part because of the ageing Canadian population as well as advances in life-saving medicine and technology (Desai et al., 2011; Douglas et al., 2007; Maguire & Carson, 2013). The CCI patient is defined as an individual whose length of stay in a critical care unit is greater than 21 days, has long-related to their illness, including neuropathy, brain dysfunction, malnutrition, immune dysfunction, functional and cognitive disability, depression, anxiety, and lower quality of life (Akgun & Siegel, 2012; Koesel, 2008; Lee et al., 2008; Maguire & Carson, 2013; Nelson et al., 2004; Wiencek & Winkelman, 2010). If these complex patients do survive their initial hospitalization, 40% to 50% survive more than 1 year after their initial discharge from an acute care facility, and approximately 50% are readmitted to the hospital within 1 year (Cox et al., 2009; Crooks & Clochesy, 2001; Douglas et al., 2007; Herridge, 2007; Maguire & Carson, 2013; Nelson et al., 2010; Wiencek & Winkelman, 2010).

As these patients are frequently readmitted to critical care areas it is important for critical care teams to have a better understanding of their

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needs, and despite increasing literature reporting high acute care readmission rates and critical care use among CCI patients, the reasons for readmission and the subsequent treatment and care provided during hospitalization, remain unexamined (Cox et al., 2009; Gardner et al., 2019; Herridge, 2007; Nelson et al., 2010; Prescott, 2018; Wiencek & Winkelman, 2010). The research to date largely focuses on patients discharged from acute care facilities to home, or to long stay subacute facilities in the United States (Khan et al., 2013). These facilities do not exist in a number of countries, including Canada. Moreover, the Canadian context of a public healthcare system likely influences hospital readmission and subsequent care of CCI patients. In Canada, an increasing number of CCI patients live in residential care facilities, and it is here that they would begin to experience an exacerbation of illness.

A collaborative team comprised of a Physician Intensivist, Advanced Practice Nurse, University Nurse Researcher, bedside care staff (both acute care and residential care), and facility leaders, came together out of mutual concern for this vulnerable group of patients. The team's goal was to gain a better understanding of the reasons for frequent acute care transfers and readmissions. The critical care team was particularly interested in improving care for this group as they are higher users of critical care services when they are readmitted to hospital. This knowledge is foundational for identifying areas to improve patient care and better support CCI patients to remain in their communities.

METHODOLOGY

The research team conducted an exploratory retrospective medical chart review study. The study focused on examining all the emergency department (ED) visits and hospital readmissions, occurring from August 2014 to August 2016, for the CCI ventilated individuals living in a residential care facility in the province of British Columbia, Canada. This methodology enabled the team to answer the research questions while avoiding duplication of primary data collection and reducing the associated burdens of research participation on participants (Gearing et al., 2006; Matt & Matthew, 2013). The study was approved by the Fraser Health Research Ethics Board (FHREB) prior to data collection.

Setting and Sample

Fraser Health is the largest health authority in the province of British Columbia, servicing more than 1.8 million people from a variety of diverse communities. CCI adult ventilated individuals who are unable to live at home reside in a dedicated 22-bed unit in a larger residential care facility. This facility employs a mixture of Registered Nurses, Licensed Practical Nurses, and respiratory therapist to care for this unique population. The residents are cared for 24 hours a day, 7 days a week by the staff. The residents in this dedicated unit represent one of the largest cohorts of these individuals in the province. It is considered a residential care unit, and therefore minimal acute care therapies are provided on site. In the event a resident experiences an acute exacerbation of illness, they are treated at the closest tertiary level hospital.

In this review all ED visits and hospital admissions of CCI individuals living in the residential care facility were included. Any acute care visit that was planned or scheduled (e.g., routine appointments for regular tracheostomy change or scheduled diagnostic imaging appointments) was excluded.

Data Collection

Medical charts were identified using the Fraser Health Meditech system. One research team member collected data from the medical charts using standardized data extraction forms to allow for data consistency.

Demographic data of all residents who visited the hospital, inclusive of age, gender, primary diagnosis leading to ventilation and admission to the residential care facility, comorbidities, and advance care directives was collected. For each ED visit or acute care readmission encounter, the

type of visit, presenting signs and symptoms or chief complaint that initiated the transfer to acute care, admission diagnosis where applicable, care provided during the acute care visit (e.g., medications, laboratory testing, diagnostic imagining, allied health services [e.g., physiotherapy, occupational health, social work, dietary], and others), length of stay, and hospital unit to which the resident was admitted was identified.

Data Analysis

Descriptive statistics was used to summarize patient demographics, the type of acute care encounter, and the care provided during their hospitalization. It was not possible conduct inferential statistics because of the small sample size.

RESULTS

Resident Demographics

From August 2014 to August 2016 a total of 26 individuals lived in the residential care facility, of which, 20 had an ED visit or an acute care admission. Of the 20 resident charts reviewed, 65% were male, and 35% were female, who ranged in age from 25 to 85 years. The majority had an underlying neurological injury (45%) or amyotrophic lateral sclerosis (ALS; 40%) as an underlying primary diagnosis and rationale for their CCI, ventilated state. The majority also had additional complex chronic conditions, and advanced care directives indicating the desire for full care including critical care and cardiopulmonary resuscitation (see Table 1). All residents had invasive devices, including a tracheostomy and gastric feeding tube.

Acute Care Encounters

There were a total of 105 acute care encounters, of which 49 were ED visits and 56 were acute care admissions. The most common presenting symptoms that initiated the need for transfer from residential care to acute care included: signs of sepsis (including change in vital signs, altered level of consciousness or change in resident behavior), and new or worsening respiratory symptoms (see Table 2). The leading admitting diagnoses were: (a) pneumonia, (b) urinary tract infection, and (c) sepsis—source unspecified. During the acute care encounter the majority of residents underwent blood work and medical imagining, and new medications were prescribed regardless of admission to hospital or return to residential care. Of the 56 admissions, all were admitted to critical care areas (54 admitted to the high acuity unit, 2 admitted to the intensive care unit) due to the specialized ventilator care required. The length of stay for the 56 admissions ranged from 1 to 73 days, with a mean length of stay of 12.9 days, resulting in a total of 725 acute care days.

DISCUSSION

The results of this review served to validate the high degree of complexity, vulnerability, and requirement for specialized ongoing invasive care, including tracheostomies, feeding tubes, and catheters that put this specialized group at a greater risk than the average residential care patient. Of particular note, is that all participants of this study had tracheostomies and gastric feeding tubes. Infectious illness, whether pneumonia, urinary tract infection, or sepsis, was identified as the main reason for the CCI ventilated patient to require an unplanned ED visitor acute care admission. These results were largely consistent with the findings in the generalized residential care population (Bowman et al., 2001; Canadian Foundation for Healthcare Improvement [CFHI], n.d.; ElBestawi & Kohm, 2018; Finn et al., 2006; Graverholt et al., 2011; Ouslander et al., 2014).

Understanding the rationale for acute care usage among this patient group will allow strategies to be employed to help improve early recognition of illness, implement treatment sooner, and decrease the overall usage of acute care where appropriate. This will serve not only to improve the care and experience of the CCI resident, but it will also aide in improving resource utilization. There are substantial financial costs associated with acute care visits, in addition to the emotional and physical impact the transfer has on the resident and family (BC Government, 2017;

TABLE 1. Participant Demographic Data (*n* = 20)

Age	Range	25–85 years
	Mean	63 years
	Median	68 years
Gender	Male	65%
	Female	35%
Primary Diagnosis (reason for admission to Maple House)	Neurological injury	9 (45%)
	Amyotrophic Lateral Sclerosis	8 (40%)
	Muscular disorders	2 (10%)
	Chronic Obstructive Pulmonary Disease	1 (5%)
Additional Co-morbid conditions	Cardiovascular conditions	10 (50%)
	No other past history	4 (20%)
	Gastrointestinal / Genitourinary conditions	3 (15%)
	Respiratory conditions	1 (5%)
	Diabetes	1 (5%)
	Other	1 (5%)
Advance Care Directives	Full Care including CPR	9 (45%)
	DNR (no CPR but will accept critical care)	8 (40%)
	DNR with medical management only	2 (10%)
	DNR with medical management within the current facility only (transfer to higher level of care)	1 (5%)

TABLE 2. Acute Care Encounters

Variable by encounters (Total encounters = 105)		**Admission Type**		**Total**
		ED Visit	**Read-mission**	
Primary diagnosis	Amyotrophic lateral sclerosis	17(16.1%)	24 (23%)	41 (39.1%)
	Neurological Injury	17 (16.1%)	22(21%)	39 (37.1%)
	Muscular Disorders	10 (9.5%)	8 (7.6%)	18 (17.1%)
	Chronic Obstructive Pulmonary Disease	5 (4.8%)	2 (1.9%)	7 (6.7%)
	Total	49 (46.5%)	56 (53.5%)	105
Admitting diagnosis	Pneumonia	3 (2.8%)	28 (26.8%)	31 (29.6%)
	Urinary tract infection	2 (1.9%)	15 (14.3%)	17 (16.2%)
	Sepsis	3 (2.8%)	8 (7.6%)	11 (10.4%)
	Gastrointestinal / Genitourinary	2(1.9%)	5 (4.8%)	7 (6.7%)
	Not Specified / ED visit only	39 (37.1%)	0 (0)	39 (37.1%)
	Total	49 (46.5%)	56 (53.5%)	105
Presenting signs and symptoms	Signs of sepsis	11 (10.4%)	24 (23%)	35 (33.4%)
	Respiratory symptoms	13 (12.4%)	20 (19%)	33 (31.4%)
	Gastrointestinal / Genitourinary	4 (3.8%)	4 (3.8%)	8 (7.6%)
	Symptoms	9 (8.5%)	1 (1.9%)	10 (10.4%)
	Equipment related issues	12 (11.4%)	7 (6.7%)	19 (18.1%)
	Total	49 (46.5%)	56 (53.5%)	105

(*Continued*)

TABLE 2. Acute Care Encounters (*Continued*)

Variable by encounters (Total encounters = 105)		Admission Type		Total
		ED Visit	Readmission	
Hospital Length of Stay (Total acute care days: 725)	0 days admitted (ED only)	49 (46.5%)	0	49 (46.5%)
	1–7 days	0	24 (23%)	24 (23%)
	8–14 days	0	17 (16.1%)	17 (16.1%)
	15–73 days	0	15 (14.4%)	15 (14.4%)
	Total	49 (46.5%)	56 (53.5%)	105
Acute care admissions	High Acuity Unit	N/A	54 (96.4%)	54 (96.4%)
	Intensive Care Unit	N/A	2 (3.6%)	2 (3.6%)
	Total	N/A	56	56
Care Provided (blood tests) during acute care encounter	No blood tests	9 (8.5%)	0	9 (8.5%)
	Blood tests	40 (38%)	56 (53.5%)	96 (91.5%)
	Total	49 (46.5%)	56 (53.5%)	105
Care Provided (medical imaging) during acute care encounter	No medical imaging	18 (17.2%)	1 (1.9%)	19 (19.1%)
	Medical imaging (x-rays, etc.)	31 (29.3%)	55 (52.6%)	86 (81.9%)
	Total	49 (46.5%)	56 (53.5%)	105
Care Provided (medications) during acute care encounter	No medications given	36 (34.2%)	0	36 (34.2%)
	Medications	13 (12.3)	56 (53.5%)	69 (65.8%)
	Total	49 (46.5%)	56 (53.5%)	105
Care Provided (other) during acute care encounter	No other treatments	41 (39%)	3 (2.9%)	44 (41.9%)
	Intravenous Fluids	2 (1.9%)	42 (40%)	44 (41.9%)
	Equipment change /repair	2 (1.9%)	0 (0)	2 (1.9%)
	Other	4 (3.7%)	11 (10.5%)	15 (14.2%)
	Total	49 (46.5%)	56 (53.5%)	105
Allied health service provided	No allied health	49 (46.5%)	12 (11.4%)	61 (57.9%)
	Full Critical care referral	0	38 (36.3%)	38 (36.3%)
	Single allied health referral	0	6 (5.8%)	6 (5.8%)
	Total	49 (46.5%)	56 (53.5%)	105

O'Neill et al., 2015). Through enhancing the understanding for acute care usage, mechanisms for earlier recognition of deteriorations can be implemented will help to facilitate timely implementation of treatment, decrease acute care usage (either through decreased number of acute care encounters or through decreased length of stay in acute care when required; CFHI, n.d.; ElBestawi & Kohm, 2018; O'Neill et al., 2015; Ouslander et al., 2014). Additional research needs to be conducted in the future to gain a more wholesome understanding of the effectiveness of potential strategies, and also to better understand the expectations and experiences of these residents.

STUDY LIMITATIONS

Although the population studied represents one of the largest cohorts of CCI patient populations in the province, it was still a relatively small population. Due to the unique characteristics of this population a convenience purposive sample was used. The results cannot be generalized to the CCI ventilated population living independently in the community without further research. The sample size also proved to be a limitation preventing the use of a univariate logistic regression analysis that was originally planned to evaluate the relationship between the presenting symptoms, primary diagnosis, and outcomes.

CONCLUSION

In summary, this study has provided insight into the rationale for acute care usage by the CCI ventilated residential care population. With this improved understanding, strategies for improving the recognition of pneumonia, urinary tract infections, and other sepsis syndromes can be implemented to improve care.

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