

the day of the week when they were admitted. ‘Weekend’ was defined as the period from midnight on Friday to midnight on Sunday, in line with hospital admission dataset statistics. This is also the timeframe used by the Canadian study² and so was utilised in this analysis for comparative purposes. Public holidays were incorporated within the weekend groupings. Further data extracted included age and gender of the patients, the course and length of their hospital stay, discharge data regardless of whether they died in hospital, were discharged home or transferred to another facility within the Trust, and details of readmission within 6 months of discharge date. We maintained the confidentiality of the study data.

Preselected conditions

The conditions selected were common emergency conditions that are treatable, cared for in clinical settings other than a critical care unit or emergency department, and in which early management in hospital may be expected to influence outcome. The six chosen conditions were:

- 1 cerebrovascular accidents (CVAs) (excluding subarachnoid haemorrhage, non-traumatic subdural haemorrhage and non-traumatic extradural haemorrhage)
- 2 chronic obstructive pulmonary disease (COPD), including bronchitis and emphysema
- 3 pneumonia (all causes)
- 4 pulmonary embolism (PE)
- 5 syncope and collapse
- 6 upper gastrointestinal bleeds (UGIB)

Chest pain was excluded because it can incorporate a number of different conditions and is often cared for within the specialised cardiac care unit setting.

Statistical analyses

We compared the in-hospital mortality rates (for both total length of stay and early mortality within 2 days of admission), readmission rates within 6 months of discharge and hospital length of stay, for patients admitted at a weekend with those of weekday admissions. Relationships between day of admission and mortality and readmission were determined using logistic regression. To assess for statistical significance, differences are expressed as odds ratios, both unadjusted and adjusted for age and sex, for patients admitted at a weekend compared to those admitted on a weekday, with 95% confidence intervals (CI). We did not adjust data for severity of illness on admission although we did subsequently look for information on those admissions that had passed through high dependency unit (HDU) and ICU settings.

Table 1. Numbers of emergency admissions and characteristics of patients admitted on weekdays and weekends.

Condition	Characteristic	Weekday admissions	Weekend admissions
All conditions	Total – n (%)	2,306 (71.1)	938 (28.9)
	Female – n (%)	1,058 (45.9)	464 (49.5)
	Age (years) – mean (SD)	67.4 (16.8)	68.5 (17.1)
	≤54 – n (%)	453 (19.6)	170 (18.1)
	55 – 69	611 (26.5)	222 (23.7)
	70 – 79	672 (29.1)	273 (29.1)
	≥80	570 (24.7)	273 (29.1)
COPD	Total – n (%)	595 (72.4)	226 (27.6)
	Female – n (%)	298 (50.1)	125 (55.3)
	Age (years) – mean (SD)	70.6 (9.9)	71.2 (9.3)
CVA	Total – n (%)	342 (65.3)	182 (34.7)
	Female – n (%)	176 (51.5)	91 (50.0)
	Age (years) – mean (SD)	74.2 (11.0)	76.1 (11.3)
PE	Total – N (%)	112 (81.8)	25 (18.2)
	Female – N (%)	54 (48.2)	15 (60.0)
	Age (years) – mean (SD)	59.6 (18.0)	59.0 (17.5)
Pneumonia	Total – n (%)	408 (72.7)	153 (27.3)
	Female – n (%)	173 (42.4)	76 (49.7)
	Age (years) – mean (SD)	65.7 (18.9)	65.3 (18.9)
Collapse	Total – n (%)	409 (66.3)	208 (33.7)
	Female – n (%)	195 (47.7)	104 (50.0)
	Age (years) – mean (SD)	67.0 (20.1)	68.9 (20.2)
UGIB	Total – n (%)	440 (75.3)	144 (24.7)
	Female – n (%)	162 (36.8)	53 (36.8)
	Age (years) – mean (SD)	61.5 (19.1)	59.0 (19.7)

COPD = chronic obstructive pulmonary disease; CVA = cerebrovascular accidents; PE = pulmonary embolism; UGIB = upper gastrointestinal bleeds.

Results

Among the six diagnoses of interest, there were 3,244 emergency admissions to the Royal Infirmary of Edinburgh during the 1-year study period: 2,306 (71.1%) were on a weekday and 938 (28.9%) at a weekend or public holiday. Of these, 2,051 were COPD, representing 23% of admissions, CVA (16.2%), PE (5.0%), pneumonia (17.3%), collapse/syncope (19.0%) and UGIB (18.0%). A breakdown by disease and admission day is shown in Table 1. Mean age on admission was 67.7 years ranging from 13 to 102 years. There were no differences in baseline characteristics between patients admitted on weekdays and those admitted at weekends (Table 1).

Mortality

A total of 332 (10.2%) patients died in hospital, 91 (2.8%) of these within 2 days of admission. For the 561 patients admitted with pneumonia, the mortality rate was significantly lower for those

admitted at a weekend as compared with those admitted on a weekday. Using logistic regression, after adjusting for age and sex, the odds ratio for death during total hospital stay, among weekend admissions relative to midweek admissions, was significant at 0.50 (0.27–0.88, $p = 0.015$) (Table 2). There was no difference in early mortality (≤ 2 days from admission) for patients with pneumonia.

For the remaining conditions, there was no significant difference in mortality for total length of stay or within 2 days of admission, according to whether patients were admitted on a weekend or weekday (Table 2).

Locate tables and indicate results

Length of stay and discharge data

Weekend admission was not associated with an increased length of hospital stay for the group of conditions studied. For weekday admissions, median length of stay was 5 days (range 0–252 days). For weekend admissions, median length of stay was the same at

5 days (range 0–186 days). We also looked at those patients discharged within 7 days of admission. There was very little difference in the proportions of patients discharged on a weekday versus at a weekend for any of the six conditions.

Readmission data

For the six studied conditions, of the 2,912 (89.8%) admissions where the patient was ultimately discharged or transferred from hospital, 994 (34.1%) patients were readmitted to the Royal Infirmary of Edinburgh within 6 months, with any diagnosis, and 72 (7.2%) of these patients subsequently died in hospital. The readmission rates at 6 months were not significantly different for patients previously admitted at a weekend as compared with previous weekday admissions (Table 3).

We also looked at early readmission data: 409 (14.0%) returned within 28 days of discharge date and 141 (4.8%) returned within 7 days, and the weekday (69.5%)/weekend (30.5%) pattern reflected the overall study findings.

Overall, weekend admission was not associated with higher in-hospital mortality, increased early readmission or readmission within 6 months of discharge or increased hospital length of stay, compared to the weekday equivalent. For patients admitted with pneumonia, the mortality rate was significantly lower for those admitted at a weekend as compared with those admitted on a weekday.

Summary of results

Key Points

Previous studies have shown increased mortality for patients admitted at weekends

For selected medical admissions our study showed no weekday/weekend variability in mortality, length of stay or readmission rates

The role of medical admissions units and consistent access to diagnostics in supporting improved patient care should be considered

Discussion

In recent years, 90% of the hospitals in Scotland that receive more than 3,000 acute medical admissions annually have

Table 2. In-hospital mortality for both total length of stay and early in-hospital mortality (≤ 2 days from admission).

	Admission day	No of admissions	Mortality for total length of stay		Odds ratio (95% CI) for mortality within total length of stay			Early in-hospital mortality (≤ 2 days of admission)		Odds ratio (95% CI) for early in-hospital mortality		
			No of deaths	Mortality rate (%)	Unadjusted	Adjusted	p value	No of deaths	Mortality rate (%)	Unadjusted	Adjusted	p value
COPD	Weekday	595	36	6	0.87	0.85 (0.42 to 1.62)	0.63	17	3	0.61	0.61 (0.17 to 1.66)	0.35
	Weekend	226	12	5				4	2			
CVA	Weekday	342	99	29	0.88	0.78 (0.51 to 1.18)	0.24	28	8	0.72	0.71 (0.33 to 1.43)	0.35
	Weekend	182	48	26				11	6			
PE	Weekday	112	14	12	0.61	0.61 (0.09 to 2.57)	0.53	5	4	–	–	–
	Weekend	25	2	8				0	0			
Pneumonia	Weekday	408	76	19	0.51	0.50 (0.27 to 0.88)	0.015	11	3	0.97	0.99 (0.27 to 3.01)	0.99
	Weekend	153	16	10				4	3			
Collapse/syncope	Weekday	409	1	0.2	–	–	–	1	0.2	–	–	–
	Weekend	208	0	0.0				0	0.0			
UGIB	Weekday	440	19	4	1.48	1.65 (0.69 to 3.71)	0.25	5	1	3.13	3.13 (0.93 to 12.81)	0.063
	Weekend	144	9	6				5	1			