ORIGINAL CONTRIBUTION

Geriatric Syndromes Predict Postdischarge Outcomes Among Older Emergency Department Patients: Findings From the interRAI Multinational Emergency Department Study

Andrew P. Costa, PhD, John P. Hirdes, PhD, George A. Heckman, MD, MSc, Aparajit B. Dey, MD, Palmi V. Jonsson, MD, Prabha Lakhan, RN, PhD, Gunnar Ljunggren, MD, PhD, Katrin Singler, MD, MME, Fredrik Sjostrand, MD, PhD, Walter Swoboda, MD, Nathalie I.H. Wellens, PhD, and Leonard C. Gray, MD, PhD

Abstract

Objectives: Identifying older emergency department (ED) patients with clinical features associated with adverse postdischarge outcomes may lead to improved clinical reasoning and better targeting for preventative interventions. Previous studies have used single-country samples to identify limited sets of determinants for a limited number of proxy outcomes. The objective of this study was to identify and compare geriatric syndromes that influence the probability of postdischarge outcomes among older ED patients from a multinational context.

Methods: A multinational prospective cohort study of ED patients aged 75 years or older was conducted. A total of 13 ED sites from Australia, Belgium, Canada, Germany, Iceland, India, and Sweden participated. Patients who were expected to die within 24 hours or did not speak the native language were excluded. Of the 2,475 patients approached for inclusion, 2,282 (92.2%) were enrolled. Patients were assessed at ED admission with the interRAI ED Contact Assessment, a geriatric ED assessment. Outcomes were examined for patients admitted to a hospital ward (62.9%, n = 1,436) or discharged to a community setting (34.0%, n = 775) after an ED visit. Overall, 3% of patients were lost to follow-up. Hospital length of stay (LOS) and discharge to higher level of care was recorded for patients admitted to a hospital ward. Any ED or hospital use within 28 days of discharge was recorded for patients

discharged to a community setting. Unadjusted and adjusted odds ratios (ORs) were used to describe determinants using standard and multilevel logistic regression.

Results: A multi-country model including living alone (OR = 1.78, p ≤ 0.01), informal caregiver distress (OR = 1.69, p = 0.02), deficits in ambulation (OR = 1.94, p ≤ 0.01), poor self-report (OR = 1.84, p ≤ 0.01), and traumatic injury (OR = 2.18, p ≤ 0.01) best described older patients at risk of longer hospital lengths of stay. A model including recent ED visits (OR = 2.10, p ≤ 0.01), baseline functional impairment (OR = 1.68, p ≤ 0.01), and anhedonia (OR = 1.73, p ≤ 0.01) best described older patients at risk of proximate repeat hospital use. A sufficiently accurate and generalizable model to describe the risk of discharge to higher levels of care among admitted patients was not achieved.

Conclusions: Despite markedly different health care systems, the probability of long hospital lengths of stay and repeat hospital use among older ED patients is detectable at the multinational level with moderate accuracy. This study demonstrates the potential utility of incorporating common geriatric clinical features in routine clinical examination and disposition planning for older patients in EDs.

Geriatric syndromes are clinical conditions among older patients that have complex, multifactorial etiologies that often confound single-mode therapeutic approaches.[1] Such syndromes are common among older emergency department (ED) patients across nations and include cognitive impairment, delirium, impairments in performing basic activities of daily living (ADLs), falls, impaired comprehension, depression, frailty, malnutrition, and precarious informal care support.[2] The distinctive needs of older patients and the unique challenges they present to ED care are often defined by the presence of geriatric syndromes.[3–7] For example, functional decline is a common symptom that provokes ED presentation,[8] often the only presenting symptom for patients with serious underlying conditions,[8–10] the sequelae of acute injuries,[11–13] and a persistent challenge to efficient ED discharge. Despite their potential importance, geriatric syndromes often remain undiagnosed or unattended to in the ED.[10,14–20] For example, Carpenter et al.[14] found that fewer than 25% of ED physicians and 30% of nurses regularly evaluate older patients for common geriatric syndromes. ED crowding and lack of geriatric education have been implicated in the failure to detect or treat geriatric syndromes.[21,22]

Studies find that older patients in the ED are at a higher risk of adverse outcomes relative to younger patients, including death, functional decline, prolonged stays, the necessity for a discharge to a higher level of care, and repeat hospital use.[23–29] Evidence from the development and validation studies of prognostic screening instruments suggests that geriatric syndromes may influence adverse outcomes among older patients.[27,30–33] Frailty, operationalized as an accumulation of numerous patient deficits, has also been found to be a predictor of some adverse outcomes among older ED outpatients.[34,35] These studies demonstrate the potential utility of incorporating geriatric syndromes in the standard clinical assessment of older adults. However, many such studies suffer from practical weaknesses, including single-facility samples, a limited sampling of geriatric syndromes and other covariates, and low participation rates. Also, the vast majority of studies focus on outcomes exclusive to ED outpatients, despite that admitted patients are numerous and are more likely to have severe conditions.[20,36–40] Prospective, multinational studies that evaluate the potential influence of geriatric syndromes on outcomes across dispositions are needed.

We set out to describe the prevalence of adverse postdischarge outcomes among older ED patients and evaluate the predictive utility of geriatric syndromes from a multinational context. The purpose of this investigation was to identify predictive and generalizable geriatric syndromes that can be assessed to improve clinical reasoning rather than to create discrete decision support instruments. We addressed weaknesses in the existing literature by collecting a comprehensive set of geriatric syndromes from a multinational ED sample. With evidence that geriatric syndromes are often missed, we hypothesized that many would be associated with adverse postdischarge outcomes.

METHODS

Study Design
This was a multinational prospective cohort study of older ED patients. Approvals for the study were obtained from all hospital and academic research ethics committees (confirmation available on request).

Study Setting and Population
A total of 13 ED sites participated. Investigators from Australia, Belgium, Canada, Germany, Iceland, India, and Sweden were requested to collect a minimum of 100 cases from all participating ED sites within their country. Urban teaching centers accounted for the majority of participating ED sites, with two regional centers and one community center also represented.

Patients aged 75 years or older were eligible for inclusion. Patients in severe acute medical crisis (highest level of triage acuity/severity), those expected to die within 24 hours, and those who did not speak the native language (and were without an interpreter) were excluded. The Australian study deviated from the eligibility criteria by initially overselecting those who were likely to be outpatient cases. Also, two countries were given a waiver of informed consent (Canada and Sweden), which allowed for the recruitment of older ED patients generally excluded from research studies,

including patients with cognitive deficits.[41–43] Such waivers were based on the judgment of minimal risk, impracticality in light of potential sample bias, and the secondary use of patient records for follow-up. All countries recruited eligible patients on a consecutive basis from the time of ED registration without any additional preselection. All countries recruited on weekdays during day shift hours, given the reported patterns of presentation among older adults.[37] Some countries also completed recruitment during evenings and weekends. Details regarding patient recruitment have been reported previously.[2]

Study Protocol

A short geriatric assessment, using the interRAI ED Contact Assessment (ED-CA), was completed immediately at enrollment into the study. The interRAI ED-CA has approximately 32 clinical items that assess the performance and capacity of a patient as well the presence of symptoms and conditions.[44] Assessment domains include cognition and physical function (premorbid/baseline and admission status), mood, comprehension, falls history, nutritional status, pain, and the presence of dyspnea (see Table 1). The "baseline" period is defined as the "three days prior to the onset of the acute illness that led to the visit," whereas the "admission" period reflects the patient's current condition. The items contained in the interRAI ED-CA have demonstrated interrater reliability in acute care and adjacent settings, having achieved overall average weighted kappas and the intraclass correlation coefficients of above 0.6 and 0.8 in separate studies across premorbid, admission, and discharge time periods.[45–47] In addition, the items have established test content validity in acute care[48] and have been used in previous ED research.[49] The assessment was performed and recorded by nurses or allied health professionals who were trained on the interRAI ED-CA and supplementary software systems. Referrals and discharge disposition were also recorded during the assessment. Details of the baseline assessment are reported elsewhere.[2]

Outcome variables among patients admitted to a hospital ward included country-specific 90th percentile (i.e., highest decile) hospital length of stay (LOS) as well as discharge to higher level of care (relative to usual living arrangement). Excessive hospital LOS are associated with adverse outcomes among older patients.[50–53] Highest decile hospital LOS was chosen instead of an explicit LOS benchmark, given the wide distribution in hospital LOS across country samples, and a lack of comparable guidelines on appropriate LOS. Any ED or hospital use within 28 days of discharge was recorded for ED patients discharged to a community setting. The outcomes employed in this investigation were similar to those used in single-country studies.[27,29,31,54–56]

A standardized follow-up was conducted to determine the hospital LOS and discharge disposition for patients admitted to a hospital ward from the ED. Inpatient follow-up occurred by manual chart review or through the secondary use of electronic patient records. A 28-day follow-up (from date of discharge) was conducted for patients discharged to a community setting from the ED. The standardized data collection included

the patients' disposition at 28 days, as well as key information from any reattendances to an ED or admissions to an acute care hospital. Follow-up at 28 days was done by telephone or with the secondary use of electronic regional hospital and mortality records. Sites that were given a waiver of consent or had an exceptionally high follow-up rate used electronic hospital and mortality data for follow-up.

Data Analysis

Stratified analyses were used to investigate the prevalence of adverse patient outcomes by country. Confidence intervals (CIs) for prevalence statistics were calculated at the 95% level ($\alpha = 0.05$) based on the binomial estimation of the standard error of a proportion. Univariate logistic regression was used to determine the observed relationship between each clinical covariate and outcome. Best-subset multivariate logistic regression was employed to identify the subset of clinical covariates that best defined the relationship between the clinical covariates and each outcome. This regression method was employed over stepwise automatic methods to decrease order-of-entry and deletion effects.[57,58] Best-subset models were selected based on overall predictive accuracy, effect sizes of the covariates, parsimony, and clinical face validity. The Hosmer-Lemeshow goodness-of-fit test, receiver operating characteristic area under the curve (AUC), and an analysis of regression residuals were used to assess model fit. Multicollinearity was also evaluated by observing the influence of removing model covariates and by assessing the level of tolerance in the final model. Generalized estimating equations, using an exchangeable correlation structure, were used to validate the generalizability of the descriptive models across country samples. This validation step was necessary given that the variation in county sample sizes could have biased the models toward countries with larger samples. Regression model CIs were calculated at the 95% level ($\alpha = 0.05$). All analyses were performed using SAS version 9.2 for Windows (SAS Institute, Inc., Cary, NC). The results of this study are reported according to the STROBE statement.[59]

RESULTS

In total, 2,475 patients were approached for inclusion and 2,282 (92.2%) were enrolled. Overall, 1,436 (62.9%) patients were admitted to a hospital ward, 775 (34.0%) patients were discharged to a community setting, 46 (2.0%) patients were discharged to long-term care/nursing home, eight (0.4%) died, and 17 (0.7%) had unspecified dispositions from the ED. The mean ($\pm$SD) age of all patients was 83.2 ($\pm$5.5) years, 41% were male, 41% lived alone, and 36% used the ED in the previous 90 days. Additional patient demographics, including clinical profiles, have been reported previously.[2]

Patients admitted to a hospital ward or discharged to the community were included for follow-up. Of patients admitted to a hospital ward, 1,421 (99.0%) were captured during inpatient follow-up. Among patients admitted and followed-up until hospital

Table 1
Unadjusted Odds Ratios for Study Variables by Postdischarge Outcome

Variable	90th Percentile Hospital LOS (n = 1,421)	Acute Discharge to Higher Level of Care (n = 1,290)*	Any ED or Hospital Use Within 28 Days Post–Index ED Visit (n = 732)
Sex, female	1.35 (0.93–1.95)	1.41 (0.97–2.05)	1.32 (0.92–1.90)
Lives alone	1.71 (1.20–2.44)	1.25 (0.87–1.78)	0.93 (0.65–1.33)
Caregiver distress[†]	1.85 (1.27–2.69)	0.98 (0.63–1.50)	1.34 (0.87–2.06)
Cognition impairment[‡]			
Premorbid[§]	1.50 (1.01–2.21)	0.94 (0.61–1.44)	1.44 (0.86–2.37)
Admission[∥]	1.62 (1.13–2.34)	1.19 (0.81–1.75)	1.50 (0.95–2.37)
Potential delirium[¶]	1.55 (0.84–2.86)	1.79 (097–3.28)	1.28 (0.50–3.31)
ADL impairment			
Bathing			
Premorbid[§]	1.77 (1.24–2.54)	1.32 (0.92–1.90)	1.99 (1.36–2.91)
Admission[∥]	2.34 (1.46–3.76)	1.73 (0.11–2.69)	1.59 (1.11–2.26)
Acute decline from premorbid**	1.05 (0.70–1.59)	1.19 (0.79–1.79)	0.81 (0.50–1.32)
Dressing lower body			
Premorbid[§]	1.48 (1.04–2.12)	0.97 (0.66–1.42)	1.97 (1.30–3.02)
Admission[∥]	2.23 (1.50–3.32)	1.63 (1.12–2.37)	2.32 (1.62–3.34)
Acute decline from premorbid**	1.57 (1.07–2.30)	1.79 (1.22–2.62)	1.80 (1.14–2.82)
Personal hygiene			
Premorbid[§]	1.28 (0.88–1.88)	0.82 (0.54–1.24)	1.37 (0.83–2.27)
Admission[∥]	1.86 (1.30–2.70)	1.44 (1.00–2.06)	1.62 (1.10–2.39)
Acute decline from premorbid**	1.65 (1.12–2.44)	1.92 (1.30–2.83)	1.66 (1.02–2.71)
Locomotion			
Premorbid[§]	1.56 (1.08–2.24)	0.90 (0.60–1.35)	1.68 (1.07–2.63)
Admission[∥]	2.37 (1.58–3.54)	1.60 (1.10–2.32)	1.73 (1.20–2.59)
Acute decline from premorbid**	1.53 (1.06–2.22)	1.76 (1.22–2.55)	1.40 (0.89–2.20)
Any premorbid impairment[††]	1.67 (1.16–2.41)	1.11 (0.78–1.59)	2.07 (1.43–3.00)
Any impairment at admission[††]	2.80 (1.62–4.86)	1.42 (0.90–2.24)	1.65 (1.16–2.36)
Any acute ADL decline**	1.14 (0.75–1.72)	1.20 (0.80–1.81)	0.78 (0.50–1.23)
IADL status			
Difficulty with medications[‡‡]	1.27 (0.89–1.81)	0.86 (0.60–1.23)	1.33 (0.09–1.97)
Difficulty with stairs[§§]	1.84 (1.26–2.69)	0.95 (0.67–1.34)	2.35 (1.64–3.36)
Impaired comprehension[∥∥]	1.14 (0.65–2.00)	1.01 (0.54–1.89)	0.80 (0.34–1.85)
Conditions and symptoms			
Poor self-reported health[¶¶]			
Premorbid[§]	2.09 (1.43–3.06)	1.01 (0.65–1.57)	1.25 (0.88–1.77)
Admission[∥]	1.38 (0.97–1.96)	0.79 (0.55–1.13)	2.06 (1.38–3.08)
Depressive symptoms***	0.80 (0.54–1.17)	0.84 (0.57–1.23)	1.36 (0.93–1.98)
Expresses anhedonia[†††]	0.84 (0.57–1.24)	0.58 (0.39–0.88)	1.73 (1.21–2.49)
Any behaviors[‡‡‡]	1.41 (0.71–2.81)	1.03 (0.48–2.20)	0.59 (0.17–2.02)
Hallucinations or delusions	1.23 (0.68–2.20)	0.93 (0.50–1.74)	0.96 (0.41–2.26)
Any falls (past 90 days)	1.46 (1.02–2.10)	1.18 (0.82–1.70)	1.04 (0.72–1.50)
Traumatic injury	2.71 (1.71–4.29)	1.22 (0.70–2.12)	0.94 (0.48–1.82)
Daily and severe pain[§§§]	1.25 (0.87–1.81)	0.86 (0.59–1.27)	1.41 (0.97–2.05)
Dyspnea[∥∥∥]			
Premorbid[§]	1.18 (0.81–1.71)	1.07 (0.73–1.57)	1.54 (1.03–2.31)
Admission[∥]	1.00 (0.70–1.44)	0.86 (0.59–1.24)	1.76 (1.21–2.57)
Unstable condition[¶¶¶]	1.15 (0.81–1.65)	0.57 (0.39–0.84)	1.13 (0.77–1.67)
Decreased food/fluids****	1.21 (0.85–1.73)	0.70 (0.48–1.03)	1.45 (1.00–2.10)
Weight loss[††††]	1.83 (1.25–2.68)	0.51 (0.30–0.87)	0.99 (0.63–1.57)
ED use (prior 90 days)			
2	1.53 (0.88–2.67)	0.75 (0.39–1.44)	2.32 (1.42–3.79)
1	0.95 (0.59–1.53)	0.73 (0.44–1.19)	2.29 (1.46–3.60)
0 (reference)	1	1	1

discharge, 13 (0.9%) were admitted to palliative care units, 55 (3.9%) to rehabilitation units, and 1,353 (95.2%) to acute general units. Of patients discharged to a community setting, 723 (93.3%) were captured during a 28-day follow-up. Among patients discharged to a community setting with 28-day follow-up, 640 (88.6%) were discharged to private residences, 58 (8.0%) were discharged to semi-independent living (e.g., board and care, assisted living), and 25 (3.4%) were unclassified (see Figure 1).

Prevalence of Adverse Outcomes
The median hospital LOS for admitted patients was 7 days (range = 4 to 12 days), whereas the overall within-country 90th percentile LOS was 24 days (see Table 2). The 90th percentile hospital LOS varied markedly by country sample (range = 11 to 57 days). Overall, 9.6% (95% CI = 8.0% to 11.2%, range = 0 to 17.6%) of admitted patients were discharged to a higher level of care, where 7.5 and 2.1% were as a result of a nursing home admission and supported community settings,

Table 1
(continued)

Variable	90th Percentile Hospital LOS (n = 1,421)	Acute Discharge to Higher Level of Care (n = 1,290)*	Any ED or Hospital Use Within 28 Days Post–Index ED Visit (n = 732)
Hospitalized in prior 90 days	1.25 (0.86–1.82)	0.99 (0.67–1.47)	1.44 (0.97–2.14)
Triage acuity‡‡‡‡			
Level 1 (highest acuity)	<0.01 (<0.1->99)	<0.01 (<0.1->99)	3.54 (0.29–42.89)
Level 2	0.33 (0.10–1.07)	0.69 (0.19–2.56)	0.44 (0.18–1.05)
Level 3	0.39 (0.12–1.20)	0.43 (0.12–1.58)	0.47 (0.23–0.97)
Level 4	0.38 (0.11–1.24)	0.51 (0.13–1.96)	0.44 (0.21–0.94)
Level 5 (lowest, reference)	1	1	1
Levels 1–3	0.88 (0.57–1.38)	0.92 (0.58–1.48)	0.93 (0.64–1.36)
Levels 4–5 (reference)	1	1	1

Data are reported as OR (95% CI).
ADL = activities of daily living; IADL = impaired activities of daily living.
*Australian and Indian samples were excluded given that the outcome did not occur.
†Primary informal helper(s) expresses feelings of distress, anger, or depression.
‡Modified independent or any impairment in making decisions regarding tasks of daily living.
§Premorbid: the 3-day period prior to the onset of the current acute illness or episode.
‖Admission: the past 24 hours or time since acute illness or episode that prompted the ED visit.
¶Acute change in mental status from person's usual functioning (e.g., restlessness, lethargy, difficult to arouse, altered environmental perception).
**Acute decline from premorbid: at admission, new impairment relative to premorbid.
††Any supervision or any physical assistance in bathing, personal hygiene, dressing lower body, and locomotion.
‡‡Difficulty remembering to take medicines, opening bottles, taking correct drug dosages, giving injections, or applying ointments.
§§Supervision or any assistance during full flight of stairs (12 to 14 stairs).
‖‖Sometimes, rarely, or never understands direct communication.
¶¶When asked, "In general, how would you rate your health?" person responds "Poor."
***When asked, patient reports feeling sad, depressed, or hopeless in past 3 days.
†††When asked, patient reports little interest or pleasure in things they normally enjoy.
‡‡‡In the past 3 days, presence of any one or more of the following: verbal abuse, physical abuse, socially inappropriate, or disruptive behavior, inappropriate public sexual behavior, or public disrobing.
§§§Pain that is severe or excruciating in past 3 days.
‖‖‖Dyspnea at rest or present when performing normal day-to-day activities.
¶¶¶Conditions/diseases make cognitive, ADL, mood, or behavior patterns unstable (fluctuating, precarious, or deteriorating).
****Noticeable decrease in the amount of food usually eaten or fluids usually consumed.
††††Weight loss of 5% or more in last 30 days; OR of 10% or more in past 180 days.
‡‡‡‡Canadian Triage and Acuity Scale (CTAS): Belgium, Canada, Germany, Iceland, India; Australian Triage and Acuity Scale (ATAS): Australia; Medical Emergency Triage and Treatment System (METTS): Sweden.

respectively (see Figure 2). Discharge to a higher level of care was not observed in two country samples (Australia and India) and varied widely between country samples with some prevalence. The majority of countries that discharged patients to a higher level of care were discharged to nursing homes. Only three of the seven countries (Belgium, Canada, and Germany) discharged study patients to supported community settings (e.g., retirement facility). There was little correlation noted between 90th percentile hospital LOS and the prevalence of discharge to a higher level of care.

Among ED outpatients, 21.9% (95% CI = 18.9% to 24.9%) revisited the ED or were admitted to an acute hospital within 28 days of discharge (see Figure 3). The prevalence of return to the hospital also showed great variability between country samples (range = 11.8 to 30.6), but was more consistent than outcomes among admitted patients. The overlapping CIs between many countries suggested that sample estimates might not reflect true differences, with exception to Belgium.

Determinants of 90th Percentile Hospital LOS

Univariate analyses showed that traumatic injury, admission ADL impairments, poor premorbid self-reported health, caregiver distress, difficulty with stairs, weight loss, and living alone were the strongest determinants of 90th percentile hospital LOS—indicating between 70 and 270% greater likelihood. Cognitive impairment, acute declines in relatively later loss ADLs, and falls were also significantly associated (see Table 1). The best multivariate explanatory model for 90th percentile hospital LOS among admitted patients included living alone, informal caregiver distress, impaired locomotion at admission, poor self-reported health, and traumatic injury (see Table 3). The proportion of patients who lived alone was 40.4%; had informal caregiver distress, 18.4%; impaired locomotion at admission, 48.9%; premorbid poor self-report, 18.7%; and traumatic injury, 8.9%. The descriptive multivariate model achieved moderate predictive accuracy (AUC = 0.70) and had a good fit. The high level of consistency between standard and multilevel odds ratios (ORs) demonstrated that the model was generalizable across country samples.
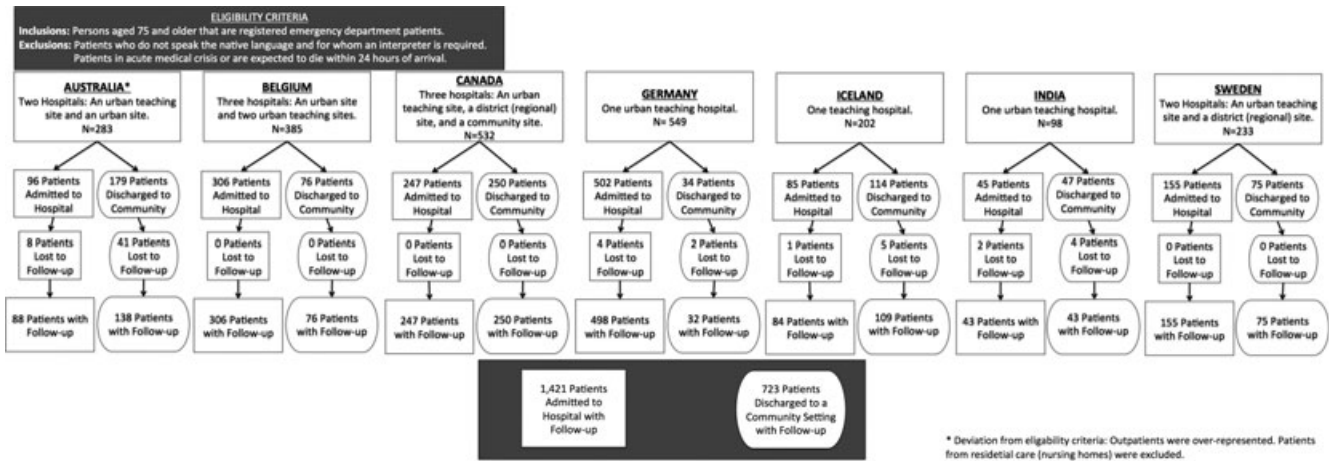
Figure 1. Multinational follow-up.

Table 2
Median and 90th Percentile Hospital Length of Stay Among Admitted ED Patients, by Country

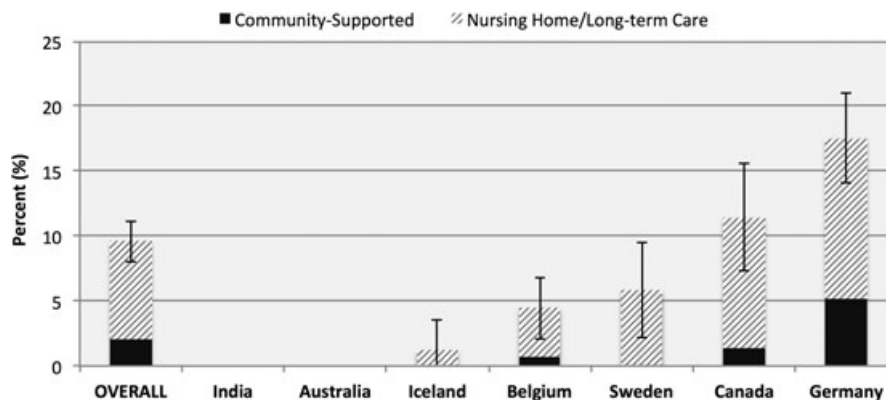|	Overall	Australia	Belgium	Canada	Germany	Iceland	India	Sweden
LOS (days), median (IQR)	7 (4–13)	4 (2–7)	8 (4–17)	12 (5–28)	7 (4–12)	6 (3–11)	6 (4–8)	6 (3–9)
90th percentile (days)	24	11	37	57	18	20	15	14
IQR = interquartile range.								

Figure 2. Discharge to higher level of care, relative to usual living arrangement, among admitted ED patients, by country.

Determinants of Discharge to Higher Level of Care
Fewer covariates were significantly associated with inpatient discharge to a higher level of care compared to that of 90th percentile LOS. Particular admission ADLs as well as declines in relatively later loss ADLs had moderate effect sizes. Also, unstable condition, anhedonia, and weight loss were moderately protective among admitted patients (see Table 1). Impaired locomotion at admission and unstable condition represented the best multivariate explanatory model for inpatient discharge to a higher level of care (see Table 4). The proportions of patients who had impaired locomotion at admission and unstable condition were 48.9 and 34.2%, respectively. Model fit was established, but overall pre-dictive accuracy of the explanatory model was weak (AUC = 0.59). The fitted multilevel model showed poor generalizability across country samples, where the effect sizes of the covariates diminished and were no longer significant or were barely significant.

Determinants of Re-presentation to ED or Readmission to Hospital
Past ED use, ADL impairment (particularly premorbid), difficulty with stairs, poor self-reported health, dyspnea, and anhedonia were significantly associated with repeat ED and inpatient hospital use among outpatients. No additional differentiation was found for past ED use beyond one occurrence. Triage acuity (acuity of
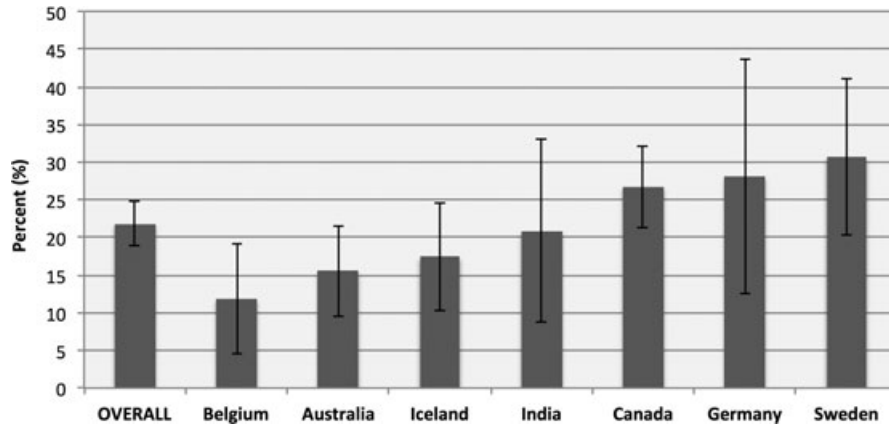
Figure 3. Any ED or hospital use within 28 days post–index ED visit, among ED patients discharged to a community setting, by country.

Table 3
Multivariate Model for 90th Percentile Hospital Length of Stay Among Admitted ED Patients, Standard and Country-level Multilevel Generalized Model

Covariates	Standard Logistic		Multilevel Logistic	
	AOR	95% CI	AOR	95% CI
Lives alone	1.76	1.21–3.49	1.78	1.32–2.40
Distressed informal caregiver(s)	1.65	1.12–2.45	1.69	1.10–2.61
Impaired locomotion (admission)	1.97	1.30–3.00	1.94	1.25–3.00
Poor self-report health (premorbid)	1.86	1.30–2.80	1.84	1.34–2.51
Traumatic injury	2.17	1.35–3.50	2.18	1.68–2.82
ROC AUC (95% CI)	0.70 (0.65–0.74)			
Hosmer-Lemeshow goodness-of-fit	$\chi^2 = 7.61$, p = 0.37			

AOR = adjusted odds ratio; ROC AUC = area under the receiver operating characteristic curve.

Table 4
Multivariate Model for Discharge to Higher Level of Care, Relative to Usual Living Arrangement, Among Admitted ED Patients, Standard and Country-level Multilevel Generalized Model

Covariates	Standard Logistic		Multilevel Logistic	
	AOR	95% CI	AOR	95% CI
Impaired locomotion (admission)	2.00	1.24–3.10	1.70	1.01–2.87
Unstable condition	0.52	0.35–0.77	0.82	0.81–1.91
ROC AUC (95% CI)*	0.59 (0.55–0.64)			
Hosmer-Lemeshow goodness-of-fit	$\chi^2 = 1.03$, p = 0.71			

AOR = adjusted odds ratio; ROC AUC = area under the receiver operating characteristic curve.

presenting condition) had a very weak curvilinear association across the full scale, and no effect when collapsed. The best multivariate explanatory model for any repeat ED or hospital use within 28 days of ED discharge included past ED visits, anhedonia, and any baseline ADL impairment (see Table 5). The proportions of community discharge patients who had recent ED visits, anhedonia, and any baseline ADL impairment were 43.0, 32.6, and 46.0%, respectively. Nontrivial and significant ORs were observed for all determinants in the model. The explanatory multivariate model achieved moderate predictive accuracy (AUC = 0.67) and good fit

with the data and was generalizable across country samples.

DISCUSSION

To our knowledge this is the first study to capture a multinational geriatric ED sample, as well as explore differences in determinants for outcomes along separate discharge pathways. In addition, this study is among the few that collected a comprehensive set of patient geriatric characteristics not traditionally available through ED medical records.

Table 5
Multivariate Model for Any ED or Hospital Use within 28 Days Post–Index ED Visit, Among ED Patients Discharged to A Community Setting, Standard and Country-level Multilevel Generalized Model

Covariates	Standard Logistic		Multilevel Logistic	
	AOR	95% CI	AOR	95% CI
Any premorbid ADL impairment	1.74	1.20–2.54	1.73	1.10–2.75
Expresses anhedonia	1.70	1.20–2.50	1.68	1.14–2.48
Any past ED visits (last 90 days)	2.10	1.44–3.02	2.10	1.42–3.11
ROC AUC (95%CI)*	0.67 (0.62–0.71)			
Hosmer-Lemeshow goodness-of-fit	$\chi^2 = 2.34$, p = 0.80			

ADL = activities of daily living; AOR = adjusted odds ratio; ROC AUC = area under the receiver operating characteristic.

The prevalence of each postdischarge outcome varied widely across country samples. This variation likely reflects a combination of differing health system practices, the reliability of sample estimates, and different case mix between geriatric ED patients across the countries included. Despite the variation in postdischarge outcomes, and the underlying health systems they reflect, the findings suggest that the risk of long hospital LOS, as well as repeat ED or hospital use, is detectable at the multinational level with moderate accuracy. Common geriatric syndromes were prevalent predictors of these outcomes in univariate and multivariate analyses. This suggests that geriatric clinical features differentiate the probability of adverse events across countries and, therefore, should be considered during clinical evaluation. The multivariate descriptive models achieved a level of accuracy comparable or superior to formal prediction tools reported in the literature.[28,54,56,60–63] However, accurate comparisons are illusory without concurrent collection and considerations of intended utility. Although not accurate enough, nor intended to replace clinical decision-making, these multivariate descriptive models may help to refine and focus existing clinical reasoning, particularly for patients with undifferentiated presentations.[64,65] The identification of the geriatric features included in each model may also aid efforts to advance core geriatric competencies among trainees and practicing ED physicians.[21,66]

The univariate and multivariate analyses suggest that specific subsets of geriatric syndromes increase the probability of particular outcomes. Differences in prognostic characteristics between outcomes suggest that basic geriatric screening, although crucial, may be refined by attention to the specific geriatric features and outcomes relevant to each patient's intended discharge disposition. Weak informal support, poor self-report, and impaired ambulation and traumatic injury at presentation predispose older patients to excessive hospital LOS, whereas recent ED visits, any baseline ADL impairment, and symptoms of anhedonia predispose older adults to proximate repeat ED or hospital use. Weak informal support (either living alone or caregiver distress), traumatic injury, and poor self-reported health were uniquely predictive of long hospital LOS among admitted patients. Recent ED use and anhedonia were unique to repeat ED or hospital use with 28 days. Functional impairment was a relatively strong predictor of

both outcomes. However, the distinction between baseline and admission functional status refined the prediction of each outcome. This suggests that clinicians should discern between baseline and admission ADL status depending on the patients discharge disposition. The specific utility of premorbid information in predicting outcomes among older patients is consistent with the inpatient literature.[67,68] Triage acuity, an important ED workflow measure, was not predictive of the postdischarge outcomes used in this study. Previous studies indicate that triage acuity may be less predictive in older cohorts.[10,62] Other factors, such as the use of different triage acuity measures, may have influenced this finding.

To our knowledge, inpatient hospital utilization after an index ED visit has been explored by one previous study,[29] but without a distinction made to inpatient stay following admission from an index ED visit. Our intent was to explore inpatient use more relevant to decision-making at the time of the index ED visit. Overall, 56.2% of older patients either lived alone or reported informal caregiver distress. Our findings indicate that weak informal support among those admitted may limit hospital discharge and lead to long hospital stays. Rutschmann et al.[10] found that close to half of ED patients presenting with functional impairment but no specific complaint had acute medical conditions that were not adequately triaged. Singal et al.[20] found that falls were a common cause of traumatic injury among older adults and are even more likely to be the cause of injury among those over the age of 75 and still more likely among those over the age of 85. Our study showed that deficits in ambulation or traumatic injury might be undertriaged in the ED and may limit hospital discharge potential following admission. Early discharge planning and rehabilitation may avoid excessive stays among patients with these characteristics. Particularly, comanagement of hip fracture patients with specialized geriatric services has shown to reduce complications and hospital LOS.[69,70] Also, elder-friendly care principles in acute wards can minimize functional declines during acute stays.[51,71] Referring older patients with deficits in ambulation or traumatic injury to impatient geriatric services from the ED may ultimately reduce access block from the ED.

Re-presentations to the ED or hospital have been investigated in many previous studies as a proxy indicator of persistent decline and unmet care needs,

particularly when they occur proximate to the index ED visit. Consistent with similar studies, the predisposing effect of previous hospital use was strong.[28,72,73] Previous use likely reflects unresolved complaints as well as predisposing and enabling factors (e.g., access, preferences). Anhedonia is a prominent symptom of major depressive disorders in older adults, and mood conditions have been known to prompt physical complaints that lead to care-seeking.[74,75] Some evidence suggests that mental illness is the most common diagnosis among older adults with frequent ED visits.[76] Older adults presenting with anhedonia may be referred to outpatient mental health services or inpatient geriatric psychiatry.[74] Poor baseline functional status among older patents has been correlated with subacute medical symptoms.[8] Identifying baseline functional status may improve the identification and treatment of subacute conditions or prompt follow-up with primary care. Studies have found that frailty, measured using the accumulation of deficits approach and the Charlson comorbidity index, are not predictive of repeat ED use.[34,62] These findings, together with our findings, suggest that specific geriatric syndromes and symptoms might have more utility in predicting repeat ED use relative to global measures. Nonetheless, repeat ED use is highly stochastic and therefore difficult to predict.[28,62]

An acceptable level of accuracy was not achieved for the prediction of discharge to a higher level of care among admitted patients. This suggests that the availability and use of supported and institutional settings varies widely across the countries included in this study. The mixed protective effect of unstable conditions is credible given that clinical instability often leads to admission, but is also an impediment for discharge to a supported or institutional community environment. However, the effect of unstable condition was mixed across country samples. The fact that a satisfactory multinational model could not be found does not necessarily indicate that the need for discharge to a higher level of care is unpredictable. In fact, separate analyses suggest that moderately accurate single-country descriptive models are feasible for most of the country samples included in this study.

LIMITATIONS

Efforts were made to improve on the limitations of previous studies; nevertheless, this study had several drawbacks. It should be noted that there is no standard definition of what constitutes an adverse postdischarge outcome among older ED patients. Patient follow-up for outcomes was completed based on clinical input, feasibility of collection, perceived generalizability, and previous research. Consistent with all previous studies, the country samples collected in this study were convenience samples and may not fully reflect the population of older ED patients within each country—particularly where country samples are relatively small. Also, previous research has found that patient outcomes vary by type of ED site.[77,78] This suggests that the generalizability of prevalence estimates should be investigated with samples that contain a wider breadth of facility types.

Notwithstanding the generalizability of prevalence estimates, there is no reason to suppose that the determinants vary across facility types or alternate sampling time frames. Concurrent evaluation and intervention to ameliorate patient risk may have influenced the relationship between the study variables and outcomes. Therefore, the strength of the relationships in each model might be considered conservative in some contexts. Sampling methods were designed to maximize representativeness and participation. However, some country studies without discrete funding were unable to recruit all consecutive patients when patient volumes exceeded resources.

This study employed a comprehensive set of independent variables relative to previous research, and particularly that of geriatric syndromes. However, the study would have been improved with the inclusion of diagnostic information to complement triage acuity. The standard collection of diagnostic information across the countries varied in terms of completeness and format, making this information impractical for inclusion in this study.

CONCLUSIONS

Common geriatric conditions and symptoms, often not a focus of evaluation in the ED, influence the probability of some postdischarge adverse outcomes among older patients and across nations. Our results support the inclusion of geriatric assessment in standard ED practice to identify and target effective interventions that decrease the likelihood of adverse postdischarge outcomes.

References

1. Inouye SK, Studenski S, Tinetti ME, Kuchel GA. Geriatric syndromes: clinical, research, and policy implications of a core geriatric concept. J Am Geriatr Soc 2007;55:780–91.
2. Gray LC, Peel N, Costa AP, et al. Profiles of older patients in the emergency department: findings from the interRAI multinational emergency department study. Ann Emerg Med 2013;62:467–74.
3. Keim S, Sanders A. Geriatric emergency department use and care. In: Meldon S, Ma OJ, Woolard RH, eds. Geriatric Emergency Medicine. New York, NY: McGraw-Hill, 2004:1–3.
4. McNamara RM, Rousseau E, Sanders AB. Geriatric emergency medicine: a survey of practicing emergency physicians. Ann Emerg Med 1992;21:796–801.
5. Sanders AB. Care of the elderly in emergency departments: conclusions and recommendations. Ann Emerg Med 1992;21:830–4.
6. Schumacher JG. Emergency medicine and older adults: continuing challenges and opportunities. Am J Emerg Med 2005;23:556–60.
7. Schumacher JG, Deimling GT, Meldon S, Woolard B. Older adults in the emergency department:

predicting physicians' burden levels. J Emerg Med 2006;30:455–60.

8. Wilber ST, Blanda M, Gerson LW. Does functional decline prompt emergency department visits and admission in older patients? Acad Emerg Med 2006;13:680–2.

9. Nemec M, Koller MT, Nickel CH, et al. Patients presenting to the emergency department with non-specific complaints: the Basel non-specific complaints (BANC) study. Acad Emerg Med 2010;17:284–92.

10. Rutschmann OT, Chevalley T, Zumwald C, Luthy C, Vermeulen B, Sarasin FP. Pitfalls in the emergency department triage of frail elderly patients without specific complaints. Swiss Med Wkly 2005;135:145–50.

11. Ferrera PC, Bartfield JM, D'Andrea CC. Geriatric trauma: outcomes of elderly patients discharged from the ED. Am J Emerg Med 1999;17:629–32.

12. Russell MA, Hill KD, Blackberry I, Day LL, Dharmage SC. Falls risk and functional decline in older fallers discharged directly from emergency departments. J Gerontol A Biol Sci Med Sci 2006;61:1090–5.

13. Shapiro MJ, Partridge RA, Jenouri I, Micalone M, Gifford D. Functional decline in independent elders after minor traumatic injury. Acad Emerg Med 2001;8:78–81.

14. Carpenter CR, Griffey RT, Stark S, Coopersmith CM, Gage BF. Physician and nurse acceptance of technicians to screen for geriatric syndromes in the emergency department. West J Emerg Med 2011;12:489–95.

15. Elie M, Rousseau F, Cole M, Primeau F, McCusker J, Bellavance F. Prevalence and detection of delirium in elderly emergency department patients. CMAJ 2000;163:977–81.

16. Hendriksen H, Harrison RA. Occupational therapy in accident and emergency departments: a randomized controlled trial. J Adv Nurs 2001;36:727–32.

17. Hustey FM, Meldon S. Prevalence and documentation of impaired mental status in elderly emergency department patients. Ann Emerg Med 2002;39:248–53.

18. Meldon SW, Emerman CL, Schubert DS, Moffa DA, Etheart RG. Depression in geriatric ED patients: prevalence and recognition. Ann Emerg Med 1997;30:141–5.

19. Rodríguez-Molinero A, López-Diéguez M, Tabuenca AI, de la Cruz JJ, Banegas JR. Functional assessment of older patients in the emergency department: comparison between standard instruments, medical records and physicians' perceptions. BMC Geriatr 2006;6:13.

20. Singal BM, Hedges JR, Rousseau EW, et al. Geriatric patient emergency visits. Part I: comparison of visits by geriatric and younger patients. Ann Emerg Med 1992;21:802–7.

21. Hogan TM, Losman ED, Carpenter CR, et al. Development of geriatric competencies for emergency medicine residents using an expert consensus process. Acad Emerg Med 2010;17:316–24.

22. Pines JM, Mullins PM, Cooper JK, Feng LB, Roth KE. National trends in emergency department use, care patterns, and quality of care of older adults in the United States. J Am Geriatr Soc 2013;61:12–7.

23. Caplan GA, Brown A, Croker WD, Doolan J. Risk of admission within 4 weeks of discharge of elderly patients from the emergency department–the DEED study. Discharge of elderly from emergency department. Age Ageing 1998;27:697–702.

24. Chin MH, Jin L, Karrison TG, et al. Older patients' health-related quality of life around an episode of emergency illness. Ann Emerg Med 1999;34:595–603.

25. Hastings SN, Heflin MT. A systematic review of interventions to improve outcomes for elders discharged from the emergency department. Acad Emerg Med 2005;12:978–86.

26. McCusker J, Bellavance F, Cardin S, Trépanier S. Screening for geriatric problems in the emergency department: reliability and validity. Identification of seniors at risk (ISAR) steering committee. Acad Emerg Med 1998;5:883–93.

27. McCusker J, Bellavance F, Cardin S, Trépanier S, Verdon J, Ardman O. Detection of older people at increased risk of adverse health outcomes after an emergency visit: the ISAR screening tool. J Am Geriatr Soc 1999;47:1229–37.

28. McCusker J, Cardin S, Bellavance F, Belzile E. Return to the emergency department among elders: patterns and predictors. Acad Emerg Med 2000;7:249–59.

29. McCusker J, Bellavance F, Cardin S, Belzile E, Verdon J. Prediction of hospital utilization among elderly patients during the 6 months after an emergency department visit. Ann Emerg Med 2000;36:438–45.

30. Di Bari M, Balzi D, Roberts AT, et al. Prognostic stratification of older persons based on simple administrative data: development and validation of the "silver code", to be used in emergency department triage. J Gerontol A Biol Sci Med Sci 2010;65:159–64.

31. Meldon SW, Mion LC, Palmer RM, et al. A brief risk-stratification tool to predict repeat emergency department visits and hospitalizations in older patients discharged from the emergency department. Acad Emerg Med 2003;10:224–32.

32. Rowland K, Maitra AK, Richardson DA, Hudson K, Woodhouse KW. The discharge of elderly patients from an accident and emergency department: functional changes and risk of readmission. Age Ageing 1990;19:415–8.

33. Runciman P, Currie CT, Nicol M, Green L, McKay V. Discharge of elderly people from an accident and emergency department: evaluation of health visitor follow-up. J Adv Nurs 1996;24:711–8.

34. Hastings SN, Purser JL, Johnson KS, Sloane RJ, Whitson HE. Frailty predicts some but not all adverse outcomes in older adults discharged from the emergency department. J Am Geriatr Soc 2008;56:1651–7.

35. Stiffler KA, Finley A, Midha S, Wilber ST. Frailty assessment in the emergency department. J Emerg Med 2013;45:291–8.

36. Aminzadeh F, Dalziel WB. Older adults in the emergency department: a systematic review of patterns of use, adverse outcomes, and effectiveness of interventions. Ann Emerg Med 2002;39:238–47.

37. Downing A, Wilson R. Older people's use of accident and emergency services. Age Ageing 2005;34:24–30.

38. George G, Jell C, Todd BS. Effect of population ageing on emergency department speed and efficiency: a historical perspective from a district general hospital in the UK. Emerg Med J 2006;23:379–83.

39. Richardson DB. Elderly patients in the emergency department: a prospective study of characteristics and outcome. Med J Aust 1992;157:234–9.

40. Strange GR, Chen EH, Sanders AB. Use of emergency departments by elderly patients: projections from a multicenter data base. Ann Emerg Med 1992;21:819–24.

41. Black BS, Rabins PV, Sugarman J, Karlawish JH. Seeking assent and respecting dissent in dementia research. Am J Geriatr Psychiatry 2010;18:77–85.

42. Karlawish J, Rubright J, Casarett D, Cary M, Ten Have T, Sankar P. Older adults' attitudes toward enrollment of non-competent subjects participating in alzheimer's research. Am J Psychiatry 2009;166:182–8.

43. Jefferson AL, Lambe S, Moser DJ, Byerly LK, Ozonoff A, Karlawish JH. Decisional capacity for research participation in individuals with mild cognitive impairment. J Am Geriatr Soc 2008;56:1236–43.

44. Hirdes JP, Curtin-Telegdi N, Poss JW, et al. InterRAI Contact Assessment: Screening Level Assessment for Emergency Department and Intake From Community/Hospital Assessment Form and User's Manual. Rockport, MA: Open Book Systems, 2009.

45. Gray LC, Bernabei R, Berg K, et al. Standardizing assessment of elderly people in acute care: the interRAI acute care instrument. J Am Geriatr Soc 2008;56:536–41.

46. Hirdes JP, Ljunggren G, Morris JN, et al. Reliability of the interRAI suite of assessment instruments: a 12-country study of an integrated health information system. BMC Health Serv Res 2008;8:277.

47. Wellens NI, Van Lancker A, Flamaing J, et al. Interrater reliability of the interRAI acute care (interRAI AC). Arch Gerontol Geriatr 2011;55:165–72.

48. Wellens NI, Deschodt M, Boonen S, et al. Validity of the interRAI acute care based on test content: a multi-center study. Aging Clin Exp Res 2011;23:476–86.

49. Boyd M, Koziol-McLain J, Yates K, et al. Emergency department case-finding for high-risk older adults: the brief risk identification for geriatric health tool (BRIGHT). Acad Emerg Med 2008;15:598–606.

50. Covinsky KE, Palmer RM, Fortinsky RH, et al. Loss of independence in activities of daily living in older adults hospitalized with medical illnesses: increased vulnerability with age. J Am Geriatr Soc 2003; 51:451–8.

51. Creditor MC. Hazards of hospitalization of the elderly. Ann Intern Med 1993;118:219–23.

52. Graf C. Functional decline in hospitalized older adults. Am J Nurs 2006;106:58–67.

53. Hitcho EB, Krauss MJ, Birge S, et al. Characteristics and circumstances of falls in a hospital setting: a prospective analysis. J Gen Intern Med 2004;19: 732–9.

54. Graf CE, Giannelli SV, Herrmann FR, et al. Identification of older patients at risk of unplanned readmission after discharge from the emergency department–comparison of two screening tools. Swiss Med Wkly 2012;141:w13327.

55. Lee JS, Schwindt G, Langevin M, et al. Validation of the triage risk stratification tool to identify older persons at risk for hospital admission and returning to the emergency department. J Am Geriatr Soc 2008;56:2112–7.

56. Salvi F, Morichi V, Grilli A, et al. Predictive validity of the identification of seniors at risk (ISAR) screening tool in elderly patients presenting to two Italian emergency departments. Aging Clin Exp Res 2009;21:69–75.

57. Hosmer DW, Lemeshow S. Applied Logistic Regression, 2nd ed. New York, NY: Wiley and Sons, 2000.

58. King JE. Running a best-subsets logistic regression: an alternative to stepwise methods. Educ Psychol Meas 2003;63:392–403.

59. von Elm E. Altman DG, Egger M, Pocock SJ, Gøtzsche PC, Vandenbroucke JP, STROBE Initiative. The strengthening the reporting of observational studies in epidemiology (STROBE) statement: guidelines for reporting observational studies. J Clin Epidemiol 2008;61:344–9.

60. Buurman BM, van den Berg W, Korevaar JC, Milisen K, de Haan RJ, de Rooij SE. Risk for poor outcomes in older patients discharged from an emergency department: feasibility of four screening instruments. Eur J Emerg Med 2011;18:215–20.

61. Fan J, Worster A, Fernandes CM. Predictive validity of the triage risk screening tool for elderly patients in a Canadian emergency department. Am J Emerg Med 2006;24:540–4.

62. LaMantia MA, Platts-Mills TF, Biese K, et al. Predicting hospital admission and returns to the emergency department for elderly patients. Acad Emerg Med 2010;17:252–9.

63. Moons P, De Ridder K, Geyskens K, et al. Screening for risk of readmission of patients aged 65 years and above after discharge from the emergency department: predictive value of four instruments. Eur J Emerg Med 2007;14:315–23.

64. Carpenter CR, Heard K, Wilber S, et al. Research priorities for high-quality geriatric emergency care: medication management, screening, and prevention and functional assessment. Acad Emerg Med 2011;18:644–54.

65. Wilber ST, Gerson LW. A research agenda for geriatric emergency medicine. Acad Emerg Med 2003;10:251–60.

66. Biese KJ, Roberts E, LaMantia M, et al. Effect of a geriatric curriculum on emergency medicine resident attitudes, knowledge, and decision-making. Acad Emerg Med 2011;18(Suppl 2):S92–6.

67. Jónsson PV, Noro A, Finne-Soveri H, et al. Admission profile is predictive of outcome in acute hospital care. Aging Clin Exp Res 2008;20:533–9.

68. Lakhan P, Jones M, Wilson A, Gray LC. The higher care at discharge index (HCDI): identifying older patients at risk of requiring a higher level of care at discharge. Arch Gerontol Geriatr 2013;57:184–91.

69. Friedman SM, Mendelson DA, Bingham KW, Kates SL. Impact of a comanaged geriatric fracture center on short-term hip fracture outcomes. Arch Intern Med 2009;169:1712–7.

70. Kates SL, Mendelson DA, Friedman SM. The value of an organized fracture program for the elderly: early results. J Orthop Trauma 2011;25:233–7.

71. Inouye SK, Bogardus ST, Baker DI, Leo-Summers L, Cooney LM. The hospital elder life program: a model of care to prevent cognitive and functional decline in older hospitalized patients. Hospital elder life program. J Am Geriatr Soc 2000;48:1697–706.

72. Crane SJ, Tung EE, Hanson GJ, Cha S, Chaudhry R, Takahashi PY. Use of an electronic administrative database to identify older community dwelling adults at high-risk for hospitalization or emergency department visits: the elders risk assessment index. BMC Health Serv Res 2010;10:338.

73. Shelton P, Sager MA, Schraeder C. The community assessment risk screen (CARS): identifying elderly persons at risk for hospitalization or emergency department visit. Am J Manag Care 2000;6:925–33.

74. Joubert L, Lee J, McKeever U, Holland L. Caring for depressed elderly in the emergency department: establishing links between sub-acute, primary, and community care. Soc Work Health Care 2013;52:222–38.

75. Raccio-Robak N, McErlean MA, Fabacher DA, Milano PM, Verdile VP. Socioeconomic and health status differences between depressed and nondepressed ED elders. Am J Emerg Med 2002;20:71–3.

76. Brokaw M, Zaraa AS. A biopsychosocial profile of the geriatric population who frequently visit the emergency department. Ohio Med 1991;87:347–50.

77. Borges Da Silva R, McCusker J, Roberge D, et al. Classification of emergency departments according to their services for community-dwelling seniors. Acad Emerg Med 2012;19:552–61.

78. McCusker J, Roberge D, Ciampi A, et al. Outcomes of community-dwelling seniors vary by type of emergency department. Acad Emerg Med 2012;19:304–12.