

# Profiles of Older Patients in the Emergency Department: Findings From the interRAI Multinational Emergency Department Study

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**Study objective:** We examine functional profiles and presence of geriatric syndromes among older patients attending 13 emergency departments (EDs) in 7 nations.

**Methods:** This was a prospective observational study of a convenience sample of patients, aged 75 years and older, recruited sequentially and mainly during normal working hours. Clinical observations were drawn from the interRAI Emergency Department Screener, with assessments performed by trained nurses.

**Results:** A sample of 2,282 patients (range 98 to 549 patients across nations) was recruited. Before becoming unwell, 46% were dependent on others in one or more aspects of personal activities of daily living. This proportion increased to 67% at presentation to the ED. In the ED, 26% exhibited evidence of cognitive impairment, and 49% could not walk without supervision. Recent falls were common (37%). Overall, at least 48% had a geriatric syndrome before becoming unwell, increasing to 78% at presentation to the ED. This pattern was consistent across nations.

**Conclusion:** Functional problems and geriatric syndromes affect the majority of older patients attending the ED, which may have important implications for clinical protocols and design of EDs. [Ann Emerg Med. 2013;62:467-474.]

Please see page 468 for the Editor's Capsule Summary of this article.

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## INTRODUCTION

### Background

Population aging in most nations is resulting in aging of hospital patient profiles. The proportion of older patients using emergency departments (EDs) is also increasing.<sup>1-3</sup> Older patients are more likely to have multiple diseases or chronic illnesses, with associated impaired physical and cognitive function, and to have more limited social support. They have disproportionately high ED use, a finding that persists despite international disparities in ED models of care.<sup>4,5</sup> Older patients attending the ED are more likely to have severe illnesses, to arrive by ambulance, and be admitted to the hospital after their ED visit.<sup>6-9</sup> Older age is also associated with increased ED length of stay and higher resource use.<sup>1,6,10</sup> In addition, older persons are at increased risk of adverse events, with higher rates of missed diagnoses, return ED visits after discharge, and medication errors, than younger severity-matched controls.<sup>11-14</sup>

### Importance

As the proportion of older persons increases, there have been cases made for redesign of ED protocols and physical layout.<sup>15-19</sup> However, the development of robust protocols and services

requires a thorough understanding of the clinical and psychosocial needs of older patients in the ED.

The patterns of presentation and presenting diagnoses of older ED patients are well documented, but very little research describes their functional, symptom, and psychosocial profiles. A limited number of studies suggest that approximately a quarter of elderly patients have mental status impairment, one sixth have potential depression, and two thirds have some functional impairment.<sup>20-24</sup> Few of these studies used multisite samples, and none provides a multinational context, to our knowledge. Comprehensive multinational studies are needed to provide a clearer profile of elderly ED patients, especially to determine whether these profiles vary among nations.

The incidence of geriatric syndromes and functional impairment may influence the layout of a department (eg, type of furniture, lighting, sound management, access to facilities), the care delivery protocols (eg, need for assistance in personal care, need for caregivers to be present), risk minimization (eg, falls, delirium, pressure ulcer), and staff training (eg, identification and management of geriatric syndromes).

**Editor's Capsule Summary***What is already known on this topic*

Older patients often have multiple functional limitations that influence their emergency department (ED) presentation and subsequent outcomes.

*What question this study addressed*

This multinational observational study of 2,282 ED patients aged 75 years or older used the interRAI ED tool, a proprietary geriatric assessment instrument, to screen for functional impairment.

*What this study adds to our knowledge*

Functional and cognitive impairments were common among older patients, and these findings were consistent across nations.

*How this is relevant to clinical practice*

Multidimensional assessments of older patients may help us target changes in ED treatments, resources, design, and professional education to improve care for this rapidly increasing segment of the ED population.

**Goals of This Investigation**

The study reported here was undertaken by members of the interRAI research collaborative, which comprises more than 60 clinicians and researchers from 30 nations, who develop and research assessment systems for aged care, disability, and mental health services.<sup>25</sup> This group set out to explore the characteristics and outcomes of older people attending EDs at an international level to gather information to support refinement of assessment systems and their embedded risk assessment tools. Our objectives were primarily focused on the development of risk assessment tools to guide decision making around discharge home from the ED and whether further assessment will be required should the patient be either discharged home or admitted to the hospital.

In this first article, the recruitment and data collection methods and the clinical characteristics and outcomes of the subjects recruited are described.

**MATERIALS AND METHODS****Study Design and Setting**

A multinational prospective observational cohort study of ED patients aged 75 years or older was conducted. Members of the interRAI research collaborative and their colleagues were invited to participate in this study. Each national research team participant was required to recruit at least 100 subjects from at least 1 ED site and to secure any resources necessary for assessment and data compilation. In total, 13 ED sites from Australia, Belgium, Canada, Germany, Iceland, India, and Sweden were represented in the study. Researchers attempted to

include sites that were broadly representative of EDs within their country. These ED sites were predominantly urban high-volume centers, with some participation from rural high-volume district sites. Research ethics approvals were obtained by national research teams for their national study, which typically required approvals from academic and hospital research ethics boards (confirmations are available on request). Two national studies received a waiver of informed consent.

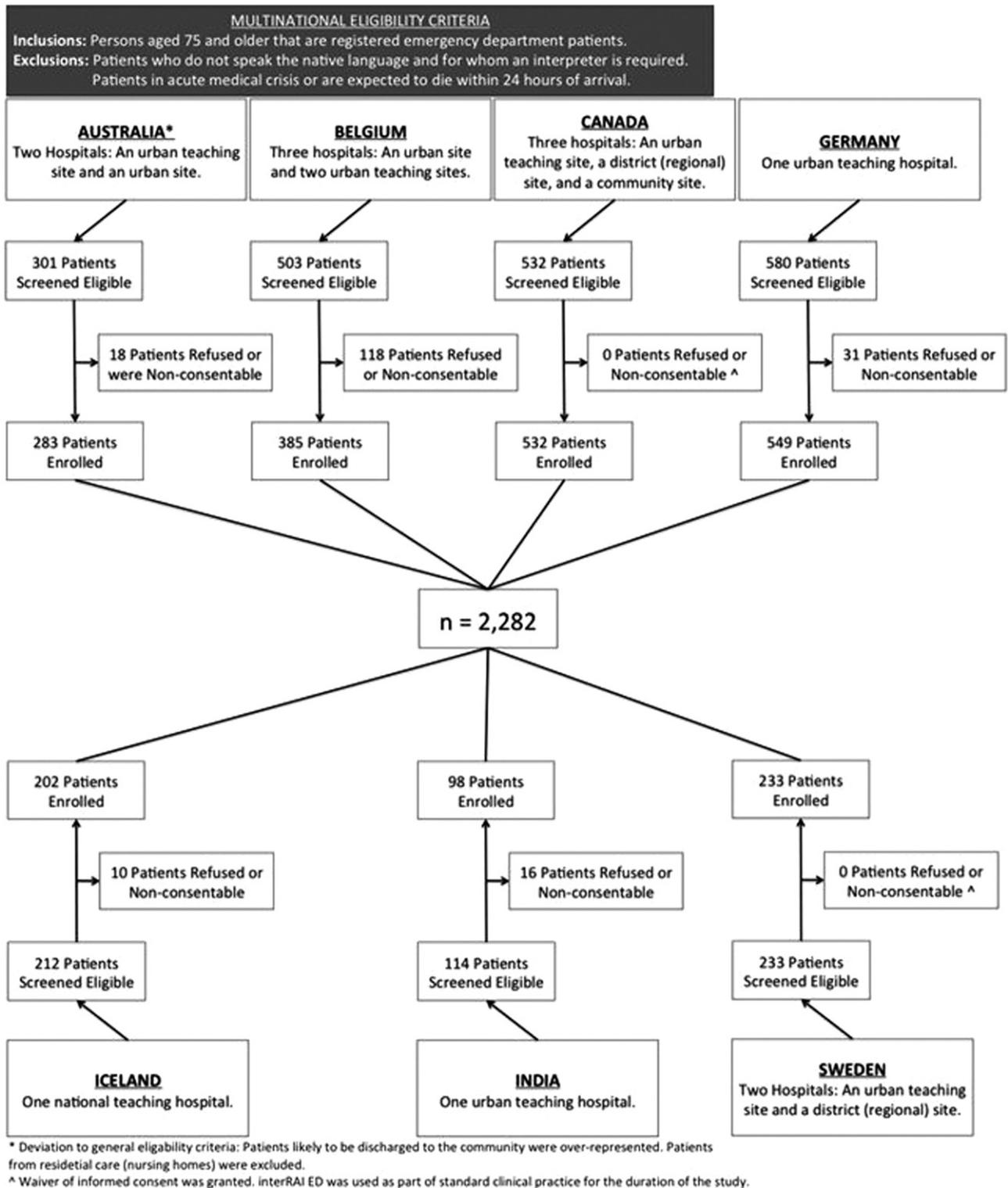
**Selection of Participants**

ED patients aged 75 years or older were eligible for inclusion. This age cutoff was chosen according to previous research that suggested individuals older than 75 years were at highest risk for poor outcomes, and to have a manageable number of patients with which to collect a representative convenience sample. Patients in severe acute medical crisis (highest level of triage acuity) or who were expected to die within 24 hours were excluded. In addition, those who did not speak the national language(s) were excluded. Australia was the only country to deviate from the eligibility criteria. The Australian study, which was primarily designed to study outcomes of older people discharged home from the ED, was a precursor to the international study. However, on commencement of the international study, the Australian study subsequently included subjects who were admitted to the hospital from the ED. Despite the obvious distortion of the sample, it was decided to include the entire Australian data set. All recruitment and data collection were completed consecutively during day shift hours (either 8 AM to 4 PM or 7 AM to 7 PM). Research suggests that ED patients aged 65 years or older are more likely to present to the ED during the morning and early afternoon.<sup>26</sup>

Study recruitment was halted when a prespecified number of cases was collected or when the ED collection period determined locally by each site concluded (between 2 weeks and 2 months). Study recruitment is shown in Figure 1. In total, 2,475 patients were approached for inclusion and 2,282 (92.2%) consented.

**Methods of Measurement**

A formal assessment, using the interRAI ED tool, was undertaken by a research nurse or an ED allied health professional involved in the research team. The interRAI ED is a short, standardized, ED screening level assessment used to support referral decision making in the ED.<sup>27</sup> This tool assesses the performance and capacity of the person across a variety of clinical domains, including cognition and physical function (at presentation and in the premorbid period), as well as mood, comprehension, falls history, nutritional status, and presence of pain or dyspnea at initial emergency assessment. Within interRAI hospital systems, the "premorbid" period is defined as the "3 days prior to the onset of the acute illness that led to hospitalization." The majority of clinical items within interRAI systems are based on observations made by trained assessors. Assessors are trained to compile a response based on the recollections of both the patient



**Figure 1.** Multinational recruitment.

and family members, as well as any other information that can be derived from medical documentation.

Although not formally tested in the ED setting, the reliability of the interRAI ED can be expected to be good, given

the excellent reliability of the same assessment items used in other settings, including acute hospital.<sup>28,29</sup> The majority of items within the interRAI ED are contained in most of the entire suite of interRAI assessments. These items, and many of

the derivative measures, have been extensively tested across a wide range of nations, languages, and settings, with consistently good results.<sup>28-31</sup>

All assessors were provided with training by local interRAI training staff. The interRAI ED was completed electronically with research or commercial software, or using the paper-based tool together with the ED sites' own electronic records system. Length of stay in the ED, referrals to other services, and discharge disposition from both the ED and the hospital (if admitted) were also recorded. The time taken to conduct the ED assessment was recorded. Assessors were also requested to judge whether a subsequent comprehensive geriatric assessment was required for each patient.

**Outcome Measures**

For patients admitted to the hospital from the ED, follow-up was conducted to determine the length of stay and discharge disposition. This was completed by manual chart review or through the use of electronic patient records. For patients discharged directly home from the ED, follow-up was conducted at 28 days after discharge. Data collected included location of the patient, any reattendances to an ED, admissions to the hospital, and admission to a long-term care institution. Follow-up at 28 days was performed by telephone or with the secondary use of electronic health care and mortality databases. Sites that were given a waiver of consent used electronic health care and mortality data for follow-up.

**Primary Data Analysis**

Frequency distributions described characteristics of the sample by country. For geriatric syndromes and functional deficits, prevalence estimates with 95% confidence intervals (CIs) were calculated as proportion of patients with available data. All analyses were performed with SPSS IBM (version 20; SPSS, Inc., Chicago, IL).

Results are presented in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology guidelines.<sup>32</sup>

**RESULTS**

**Characteristics of Study Subjects**

Thirteen hospitals from 7 nations joined the study (Figure 1). The EDs were predominantly located in large or medium-size metropolitan hospitals. A total sample of 2,282 patients was recruited, ranging from 98 to 549 across nations. Each hospital used varying recruitment hours across the week, depending on the availability of resources, with the majority of recruitment occurring during standard weekday working hours. In the 5 nations where formal consent was required, consent rates were high (88.8%).

In the majority of cases, less than 5% of data were missing.

Demographic characteristics by nation are shown in Table 1. Overall, average age of patients was 83.2 years, 41% were men, and 41% lived alone. One hundred sixty-three (7%) were

**Table 1.** Demographic characteristics.\*

Characteristic	Australia, n=283 (12.4%)	Belgium, n=385 (16.9%)	Canada, n=532 (23.3%)	Germany, n=549 (24.1%)	Iceland, n=202 (8.9%)	India, n=98 (4.3%)	Sweden, n=233 (10.2%)	All Nations, N=2,282
Age, mean (SD), y	81.9 (4.9)	82.0 (4.8)	84.9 (6.0)	83.0 (4.9)	82.7 (4.5)	79.7 (5.6)	85.2 (5.9)	83.2 (5.5)
Sex, men	128 (45.2)	176 (45.7)	185 (35.0)	216 (39.3)	90 (44.6)	54 (55.1)	90 (38.6)	939 (41.2)
Living alone	121 (42.8)	139 (37.2)	227 (42.7)	187 (34.2)	106 (52.5)	3 (3.1)	139 (59.7)	922 (40.6)
Carer stress/family overwhelmed	18 (10.5)	68 (17.8)	118 (22.3)	76 (13.8)	45 (27.3)	74 (75.5)	92 (55.1)	491 (23.8)
Admitted from LTC	0	11 (2.9)	27 (5.1)	107 (19.6)	0	0	18 (7.8)	163 (7.2)
Visited ED in last 90 days <sup>†</sup>	115 (40.8)	66 (17.1)	308 (57.9)	105 (19.2)	69 (34.3)	64 (65.3)	81 (34.9)	808 (35.5)
Admitted to the hospital in the last 90 days <sup>†</sup>	63 (22.3)	85 (22.1)	101 (19.2)	180 (32.9)	61 (30.3)	62 (63.3)	72 (30.9)	624 (27.5)

LTC, Long-term care.

\*Data are shown as No. (%) unless otherwise indicated.

<sup>†</sup>Before current ED presentation.

**Table 2.** Prevalence estimates for functional deficits.

Activities of Daily Living	Percentage (95% CI)	
	Premorbid	Admission
Bathing (supervision/assistance)	40 (38.0–42.0)	60.9 (58.9–62.9)
Personal hygiene (supervision/assistance)	23.7 (22.0–25.4)	42.3 (40.3–44.3)
Dressing lower body (supervision/assistance)	28.5 (26.6–30.4)	49.1 (47.0–51.2)
Locomotion (supervision/assistance)	25.8 (24.0–27.6)	49.1 (47.0–51.2)
Cognitive skills for daily decision making (supervision/assistance)	20.0 (18.4–21.6)	25.5 (23.7–27.3)
Instrumental ADL capacity managing medications (supervision/assistance)		39.1 (37.1–41.1)

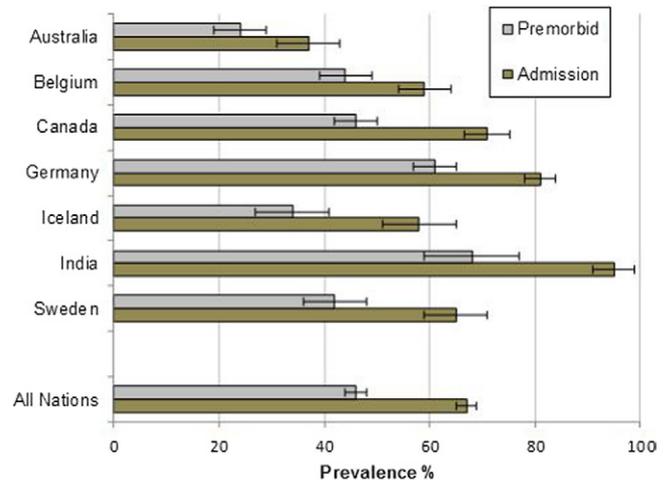
ADL, Activities of daily living.  
\*Instrumental ADL.

admitted from long-term care, but this varied widely across nations (Germany 20%; all other nations less than 10%). Use of the ED in the previous 90 days was high (36%), as was hospitalization (28%). There was caregiver stress or the family was feeling overwhelmed in 24% of cases, but among Indian cases the rate was as high as 76%.

Prevalence estimates with 95% CIs for functional deficits are shown in Table 2. There was evidence of cognitive impairment in 26% (95% CI 24% to 27%) of patients when in the ED compared with 20% (95% CI 18% to 22%) in the premorbid period. In 16% of patients (95% CI 15% to 18%), there was evidence of an acute change in mental state, suggesting the presence of delirium. Problems in performing personal activities of daily living were common in each of the 4 domains assessed, with 46% (95% CI 44% to 48%) of patients requiring help in at least 1 domain in the premorbid period. Bathing was the most common problem area. These proportions increased significantly from the premorbid period, with only 33% of patients (95% CI 31% to 35%) considered independent in activities of daily living in the ED. Particularly with respect to locomotion, the proportion of patients who could not walk without supervision increased from 26% (95% CI 24% to 28%) premorbid to 49% (95% CI 47% to 51%) in the ED.

More than one third of patients (37%; 95% CI 35% to 39%) fell in the 90 days before presentation, and 21% (95% CI 20% to 23%) reported weight loss. In the 3-day period before the onset of the acute illness, 39% of patients (95% CI 37% to 41%) experienced daily pain, 39% (95% CI 37% to 41%) required supervision with medications, and 35% (95% CI 33% to 37%) experienced dyspnea at rest or with normal daily activities on ED presentation.

Overall premorbidly, 48% of patients (95% CI 46% to 50%) were dependent in activities of daily living or had a cognitive problem. At presentation, 78% of patients (95% CI 76% to 80%) were dependent in activities of daily living, had a



**Figure 2.** Prevalence estimates (95% CIs) of activities of daily living impairment by country.

**Table 3.** Outcomes.

Outcomes	N=2,282
<b>Discharged destination from the ED, No. (%)</b>	
Acute care ward	1,364 (60.2)
Other hospital (including rehabilitation/palliative care)	72 (3.2)
Long-term care facility	46 (2.0)
Private home	663 (29.3)
Community-supported care	112 (4.9)
Died	8 (0.4)
Length of stay in acute care hospital for patients admitted from the ED, median (interquartile range), days	7 (4–13)

cognitive problem (including delirium), or had fallen in the past 90 days. This pattern was consistent across nations, although the proportions in India (premorbid 70%, 95% CI 61% to 79%; admission 97%, 95% CI 94% to 100%) were distinctly greater than that of other countries, as shown in Figure 2.

In the ED, 21% received intravenous therapy; 12%, oxygen therapy; 6%, an indwelling catheter; and 6%, wound care. The median length of time in the ED was 195 minutes (interquartile range 132 to 300 minutes). The length of stay in ED was not collected in the Canadian or Australian version of the instrument.

As shown in Table 3, the majority of patients (60%) were admitted to an acute hospital ward from the ED, of whom 76% were living in private homes before ED presentation, whereas 14% were in community-supported accommodation, such as boarding houses, and 10% were in institutional care. Other discharge destinations from the ED included private home (29%), community-supported accommodation (5%), and institutional care (5%). About half of those discharged to institutional care went to long-term care. Less than 1% of patients died in the ED. Of live discharges from ED, 36% of patients returned to their usual residence.

**Table 4.** Prevalence estimates for functional deficits by ED discharge setting.\*

Functional Deficit	Percentage (95% CI)		
	Community, N=775	Institution (Hospital), N=1,436	Institution (LTC), N=46
Any premorbid ADL disability	28.8 (25.6–32.0)	53.7 (51.1–56.3)	89.1 (80.1–98.1)
Any admission ADL disability	47.4 (43.9–50.9)	76.2 (74.0–78.4)	93.5 (86.4–100)
Any premorbid geriatric syndrome	31.5 (28.2–34.8)	55.6 (53.0–58.2)	91.3 (83.2–99.4)
Any admission geriatric syndrome	64.8 (61.4–68.2)	84.2 (82.3–86.1)	95.6 (89.6–100)
Premorbid cognitive skills dependency	12.2 (9.9–14.5)	22.9 (20.7–25.1)	58.7 (44.5–72.9)
Admission cognitive skills dependency	15.1 (12.6–17.6)	29.8 (27.4–32.2)	58.7 (44.5–72.9)

\*Excludes deaths in the ED.

Of live discharges from ED, there were significant differences in functional profiles, depending on discharge setting, as shown in Table 4.

Of those discharged to a community setting from the ED for whom follow-up data were available (93%), 18% returned to the ED within 28 days of discharge and about 4% of patients had more than 1 return visit to ED. In the same cohort, 12% of patients were admitted to the hospital.

Broadly, the demographic characteristics and clinical features were similar among nations, apart from India (see below). For example, the pattern of high levels of premorbid and admission limitations in personal activities of daily living and cognition were observed across nations. Admission rates to the hospital were also similarly high, consistently above 40% (except for Australia [37%], where there was a deliberate selection bias in favor of patients discharged home). In Germany (91%) and Belgium (74%), the rates were significantly higher than in other nations.

Compared with those of the other countries, Indian patients were younger (mean age 79.7 versus 83.4 years), more likely to be men (55% versus 41%), and not living alone (97% versus 58%). There were no admissions from long-term care, and rates of recent attendance at the ED (65% versus 34%) and hospitalization (63% versus 26%) were considerably higher than in other nations. Patients in India were also more likely to have a premorbid cognitive impairment (63%, 95% CI 54% to 73% versus 18%, 95% CI 16% to 20%) or activities of daily living limitation (68%, 95% CI 59% to 78% versus 45%, 95% CI 43% to 47%) and a higher likelihood of experiencing any geriatric syndrome at admission (97%, 95% CI 94% to 100% versus 77%, 95% CI 75% to 79%).

## LIMITATIONS

The participating EDs and countries were involved in the study because they were in some way affiliated with, or encouraged to join the study by, an interRAI member. This resulted in a focus on metropolitan or large regional hospitals.

Because the project was conducted on only a modest budget, and in some nations without any direct funding, compromises were required in the process of securing representativeness of the samples in each ED. Few of the EDs were able to recruit patients outside normal weekday working hours. Evidence from other studies suggests that this may not distort the sample greatly. In addition,

because of restrictions in the availability of assessors, in some sites consecutive patients could not be recruited. However, our protocol was designed to ensure no systematic bias in selection of subjects beyond these specific constraints.

The study focused primarily on functional characteristics. It would have been improved by the inclusion of diagnostic information and measures of acuity. These parameters have been shown to influence outcomes.<sup>33,34</sup> Such measures were not collected in a standardized format in the study EDs, such that a large increase of research resources would have been required to collect them.

Despite these issues, the breadth of involvement among nations provides information and insights hitherto unavailable.

## DISCUSSION

To our knowledge, this is the most extensive international study of the characteristics and outcomes of older ED patients to be reported to date.

The findings illustrate that the majority of older patients attending EDs are frail and dependent on others. The level of premorbid morbidity is high, with cognitive impairment and limitations in activities of daily living being particularly common. Consistent with studies conducted in the hospital,<sup>35–38</sup> a decline in physical functional status was associated with the acute illness such that the majority of the cohort was dependent at presentation to the ED. Cognitive impairment was also more common, with a change of mental status observed in many patients, suggesting the presence of delirium. Overall, more than 75% of patients appeared to have at least 1 geriatric syndrome.

These patterns were universal among the sites in traditional developed nations. Although the Indian data are drawn from a single large tertiary hospital in New Delhi, there are some remarkable observations. Patients present at a younger age, have higher levels of premorbid and admission functional impairment, and have poorer outcomes. The data appear to suggest that older people present to the ED at a more serious stage of illness advancement than in other nations. Their caregivers are at higher levels of distress and their families feel more overwhelmed. Clearly, further study involving other EDs and similar nations is required to confirm whether this pattern is typical.

The presence of new dependency in activities of daily living, particularly when the patient lives alone, constitutes a major issue if there is a wish to discharge the patient directly home. If dependence in cognitive or physical function is present more than transiently, there may be a need to provide at least short-term institutional care or intensive services in the home, even if the medical diagnosis does not, in its own right, mandate hospital care. In our experience, this scenario is a source of frustration to many clinicians and hospital administrators, who often perceive admission of such individuals to constitute inappropriate use of limited and expensive resources. However, this situation is common and does seem to warrant discrete strategies both in the ED and the hospital to address them effectively.

Observations from other single-nation studies suggest that older people attending the ED have very different needs than younger patients.<sup>39,40</sup> Because of their functional limitations, particularly in regard to cognition and communication, older people are likely to require assiduous history taking, with information often dependent on collateral evidence from family members or caregivers. The risk of missed diagnosis is high.<sup>4,34</sup> The presence of premorbid illness and functional limitation is likely to influence the manner in which acute illnesses present. The length of stay in the ED is likely to exceed that of younger patients.<sup>34</sup>

While older patients are in the ED, there will be special care requirements. Cognitive impairment, including delirium, combined with impaired self-care and mobility problems, is likely to be associated with a higher risk of falling and pressure ulcer. If the stay in the ED is for more than a very short period (and this study indicates that this is often the case), nursing resources will be required to ensure continuous observation, appropriate skin care to avoid pressure ulcers, and adequate hydration and toileting. Input from specialists with expertise in geriatric medicine is likely to be required. The high prevalence of geriatric syndromes among patients presenting to the ED suggests the strong need for ED staff to have specialist training in geriatric care. However, in our experience, many ED staff perceive their role to be primarily in the task of assessment and management of severe illnesses and injuries, and geriatric care can be regarded as an inappropriate role for the ED. If this view is maintained, the case for introducing specialist teams and even specialized environments becomes more justified so that such high-risk patients can benefit from comprehensive geriatric assessment and intervention.

Ultimately, good design, expertise, and resources for care of older patients in the ED should be determined by consideration of the nature of the acute illnesses, the degree of associated functional impairment, the presence and nature of geriatric syndromes, the risk of adverse events, and the duration of stay in the ED.

In summary, our study demonstrates that functional dependency and geriatric syndromes affect the majority of older people attending EDs, across a wide range of nations with

different health systems and cultural contexts. This high prevalence suggests a need for careful scrutiny of current clinical practice and design of EDs worldwide.

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