ORIGINAL ARTICLE

Short stay emergency admissions to a West Midlands NHS Trust: a longitudinal descriptive study, 2002–2005

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Emerg Med J 2007;**24**:553–557. doi: 10.1136/emj.2006.043901

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Accepted 17 May 2007

Objectives: To describe changes and characteristics in emergency admissions to a West Midlands National Health Service Trust, 2002–2005, with a focus on short stay emergency admissions.

Methods: A longitudinal descriptive study using retrospective analysis of routine admissions data. Admissions were categorised as short (0/1 day) or long (≥2 days) and examined separately using a General Linear Model. Factors favouring short stays as opposed to long stays were examined using multivariable logistic regression.

Results: There were 151 478 emergency admissions to the Trust between 1 April 2002 and 31 December 2005, of which 2910 (1.92%) had no discharge date recorded. Adjusted means showed a 7.76% increase in emergency admissions in winter months (October–January) and a 14.50% increase across the study period. Increases were greater in short stay (34.03%) than long stay emergency admissions (8.38%). Odds of short stays in admitted patients increased by 25%. Higher odds of short stays were also associated with younger age, winter month and medical admitting specialty ($p<0.001$).

Conclusions: Increases in emergency admissions were greater in short stay than long stay cases. Reasons for this may be both appropriate (increased use of clinical protocols and falling average length of stay) and detrimental (pressure to meet 4 h emergency department target, changing primary care provision). Further research is needed before generalising findings to other Trusts.

Emergency care in England has been subject to recent reform. Patients spending <4 h in emergency departments increased from 67% to 98% between 2002 and 2005,[1] resource reallocation and ''See and Treat'' initiatives being among varying measures introduced within this period.[2] Against such reform, physicians in the West Midlands have suggested anecdotally a rise in emergency hospital admissions; particularly in those proceeding to have only a short stay in hospital. This suggestion has not previously been confirmed or disproved by research.

There were over 4.4 million emergency hospital admissions in England in 2004/05,[3] accounting for 36.6% of total admissions,[3] at an average cost each of £1800 (local estimate). Concern exists that rising emergency admissions may affect quality of care[4] and higher bed occupancy is known to correlate with longer waits in emergency departments.[5] Rising UK emergency admissions have been reported for over 40 years with average annual increases suggested of 3–5%.[4 6 7] Validity of such reports has, however, been challenged[8] and reasoning for rises remains largely speculative.[4 9]

We aimed to describe emergency admissions to one National Health Service Trust over the period 2002–2005, focusing on short stay emergency admissions. Specific objectives were to examine changes in total emergency admissions, to compare trends in short and long stay emergency admissions, and to describe factors (age, admitting specialty and month) associated with short stays in admitted patients. A review of emergency admissions at this Trust is appropriate given the process changes that have occurred in England in recent years; however, we did not aim to identify a causal link with any particular measure of healthcare reform. Short stay admissions were defined as those discharged in <2 days—a definition used by the NHS Institute for Innovation and Improvement in assessing emergency care quality.[10] They demonstrated wide variation among NHS Trusts of the proportion of emergency admissions spending <2 days in hospital (range 48–69%, median 60%),[10] beyond what would be expected by variation in case mix. National figures can only give a gross overview; this study aims to add detail that can only be achieved by study at local level, which has never been previously undertaken.

METHODS AND ANALYSIS

A longitudinal descriptive study, in which routine admissions data were retrospectively analysed to assess emergency admission rates over 45 months, was undertaken.

Setting

The study was conducted on a large teaching Trust in the West Midlands, serving a diverse population of 500 000. Electoral wards served range from within the 6% most deprived in England to within the 25% most affluent, with ethnic minority representation ranging from 8.7% to 78.3%.[11]

The Trust comprises two acute sites, with a mean of 32 300 and 7300 emergency admissions per year. The main admitting specialties across the Trust over the study period were general medicine (34.9%), paediatrics (20.2%), gynaecology (9.3%) and general surgery (9.2%).

Sample

The sample included all emergency admissions to the Trust occurring between 1 April 2002 and 31 December 2005, as recorded on a hospital Patient Administration System (PAS). This start date was chosen as the earliest point the PAS was in full operation.

Hospital Patient Administration System

An emergency admission was defined as an admission not booked before the day of arrival. Figure 1 summarises the process of emergency admission to the Trust. Details of emergency admissions were recorded on the PAS by a ward clerk on arrival to an inpatient ward. Transfers to emergency assessment areas or short-stay clinical decision units were not

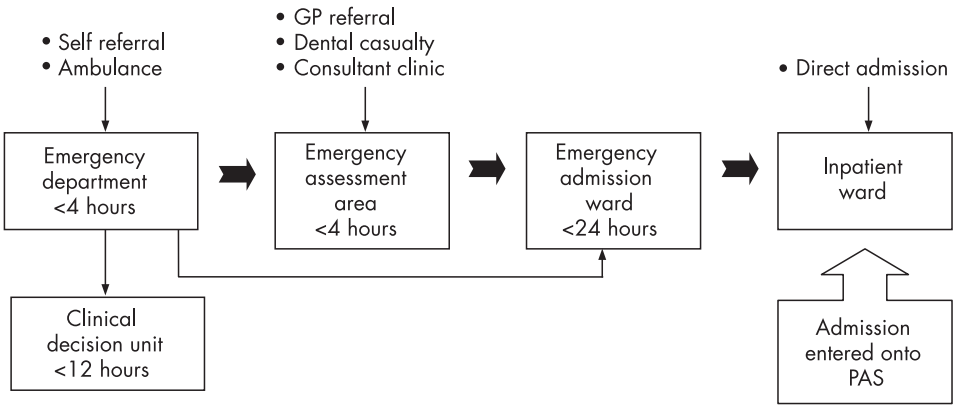

Figure 1 Process map for emergency admissions to this Trust. GP, general practitioner; PAS, Patient Administration System.

recorded on the PAS, but were recorded on a different system. Transfers between wards, hospitals or from other NHS Trusts were further excluded, as these were felt to be unrepresentative of most admissions.

Anonymised admissions data were extracted from the PAS with assistance from the Trust Planning Department; including admission/discharge dates, age, admitting hospital and admitting specialty. Length of stay was calculated by subtracting admission from discharge date and admissions then categorised as short (0 or 1 day) or long (≥2 days). Admission years were labelled from 1 to 4 (2002/03, 2003/04, 2004/05, and 2005); running from 1 April to 31 March, apart from year 4 which ended on 31 December 2005.

Analysis

Demography was described using frequencies and medians and comparisons made between patient groups using non-parametric Mann–Whitney U tests (for age and length of stay, assumed not to be normally distributed) and Fisher's exact test (for categorical admitting specialties).[12]

Effects of time upon admission frequency in short and long stay patients were investigated with separate General Linear Models, with month and year entered as fixed factors. Frequencies were assumed to have a Poisson distribution, so a square root transformation was used for conversion to a normal distribution. Multivariable logistic regression was used to examine association of admission year and other factors with short stay status, to obtain odds ratios for short stays in admitted patients. Analysis used SPSS version 13.0 with significance assumed at $p<0.05$.

RESULTS

Emergency admissions demography

There were a total of 151 478 emergency admissions to the Trust over the study period. Table 1 shows emergency admission numbers and sample characteristics for each year under study.

A total of 2910 admissions (1.92%) had no discharge date recorded, most being from years 1 and 2. These were included when considering total emergency admissions but excluded from comparisons of short and long stay admissions (where knowledge of length of stay was required).

Median age of overall sample was 54 years (range 0–105, SD 29). This did not change significantly across the study period. Overall 66 939 (44.6%) patients were admitted under general medicine, increasing from 41.6% to 45.8% (of all admissions) between years 1 and 4. This increase was similar (3.3% and 3.1%) in both short and long stay patients.

Median length of stay in hospital was 2 days with 42.4% of all emergency admissions having a stay shorter than this. Short stay admissions had a younger median age (27 vs 65 years, $p<0.001$) and a greater proportion of non-medical patients (30.5% vs 39.5%, $p<0.001$) than longer stay admissions.

Trends in total emergency admissions

Admission month and year each had a significant main effect upon emergency admission frequency (month: $F_{11} = 6.54$, $p<0.001$; year: $F_3 = 30.3$, $p<0.001$). Emergency admissions overall were more frequent each year in winter months (October–January) with a mean of 256 (7.76%) more admissions per month than at other times of the year ($p<0.000$).

Table 2 shows adjusted mean emergency admissions, for years 2002–2005. Adjusted means showed emergency admissions increased by 14.60% (5532 per year) across the study period ($p<0.001$). Annual increases were largest between years 1 and 2 (6.53%) and between years 3 and 4 (6.47%).

Trends in short and long stay emergency admissions

Table 2 shows frequencies of emergency admissions modelled individually for short and long stay patients. Adjusted means showed short stay emergency admissions increased by 34.03% between years 1 and 4 ($p<0.001$). In comparison, long-stay emergency admissions increased by 8.38% ($p<0.001$).

Figure 2 shows adjusted mean emergency admissions per month for short and long stay patients. For short stay patients

Table 1 Emergency admissions frequencies and characteristics, 2002–2005

Year	Emergency admissions	% short-stay admission	Median length of stay (days)	General medical admission (%)	Exclusions* (%)
Site					
1. 2002/03	37880	40.9	2.00	15748 (41.6)	1566(4.13)
2. 2003/04	40354	40.8	2.00	18026 (44.7)	879(2.18)
3. 2004/05	40771	43.1	2.00	18343 (45.0)	320(0.78)
4. 2005†	32473	45.1	2.00	14822 (45.8)	145(0.45)

*No discharge date recorded.
‡2005 covered a 9-month period.

Table 2 Estimated emergency admissions (per month) for total, short, and long stay patients (General Linear Model adjusted means)

	Year	Admissions (per month)	SE	95% CI
Total emergency admissions	1. 2002–03	3157	31.26	3093 to 3221
	2. 2003–04	3363	31.26	3299 to 3427
	3. 2004–05	3398	31.26	3334 to 3461
	4. 2005	3618	37.57	3541 to 3695
Short stay emergency admissions	1. 2002–03	1237	22.84	1190 to 1283
	2. 2003–04	1344	22.84	1297 to 1390
	3. 2004–05	1451	22.84	1405 to 1498
	4. 2005–	1658	27.45	1602 to 1714
Long stay emergency admissions	1. 2002–03	1789	20.81	1747 to 1832
	2. 2003–04	1946	20.81	1904 to 1988
	3. 2004–05	1920	20.81	1877 to 1962
	4. 2005	1939	25.01	1888 to 1990

CI, confidence interval; SE, standard error.

increases were seen with each passing year with annual increases of 8.65% and 7.96% over the first 3 years of the study. However, the largest increase was between years 3 and 4 (14.27%).

In contrast there were smaller increases in long stay emergency admissions, these rising overall by 8.38% across the study period. This rise occurred almost entirely between years 1 and 2 (8.77% increase) with the numbers of long stay admissions remaining relatively stable after this point (falling by 1.34% between years 2 and 3 and rising 0.99% between years 3 and 4).

Influences upon length of hospital stay

Multivariable logistic regression was used to simultaneously examine factors predictive of a short stay after admission. Odds ratios are shown in table 3. Odds of a short stay increased significantly in the last 2 years of the study, a patient admitted in year 4 being 25.6% more likely to have a short stay than in year 1. Younger age, medical specialty and winter month were also each independently predictive of a short hospital stay.

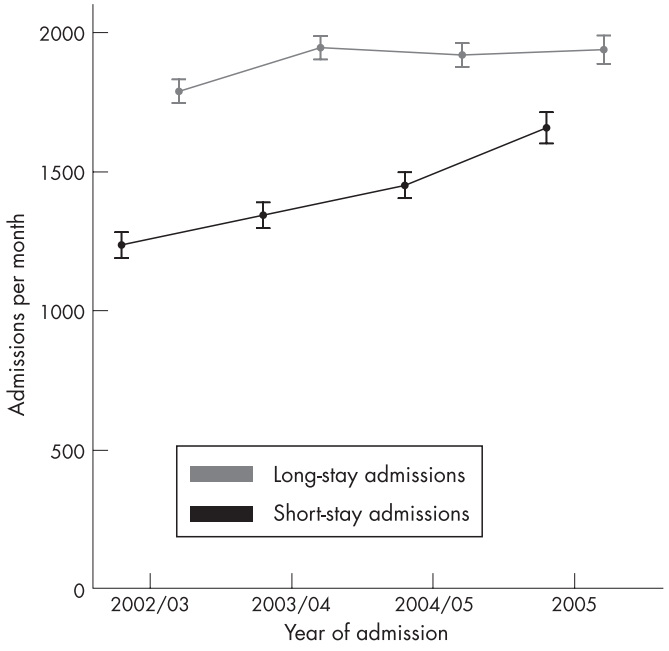

Figure 2 Short and long stay emergency admissions per month, by year of admission (General Linear Model adjusted means with 95% confidence intervals).

Limitations

This study looks at one Trust only. Although this may influence the generalisability, it does add detail that is otherwise not available because of the variation on data routinely recorded by organisations. This is the first study of its kind and provides new insight; further study across multiple sites is planned. The hospital PAS is not designed or validated for research purposes and may be subject to a number of limitations associated with collection and interpretation of routine data.[13] More exclusions from length of stay analysis were from earlier years, creating potential for bias. Admissions to the clinical decision unit were not recorded on the PAS. This was developed specifically for short (<24 h) periods of observation, with admissions estimated to have risen from 162 to 308 across the study period. Short stay rises may therefore be underestimated by as much as 4.6%.

DISCUSSION

This is the first UK study to quantify, contrast and examine short and long stay patients within a longitudinal emergency admissions investigation. Increased odds of short stays were associated with younger age and medical admitting specialty. Short stay association with younger age has been reported previously in prospective studies with smaller samples.[14] Younger people may be more likely to have single system disease and less likely to require social support on discharge. With age accounted for, short stays were associated with medical admitting specialty. Both positive[15] and negative[14] associations of short stays with medical patients have been reported previously.

Short hospital stays were also associated with winter months of admission, a finding not previously reported. Admissions overall were 7.76% higher each year from October to January, in line with studies sampling larger populations over longer timeframes.[16] This may reflect seasonal rises in respiratory and cardiovascular illness,[9] but also other factors such as higher prevalence of severe illness and differing social needs.

At this Trust, emergency admissions increased overall by 14.60% over a 45 month period. This was in line with reported national rises of 5.17% in 2003/04 and 6.49% in 2004/05.[3] Emergency admissions increased by 34.03% in short stay patients and 8.38% for longer stay patients, with odds of a short stay occurring after admission increasing by 25.60%. While observational findings from a single centre study gathered over a relatively short time period cannot be used to infer that changes in emergency department practice are responsible for these findings, we suggest a number of areas for discussion when considering short stay emergency admission rises at this Trust.

Increasing short stay admissions may be appropriate for several reasons. In this organisation introduction of clinical

Table 3 Adjusted odds ratios from logistic regression analysis, predicting short stays in admitted patients

Factor	OR (95% CI)	p Value
Year		
1. 2002/03	1.000	–
2. 2003/04	1.015 (0.982 to 1.052)	0.383
3. 2004/05	1.115 (1.082 to 1.152)	0.000
4. 2005	1.256 (1.212 to 1.300)	0.000
Age	0.962 (0.962 to 0.963)	0.000
Specialty		
Other	1.000	–
General medicine	1.770 (1.719 to 1.822)	0.000
Month		
April	1.000	–
May	1.048 (0.992 to 1.109)	0.095
June	1.044 (0.987 to 1.104)	0.129
July	1.013 (0.958 to 1.071)	0.649
August	1.040 (0.084 to 1.099)	0.166
September	1.054 (0.997 to 1.114)	0.062
October	1.005 (0.951 to 1.062)	0.850
November	1.075 (1.017 to 1.136)	0.010
December	1.213 (1.149 to 1.280)	0.000
January	1.091 (1.028 to 1.158)	0.004
February	1.167 (1.098 to 1.240)	0.000
March	1.409 (1.326 to 1.498)	0.000

CI, confidence interval; OR, odds ratio.

protocols into the emergency department may have lowered clinical threshold for admission in certain patients, aiming to improve patient safety by not discharging high risk patients from the ED. Probably the most significant recent protocol introduced to this Trust was between 2002 and 2003 for rule out of acute coronary syndrome in chest pain patients. However, as chest pain is estimated to account for 6% of emergency department attendances,[17] it is unlikely that a new protocol for these patients accounts for the total short stay rise observed at this Trust.

Decreasing length of stay may have increased the proportion of patients discharged within 2 days, where previously their stay might have been longer. Mean length of stay in the UK fell from 11.7 to 6.8 days from 1980–2000, increasing to 6.95 in 2001.[18] Estimated mean length of stay at this Trust fell from 8.23 to 6.35 days in medical patients and from 4.14 to 3.50 days in surgical patients (2002–2005). Reasons for falling length of stay are likely to be complex; however, an increasing emphasis on improving efficiency, increased outpatient management, decreased delayed discharges and improved investigation turnaround may be responsible.

Short stay emergency admissions may have increased for other reasons, some of which may be detrimental. Introduction of the NHS Plan 4 h wait target[19] could have increased pressure to admit patients who could not be safely discharged within 4 h but could potentially have been discharged soon after. This target was set at 90% by December 2003, and 98% by March 2005,[2] coinciding with the largest short stay rises occurring at this trust in 2004/05 and in 2005. This does not, however, prove causation, particularly as presence of targets may also have encouraged adoption of positive improvements—for example, a clinical decision unit to reduce risk of discharge. The highest short stay rises were in later years, occurring in 2004/05 and 2005 (when target achievement was a priority). This may indicate a stepwise rather than a gradual increase, suggesting an intervention or sudden service change may be responsible.

Changes in primary care may also have influenced admissions. New general practitioner (GP) contracts introduced in April 2004 enabled GPs to opt out of providing 24 h care for the first time; timing again coinciding with the largest short-stay rises at this trust. Emergency GP referrals may have increased, with reduced continuity of community care increasing reluctance among GPs to perform a gate keeping role.[20] Lack of past medical history may then increase the likelihood of admission on arrival to hospital. In addition, availability of primary and secondary care facilities may have further influenced admissions. For example, a lack of community facilities may mean patients are admitted briefly for interventions that could otherwise be undertaken in the community (for example, 2 day intravenous antibiotics); a lack of urgent outpatient facilities may also provoke short admissions—for example, for a suspected transient ischaemic attack.

Other organisational changes have also occurred and causation cannot be proved with this descriptive study. It is not known whether experiences at this Trust are representative of those elsewhere and we plan a further study using UK wide administrative data to assess generalisability of these findings. A validated survey of medical records, and study of emergency department attendance patterns, may indicate whether inappropriate emergency admissions have in fact risen, and the specific diagnostic groups in which these rises have occurred. Full evaluation of effects of government targets, GP contracts and other health service changes are also recommended.

In conclusion, emergency admission rises to this Trust from 2002–2005 were considerably greater in short stay than in long stay patients. Careful interpretation of this finding may indicate areas for focus in assessing recent reform of emergency services.

ACKNOWLEDGEMENTS

We would like to thank all emergency staff who participated in informal interviews to review and interpret study findings, Ms C Rymer and the Trust Planning Department for assistance obtaining admissions data, and Dr A MacNamara for assistance in organising informal staff interviews.

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Funding: None.

Conflicts of interest: None.

Ethical approval was obtained from Solihull Local Research Ethics Committee in December 2005

Contributors: ES developed the project, performed data analysis and wrote the first draft of the paper. MWC had the original idea for the study, helped in design and data analysis and reviewed the paper. CMW assisted with study preparation and reviewed the paper. RLH reviewed the statistical methods used. MWC is the guarantor of the paper.

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