RESEARCH PAPER

Characteristics of older people with cognitive impairment attending emergency departments: A descriptive study

Linda M. Schnitker, PhD\textsuperscript{a,b,*}  
Elizabeth R.A. Beattie, PhD\textsuperscript{a}  
Melinda Martin-Khan, PhD\textsuperscript{b,c}  
Ellen Burkett, MBBS\textsuperscript{b,d}  
Leonard C. Gray, MD, PhD\textsuperscript{b,c}

\textsuperscript{a} School of Nursing, Queensland University of Technology, Brisbane, Australia  
\textsuperscript{b} The Centre for Research in Geriatric Medicine, The University of Queensland, Brisbane, Australia  
\textsuperscript{c} Centre for Online Health, The University of Queensland, Brisbane, Australia  
\textsuperscript{d} Department of Emergency Medicine, Princess Alexandra Hospital, Brisbane, Australia

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Summary  
Objective: The objective of this paper is to describe the profile of older people with cognitive impairment (CI) presenting to emergency departments (EDs).  
Methods: This was a multi-centre (n = 8) observational study of a convenience sample of older (≥70y) ED patients (n = 579). Participants were prospectively assessed for CI and surveyed for the duration of their ED stay (n = 191). A picture of patients' health status and ED responses to care needs was obtained through application of standardised assessment tools. Additionally, observations of care processes in ED were undertaken. Demographic data were collected through both ED's information system and survey. Outcome data were collected 28 days post-ED visit using follow-up telephone interviews.  
Results: Of 579 older persons, 191 (33%) persons met criteria for CI. The majority of older ED patients with CI in ED lived in the community (157/177, 88.7%), arrived by ambulance (116/172, 67%), were accompanied by a support person (94/149, 63%), were triaged as urgent to semi-urgent (157/191, 82%), and were hospitalised (108/172, 57%). The median ED length of stay was 6 h. In ED, 53% of the sample experienced pain (92/173). Older ED patients with CI pose the following characteristics: prior hospital admissions (43/129, 33%), incontinence (61/178, 34%),

* Corresponding author at: School of Nursing, Queensland University of Technology, Brisbane, Australia. Tel.: +61 731383840.  
E-mail address: linda.schnitker@qut.edu.au (L.M. Schnitker).

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What is known

- There is little known about the older ED population with CI.

What this paper adds?

- We examined the characteristics of this population while in ED.
- We found that this population has several risk factors for adverse events and outcomes.
- Understanding of these characteristics allows tailoring of care that suits their needs.

Introduction

The care of older people in emergency departments (EDs) has had greater attention in recent years.1–3 Older ED patients have worse health outcomes and are at increased risk of adverse events during their ED stay, including undertriage of illness severity, lack of recognition of geriatric syndromes, and adverse medication-related events.5 Compared with older ED patients without cognitive issues, there is evidence that those with cognitive impairment (CI) are at further increased risk of negative outcomes and adverse events when presenting to EDs.7–10 As the population ages there will be ongoing and increasing use of the ED by older adults. Therefore it is timely that consideration is given to those older people with CI who are seeking care in EDs.

Three literature reviews each found a paucity of research specific to the cognitively impaired older ED population.11–13 Several recommendations, targeting ED’s physical layout, modifications of care delivery, and staff education, have been reported to improve the ED experience and outcomes of seniors with CI and their families.3,11,14

Establishing or refining specific ED services and robust care delivery protocols relevant to the clinical care of this at-risk ED population first requires a good understanding of their presenting features and needs. Yet there is little knowledge regarding the characteristics of older ED patients with CI. A parent study ‘developing a suite of quality indicators to support quality of care for older people with cognitive impairment in EDs”15–17 created the opportunity to outline the characteristics of older persons with CI presenting to EDs. A significant phase in this parent study was to collect data on initially established quality indicators for the care of older persons in ED targeting a range of clinical care domains. Thus the objective of this sub-study is a secondary analysis using variables collected in the parent study to describe profiles of older people with CI in EDs (e.g. demographics, comorbidities, reason for ED presentation, outcomes).

Methods

Study design and setting

This was a multi-centre descriptive cohort sub-study. Persons aged 70 years and over who presented to the EDs of eight Australian hospitals in the time period between May 2012 and February 2013 were recruited and surveyed over the duration of their ED stay. The hospitals included four teaching hospitals (i.e. major trauma services) and four major community hospitals (i.e. regional trauma services). Hospitals were based in two eastern Australian states (five hospitals in Queensland, two hospitals in Victoria) and one Australian territory (one hospital in Australian Capital Territory). Data obtained from those older people identified prospectively by researchers as having CI were analysed in this sub-study.

Ethical approval

Prior to commencement, ethical approval was obtained from the ethics committee of The University of Queensland (approval no. 201200631) and from each hospital’s Human Research Ethics Committee.

Selection of participants

All patients aged 70 years and over who presented to one of the participating ED sites during working hours (Monday to Friday 8am to 5pm) and did not meet any of the exclusion criteria were eligible for enrolment in the main study. The hours of enrolment were chosen on convenience basis due to availability of research nurses at this time. Informed written consent was gained either from the individual or the person legally responsible for the patient’s health matters. Patients were excluded if:

1. They were present in the ED for two or more hours prior to a research nurse being available. Data needed to be collected measuring the health status of the patients for the duration of the ED episode and if the patient had been already been in ED for more than 2 hours prior to consent the health status may have changed significantly over this time (e.g. pain, delirium),

2. They had an acute illness of such severity that their condition prevented research staff from gaining informed consent,
3. They had already been recruited to the study on a previous ED visit,
4. Research nurses could not arrange an interpreter in a suitable time-frame.

After consenting, all study participants underwent cognitive screening, using the Orientation Memory Concentration Test (OMCT), a cognitive screener that tests for orientation (questions regarding time, memory (asked to remember an address), and concentration (count backwards and months in reverse order).\(^\text{18}\) Those identified as having CI (i.e. inclusion criteria) were counted in for further analysis in this sub-study. The OMCT was chosen as it has been validated in the ED setting\(^\text{19}\) and has, compared to other short screening tests, more optimal psychometric properties.\(^\text{12}\) For delirium recognition, the interRAI Delirium Screen was applied. This tool screens for delirium symptoms. This tool was chosen as it is imbedded in a standardised comprehensive geriatric assessment\(^\text{20}\) and has previously shown optimal psychometric properties.\(^\text{21}\) It screens for acute change in mental status and a change in cognition across a day. Patients were identified as having CI if they met the cut-off point for impairment on one of the applied formal tests (OMCT or the interRAI Delirium Screen) (Table 1) or if there was a formal prior diagnosis of chronically impaired cognition (including dementia or mild cognitive impairment).

### Data collection

Patient demographics were collected by accessing the ED’s electronic information system (EDIS), including age, gender, living status, mode of arrival, length of ED stay, departure destination, presenting complaint and assigned Australian Triage Scale (ATS) category (which describes the clinical urgency of the presentation in 5 numeric categories with 1 indicating the most urgent and 5 the least urgent presentation).\(^\text{22}\)

### Additional measures

The interRAI ED Tool\(^\text{23}\) that is based on a comprehensive geriatric assessment was used to obtain detailed information about each patient’s health status, assessing both the period prior to the onset of the ED presenting complaint (3 days pre-morbidly) and that at ED presentation (current). Additional standardised tools were applied (Table 2). Where no standardised instrument existed a structured questionnaire was developed to collect any additional data determined to be of relevance. Research nurses employed all had emergency nursing backgrounds. The older person and/or his/her relative were interviewed and associated care processes observed (e.g. pressure ulcer interventions applied by ED staff) on a minimum of two occasions by our data collectors within the ED episode. To collect relevant data, shortly after recruitment a first interview (index interview) was carried out, and 2–3 h after the index interview (or just before ED departure) a second review was undertaken. A follow-up telephone interview was conducted to identify health outcomes and adverse events at 28 days.

Data was stored in a locked cabinet and electronically on a mainframe drive computer file at The University of Queensland.

### Statistical analyses

Where applicable, prevalence estimates were calculated as the proportion of people among those with a given characteristic (i.e. those with missing data were not included in the denominator). In describing characteristics with normal distributions, mean and standard deviation (SD) were used. If a variable was significantly skewed, non-parametric measures of central tendency (median and interquartile range (IQR)) were used. Statistical analyses were performed using SPSS IBM (version 22; SPSS, Inc., Chicago, IL).

### Results

Of 579 persons who participated in the parent study (field testing quality indicators), 191 (191/579, 33%) older persons met the defined criteria for CI (number of patients who scored positive on either one of the cognitive screening tools or had an established diagnosis of chronically impaired cognition). One hundred and forty-three persons (143/423, 34%) met the criteria for cognitive impairment using OMCT (423 persons completed the OMCT), of whom 137 (137/143, 96%) had minimal to moderate impairment (OMCT score 9–19) and 6 (6/143, 4%) had severe cognitive
impairment (OMCT score 20–28). Forty-one persons (41/384, 7%) met the criteria for delirium (384 completed the interRAI Delirium Screener). Twenty persons (20/360, 6%) had previously recognised cognitive impairment (a dementia diagnosis present in the list of medical disorders).

Table 3 shows demographic data of the study sample and reasons for ED presentation are summarised in Table 4.

### Comorbidities and medication use

Of the 120 persons from whom we collected data on pre-morbid medical conditions, we found that the comorbidities ranged from 0 to 12 in this group. Six percent of the older ED patients with CI had no (1/120) or one comorbid condition (7/120). The median number of pre-morbid diseases was 4.0 (IQR = 3–6, range 0–12). We also collected data on medication use (number of drugs prior to the ED presentation) and found that of the 177 persons, 176 persons (176/177, 99%) used one or more types of drugs each day. The median number of drugs that was taken by this group was 7 (IQR = 4.5–8, range 0–19). Of the total group, 120 persons (120/181, 66%) were confirmed to be independently managing their medications, 61 persons (61/181, 34%) needed assistance in taking their medication, and this ranged from set-up help only to total dependence.

### Activities of daily living and mobility

Pre-morbidly, 81 persons (81/190, 43%) were dependent on support to carry out any of the following ADL tasks: bathing; personal hygiene; or dressing. Prior to the ED visit, 148 individuals (148/183, 81%) were independent in their mobility,
Table 3  Demographics of older ED patients with CI (N=191).

<table>
<thead>
<tr>
<th>Category</th>
<th>Frequencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean age (years)</td>
<td>82.6 (7.0, 29/191)</td>
</tr>
<tr>
<td>(mean (SD, range)/total)</td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>104/191 (54.5)</td>
</tr>
<tr>
<td>(n/total (%))</td>
<td></td>
</tr>
<tr>
<td>Residence</td>
<td></td>
</tr>
<tr>
<td>Community</td>
<td>157/177 (88.7)</td>
</tr>
<tr>
<td>Lives alone</td>
<td>66/155 (42.6)</td>
</tr>
<tr>
<td>RACF high care</td>
<td>5/177 (2.8)</td>
</tr>
<tr>
<td>RACF low care</td>
<td>8/177 (4.5)</td>
</tr>
<tr>
<td>RACF unknown level</td>
<td>7/177 (4.0)</td>
</tr>
<tr>
<td>Mode of arrival</td>
<td></td>
</tr>
<tr>
<td>Ambulance</td>
<td>116/172 (67.4)</td>
</tr>
<tr>
<td>Private vehicle</td>
<td>53/172 (30.8)</td>
</tr>
<tr>
<td>Othera</td>
<td>3 (1.7)</td>
</tr>
<tr>
<td>Triage level (ATS)</td>
<td></td>
</tr>
<tr>
<td>Level 2</td>
<td>28 (14.7)</td>
</tr>
<tr>
<td>Level 3</td>
<td>121 (63.4)</td>
</tr>
<tr>
<td>Level 4</td>
<td>36 (18.8)</td>
</tr>
<tr>
<td>Level 5</td>
<td>6 (3.1)</td>
</tr>
<tr>
<td>ED length of stay (hours)</td>
<td>6 (4–8, 1–33)/191 (IQR, range)</td>
</tr>
<tr>
<td>Disposition</td>
<td></td>
</tr>
<tr>
<td>Discharged</td>
<td>55/172 (32)</td>
</tr>
<tr>
<td>Hospital admission</td>
<td>108/172 (56.5)</td>
</tr>
<tr>
<td>Otherb</td>
<td>9/172 (5.3)</td>
</tr>
</tbody>
</table>

ATS, Australasian Triage Scale; RACF, Residential Aged Care Facility.

a Public transport/arrived from medical clinic.
b Transferred to another facility/did not wait.

While during the ED visit, 109 persons (109/179, 60%) were autonomous in movement. We appraised the medical record of 121 patients and found that a mobility assessment (such as ‘timed up and go test’) was undertaken in 15 cases (15/121, 12%). In the three days prior to the ED visit, 30 people (30/145, 21%) had a fall incident. We prospectively determined falls risk for 119 persons. The Falls Risk for Older People in the Community (FROP-Com) Screen scores found that of the 119 persons, 76 (76/119, 64%) had a low risk and 43 (43/119, 36%) had a high risk for future falls. Three patients (3/187, 2%) experienced a fall incident during their ED episode of care.

Bladder/bowel

Prior to the onset of the acute illness, 61 people reported bladder or bowel control problems (61/178, 34%) of whom 44 (44/178, 72%) had urinary incontinence, six persons (6/61, 10%) had issues in the voluntary excretion of bowel contents, and 11 (11/61, 18%) experienced both (doubly incontinent). Sixty-six persons (66/165, 40%) required assistance with toileting during their ED presentation of whom 12 (12/66, 18%) needed maximal assistance or were totally dependent. Eight persons (8/175, 5%) experienced a urine catheter insertion during their ED episode of care.

Pain

In 77 persons (77/173, 45%), pain was a contributing factor to the decision to come to ED. A total of 92 persons (92/173, 53%) declared that they experienced pain in ED. Of those, 61 (61/92, 66%) had a new episode of pain, 23 (23/92, 25%) had worsening of chronic pain, and 8 persons (8/92, 9%) had chronic pain with no acute exacerbation. Using the Numeric Rating Scale (NRS), pain was verbalised as moderate to excruciating in 72 cases (72/92, 78%). Except for four cases, 133 older persons with mild to moderate cognitive impairment (n=137) rated their pain using NRS. Five of six persons with severe cognitive impairment ranked their pain using this scale. The Pain Assessment in Advanced Dementia (PAINd) scale, an observational pain scale, was also applied by researchers and results found that 36 persons (36/188, 19%) of the total sample exhibited pain behavioural symptoms during the ED visit. ED staff assessed the patient’s pain levels in 149 cases (149/187, 80%) prior to the first interview by our research nurse and in 106 cases (106/189, 56%) prior to the second interview. For those who experienced pain (measured using the Verbal Numeric Rating Scale), 43 persons (43/92, 47%) did not receive analgesia during their stay in ED (nor was there an explanation why pain treatment was not offered).

Pressure ulcer

Six persons (6/72, 8%) presented to the ED with a pressure ulcer (PU). The PUs were staged according to the National Pressure Ulcer Advisory Panel. One person had a PU categorised as stage 2 to un-stageable (i.e. evidence of an open skin) and five persons had observed areas of persistent redness (stage one). There was evidence in the medical record that the ED provider performed a PU risk assessment in 31 cases (31/122, 25%). Where performed, risk assessment was commonly carried out by applying a formal PU risk tool (25/31, 81%). Our research nurse was able to collect...
variables to calculate the Waterlow score (25) on 46 persons and found that not a single person had ‘no risk’ for pressure areas. Of the persons at risk for developing pressure sores (n = 46), 14 persons (14/46, 30%) were ‘at risk’, 18 (18/46, 39%) were ‘high risk’ and 14 persons (14/46, 30%) were at ‘very high risk’. Pressure reducing mattresses were used with four patients (4/173, 2.3%).

Hydration

Seventy-three persons (73/182, 40%) experienced a noticeable decrease in the amount of food and fluid intake three days prior to the ED presentation. Weight loss (5% in the last 30 days or 10% or more in the last 180 days) was an issue in 37 patients (37/178, 21%). Pre-morbidly, 28 persons (28/186, 15%) required assistance in eating or drinking. We asked the patient or their support person whether the patient was offered a drink during the ED visit. No drink was offered in 60% of the cases (102/171); 21 of those were ‘nil by mouth’.

Support person

Fifty-five patients (55/149, 37%) did not have a support person present during their ED stay. Of those patients who had a carer available (n = 94), 29 support persons (29/73, 40%) expressed feeling overwhelmed or distressed by the illness of their relative. Of those four patients were sent home. Seventy-seven patients (77/156, 55%) had formally appointed someone to make health decisions for them if at a time they were unable to make those decisions for themselves.

Subjective rating of health

We asked the patient (or her/his support person) to grade their general health (i.e. before they were acutely ill) with five response alternatives ranging from excellent to poor (1–4), and ‘no answer’ (5). Self-rated health was recorded in 18 cases (18/180, 10%) as excellent, 94 (94/180, 52%) as good, 48 (48/180, 27%) as fair, 12 (12/180, 7%) as poor, while 8 (8/180, 4%) did not respond. In consideration of the current acute illness (resulting in presentation to the ED), 10 patients (10/183, 6%) scored their health as excellent, 62 (62/183, 34%) as good, 53 (53/183, 29%) as fair, 49 (49/183, 27%) as poor and 9 (9/183, 5%) did not respond.

Behavioural symptoms

Six persons (6/118, 3%) exhibited behavioural and psychological symptoms (yelling, agitation or aggression) during the ED episode of care. Management of disruptive behaviours by ED staff included verbal de-escalation, satisfying patient need (other than pain), and no response. No patients had physical restraint applied.

Factors which may be relevant to delirium prevention in ED

Of the 160 (160/172, 93%) persons who wore glasses in daily life (n = 160), 61 (61/160, 38%) did not bring their glasses to the ED, and in the ED cubicle, 19 persons (19/160, 12%) did not have their aids within reach. For the 44 (44/171, 26%) people who used hearing aids, 31 (31/44, 71%) did not bring their hearing support, and 2 (2/44, 5%) did not have them within reach. From the ED cubicle, daylight was visible in 29 (29/173, 17%) and a clock in 22 instances (22/173, 13%). In one case (1/153, 1%) a geriatrician was involved in the ED episode of care.

Other

During the first interview, 62 persons (62/177, 35%) did not have an identification band present. The nursing call button was not within reach of the patient in 75% (123/164) of the cases.

Outcomes

Health outcomes and adverse events 28 days post ED, experienced by those discharged home (n = 55), are presented in Table 5.

Discussion

To our knowledge, this is the only report of a systematic attempt to describe the characteristics of older ED patients who have CI (N = 191). The findings demonstrate that acutely sick older people with CI are predisposed to (interrelating) factors which may be associated with negative outcomes when presenting to EDs.

References to previous research concerning risk factors for adverse events and health outcomes

Cognitive impairment itself may make older persons prone to adverse events. For example, older persons with CI may be an unreliable source from whom to gain a comprehensive patient history, depending on the extent of their CI. Han and colleagues found that older persons with CI, especially those with delirium, have problems accurately stating their presenting complaint and understanding ED discharge information.20 In addition CI may contribute to the onset of delirium.31
Compared to their non-impaired peers, older persons with CI are recognised as being vulnerable in ED settings.\(^{9,10}\) Both the Identification of Seniors at Risk (ISAR) screening tool and the Triage Risk Screening Tool (TRST) include evidence of CI in older adults as a risk factor for adverse outcomes, such as ED representation, functional decline, hospitalisation, institutionalisation, and death post ED visit. We used the OMCT to screen for CI. Compared to other tests, to date, the OMCT, although not measured against the gold standard, has the most optimal psychometric properties (a sensitivity of 95% and a specificity of 65%) achieved in the older ED population.\(^ {19}\) Recently published geriatric emergency department guidelines developed by the American College of Emergency Physicians, American Geriatrics Society, Emergency Nurses Association, and the Society for Academic Emergency Medicine, indicate that the OMCT is a feasible tool for cognitive screening in ED.\(^ {35}\) Despite this, a study carried out by Shah found that of those persons identified as impaired in ED (N = 43) only 12% had evidence of CI at the two-week follow up.\(^ {36}\) One of the author’s explanations was the change in clinical state of patients when re-assessed in the home environment. An acute illness, unexpected transition from a familiar into a hectic and busy ED environment, the use of medications administered in ED, and uncertainty of future health outcomes may have an impact on cognitive function in older adults who present to EDs. This data goes someway to suggest that those testing positive for CI in ED require follow-up assessment.

In addition to evidence of CI, this ED population is unwell, which may further affect performance in everyday activities, has multiple co-morbidities, which of some are associated with CI,\(^ {34}\) and often uses multiple medications. These deficit accumulations mark older persons with CI as frail\(^ {35}\) and therefore more prone to adverse outcomes in ED.\(^ {36}\) However those who experience impaired mobility, incontinence, falls, and/or pressure ulcers have increased vulnerability to adverse outcomes.\(^ {37}\) Also ED overcrowding is associated with increased adverse outcomes.\(^ {38}\) The implication is that those with long ED stays are prone to adverse events and health outcomes\(^ {39,40}\) as compared to those staying shorter periods in ED. Likewise, although to our knowledge not validated in populations with CI, poor self-rated health is used as a predictor for adverse outcomes.\(^ {41}\) The results concerning health outcomes post 28 days ED visit demonstrate that nine ED re-presentations, one hospitalisation, and three fall incidents occurred in those persons with CI who were discharged home. However, this low prevalence, together with significant incomplete data for follow-up (>5%) precludes optimal analysis. There is previously published evidence that approximately 15% of non-impaired elders experience an ED re-presentation,\(^ {42-44}\) up to 14% are hospitalised,\(^ {36,44}\) and 1–2% die within one month after the ED visit.\(^ {36,45,46}\)

A multi-component delirium intervention has been reported to be effective in reducing the number and duration of delirium in hospitalised older adults.\(^ {46}\) This programme targets delirium risk factors, including CI, sleep deprivation, immobility, visual impairment, hearing impairment, and dehydration. While this specific intervention has not been evaluated in older ED patients, we found that in our sample, some risk factors, including visual impairment, hearing impairment and dehydration, were not optimally addressed in the ED setting, although this was not always within the control of ED staff (i.e. several patients forgot to bring their aids to ED). In addition, eight persons received urethral catheters, which is recognised as a risk factor for delirium.\(^ {31}\) Avoidance and shortened use of catheters in older persons is recognised as one of the elements of an effective multifactorial intervention strategy to prevent delirium\(^ {48}\); however, this was not measured in this study population.

**Limitations**

In this study, the lack of available data (missing data ranked from 0% to 62.3% for individual data items) resulted in lost information, weakened generalisability and limited the scope of analysis for determining (additional) important features of this ED population. The most common reason for missed data was that some patients only stayed for a short period of time in ED and therefore a second interview could not take place. As impaired cognition may impact on attention, memory, comprehending and producing language, behaviour, and decision making, the study participants (who had this problem) might have experienced difficulties in responding or accurately responding, especially for those who did not have a support person in ED (in our study 55 persons). This should be considered when interpreting the results. Furthermore the screening tools utilised for the identification of PUs and fall risks require the collection of multiple variables. For example we could only calculate these risks for 24% (for PU risk by completion of the Waterlow Pressure Ulcer Risk Assessment Tool) and 62.3% (fall risk by completion of the FROP-Com screening tool) of the study population. It may be that gathering patient information in a demanding ED environment, where this data is frequently incomplete,\(^ {39}\) is challenging for this ED population. Other than the FROP-Com,\(^ {40}\) clinical screening tools have not been evaluated using strong research methodology in older ED patients, which leave us unsure of their reliability or validity. Another limitation was the timing of data collection, which restricted the opportunity to look at this specific population as a whole (i.e. those presenting during the day and night).

**Improving patient care and outcomes**

The specific characteristics of this ED population found in this study may guide the identification of optimal practice of this increasing ED population. Best practice potentials for the care of this vulnerable population in the ED setting, some of which have been proposed by other authors,\(^ {1,12,32}\) are presented in Box 1. In ED, there was geriatric input in one patient only, while a geriatric assessment team would have accepted care of 108 patients who were subsequently admitted to the acute care setting. ‘Geriatricising’ our EDs will assist in meeting the special care needs of this population. These perceptions of optimal multi-disciplinary geriatric care, in which emergency nurses are key, are based mostly on face validity or research carried out in other health care settings; additional research is required for further definition of these concepts and whether these interventions are effective and efficient (e.g. intervention will be carried out

in a timely manner) in improving health outcomes of older ED patients with CI.

Conclusion

This study describes characteristics of older ED patients who have cognitive impairment. The ED population with cognitive impairment seems to possess several predisposing and precipitating risk factors for adverse events and health outcomes. Increased understanding of their specific care needs enables tailoring the quality of emergency care that better suits their needs (and the needs of their carers). Potential modifications in ED processes and ED structure are proposed but need further research to investigate whether these are effective and efficient.

Author contributions

All authors made a substantial contribution to conception and design of the study. LS was accountable for analysis and interpretation of the study data and primarily responsible for drafting the manuscript. EB, MMK and LG critically revised the manuscript. All authors gave final approval for submission of the paper.

Provenance and conflict of interest

None. This paper was not commissioned.

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