Can medical admission and length of stay be accurately predicted by emergency staff, patients or relatives?

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Abstract

Objectives: To determine the accuracy of predictions of the need for hospital admission and, if admitted, length of stay (LOS) made early in an emergency attendance by emergency department (ED) doctors, nurses, patients and relatives, and the characteristics of ED presentations predictive of admission and short stays (⩽ 3 days).

Methods: Prospective collection of predictions by medical and nursing staff, patients and relatives of ED departure status and LOS (1 day, 2–3 days, 4–7 days or longer) of a convenience sample of adults presenting with medical symptoms. Predictions were made before full medical assessment and matched against actual departure status and LOS. Vital signs and demographics were recorded.

Results: Seventy five percent (2159/2904; CI 73%–77%) of all admission predictions in 704 patients were correct with 85% (575/673; CI 81%–88%) of doctors' predictions correct. Thirty-five percent (361/1024) of all LOS predictions for 331 patients were correct with 46% (122/268; CI 40%–52%) of doctors' predictions correct. Risk factors for short-stay over longer admission included age less than 65, normal oxygen saturations and self-referral.

Conclusion: Emergency admissions can be predicted with reasonable accuracy but LOS is difficult to predict. Development of a prediction tool may facilitate streaming and appropriate use of short-stay units.

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What is known about the topic?

We are unaware of any published report on the accuracy of predicting admission and length of stay by emergency clinicians, patients or relatives.

What does this paper add?

This paper demonstrates that for medical emergency patients even the emergency department (ED) doctors predict admission accurately only 85% of the time, and triage nurses around 70% of the time, which is similar to patients and relatives. It shows that predicting short admissions is often inaccurate and creates a baseline for future comparison.

What are the implications for practitioners?

As there is more emphasis on rapid transit for patients through an ED, identification early in the ED attendance of the likelihood of the requirement for admission (streaming) and appropriately selecting patients for short stay wards becomes important. Streaming of medical-type emergency patients from triage is often inaccurate. Consequences of inaccurate prediction of admissions could be unnecessary admissions and unnecessary patient transfers in and out of short stay units. Current prediction accuracy by ED clinicians could possibly be improved by developing a clinical prediction tool using the risk factors for admission and short stay identified in this study.

EFFORTS TO MAXIMISE efficient use of health resources have resulted in novel approaches to health care delivery in health services with emergency departments (EDs). These include the practice of "streaming" or "fast-tracking" whereby patients are allocated into different areas after triage

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as "likely discharge" and "likely admission",[1] and the development of short-stay units (SSUs), including Medical Assessment and Planning Units, Emergency Observation Units and Emergency Medical Units (EMUs).[2-6] Short-stay units may be located within or adjacent to EDs, or associated with acute medical units. Entry to and management of such units is by a varying mixture of internal and emergency physicians. Although clinicians determine the suitability of admission to SSUs based on casemix and estimated length of stay (LOS) criteria, prospective assessment of the ability of emergency health professionals to accurately predict admission or LOS has been lacking. In addition, we suspected that patients and their relatives would have an opinion on the need for admission and length of stay required. Furthermore, staff, patients and families often need to plan services — knowing how long a person will be in hospital is useful information. Patients and relatives often ask ED staff the very valid question: How long will I be in hospital?

In June 2004, the Victorian Department of Human Services commissioned a project to investigate and evaluate the use of SSUs across Victoria.[7] For some SSU models to be successful, appropriate patient selection is required. Common themes with SSUs are rapid medical assessment, high turnover and early decision on disposition, often with care pathways and involvement of allied health professionals. Most of these units have LOS criteria ranging from overnight to 3 days. In general, short-stay units concentrate on patients with a medical condition as distinct from trauma, patients requiring surgery or mental health presentations. Success of the units is sometimes assessed by reduction in total LOS and reduction in necessity for transfer of care to other specialist units. This success can be dependent on the ability to accurately predict LOS and select appropriate patients for the SSU.

Many patient characteristics and demography and much clinical data are available at triage and in the first few minutes of emergency assessment. We hypothesised that some of these characteristics could be associated with both the likelihood of admission and length of hospital stay.

The study was undertaken to explore the accuracy with which ED staff, patients and their relatives can predict ED departure status and LOS, particularly for short stays. The study also sought to determine characteristics of patients that place them at risk for hospital admission and for short hospital stays (1–3 days).

Methods

This prospective, observational study was carried out at St. Vincent's Hospital, Melbourne (SVHM), an inner urban tertiary referral hospital with an annual ED attendance of 33 000 adults. During the period of study the hospital operated an ED-based six-bed overnight stay unit (Emergency Observation Unit) administered by ED staff, and a 15-bed EMU, located remote from the ED on the eighth floor of the same building, with a length of stay criteria of up to 3 days. Beds in both of these locations were commonly occupied by patients from other specialty units due to bed access issues. The EMU was substantially run by emergency physicians, with regular input from general physicians. Admission to EMU and the Emergency Observation Unit was determined by ED staff.

A brief survey was administered orally by a single research assistant during 63 randomly selected emergency shifts across the 7-day week, including evening ($n = 16$), and night ($n = 15$) shifts between 11 July to 27 October 2004. Inclusion criteria were patients triaged with a "medical" triage presentation description. This description was interpreted at the time by the research assistant in consultation with the triage nurse or duty emergency physician when there was doubt. Exclusion criteria were presentations with trauma, mental health and/or behavioural disturbance, surgical patients and patients subsequently transferred to another hospital. Non-English speaking background was not an exclusion criterion provided adequate interpretation was available.

Triage nurses, ED primary care nurses and ED doctors of all levels who first saw the patient (ED physicians, registrars, hospital medical officers [HMOs], or interns) were asked: "Will this patient be admitted?" followed by "If so, what will be the

1 Characteristics of study sample and the remainder that were eligible for the study

Variable	Study sample (medical patients)	Remaining population eligible for study*
Admitted (95% CI)	47.0% (43%–51%)	25.0% (23.9%–26.1%)
Mean age (years) if admitted (95% CI)	63.6 (61.2–65.7)	62.2 (61.2–63.2)
Ambulance arrival if admitted (95% CI)	55.6% (50.2%–61.0%)	47.2% (44.6%–49.6%)
Total length of stay (days) if admitted, median (IQR)	4 (5)	4 (6)
Short stay (1–3 days) if admitted (95% CI)	46.2% (42%–52%)	41.7% (39.3%–45.7%)

* Excludes surgical and mental health presentations.

2 Admission predictions by emergency staff, patients and relatives

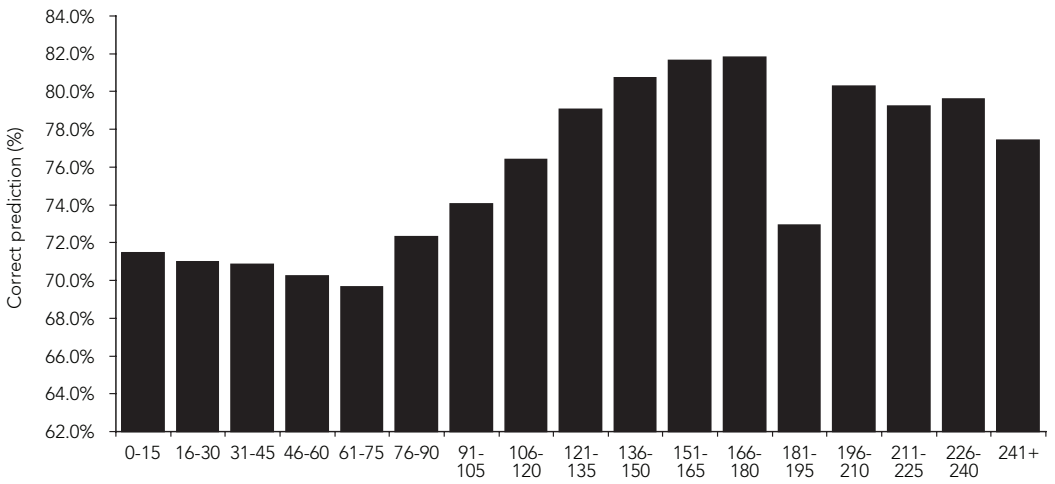
	No. mins to prediction, median (IQR)	Correctly predicted admissions* no. (%; 95% CI)	Correctly predicted no admission† no. (%; 95% CI)	Total correct classification‡ no. (%; 95% CI)
Triage nurse	36 (78)	263/400 (66%; 61%–71%)	217/273 (79%; 74%–84%)	480/673 (71%; 68%–74%)
Primary ED nurse	88 (102)	255/362 (70%; 65%–75%)	259/331 (78%; 73%–83%)	514/693 (74%; 71%–77%)
Attending doctor	150 (121)	272/321 (85%; 81%–89%)	303/352 (86%; 82%–90%)	575/673 (85%; 82%–88%)
Patients	81 (104)	171/267 (64%; 58%–70%)	199/271 (73%; 68%–78%)	370/538 (69%; 65%–73%)
Relatives	82 (94)	127/206 (62%; 55%–69%)	93/119 (78%; 88%–98%)	220/325 (68%; 63%–73%)
Total	86 (116)	1088/1556 (70%; 68%–72%)	1071/1348 (79%; 77%–81%)	2159/2904 (75%; 73%–77%)

* Total admitted/total number of predictions of admission (ie, "yes" only). † Total discharged/total number of predictions of discharge (ie, "no" only). ‡ Total correct predictions/all predictions. ED = emergency department.

length of stay?" Due to practical difficulties in following patient processing not all levels of clinician were interviewed for all patients. Patients and accompanying relatives were separately asked two questions: "Do you think you/your relative will need admission into a hospital ward bed?" and, if they answered in the affirmative, "Can you estimate how long you think you/your relative will be in hospital?" Participants were asked to estimate in whole days.

Demographic and clinical variables were subsequently obtained from patient electronic files. These included ED departure status (admitted/discharged), actual LOS (defined as ED presentation time to hospital discharge time), previous attendance (within 30 days or not), age, gender, triage category (Australasian Triage Scale [ATS] 1–5),[8] systolic blood pressure (normal: 100–140 mmHg, or abnormal), pulse (normal: 50–100 bpm, or abnormal), temperature (normal: 36.5–37.5° C, or abnormal), oxygen saturation (normal: 92%–100%, or abnormal), Glasgow Coma Scale (GCS) score (3–13 or 14–15), arrival by ambulance, referral source (referred by health care professional or not), residential type ("lives alone" [including homeless, private alone] or "lives with others" [including private with others, prison, aged care, nursing home, supported accommodation, and institute for the disabled, hostel, housing commission, retirement village]) and ED arrival time. For each predicting group (triage nurse, primary care nurse, attending doctor, patient, and relative), the time elapsed in minutes between patient arrival and time of prediction (hereafter referred to as time to prediction) was also recorded contemporaneously by the researcher. This was rounded to the nearest 15 minute interval for statistical analyses.

3 Accuracy of staff, patients' and relatives' departure status predictions relative to time elapsed since emergency department arrival



This study was deemed by the hospital to be a quality improvement project not requiring formal review by St Vincent's Hospital Human Research Ethics Committee.

Data analyses

Demographic, clinical and survey data were collated in a Microsoft Access database (Microsoft Corporation, Redmond, Wash, USA) and statistical analyses were performed using SPSS for Windows (Version 13.0, SPSS Inc, Chicago, Ill, USA). For derived variables, actual LOS was rounded to the nearest whole number except where LOS was less than 1 day, in which case LOS was rounded up to 1 day. This accounted for the fact that all participants made their predictions in whole days. Both actual LOS and predicted LOS were grouped as 1 day, 2–3 days, 4–7 days, or 8 days or greater.

Data for accuracy of predictions were analysed using descriptive statistics (%, 95 % CI calculated using the *t*-distribution), sensitivity and specificity. Binomial logistic regression (BLR; direct method) was used to assess whether time to prediction was a significant covariate of ED departure status and LOS accuracy, and in a separate analysis, to compare the accuracy of each predicting subgroup. Pearson's chi-square was used to analyse whether accuracy (total correct classification) varied as a function of doctors' level of experience. Likelihood ratio and odds ratio were used to identify the strength of association between patient clinical or demographic factors and departure status, short-stay versus long stay. Forward stepwise binary logistic regression (likelihood ratio method) was use to assess predictive models of admission compared with departure, and short stay compared with long stay. For all significance tests, two-tailed tests were used and alpha was set at 0.05.

Results

Sample characteristics

Predictions were made for a total of 704 (51% male; 49% female) patients attending the ED, representing 7.4% all ED attendances during the study period. The mean age was 63.6 years (95% CI, 61.2–65.7 years). The final sample included two patients (<1% of study population) that met the exclusion criterion of being a surgical patient, as indicated by their subsequent admission to a surgical unit (neurosurgery). A total of 1054 participants (38 triage nurses, 86 primary ED nurses, 67 doctors, 538 patients, and 325 relatives) provided

4 Odds ratios and likelihood ratios for clinical and demographic characteristics associated with admission

Characteristic	Odds ratio (95% CI)	Likelihood ratio	*P* value
Abnormal oxygen saturation*	11.71 (3.54–38.82)	28.77	< 0.001
GCS score < 14	4.79 (1.60–14.4)	10.07	0.002
Abnormal pulse†	2.27 (1.52–3.39)	16.75	< 0.001
Age > 75 years	2.16 (1.53–3.06)	19.39	< 0.001
Arrived by ambulance	1.88 (1.39–2.54)	17.28	< 0.001
Higher acuity triage‡ 1, 2 or 3	1.87 (1.32–2.66)	12.55	< 0.001
Lives alone§	1.25 (0.87–1.78)	13.50	< 0.001
Normal systolic blood pressure¶	2.56 (1.30–5.05)	8.03	0.005
Referred to ED by health care professional	1.23 (0.91–1.67)	1.74	0.19
Abnormal body temperature**	1.22 (0.88–1.69)	1.43	0.23
ED visit in previous 30 days	1.09 (0.73–1.62)	0.18	0.68
Male	1.02 (0.76–1.37)	0.012	0.91

GCS = Glasgow Coma Scale. ED = emergency department. * Normal range (NR), 92%–100%. † NR, 50–100 bpm. ‡ Australasian Triage Scale.[8] § Includes private alone, homeless. ¶ NR, 100–140 mmHg. ** NR, 36.5–37.5° C

valid departure status or LOS predictions. Three-hundred and thirty-three patients (47.3%) were admitted, representing 17.2% of all medical admissions during the study period. Of admitted patients, 79 (23.9%; 95% CI, 19.3%–28.5%) stayed 1 day, 24 (22.7%; 95% CI, 18.2%–27.2%) stayed 2–3 days, 114 (34.4%; 95% CI, 27.3%–39.5%) stayed 4–7 days, and 63 (19.0%; 95% CI, 14.8%–23.2%) stayed 8 or more days. The remaining sample characteristics of the study patients that were admitted compared with all medical admissions over the study period are provided in Box 1. The modal triage category was ATS 3.

Departure status predictions

A total of 2904 valid predictions for departure status were made. Whether or not a patient required admission was correctly predicted 75% (95% CI, 72%–78%) of the time (Box 2). As a group, ED doctors' predictions were the most accurate (85%; 95% CI, 82%–88%); their classification accuracy was greater than all other groups, all of whom had similar levels of accuracy, at around 70% (range: 68%–85%).

Among attending doctors, departure status prediction accuracy did not vary significantly as a function of position (Consultant, 85%; 95% CI, 79%–91%; Registrar, 88%; 95% CI 84%–92%; HMO, 84%; 95% CI, 78%–90%; Intern, 84%; 95% CI, 77%–91%).

Time elapsed (15 min intervals) between ED arrival and the time of prediction was a significant covariate of departure status prediction accuracy in a binary logistic regression model ($P = 0.001$; Box 3) and accounted for five to eight percent of variance in accuracy of prediction. When short stays only (1–3 days) were included in the analysis ($n = 629$), time ceased to be a significant covariate of admission prediction accuracy.

Several characteristics were identified as risk factors for admission, the strongest being abnormal oxygen saturation (Box 4). Auto-correlation among variables was weak (phi < 0.3). Therefore all significant risk factors were included in a forward stepwise binary logistic regression with admission as the dependent outcome. The final model for factors indicating admission included abnormal oxygen saturation (OR, 12.41; 95% CI 2.84–54.3), normal blood pressure (OR, 3.62; 95% CI 1.56–8.44), and age greater than 75 (OR, 2.3; 95% CI 1.41–3.76). This model accounted for 10.7%–14.3% of the variance and yielded a correct classifi-

5 Predictions correctly estimated, underestimated or overestimated for each length of stay period (no. [%])*

Outcome	Attending doctor	Triage nurse	ED nurse	Patients	Relatives	Total* (%, 95% CI)
Prediction: 1 day						
Correct	26 (68.4%)	18 (36%)	20 (32.8%)	9 (26.5%)	10 (33.3%)	83/213 (39%; 32.4%–45.4%)
Stayed > 1	12 (31.6%)	32 (64%)	41 (67.2%)	25 (73.5%)	20 (66.7%)	130/213 (61.0%; 54.4%–67.6%)
Prediction: 2 or 3 days						
Correct	33 (32.4%)	40 (26.7%)	25 (21.6%)	14 (22.6%)	12 (21.8%)	124/485 (25.6%; 21.7%–28.5%)
Stayed 1 day	18 (17.6%)	30 (20%)	26 (22.4%)	11 (17.7%)	12 (21.8%)	97/485 (20.0%; 16.4%–23.6%)
Stayed > 3 days	51 (50%)	80 (53.3%)	65 (56%)	37 (59.7%)	31 (56.4%)	264/485 (54.4%; 50.0%–58.8%)
Prediction: 4–7 days						
Correct	57 (48.7%)	24 (42.1%)	31 (44.9%)	14 (43.8%)	10 (45.5%)	136/297 (45.8%; 40.1%–51.5%)
Stayed < 4 days	33 (28.2%)	17 (29.8%)	24 (34.8%)	7 (21.9%)	7 (31.8%)	88/297 (29.6%; 24.4%–34.8%)
Stayed > 7 days	27 (23.1%)	16 (28.1%)	14 (20.3%)	11 (34.4%)	5 (22.7%)	73/297 (24.6%; 19.7%–29.5%)
Prediction: 8+ days						
Correct	6 (54.5%)	1 (50%)	3 (50%)	5 (100%)	4 (80%)	19/29 (65.5%; 47.8%–83.2%)
Stayed < 8 days	5 (45.5%)	1 (50.0%)	3 (50.0%)	0	1 (20.0%)	10/29 (34.5%; 16.8%–52.2%)
All time periods						
Correct (%, 95% CI)	122/268 (45.5%; 39.5%–51.5%)	83/259 (32.0%; 26.3%–37.7%)	79/252 (31.3%; 25.6%–37.0%)	42/133 (31.6%; 23.7%–39.5%)	36/112 (32.1%; 23.5%–40.7%)	361/1024 (35.3%; 32.4%–38.2%)

* Denominator = number of predictions for time period. ED = emergency department.

cation rate of 63.8%. Using this model, the sensitivity and specificity for admission were 51.1% and 76.2%, respectively.

Length of stay predictions

A total of 1024 valid predictions of LOS were made (Box 5). Across all predicting groups, most difficulty was encountered accurately predicting hospital stays of 2–3 days duration where 25.6% (95% CI, 22.9%–28.3%) were correct, but predicting stays of 8 days or more proved less difficult, with 65.5% (95% CI, 47.8%–83.2%) accurate. The overall accuracy per group was greatest among attending ED doctors (45.5%; 95% CI, 39.5%–51.5%) compared with all other groups who predicted successfully about 30% of the time.

Among attending doctors, accuracy of LOS predictions did not vary significantly as a function of position (Consultant, 37% [95% CI, 26%–48%]; Registrar, 26% [95% CI, 18%–35%]; HMO 27% [95% CI, 16%–38%]; Intern, 28% [95% CI, 12%–45%]).

Emergency staff were more likely to underestimate than overestimate the actual LOS. For doc-

6 Odds ratio and likelihood ratio for clinical and demographic characteristics associated with short stay (1–3 days)

Characteristic	Odds ratio (95% CI)	Likelihood ratio	*P* value
Normal oxygen saturation*	3.76 (1.49–9.49)	9.47	0.003
Age < 65	2.01 (1.29–3.12)	9.79	0.002
Not referred by health care professional	1.98 (1.26–3.10)	9.05	0.003
GCS score 14–15	2.44 (0.84–7.08)	2.96	0.085
Normal pulse†	1.61 (0.96–2.69)	3.37	0.067
Female	1.41 (0.92–2.18)	2.45	0.12
Normal body temperature‡	1.41 (0.88–2.26)	2.10	0.15
ED visit previous 30 days	1.19 (0.69–2.03)	0.38	0.54
Abnormal systolic blood pressure§	1.50 (0.68–3.32)	1.03	0.31
Lives with others¶	1.19 (0.72–1.98)	0.48	0.49
Higher acuity triage** 1, 2, 3	1.03 (0.59–1.78)	0.008	0.93
Arrived by ambulance	1.25 (0.81–1.94)	1.04	0.31

GCS = Glasgow coma sccale. ED = emergency department. * Normal range (NR), 92%–100%. † NR, 50–100 bpm. ‡ NR, 36.5–37.5° C. § NR, 100–140 mmHg. ¶ Compared with lives alone (private alone, homeless).** Australasian Triage Scale.[8]

tors, 90/268 (33.5%; 95% CI, 27.8%–39.2%) predictions for LOS were for a shorter period than transpired, whereas 56/268 (20.8%; 95% CI, 15.9%–25.7%) predictions were for a longer period than actual LOS (Box 5). For all other groups (excluding doctors), 337/756 (44.6%; 95% CI, 41.1%–48.1%) predictions fell short of the actual LOS whereas 139/756 (18.4%, 95% CI, 15.6%–21.2%) were over-predicted.

Time elapsed from arrival in ED to prediction was not a significant covariate of LOS prediction accuracy for all stays, or when short stays of only 1–3 days ($n = 437$) were included in a binary logistic regression model.

Several risk factors for short stay (3 days or less compared with longer stays) were identified from patient clinical and demographic characteristics (Box 6), the strongest being normal oxygen saturation. Since correlations between significant risk factors (normal oxygen saturation, age less than 65, not referred by health care professional) were negligible (phi < 0.2), all were included in a forward stepwise binary logistic regression. All three variables were found to contribute significantly to the model predicting short stay accounting for between 8%–11% of variance, and with an overall correct classification rate of 65% (normal oxygen saturation: OR, 3.09; 95% CI, 1.19–7.99; not referred by health professional: OR, 1.99; 95% CI, 1.17–3.38; aged less than 65: OR, 1.93; 95% CI, 1.16–3.23). Using this model the sensitivity and specificity for short stays were 37.9% and 86.4%, respectively.

Use of short-stay units

Of the 153 patients that had a hospital stay of 3 days or less, 57 patients (37%) were admitted to a designated SSU. Of the 16 patients admitted to the emergency observation unit, 15 (94%) stayed 1 day. Of the 41 patients admitted to EMU, 33 (80%) stayed 3 days or less.

Of the 26 patients that doctors correctly predicted as requiring a 1-day stay, eight (31%; 95% CI, 12.7%–48.9%) were admitted to the emergency observation unit. Of the 33 patients correctly identified as requiring a 2–3 day stay, six (18%; 95% CI, 6.1%–33.9%) were admitted to EMU.

Discussion

As there is more emphasis on rapid transit for patients through an ED, it is important to identify the requirement for admission early in the ED

attendance (streaming), and appropriately select patients for short-stay wards. Streaming and SSUs have been implemented with some reported success[1] but the accuracy of prediction of admission and LOS by emergency staff has not been well studied. Consequences of inaccurate prediction of the need for admission or LOS could be unnecessary admissions and unnecessary patient transfers in and out of SSUs.

Our study demonstrates that for medical patients, even the ED doctors, who themselves have some say in who gets admitted, predict admission requirement accurately before full medical workup only 85% of the time, and triage nurses only about 70% of the time — an accuracy level comparable to patients and relatives. Predicting the duration of short admissions is often inaccurate and, as demonstrated by the present study, doctors would more often predict wrongly than correctly if asked to advise a patient or relative on an anticipated LOS following a medical emergency attendance.

The risk factors identified for admission (arrival by ambulance, score less than 14, abnormal oxygen saturation, age greater than 75, living alone, higher triage acuity (1,2 or 3) and abnormal pulse and normal blood pressure), with high imputed likelihood ratios, are consistent with other literature.[9] Most, if not all, of these data are available at the time of presentation at triage. Using the likelihood ratios of one or a combination of these "tests" to the pre-test probability estimated at triage could develop in to a powerful "diagnostic" test for the "condition" of admission, and assist in the streaming process for some patients. Through the using of multivariate modelling, we attempted to develop a clinical prediction tool. However, in light of the low sensitivity (51%) of the optimal model identified here, it would appear that careful clinical evaluation still remains the best available method for determining need for admission. In addition, the statistical finding that normal blood pressure appeared to be associated with admission is counterintuitive.

There were fewer factors, for admitted patients, associated with an LOS of 3 days or less; namely, lack of referral to ED by a health professional, age less than 65, and normal oxygen saturations. Together, these variables formed the optimal model for short-stay prediction, albeit with a low sensitivity (37.9%). Further analysis, perhaps of casemix, comorbidities and presenting symptoms would be required before a useful clinical prediction tool could be developed for the condition of a short-term admission.

In this sample only a third of patients correctly predicted by doctors as requiring a stay of 1–3 days actually went to a designated SSU. Factors other than predicted LOS seem to have determined the destination of the patient, in particular the casemix and the need for the skills of a particular specialty unit. However, with SSUs having the potential to improve operational efficiency of EDs[1] and improve cost effectiveness for patient stays in hospital,[5] it is important that they are used to their full potential. Further development of a tool to assist patient selection and training for ED staff may help maximise efficient use of SSUs.

The fact that accuracy of admission prediction improved the longer the patient was present in the ED is an important yet unsurprising finding, since as this time increases more information becomes available to assist decision making. With new initiatives in some jurisdictions, such as a 4-hour (for discharge home) or 8-hour (for ward admission) time limit in the ED, it is important that clinicians and administrators understand that correct decisions on admissions are more likely to be made later in the ED attendance. Hasty or early pressure for patient disposition could lead to patients being erroneously discharged or unnecessarily admitted.

It was interesting to find that prediction accuracy for admission did not vary according to level of experience of the ED doctor. An examination of factors contributing to doctors' decision making regarding admission was beyond the scope of this study.

Patients and relatives are often perceived as passive recipients of the emergency health care process. Nevertheless, they often arrive in ED with a predetermined idea of the likely outcome of their ED visit. They were able to predict the requirement for admission and length of stay to the same degree

of accuracy as triage and primary nurses. Asking patients during their ED attendance the outcome they expect could be useful.

This study has limitations to consider when interpreting the results. The number of patients for whom predictions were made represented 7.4% of ED attendances during the study period. Despite this low proportion, a large sample was obtained, and by sampling at random shifts we believe the sample is representative. Interpretation of what was a medical emergency attendance could have been subject to selection bias whereby some medical patients were unnecessarily excluded. However, only two of 333 admissions triaged as medical were admitted under a surgical unit, indicating some accuracy in the selection process.

During data collection, efforts were made to interview participants privately. As in any busy ED there may have been times when respondents' predictions were overheard by other study participants.[10] This may have influenced the answers given by some responders. Finally, although there is often more than one doctor involved in the care of ED patients, in some instances the doctor making the prediction regarding admission was also the doctor who subsequently made the decision regarding admission.

Conclusion

Emergency staff, patients and their relatives can accurately predict admission and discharge. These same groups are poor predictors of hospital LOS. Predicting the need for admission is less accurate early in an emergency attendance. Accuracy of LOS prediction is least for stays of 2–3 days. Length of stay is more likely to be underestimated than overestimated by all groups. Patients and their relatives have an idea of the need for admission and likely LOS comparable to emergency nurses. Accuracy of predictions for both admission and LOS does not vary according to level of doctors' experience.

This study represents the first step in the development of a clinical tool for selection of appropriate SSU patients. It is noteworthy that few clinical demographic variables were related to LOS. Further development of such a tool, with a particular focus on improving the sensitivity for short-stay admission prediction, is a worthwhile area of future study.

Competing interests

The authors declare that they have no competing interests.

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