

ORIGINAL ARTICLES

Defining potentially preventable emergency department visits for older adults

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ABSTRACT

Objective: As older adults become increasingly reliant on emergency departments (EDs) for care, there is an interest in determining what types of ED visits by this population may be preventable, or amenable to other forms of care. The aim of this project was to explore the concept of preventable ED visits by older adults.

Methods: We conducted a literature search to identify definitions of “preventable” or “avoidable” ED visits. We then applied a definition of preventable ED visits to an administrative data set consisting of ED visit data extracted from four sites in Halifax, Nova Scotia, Canada. Visits for patients 65 years of age or older were eligible for inclusion. Visits were categorized using triage level and discharge diagnosis.

Results: Four methods of defining preventable ED visits were identified in our literature search: 1) Ambulatory Care Sensitive Conditions (ACSCs) (N = 7), 2) Low Acuity/low intensity visits (N = 5), 3) New York University (NYU) (Billings) Algorithm (N = 3) and 4) hospital admission vs. non-admission (N = 1). We categorized 34,454 ED visits from our dataset using a modified definition of preventable ED visits that included ACSCs (15.3%) as well as low acuity visits that required no testing or hospital admission (9.9%).

Conclusions: Our results suggest that approximately 25% of ED visits by older adults may be preventable or amenable to other forms of care. This data may be useful in the planning of care delivery appropriate for the needs of this population.

Key Words: Older adults, Health services, Primary care, Emergency care

1. INTRODUCTION

Older adults are increasingly reliant on the emergency department (ED) to provide health care.^[1-3] However, the evidence suggests that the ED is not always the best place to provide care to this vulnerable population. The single-problem, goal-directed model of care delivery in the ED is not suited to the complex needs of older adults who often require comprehensive evaluation and follow-up for ongoing medical issues.^[1] Illness complexity and comorbidities that are common in this population can represent a challenge for ED

care providers, increasing the strain on an already stressed and overcrowded system.^[4,5] Increased ED use by older adults can also be viewed as an important patient safety issue. Prolonged lengths of stay may expose older adults to an increased risk of adverse events in the ED related to delayed diagnosis and medication errors.^[6]

Establishing a definition of preventable ED visits for the older adult population is an important step in identifying populations presenting with complaints amenable to care more suited to their specific needs. Currently there is no widely

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accepted definition of ED visits for older adults that may be amenable to primary care or other forms of care. The goal of this two-part study was to explore the concept of “preventable” ED visits by 1) seeking a common definition of “preventable” ED visits for older adults through a search of the relevant literature, and 2) applying a selected definition of preventable ED visits to our own administrative data set.

2. METHODS

2.1 Literature search

A search of the literature was conducted to find studies that employed a specific definition of “preventable” or “avoidable” ED visits, either for older adults or the general population. The search was originally conducted in August of 2014 and was updated in May of 2016 to include more recent articles. A summary of the search strategy and selection of articles is presented in Figure 1. Search terms encompassed the concepts of “older adults”, “emergency department care” and “preventable”. Multiple synonymous terms for these concepts were used to develop the search strategy for each database. To increase the comprehensiveness of the literature search we also included in the selection PubMed articles found to be related to two known established papers on preventable ED visits for older adults.

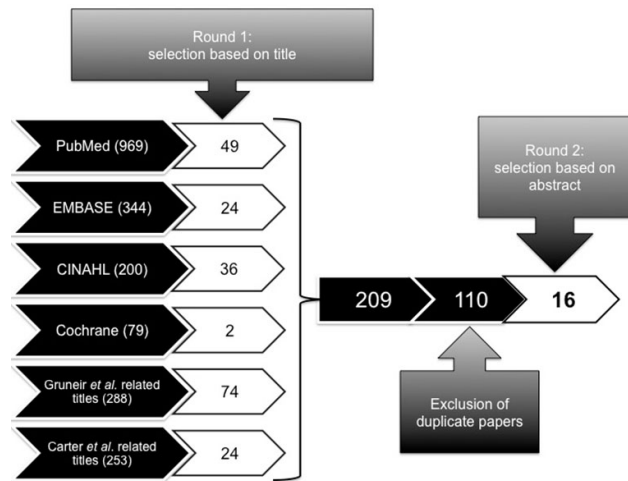


Figure 1. Flow chart describing the search strategy and selection of articles

Articles were selected in consecutive rounds of review on the basis of two main search criteria:

- (1) Use of a strategy to define “preventable” or “avoidable” ED visits
- (2) The application of this strategy to our population of interest (older adults)

Two rounds of selection were conducted. The first was based on title alone. Duplicate publications were then eliminated.

The second round of selection was based on extracted abstracts (or full text articles where required) to determine if the selection criteria described above were satisfied. Publications were excluded if they related only to a disease-specific subset of the older adult population (e.g. older adults with congestive heart failure), if the focus of the paper was on avoidable hospital admissions rather than avoidable ED visits, or if no explicit definition of preventable ED visits was provided in the text.

2.2 Application of the definition

2.2.1 Proposed definition of “preventable” ED visits for older adults

Following our literature review, we selected a definition of preventable ED visits for our patient population to apply to our dataset. This definition, which was modified from Gruneir et al, 2010^[18] categorized ED visits as preventable: 1) ACSC visits or 2) low acuity (Canadian triage and acuity scale (CTAS) 4 and 5) visits not requiring admission to hospital or investigations unavailable through primary care. Visits that did not fit either of these criteria were categorized as 3) all other visits/non-preventable. Visits were categorized using triage level and discharge diagnosis (WHO International Classification of Diseases (ICD) coding).^[26] Visits that could be classified as either 1 or 2 were classified as type 1 (i.e., potentially preventable). We chose this definition as it encompassed elements of the two most common approaches to defining potentially preventable ED visits from our literature review.

2.2.2 Data and analysis

Our data set included administrative ED visit data from four sites within the Capital District Health Authority (CDHA) in Nova Scotia, Canada. Sites included a tertiary care hospital, two community hospitals and a community health centre. The CDHA Research Ethics Board approved this study.

Clinical and demographic data from all study sites were extracted from the Emergency Department Information System (EDIS), which electronically captures real-time information on ED visits. Patient transfers from one facility to another are treated as separate events by this system. Visits for patients 65 years-of-age or older from any of the four study sites between April 1, 2012 and March 31, 2013 were eligible for inclusion in the analysis. Multiple visits may have been attributable to one patient during the study period. ED diagnoses were coded in both ICD-9-CM and ICD-10-CA formats. The closest matching categories for ICD-9-CM and ICD-10-CA codes were used to group ED visit diagnoses into major clinical categories and diagnostic clusters. These codes were also used to categorize the ED visits according to the definition of preventable ED visits described above.

All analyses were conducted using STATA statistical software (STATA Corp., College Station TX, Version 9). Visits were characterized using standard descriptive statistics. Standard deviations (SD) are shown where appropriate.

3. RESULTS

3.1 Literature search

Sixteen studies were identified that met our search criteria (see Table 1).^[17-22] Overall we found four common approaches used to define preventable ED visits: 1) Ambulatory Care Sensitive Conditions (ACSCs) (N = 7), 2) Low Acuity/low intensity visits (N = 5), 3) New York University (NYU)

(Billings) Algorithm (N = 3) and 4) hospital admission vs. non-admission (N = 1). Overall the proportion of preventable ED visits identified by these studies ranged from 5.7% to 74.2%.

ACSCs are generally defined as a set of conditions where appropriate ambulatory care prevents or reduces the need for admission to hospital (e.g. hypertension, chronic obstructive pulmonary disease etc.)^[23] One study used both ACSCs and a subset of low acuity visits to define preventable ED visits.^[18] The types of chronic conditions included in the definition of ACSCs varied among studies.

Table 1. Summary of articles identified in the literature search that defined preventable ED visits

Study (year of publication)	Population	Method of defining preventable ED visits	% of ED visits determined to be Preventable
Altmayer et al. (2005)	1-74 years	Low Acuity (CTAS 4,5)	7.20%
Brownell et al. (2014)	65 years and over (in long-term care)	ACSCs	19%
Burke et al. (2015)	65 years and over (in long-term care)	ED visits resulting in discharge (vs. admission)	53.5%
Carter et al. (2006)	65 years and over	ACSCs	~20%
Chan et al. (2013)	All age groups	NYU Algorithm	53%
Chen et al. (2015)	All age groups	NYU Algorithm	~ 25%
Chukmaitov et al. (2012)	All age groups	ACSCs	17.60%
Dowd et al. (2013)	All age groups	NYU Algorithm	~ 50%
Faulkner et al. (2015)	65 years and over	Low Acuity (ATS 4,5)	No % given
Fingar et al. (2015)	18 years and over	ACSCs	No % given
Freed et al. (2015)	All age groups	Low Acuity (Primary Care Type Presentations)	74.2%
Gruneir et al. (2010)	65 years and over (in long-term care)	ACSCs and Low Acuity (CTAS 4,5)	25%
Johnson et al. (2012)	18 years and over	ACSCs	8.40%
Shah et al. (2015)	65 years and over (in Senior Living Communities)	ACSCs	13.9%
Siminski et al. (2008)	All age groups	Low Acuity (Primary Care Type Presentations)	No % given
Wolinsky et al. (2008)	70 years and over	Low Acuity/ intensity (CPT codes)	5.7% low-intensity (of all Study Participants - not all ED users)

Notes. CTAS = Canadian Triage and Acuity Scale; ATS = Australasian Triage Scale; Current Procedural Terminology (CPT) codes corresponding to payment for low intensity of physician services, which could have been provided in alternative settings

Low acuity visits were a way to define preventable ED visits. Authors often use only a subset of low acuity visits to define preventable visits as in the case of “primary care-type presentations”^[17,21] which were defined as visits assessed as triage (Australasian triage scale [ATS]) category 4 or 5, but excluding patients who were admitted to the hospital from the ED, transported by ambulance, referred by a GP or treated in the ED for more than 12 hours.

The NYU algorithm was developed at the New York University Center for Health and Public Service Research. Based on a sample of 6000 full ED records, the algorithm classifies visits on the basis of discharge diagnosis as 1) non-emergent, 2) emergent/primary care treatable, 3) emergent – ED care needed – preventable/avoidable and 4) emergent – ED care needed – not preventable/avoidable.^[24,25]

ED visits resulting in discharge rather than admission was

used in one study examining preventable ED visits among elderly nursing home patients.^[9] Expectedly this method resulted in a high proportion of visits being classified as preventable (53.5%).

3.2 Application of the definition

There were 34,461 ED visits for patients 65 years-of-age and older during the study timeframe. Seven observations were excluded from the analysis because key demographic information (age, gender) was omitted or erroneous (N = 6), or because information on ED disposition was not available (N = 1). The total number of visits included in the analysis was 34,454. Demographics and patterns of ED use for this dataset have been described previously.^[27]

Categorization of these visits, based on our selected definition of potentially preventable ED visits as described above, is outlined in Figure 2. Based on this definition, up to 25% of ED visits by older adults may be amenable to other forms of care.

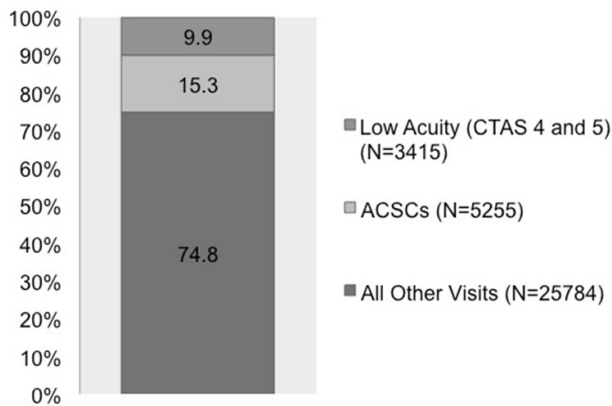


Figure 2. ED visits from administrative dataset categorized by visit type

Basic demographic and visit characteristics stratified by visit type are provided in Table 2. In brief, demographic parameters were similar across visit types. Visits by patients aged 85 years and older were less likely to be classified as preventable in either possible category. Visits classified as low acuity had a shorter mean length of stay and were less likely to involve arrival by ambulance.

The breakdown of ACSC conditions by diagnosis category is shown in Figure 3. The most common discharge diagnoses for visits of this type were cellulitis/skin infections (25.5%) followed by kidney infection (20.2%), chronic obstructive pulmonary disease (20.0%) and congestive heart failure (11.6%).

Table 2. Demographic and visit characteristics from the administrative dataset categorized by visit type

	Visit Type		
	ACSC	Low Acuity	Other
Sex			
Female	55.2%	53.2%	54.8%
Male	44.8%	46.8%	45.2%
Age Group			
65 to 75	45.3%	57.28	45.7%
75 to 84	36.7%	32.7%	35.0%
85+	18.0%	10.0%	19.3%
Mean Age (years)	76.4 (SD 7.9)	74.3 (SD 7.3)	76.6 (SD 8.2)
Mean Length of Stay (hrs)	8.3 (SD 9.5)	2.5 (SD 3.6)	8.3 (SD 9.8)
Time of Visit			
Weekday	69.4%	68.8%	72.8%
Weekend	30.6%	31.2%	27.2%
Mode of arrival			
Ambulance	31.3%	6.9%	36.0%
Friend or Relative	42.2%	46.3%	43.1%
Self	25.7%	45.4%	20.0%
Other	0.8%	1.5%	0.7%
Life Flight	0	0	0.2%

Notes: SD = standard deviation

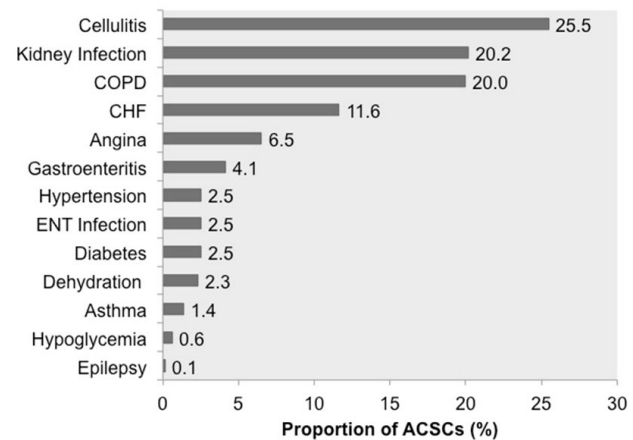


Figure 3. ACSC ED visits from administrative dataset stratified by discharge diagnosis category; COPD = chronic obstructive pulmonary disease; CHF = congestive heart failure; ENT = ear, nose and throat

4. DISCUSSION

We explored the concept of preventable ED visits by older adults through a literature search, as well as an application of a definition of preventable visits to an administrative dataset.

With respect to our literature search, we found that there are generally four ways in which preventable ED visits are defined in the current literature: 1) Ambulatory Care Sensitive Conditions (ACSCs), 2) Low Acuity/low intensity visits, 3) NYU (Billings) Algorithm and 4) hospital admission vs. non-admission.

The use of ACSCs was the most popular approach to defining preventable ED visits in our study. The rate of hospitalization for ACSCs is a widely used and validated quality indicator for access to care in the older adult population.^[28,29] The conventional definition of ACSCs has not been validated for ED visits, however it may serve as an indicator for conditions that are treatable at the level of primary care. While ACSCs are generally defined as chronic conditions that may be addressed at the level of primary care, the types of conditions included in the definition of ACSCs varied by study, an important limitation when attempting to reach a consensus definition for preventable visits. Additionally, the ACSC definition does not capture other diagnoses such as injuries and falls, which are commonly felt to be potentially preventable in the older adult population.^[30]

Low acuity was also a common method of defining preventable ED visits in our search. This method can be easily applied to administrative data as triage information is consistently captured for these datasets. While simple it is important to note that low acuity was defined by country-specific triage systems (CTAS, ATC) which differ in their criteria. Importantly, acuity assessed at triage may not be the best way to define preventable ED visits in the older adult population. Many conditions may present atypically or insidiously in older adults compared with younger populations. Older patients may be assessed as lower acuity for complaints that turn out to be much more serious. Furthermore, some low acuity complaints may require procedures such as laceration repair, or casting not available outside of a tertiary centre. More generally, it is important to acknowledge that historically low acuity ED visits have been used as a proxy for “inappropriate” care, suggesting wastefulness or abuse of the system by the patient. It is worth noting that Canadian research has demonstrated that low acuity visits do not significantly contribute to acute-care resource use, and are considered an inappropriate surrogate marker for preventable ED care.^[31,32] There is a concern that defining preventable or avoidable ED visits in terms of acuity will lead to unwarranted refusal of care for patients who indeed require hospital treatment. The use of a subset of low acuity visits as an indicator - visits not requiring admission or hospital-based testing, for example – may be a more appropriate approach.

The NYU or Billings algorithm was developed by John Billings and colleagues at the New York University Center for Health and Public Service Research. The classification system is based on a sample of 6000 ED records for which an expert panel determined the proportion of visits for various discharge diagnosis codes that were preventable or avoidable following review of the full ED visit record. ED visits then classified as described above, with separate classifications

for visits related to alcohol, mental health, substance use and injury. While this approach is a thoughtful extension of the concept of ACSCs taking into account that not all visits for a particular condition may be preventable, it is complex to apply to administrative data relative to the other methods described. Furthermore, the external validity of an algorithm based on visits from a specific location for one period of time is somewhat questionable. For example, it is unclear how the proportions of preventable visits for specific conditions may change in the context of different geographic locations with differing demographic characteristics and differing systems for health care delivery.

Lastly, visits not requiring hospital admission (vs. those that did) was a method used by one study in our literature search. Arguably the most simplistic approach to classifying preventable ED visits, it is certainly not as selective as other methods and resulted in a high proportion of visits classified as preventable. This approach is likely not applicable to community dwelling older adults as all ED visits resulting in discharge would not be considered by many to be potentially preventable based on our review of the literature on this topic.

Future directions

While the proportion of preventable ED visits varied considerably among the studies included in our analysis, our finding that 25% of ED visits by older adults may be preventable is consistent with many studies identified in our literature search. Our analysis also demonstrated the feasibility of applying such a definition to an administrative dataset containing commonly extracted variables. The proportion of preventable ED visits for older adults may be used as a metric for access to quality care if followed over time. Characterizing preventable ED visits for the older adult population may also be useful for the planning of alternative modes of care. For example, visits for chronic conditions may be reduced by community-level interventions targeted to specific diagnosis or populations of older adults.^[33–35]

Future study may further explore and validate a definition of preventable ED visits for older adults that accounts for the shortcomings of the approaches described in this study. The development of an algorithm like the NYU/Billings algorithm, but applied specifically to the older adult population may also be a useful area for future study. A more clear understanding of why older adults access emergency care may also be helpful, particularly determining the impact of limited access to primary care on ED visits in this population.

Beyond the limitations of the classification methods described above, our study had several additional limitations of

note. Many synonyms are used in the literature to describe preventable ED visits and hospitalizations in different populations. It is possible that despite our best efforts to use encompassing search terms that some studies were missed in our literature search. Within our dataset, discharge diagnoses were not uncommonly listed as non-specific (26% of total diagnoses). As we could not accurately categorize these visits it is likely that our findings underestimate the proportion of ACSC visits, and therefore the total proportion of ED visits in our data set that may be preventable. Lastly, It is important to acknowledge that “preventability” is dependent on multiple factors, many of which are not commonly accounted for in our dataset, such as rapidity of onset of illness or presence of multiple comorbid conditions. The concept of “preventability” also assumes adequate access to primary care or other modes of care, which is not always available. We advocate for the use of such definitions of preventable ED visits in the planning of alternative, more appropriate and perhaps safer modes of care for older adults, and not as a means to deny or restrict access to needed health care for this vulnerable population.

5. CONCLUSIONS

Our study demonstrates that there are several definitions of preventable ED visits applied to older adult populations in the literature. Our finding that up to 25% of older adult ED visits in our dataset may be preventable is consistent with other studies identified in our literature search, and demonstrates the applicability of identified definitions to administrative data. While there remains no standardized definition of preventable ED visits for older adults exploring this concept as it has been presented in the literature is a first step. Quantifying and characterizing visits that are potentially amenable to other forms of care may be used both as a metric for access to quality health care in older adult populations, and as a tool to target future interventions involving improved or alternative care options.

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CONFLICTS OF INTEREST DISCLOSURE

The authors declare no conflicts of interest.

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