Q J Med 2014; **107**:977–987
doi:10.1093/qjmed/hcu111 Advance Access Publication 16 June 2014

Characteristics and outcomes of older persons attending the emergency department: a retrospective cohort study

S.P. KENNELLY, B. DRUMM, T. COUGHLAN, R. COLLINS, D. O'NEILL and R. ROMERO-ORTUNO

From the Department of Age-Related Health Care, Tallaght Hospital, Dublin, Ireland

Address correspondence to Dr S.P. Kennelly, Department of Age-Related Health Care, Tallaght Hospital, Dublin 24, Ireland. email: sean.kennelly@amnch.ie

Received 9 March 2014 and in revised form 6 May 2014

Summary

Background: The analysis of routinely collected hospital data informs the design of specialist services for at-risk older people.
Aim: Describe the outcomes of a cohort of older emergency department (ED) attendees and identify predictors of these outcomes.
Design: retrospective cohort study.
Methods: All patients aged 65 years or older attending an urban university hospital ED in January 2012 were included ($N = 550$). Outcomes were retrospectively followed for 12 months. Statistical analyses were based on multivariate binary logistic regression models and classification trees.
Results: Of $N = 550$, 40.5% spent $\leqslant 6$ h in the ED, but the proportion was 22.4% among those older than 81 years and not presenting with musculoskeletal problems/fractures. $N = 349$ (63.5%) were admitted from the ED. A significant multivariate predictor of in-hospital mortality was Charlson comorbidity index [CCI; odds ratio = 1.19, 95% confidence interval: 1.07, 1.34, $P = 0.002$]. Among patients who were discharged from ED without admission or after their first in-patient admission ($N = 499$), 232 (46.5%) re-attended ED within 1 year, with CCI being the best predictor of re-attendance (CCI $\leqslant 4$: 25.8%, CCI > 5: 60.4%). Among $N = 499$, 34 (6.8%) had died after 1 year of initial ED presentation. The subgroup ($N = 114$) with the highest mortality (17.5%) was composed by those aged >77 years and brought in by ambulance on initial presentation.
Conclusions: Advanced age and comorbidity are important drivers of outcomes among older ED attendees. There is a need to embed specialist geriatric services within frontline services to make them more gerontologically attuned. Our results predate the opening of an acute medical unit with specialist geriatric input.

Introduction

People aged 65 years or older represent up to 20% of the emergency department (ED) attendances.[1] Because of demographic trends,[2] that proportion will continue to rise.[3] Older people admitted to hospital as medical emergencies are a more heterogeneous population than younger population, with a wider range of trajectories and outcomes.[4] A substantial proportion of older patients present to the ED with complex co-morbidities and functional decline, and acute hospital care (starting in the ED) needs to be tailored to meet the special needs of this particularly vulnerable population.[5] Comprehensive geriatric assessment (CGA) for older adults admitted to hospital increases a patient's likelihood of being alive and in their own home at up to 12 months.[6] Research has shown that it is possible to embed CGA within EDs, which may be associated with improvements in operational outcomes.[7] However, CGA is a finite resource and it should be targeted to those who need it the most.

Over recent years, there has been a growing emphasis on the formal identification of the frail older person who is most likely to benefit from specialised interventions, rather than using an arbitrary age cut off.[5,7–9] In Ireland, for example, the importance of acute care for the frail older person has been recognized by the National Clinical Programme for Older People.[10] In the United Kingdom, the Future Hospital Commission has recommended early access to CGA services for older people presenting to the hospital with frailty.[11]

The analysis of routinely collected hospital data is invaluable as a learning resource to inform the evidence-based design of local strategies and pathways to identify older people at risk in need of specialist services. One way of characterizing the journey and studying the outcomes of older people in the acute hospital system is via design of a retrospective cohort study.[12] The aim of this study was to characterize the demographic profile of adults older than 65 years attending the ED of an urban university hospital in January 2012 and to follow their outcomes including admission rates, ED re-attendance rates and mortality rates over the following year and identify predictors of these outcomes.

Methods

Setting

This study was conducted in an acute 600-bedded tertiary referral university teaching hospital in Dublin, serving an urban population of around 300 000 people (www.amnch.ie).

Cohort

All patients aged 65 years or older attending the ED in January 2012 were included. Outcomes were retrospectively followed for 12 months.

Data collection

Data on patient demographics, clinical characteristics and outcomes were extracted from the electronic ED Symphony® record, clinical notes and the Hospital Inpatient Enquiry (HIPE) system.[13]

Cohort characterization variables

Basic demographic information included age (years), gender and whether patients were residing permanently in a nursing home (NH).

ED attendance characteristics included ED registration during out of hours (i.e. outside 09:00 to 17:00 h Monday to Friday), visit to the ED in the previous 30 days, self-referred to the ED and brought in by ambulance (BIBA) to the ED.

The diagnostic categories recorded on ED triage were based on routinely collected, mutually exclusive categories based on the major diagnostic categories (MDC) classification (http://en.wikipedia.org/wiki/Major_Diagnostic_Category). Some of the individual categories with very low patient numbers were collapsed together resulting in the following MDC list: collapse/syncope; injury/accident/fall; musculoskeletal/fractures; seizure/head ache; stroke; cardiovascular; respiratory; digestive; genitourinary/renal; infections and haem atological.

High acute illness severity was defined as a Manchester Triage Score (MTS) of 1 (immediate), 2 (very urgent) or 3 (urgent) (%). Categories 4 and 5 are graded as standard and non-urgent, respectively. The MTS is a sensitive tool for detecting those who subsequently need critical care and are ill on arrival in the ED department.[14]

Patient comorbidity was measured with the Charlson Comorbidity Index (CCI).[15] The CCI (without age adjustment) was calculated for each participant on the basis of their medical histories (i.e. by manually reviewing their attendance medical notes). CCI encompasses 19 medical conditions weighted 1–6 with total scores ranging from 0 (lowest) to 37 (highest) comorbidity.

Outcome variables

We measured the proportion of patients spending 6 h or less in the ED. In January 2009, the Irish Health Service Executive introduced a total waiting time target of 6 h from the registration of the patient in the ED to admission or discharge from the ED.[16] We also recorded the proportion of patients admitted from the ED.

'First admission' was defined as the in-patient admission linked to the first ED attendance. For all first hospital admissions, we measured the following outcomes: in-patient length of stay (LOS, days); prolonged LOS (i.e. LOS > 30 days) (%); in-hospital mortality (%) and discharge to NH (%).

For all first ED attendances, the following outcomes were computed: re-attendance to ED within 1 month (%); re-attendance to ED within 1 year (%) and mortality within 1 year (%). Readmission information was collected through the HIPE system, and it only reflects readmissions to our hospital. Mortality data were also collected through HIPE, and for deaths outside the hospital system, we conducted a manual check on http://www.rip.ie/.

Table 1 Predictors of ED stay being 6 h or less (binary logistic regression)

Six hours or less in the ED	*B*	Standard error	*P*	OR	95% CI for OR	
					Lower	Upper
Age	−0.03	0.01	**0.014**	0.97	0.94	0.99
Female sex	0.30	0.20	0.132	1.35	0.91	2.00
NH resident	0.75	0.39	0.054	2.12	0.99	4.55
Out of hours registration	−0.46	0.20	**0.020**	0.63	0.43	0.93
Previous ED attendance	0.20	0.28	0.474	1.22	0.71	2.11
Self-referred	0.22	0.21	0.298	1.25	0.82	1.90
BIBA	−0.44	0.22	**0.042**	0.64	0.42	0.98
Collapse/syncope	−0.03	0.47	0.950	0.97	0.39	2.45
Injury/accident/fall	0.71	0.55	0.195	2.04	0.69	6.01
Musculoskeletal/fractures	1.14	0.37	**0.002**	3.14	1.51	6.51
Seizure/headache	0.08	0.70	0.908	1.08	0.28	4.25
Stroke	−0.29	0.53	0.583	0.75	0.27	2.10
Cardiovascular	−0.08	0.39	0.846	0.93	0.43	1.99
Respiratory	0.28	0.50	0.581	1.32	0.49	3.55
Digestive	−0.20	0.42	0.628	0.82	0.36	1.86
Genitourinary/renal	0.53	0.60	0.380	1.69	0.52	5.48
Infections	−0.55	0.37	0.143	0.58	0.28	1.20
Haematological	−0.10	0.46	0.835	0.91	0.37	2.24
High acuity	−0.91	0.37	**0.015**	0.40	0.19	0.84
CCI	−0.04	0.05	0.371	0.96	0.88	1.05

The p values in bold all reached statistical significance versus unbolded values which did not. The level of significance was set at a $P<0.05$ as mentioned in script- therefore the bold figures are the *P*-value.

Statistical analyses

All statistical analyses were carried out on a fully anonymized database, using IBM® SPSS® Statistics package (version 20). Data were described as percentages or mean with standard deviation (SD) with or without range. To investigate the predictors of the outcomes of interest, multivariate binary logistic regression models were computed (method: enter with automatic bootstrapping). For each predictor, odds ratio (OR) and 95% confidence interval (CI) for OR were computed. The level of significance was set at $P<0.05$.

For selected outcomes, the significant predictors from the logistic regression were entered in a classification tree (CT). CT is a data mining technique that allows the identification of homogeneous subgroups with high or low risk for a given outcome. We chose the exhaustive chi-squared automatic interaction detection (CHAID) method, which examines all possible splits for each predictor. At each step, CHAID chooses the independent predictor variable that has the strongest interaction with the dependent variable.

Ethics

Ethics approval for this retrospective cohort study was obtained from Tallaght Hospital/St. James's Hospital Joint Research Ethics Committee (ref. 2012/12/27).

Results

Study cohort

In 2012, there were 43,383 ED attendances and 11,026 admissions, of whom those aged 65 years or older accounted for 7,862 (18.1%) attendances and 4,097 (37.2%) admissions. In the month of January 2012, there were 3,535 ED attendances and 1,031 admissions, with those aged 65 years or older accounting for 550 (15.6%) attendances and 349 (33.5%) admissions. Those 550 attendances constitute the cohort of our study. The 550 ED attendances represent 550 individual cases.

Cohort descriptives

In $N=550$ ED attendances, the mean age was 76.5 years (SD 8.0, range 65–100 years). Fifty-two percent ($N=287$) were women, and 7.6% ($N=42$) were NH residents. Fifty-nine percent ($N=323$) arrived to ED out of hours, and 14.0% ($N=77$) had been in the ED in the preceding month. Fifty-nine percent ($N=326$) were self-referred to ED, and

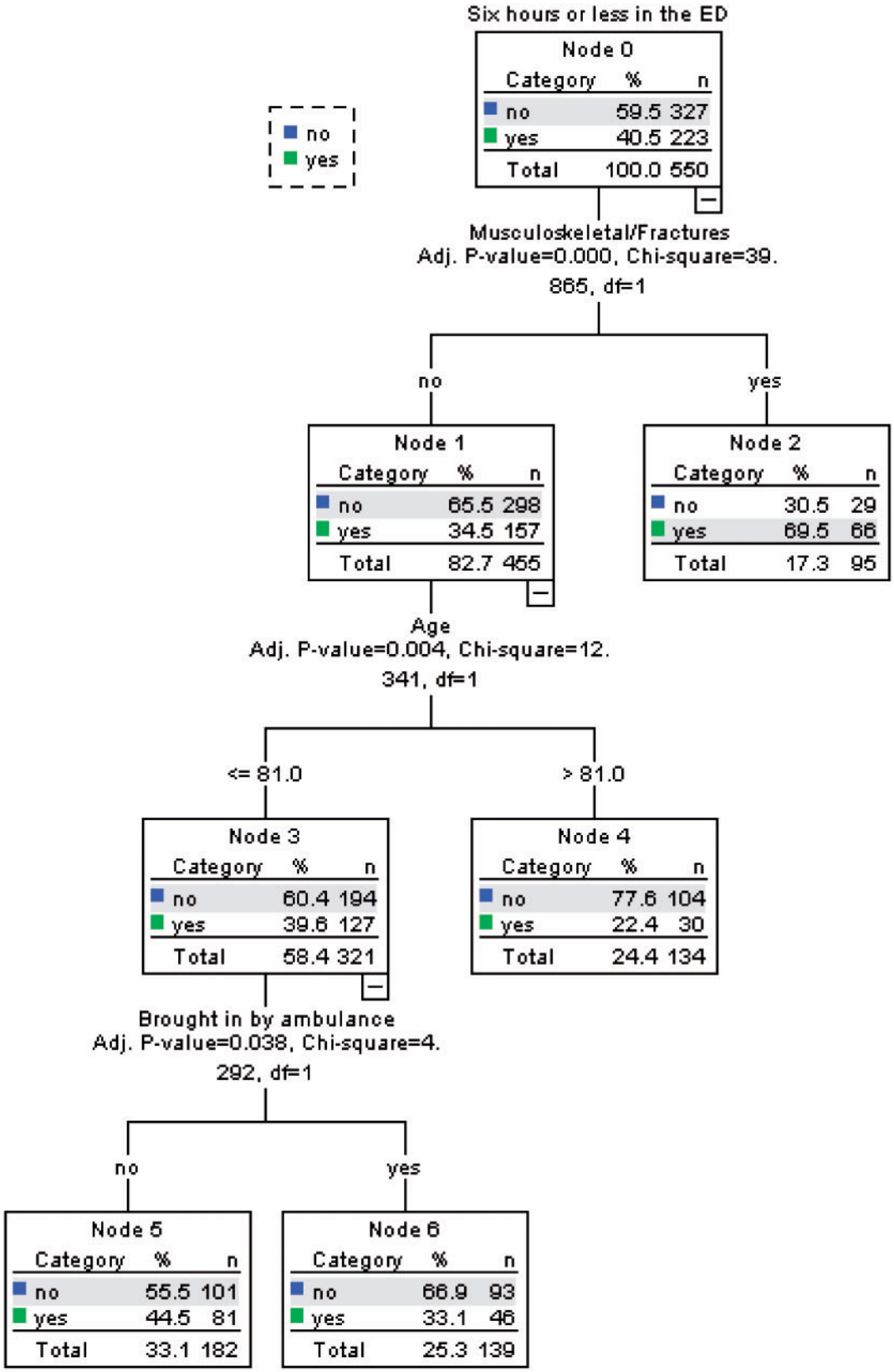

Figure 1. CT with predictors of ED LOS.

Table 2 Predictors of being admitted from the ED (binary logistic regression)

Admitted from the ED	*B*	Standard error	*P*	OR	95% CI for OR	
					Lower	Upper
Age	0.02	0.02	0.292	1.02	0.99	1.05
Female sex	−0.15	0.22	0.495	0.86	0.55	1.33
NH resident	−1.33	0.44	**0.002**	0.26	0.11	0.63
Out of hours registration	0.04	0.22	0.858	1.04	0.68	1.59
Previous ED attendance	0.11	0.32	0.725	1.12	0.60	2.08
Self-referred	−0.47	0.23	**0.046**	0.63	0.40	0.99
BIBA	1.55	0.25	**<0.001**	4.72	2.88	7.73
Collapse/syncope	−0.06	0.51	0.909	0.94	0.35	2.58
Injury/accident/fall	−1.34	0.59	**0.022**	0.26	0.08	0.82
Musculoskeletal/fractures	−1.12	0.39	**0.004**	0.33	0.15	0.70
Seizure/headache	0.13	0.71	0.853	1.14	0.28	4.61
Stroke	2.74	1.08	**0.011**	15.53	1.88	128.02
Cardiovascular	0.88	0.44	**0.044**	2.42	1.02	5.70
Respiratory	0.20	0.56	0.717	1.23	0.41	3.69
Digestive	−0.34	0.43	0.429	0.71	0.31	1.65
Genitourinary/renal	0.01	0.64	0.982	1.01	0.29	3.58
Infections	0.95	0.41	**0.021**	2.57	1.15	5.76
Haematological	−0.79	0.48	0.097	0.45	0.18	1.15
High acuity	0.96	0.39	**0.015**	2.60	1.20	5.61
CCI	0.11	0.05	**0.045**	1.11	1.00	1.23

44.7% ($N = 246$) were BIBA. Although 30% percent of those who did not self-refer were BIBA, 55% of those who self-referred were BIBA.

The frequencies of major diagnoses were as follows: collapse or syncope: 6.5%; injury, accident or fall: 3.6%; musculoskeletal/fractures: 17.3%; seizure/headache: 2.0%; stroke: 4.7%; cardiovascular: 12.4%; respiratory: 4.7%; digestive: 9.3%; genitourinary or renal: 2.9%; infections: 19.5%; haematological: 6.5% and other: 10.5%.

Of the $N = 550$ ED attendances, 91.8% presented with high acuity according to the MTS classification ($N = 10$ category 1, $N = 199$ category 2 and $N = 296$ category 3). The mean CCI in the cohort was 5.9 (SD 2.4, range 2–21).

Time spent in the ED

In the cohort of $N = 550$, the mean time spent in ED was 556.8 min (SD 507.7) and $N = 223$ (40.5%) spent 6 h or less. As Table 1 shows, a significant multivariate predictor of a shorter ED LOS was presenting with musculoskeletal problems/fractures (OR = 3.14, 95% CI: 1.51–6.51, $P = 0.002$). Significant multivariate predictors of longer ED LOS were higher acuity (OR = 0.40, 95% CI: 0.19–0.84, $P = 0.015$), out of hours presentation (OR = 0.63, 95% CI: 0.43–0.93, $P = 0.020$), BIBA (OR = 0.64, 95% CI: 0.42–0.98, $P = 0.042$) and advancing age (OR = 0.97, 95% CI: 0.94–0.99, $P = 0.014$). Figure 1 shows that the subgroup with the highest proportion of patients spending 6 h or less in ED (69.5%) was the one presenting with musculoskeletal problems/fractures ($N = 95$). Those not presenting with musculoskeletal problems/fractures and older than 81 years ($N = 134$) had the lowest proportion of spending 6 h or less in ED (22.4%).

Admission from the ED

Of $N = 550$, 349 (63.5%) were admitted from the ED. As Table 2 shows, significant multivariate predictors of being admitted from the ED were presenting with stroke (OR = 15.53, 95% CI: 1.88–128.02, $P = 0.011$), BIBA (OR = 4.72, 95% CI: 2.88–7.73, $P < 0.001$), high acuity (OR = 2.60, 95% CI: 1.20–5.61, $P = 0.015$), presenting with infections (OR = 2.57, 95% CI: 1.15–5.76, $P = 0.021$), presenting with cardiovascular condition (OR = 2.42, 95% CI: 1.02–5.70, $P = 0.044$) and higher CCI (OR = 1.11, 95% CI: 1.00–1.23, $P = 0.045$).

Significant multivariate predictors of not being admitted from ED were being an NH resident (OR = 0.26, 95% CI: 0.11–0.63, $P = 0.002$), presenting with an injury, accident or fall (OR = 0.26, 95% CI: 0.08–0.82, $P = 0.022$), presenting with a musculoskeletal problem or fracture (OR = 0.33, 95% CI: 0.15–0.70, $P = 0.004$) and self-referral to ED (OR = 0.63, 95% CI: 0.40–0.99, $P = 0.046$) (Table 2).

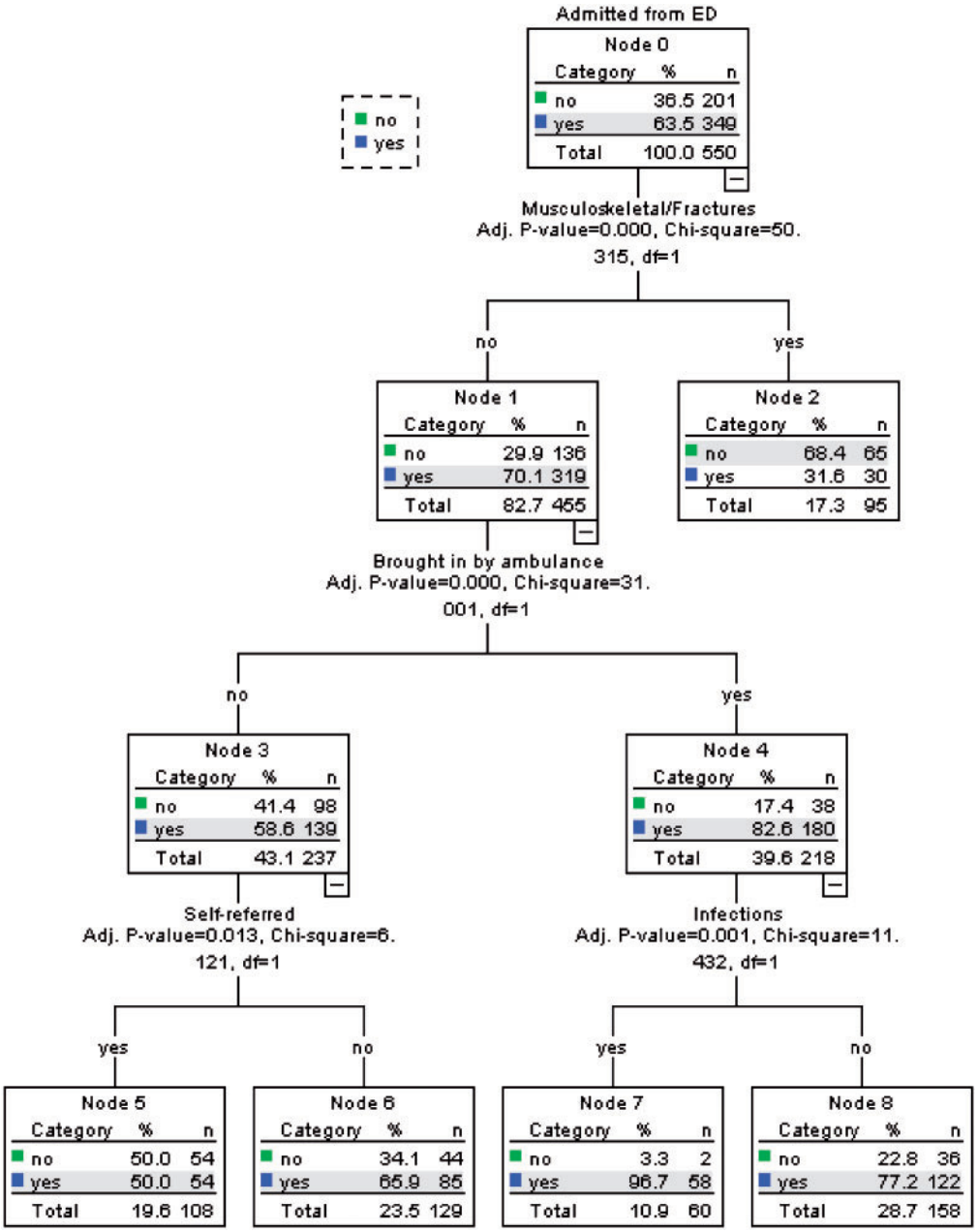

Figure 2. CT with predictors of admission from ED.

Figure 2 shows that the subgroup with the highest proportion of patients admitted from ED (96.7%) was the one BIBA with infections ($N = 60$). The subgroup with the lowest proportion of patients admitted (31.6%) was composed by those presenting with musculoskeletal problems/fractures ($N = 95$).

In-patient outcomes for all first hospital admissions

For the 349 patients admitted to hospital, the average in-patient LOS was 13.1 days (SD 19.0), with $N = 32$ (9.3%) having a prolonged hospital admission (i.e. 30 days or longer). Among the 20 admission predictors shown in Table 1, the only significant multivariate predictor of prolonged LOS in admitted patients was advancing age (OR = 1.07, 95% CI: 1.02–1.13, $P = 0.012$).

Of the 349 patients admitted, 51 (14.6%) died in hospital. Among the 20 admission predictors shown in Table 1, the only significant multivariate predictor of in-hospital mortality was CCI (the higher the CCI, the higher mortality: OR = 1.19, 95% CI: 1.07–1.34, $P = 0.002$).

Among the 349 patients admitted, 52 (14.9%) were discharged to NH. Among the 20 admission

Table 3 Predictors of ED re-attendance at 1 year (binary logistic regression)

ED re-attendance at 1 year	*B*	Standard error	*P* value	OR	95% CI for OR	
					Lower	Upper
Age	0.00	0.02	0.868	1.00	0.97	1.04
Female sex	0.12	0.26	0.643	1.13	0.67	1.89
NH resident	1.31	0.80	0.101	3.71	0.78	17.74
Out of hours registration	−0.04	0.27	0.876	0.96	0.56	1.63
Previous ED attendance	0.14	0.37	0.712	1.15	0.55	2.39
Self-referred	0.02	0.30	0.951	1.02	0.57	1.82
BIBA	0.22	0.30	0.453	1.25	0.70	2.23
Collapse/syncope	0.37	0.62	0.552	1.45	0.43	4.92
Injury/accident/fall	−1.12	1.16	0.334	0.33	0.03	3.18
Musculoskeletal/fractures	−0.53	0.62	0.398	0.59	0.17	2.00
Seizure/headache	0.46	1.02	0.650	1.59	0.21	11.78
Stroke	0.25	0.59	0.674	1.28	0.40	4.06
Cardiovascular	0.53	0.50	0.295	1.69	0.63	4.53
Respiratory	1.84	0.77	**0.017**	6.27	1.38	28.43
Digestive	1.19	0.60	**0.047**	3.29	1.02	10.66
Genitourinary/renal	0.02	0.88	0.979	1.02	0.18	5.70
Infections	0.57	0.47	0.226	1.76	0.70	4.40
Haematological	0.66	0.73	0.363	1.94	0.47	8.09
High acuity	0.69	0.84	0.412	1.99	0.39	10.29
CCI	0.18	0.07	**0.008**	1.20	1.05	1.36
Six hours or less in ED (1st atten.)	−0.04	0.31	0.900	0.96	0.52	1.77
In-patient LOS (1st adm.)	0.00	0.01	0.686	1.00	0.98	1.01
Discharge to NH (1st adm.)	−0.33	0.63	0.602	0.72	0.21	2.48

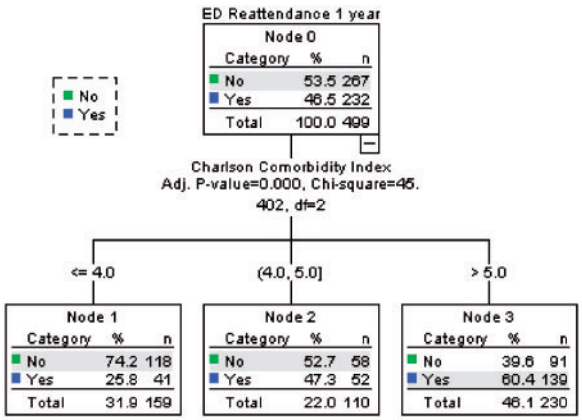

Figure 3. CT with predictors of ED re-attendance at 1 year.

predictors shown in Table 1, significant multivariate predictors of discharge to an NH were being an NH resident prior to admission (as expected: OR = 1,180.94, 95% CI: 160.78–8,674.15, $P < 0.001$), self-referral to ED (OR = 7.27, 95% CI: 1.49–35.55, $P = 0.014$) and advancing age (OR = 1.13, 95% CI: 1.06–1.21, $P = 0.001$).

Re-attendance to ED

Four hundred ninety-nine patients in the cohort were discharged from ED without admission or after their first in-patient admission (those who died during their first in-patient admission are discounted). Of those 499 patients, 68 (13.6%) re-attended to ED within 1 month of discharge and 232 (46.5%) within 1 year of discharge. The mean number of re-attendances within 1 year of discharge was 1.3 (SD 2.2, range 0–16).

Among the 23 predictors included in Table 3, the only significant multivariate predictor of re-attendance at 1 month was in-patient LOS during the first admission (the longer the in-patient LOS, the lower the risk of early ED re-attendance: OR = 0.95, 95% CI: 0.91–1.00, $P = 0.044$).

As Table 3 shows, significant multivariate predictors of ED re-attendance at 1 year were initial presentation with respiratory disease (OR = 6.27, 95% CI: 1.38–28.43, $P = 0.017$), with digestive disease (OR = 3.29, 95% CI: 1.02–10.66, $P = 0.047$) and higher CCI on initial presentation (OR = 1.20, 95% CI: 1.05–1.36, $P = 0.008$). In the CT shown in Figure 3, the strongest predictor among the latter three was CCI, in an incremental fashion: the subgroup with a CCI of 4 or less ($N = 159$) had a 1-year re-attendance rate of 25.8%, whereas the subgroup with a CCI greater than 5 ($N = 230$) had a 1-year re-attendance rate of 60.4%.

Table 4 Predictors of mortality at 1 year (binary logistic regression)

Twelve-month mortality	*B*	Standard error	*P*	OR	95% CI for OR	
					Lower	Upper
Age	0.06	0.03	**0.034**	1.07	1.01	1.13
Female sex	−0.55	0.48	0.260	0.58	0.22	1.50
NH resident	0.37	1.18	0.754	1.45	0.14	14.61
Out of hours registration	−0.42	0.47	0.362	0.65	0.26	1.63
Previous ED attendance	−0.78	0.65	0.232	0.46	0.13	1.65
Self-referred	−0.90	0.55	0.102	0.40	0.14	1.20
BIBA	1.44	0.59	**0.015**	4.23	1.32	13.52
Collapse/syncope	1.41	1.08	0.194	4.08	0.49	34.12
Injury/accident/fall	−18.19	13 944.32	0.999	0.00	0.00	
Musculoskeletal/fractures	−17.92	6746.84	0.998	0.00	0.00	
Seizure/headache	−16.79	17 292.54	0.999	0.00	0.00	
Stroke	−0.14	1.35	0.919	0.87	0.06	12.36
Cardiovascular	0.91	0.99	0.355	2.49	0.36	17.24
Respiratory	0.18	1.22	0.885	1.19	0.11	12.91
Digestive	−0.30	1.44	0.837	0.74	0.04	12.53
Genitourinary/renal	0.49	1.49	0.742	1.63	0.09	30.22
Infections	0.89	0.91	0.327	2.44	0.41	14.46
Haematological	1.49	1.18	0.209	4.43	0.44	45.21
High acuity	17.16	10 757.69	0.999	28 382 054.79	0.00	
CCI	0.14	0.09	0.124	1.16	0.96	1.39
Six hours or less in ED (1st atten.)	0.51	0.51	0.317	1.67	0.61	4.53
In-patient LOS (1st adm.)	0.01	0.01	0.213	1.01	0.99	1.04
Discharge to NH (1st adm.)	−1.22	1.08	0.262	0.30	0.04	2.49
ED re-attendance (1 month)	1.20	0.66	0.072	3.31	0.90	12.16
ED re-attendance (1 year)	−0.14	0.50	0.786	0.87	0.32	2.34

Mortality at 1 year

Among the 499 patients who were discharged from ED without admission or after their first admission, 34 (6.8%) were dead 1 year after their initial ED presentation. As Table 4 shows, multivariate predictors of 1-year mortality were BIBA on initial ED presentation (OR = 4.23, 95% CI: 1.32–13.52, $P = 0.015$) and age on initial presentation (OR = 1.07, 95% CI: 1.01–1.13, $P = 0.034$).

The CT in Figure 4 shows that the subgroup ($N = 114$) with the highest mortality at 1 year (17.5%) was composed by those aged more than 77 years and BIBA on initial presentation. On the contrary, there was a subgroup with a 0% mortality rate ($N = 138$) composed of those not BIBA and aged less than 72 years on initial presentation.

Discussion

In this study, we characterized a cohort of adults older than 65 years attending the ED in an urban tertiary referral university teaching hospital and followed their outcomes including admission rates, ED re-attendance rates and mortality rates over the following year, identifying predictors of those outcomes. The study was based on routinely collected data and its ultimate goal was to inform the design of further evidence-based local strategies to improve older patients' flow, experience and target resources to those who need it the most.

The characterization of the cohort revealed phenomena previously described in our catchment area, such as a high proportion of patients attending ED out of hours (59%). In a previous study reviewing all NH residents presenting to the study ED, only one-third of visits were during 'normal' working hours.[17] Therefore, embedding CGA within the ED and making it operational during out of hours could be associated with improvements in outcomes.[7] In addition, the detection and management of geriatric syndromes (e.g. delirium) by frontline non-specialist healthcare staff may benefit from screening tools and care pathways.[18] It is worth noticing, however, that the evidence supporting a CGA in the ED (not during inpatient stay) is not yet conclusive; for example, one study showed that readmission rates in

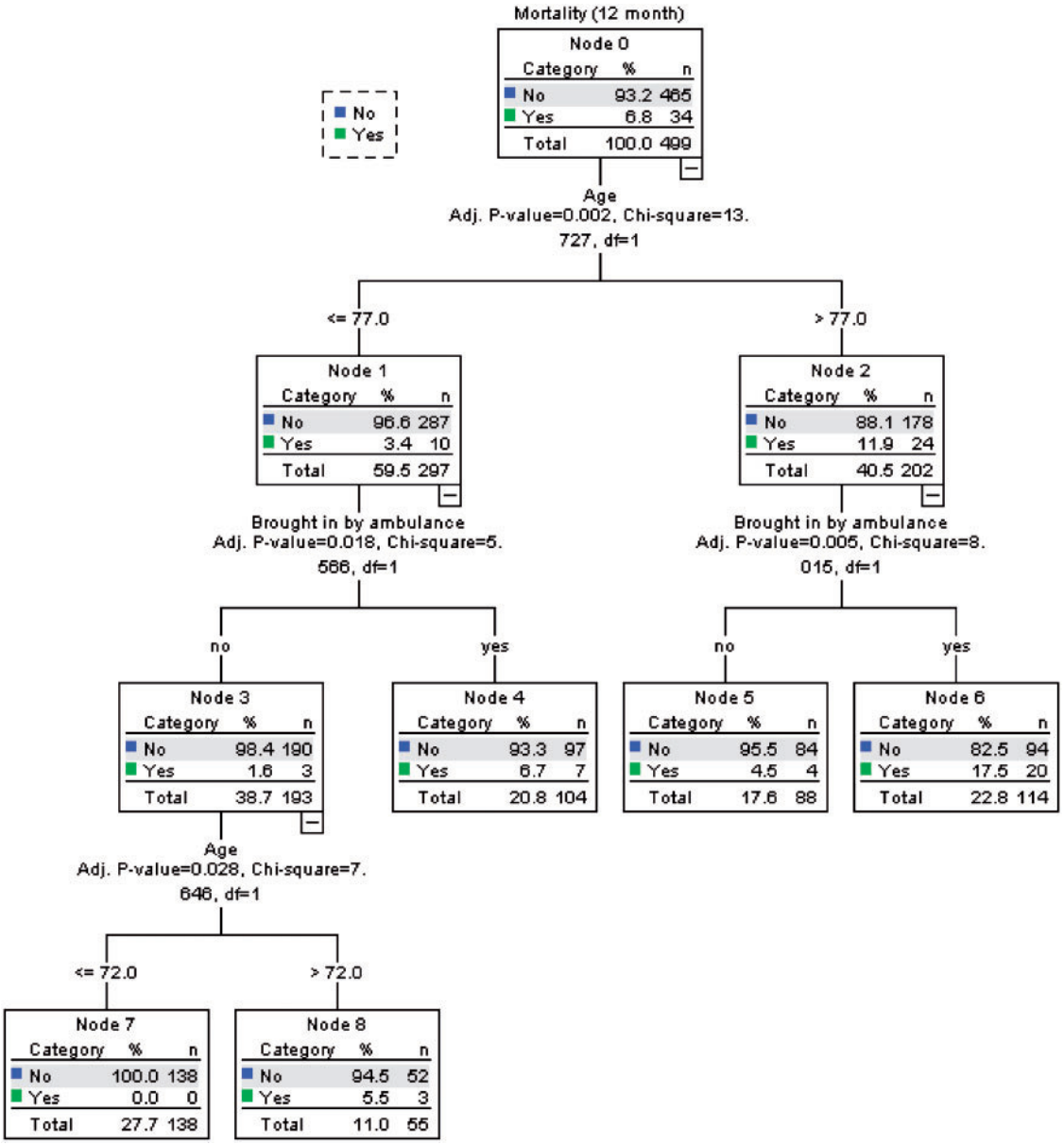

Figure 4. CT with predictors of 1-year mortality.

people aged 85+ years fell from 26.0% at 90 days to 19.9%, but readmission rates were not significantly reduced in other age groups.[7]

In our sample, the fact that 53% of GP referrals arrived to ED out of hours could be due to the fact that these patients were seen by out-of-hour-GPs or that they were seen by their regular GPs during the day but were delayed 'in transit' to the ED. To minimize the proportion of daytime GP referrals who end up attending the ED out of hours, 'rapid access' geriatric-led services (which bypass the ED) have been successfully implemented elsewhere.[19,20]

Regarding ED waiting times, we found that almost 80% of those over 80 years of age not presenting with musculoskeletal issues/fractures spent more than 6 h in the ED. It is worth noticing that these figures predate the opening of an acute medical unit in the study site in July 2012, with specialist geriatric input. In that regard, bed availability affecting waiting times in ED is an influential factor that we could not measure systematically, adding to the limitations of our study.

The fact that BIBA was an important predictor of admission and 1-year mortality would suggest an appropriate use of the ambulance service by older people in our local catchment area. Previous studies have shown that older people are disproportionately high users of ambulance services,[21] which in the opinion of some calls for further investigation of

underlying causes and alternative models of care.[22] However, our data would suggest that older people who are initially BIBA are at much higher risk of longer term mortality, even when they survive the first hospital admission. Indeed, a previous study showed that patients who call for an ambulance due to suspected acute myocardial infarction appear to have a higher early mortality compared with those who do not, suggesting that these patients therefore might be the most suitable candidates for early intervention studies.[23] Analogously, older patients BIBA to the ED should be preferential targets of CGA.

The finding of higher comorbidity as a predictor of ED re-attendance at 1 year is consistent with previous studies[24,25] and may reflect the nature of chronic disease exacerbations in the context of multimorbidity, with opportunities for specialist geriatric case management. For example, a previous study showed that an acute care for elders unit had positive impacts on costs and 30-day re-admissions.[26] Our study is observational in nature, and we could not reliably isolate a subgroup of first admissions who had a CGA intervention (i.e. via direct geriatric admission or specialist geriatric consultation service). A purposefully designed interventional study could study the impact of CGA during in-patient admission on operational outcomes such as ED re-attendances or re-admissions.

In conclusion, advanced age, comorbidity and acute illness severity are important drivers of outcomes among older ED attendees. The results of our study highlight the interactive effects of these parameters, suggesting that specific hospital pathways may be designed for different patient typologies, to improve outcomes. There is a need to consider how best to integrate specialist geriatric services and frontline services, to make them more gerontologically attuned and ensure the best possible outcomes for older patients presenting to the acute setting.

Conflict of interest: None declared.

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