

Dr Foster's case notes

Length of hospital stay and subsequent emergency readmission

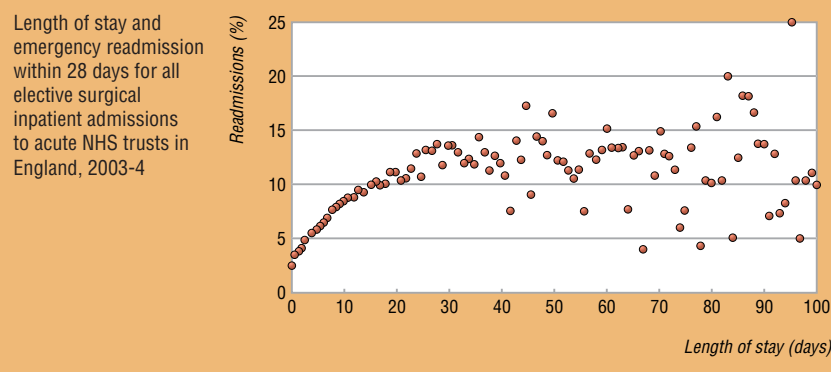
Reduction of length of stay is one of the 10 high impact changes suggested by the NHS Modernisation Agency.^{w1} Reducing length of stay lowers the cost of care per patient and allows for increased bed occupancy, but the effect on emergency readmission rates is equivocal.^{w2 w3} We examined hospital episode statistics to investigate the association of inpatient length of stay for elective surgery with subsequent emergency readmission.

The bottom line

- The risk of readmission rises with increasing length of stay

We looked at all records for inpatients undergoing elective surgery (determined by healthcare resource group) who were discharged alive and readmitted as emergencies within 28 days of discharge. Emergency transfers between hospitals were not counted as being readmissions. Length of stay was calculated as the number of days between the dates of the end and the start of each admission; if both dates were the same then the length of stay was 0 days. We plotted scatter graphs for length of stay in days against the proportion of readmission for admissions and used a logistic regression model to test for the association of the likelihood of emergency readmission with length of stay. We excluded minor and diagnostic procedures. Healthcare research groups were grouped further according to the trim point (the number of days spent by the patient in hospital after which the hospital begins charging an excess tariff per extra day stayed). We also looked at common specific operation groups (coronary bypass, hernia repairs, cholecystectomy, primary knee replacement, primary hip replacement, mastectomy, transurethral resection of prostate).

Odds of readmission rose with increasing length of stay for all of the selected admissions combined (figure), even after adjustment for other factors. The effect was seen across all procedures grouped by trim point (table 1 and fig 1 on bmj.com). The relation between length of stay and emergency readmission is more complex for specific procedures. For coronary bypass and primary knee replacement there seems to be no relation



Odds ratios (95% CI) of emergency readmission for elective surgical admissions

Procedure	Health resource group	Length of stay (days)			
		≤4	4-7	8-14	≥15
Coronary bypass	E04	1.0	1.73 (0.49 to 6.03)	2.30 (0.66 to 8.06)	2.26 (0.64 to 7.96)
Inguinal, umbilical, or femoral hernia repair	F73, F74	1.0	1.82 (1.54 to 2.15) **	2.50 (1.84 to 3.40) **	2.37 (1.3 to 4.10) *
Cholecystectomy	G13, G14	1.0	1.53 (1.36 to 1.73) **	2.68 (2.24 to 3.20) **	2.74 (2.04 to 3.68) **
Primary knee replacement	H04	1.0	0.88 (0.61 to 1.26)	0.97 (0.67 to 1.39)	1.3 (0.90 to 1.89)
Primary hip replacement	H80, H81	1.0	0.54 (0.37 to 0.80) *	0.55 (0.38 to 0.81) *	0.63 (0.43 to 0.94) *
Mastectomy (partial, total, subtotal)	J46, J47, J48, J49	1.0	1.23 (1.08 to 1.41) *	1.94 (1.62 to 2.31) **	1.47 (0.92 to 2.36)
Prostate transurethral resection procedure	L27, L28	1.0	1.18 (1.05 to 1.33) *	1.56 (1.30 to 1.89) **	2.02 (1.48 to 2.77) **

*P<0.05, **P<0.001.

(table). Around 10% of patients undergoing coronary bypass operation and 3% undergoing hernia repairs have an emergency readmission within 28 days of discharge (table 2 on bmj.com). For all selected admissions, factors significantly associated with increased odds of readmission were age under 5 years (compared with all other age groups), being male, increasing socioeconomic deprivation, admission to a trust which did not perform day case surgery, and higher numbers of comorbid conditions (table 3 on bmj.com). A likely explanation for the relation between length of stay and emergency readmission rate is that ill people with complex problems stay in hospital longer and are also more likely to be readmitted.

The basic figures

- 5.1% of inpatient admissions for elective surgery have an emergency readmission within 28 days
- 6.7% of inpatients discharged alive had a length of stay of less than one day. Of these, 2.4% were later readmitted as emergencies
- 10% of coronary bypass operations have an emergency readmission within 28 days of discharge, but the emergency readmission rate is not significantly related to length of stay
- Only 3% of hernia repairs have an emergency readmission within 28 days

This month's Dr Foster's case notes were compiled by Susan Williams, Alex Bottle, and Paul Aylin of the Dr Foster unit at Imperial College. Dr Foster is an independent research and publishing organisation created to examine measures of clinical performance



References, methodology, and tables are on bmj.com

