Duration of consultant experience and patient outcome following acute medical unit admission: an observational cohort study

Authors: Marcus J Lyall, A James Dear, Johanne Simpson and Nazir Lone

Background
The effect of the duration of consultant experience on clinical outcomes in the acute medical unit (AMU) model remains unknown.

Methods
Unscheduled AMU admissions (n = 66,929) admitted by 56 consultant physicians between 2017 and 2020 to two large teaching hospital AMUs in Lothian, Scotland were examined. The associations of consultant experience on AMU with patient discharge, mortality, readmission and postdischarge death were calculated adjusting for clinical acuity, pathology and comorbidity.

Results
Increasing consultant experience was associated with a continuous increase in likelihood of early AMU discharge (odds ratio (OR) 1.08; 95% confidence interval (CI) 1.07–1.10; p < 0.001 per 5 years’ experience), which persisted after adjustment for confounders (OR 1.06; 95% CI: 1.01–1.11; p = 0.01). There was no association with early readmission, death after discharge or 30-day inpatient mortality. The marginal effect estimate translates into 31 (95% CI: 25–36), 41 (95% CI: 30–53) and 52 (95% CI: 35–71) additional safe discharges per 1,000 admissions for clinicians of 15, 20 and 25 years’ experience, respectively compared with those recently completing training.

Conclusions
Increasing consultant physician experience associates with early safe discharge after AMU admission. These data suggest that the support and retention of experienced clinicians is vital if escalating pressures on unscheduled medical care are to be addressed.

KEYWORDS: experience, safety, acute medicine

DOI: 10.7861/clinmed.2022-0546

Introduction
The impact of duration of physician experience on patient outcome remains disputed. Increasing duration of practice might be expected to result in greater cumulative clinical skill; however, it also presents the challenge of maintaining current best practice. Evidence suggests that increasing clinical experience is associated with improved outcomes in some surgical and obstetric studies, but not others. Data on the effect of duration of experience on unscheduled medical hospital admissions are similarly conflicting. Single-centre retrospective analyses from Dublin, Ireland reported a significant reduction in 30-day mortality and reduced length of stay in ‘high-risk’ patients. Conversely, single and multicentre studies in the US healthcare system reported an increased length of stay and mortality with longer duration of practice, whereas similar studies from the UK and Canadian healthcare systems report no significant effect.

Only two reported study cohorts have been within the acute medical unit (AMU) model. AMUs present an essential relief point for emergency medicine departments, which have been under increasing strain in the UK. As such, an essential role for AMU consultant physicians is to safely discharge patients who do not require inpatient care to promote patient flow and relieve departmental congestion.

The association between consultant experience on patient outcome following AMU admission remains uncertain. In light of current concerns regarding the loss of experienced physicians because of early retirement or ‘burnout’, understanding the value of experience is vital if increasing pressures on unscheduled care are to be addressed. To investigate this further, we examined the relationship between duration of consultant experience and rates of immediate AMU discharge, 30-day inpatient mortality, 7-day hospital readmission and postdischarge death in patients admitted to two large teaching hospital AMUs in Lothian, Scotland.

Methods
Study design and setting
A retrospective observational study was performed across two secondary care hospital AMUs (Royal Infirmary of Edinburgh and Western General Hospital, Edinburgh) in NHS Lothian, a health board providing care for around 800,000 residents in southeast...
Scotland. AMU admissions in Lothian are referred from emergency medicine departments, general practices and out-of-hours GP services. All AMU consultant admissions were included over a 3-year period (1 April 2017 to 31 March 2020). This period was selected as the point at which data were reliably available (1 April 2017) until the point at which Coronavirus 2019 (COVID-19) social restrictions were implemented in Scotland, significantly altering the admission case mix. Only NHS Lothian residents were included in the study to maximise completeness of readmission and demographic data.

Variables

In terms of outcome variables, the primary outcome was discharge by the admitting AMU consultant from the AMU before 20:00 h on the last day of the on-call period. Admission and discharge data were obtained from the TRAkcare inpatient clinical management system (InterSystems, Cambridge, MA, USA). The acute medicine rota in both hospitals runs on three on-call periods (08:00 h Monday–08:00 h Wednesday; 08:00 h Wednesday–08:00 h Friday; and 08:00 h Friday–08:00 h Monday). Patients admitted under the consultant on call remain under that consultant until the end of the on-call period unless they are discharged, deceased or their care is taken over by another specialty. ‘AMU discharge’ was defined as a discharge (excluding discharge by another specialty service, self-discharge or death) before 20:00 h on the final day of the AMU on-call period. We used AMU discharge rather than length of stay as per previous studies. This was chosen because discharge decisions beyond 48–72 h will be delivered by the incoming service rather than by the admitting clinician. Therefore, AMU discharge is the preferred outcome variable because the discharge decision can be reliably attributed to the admitting clinician, allowing consultant-level analysis.

Inpatient 30-day mortality was defined as death from any cause during admission within 30 days of the admission date. Readmission was defined as any unplanned admission within 7 days following an ‘AMU discharge’. The 30-day discharge mortality was defined as death registered (www.nscotland.gov.uk) within 30 days following ‘AMU discharge’. ‘In community care’ was defined as a patient who had undergone ‘AMU discharge’ but was not registered to have been readmitted within 7 days or died within 30 days following AMU discharge.

In terms of exposure variables, consultant experience was calculated as the time in years from admission to the UK General Medical Council Specialist Register to the date of patient admission and was included as a continuous variable. Consultant gender and acute internal medicine (AIM) accreditation were included as binary variables.

Other covariates:

- Patient age: continuous (years)
- Patient sex: binary (male, female)
- Scottish Index of Multiple Deprivation quintile (www.isdscotland.org): ordinal (1–5)
- Charlson Comorbidity Index calculated using inpatient discharge diagnosis codes for the 5 years preceding admission, analysed with ‘comorbidity package’ in R; ordinal (0, 1–2, >2)
- Acute kidney injury (AKIN score) calculated as previously described, binary (No AKI=0, AKI present=1–3).

Pathology case mix adjustment was performed using discharge diagnosis codes from the International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10-CM) at the chapter level.

Model assumptions of predictor values were checked visually, including multicollinearity, and deemed acceptable.

Statistical analysis

Mixed-model binary logistic regression was performed using the ‘finalfit’ package in R with ‘AMU discharge’, ‘inpatient 30-day mortality’ and ‘in community care’ as separate dependent variables, and with hospital site and individual consultant included as separate random effects. The model was then repeated on the AMU discharged patient population, with 7-day readmission and 30-day death following discharge as dependent variables. A p-value <0.05 was deemed significant. Marginal effects of predicted outcome were generated as previously described and used to estimate outcomes for a 1,000-patient AMU admission sample. Analysis and graphic outputs were generated using R version 4.0.3. The study utilised only anonymised retrospective routinely collected healthcare data. The NHS Research Authority decision tool confirmed that this study did not require research ethics committee review and, therefore, the study proceeded to regional Caldicott Guardian approval (ref: 2284).

Results

There were 66,929 admissions relating to 40,819 individual patients admitted under 56 individual consultants during the study period. The mean number of patients seen by each consultant was 1,178 (standard deviation (SD) ± 679).

Markers of increasing frailty, comorbidity and acuity were negatively associated with AMU discharge, such as age (OR 0.98; 95% CI: 0.98–0.98, p<0.001 per year), increasing Charlson comorbidity index (0.91; 0.84–0.98, p=0.014 for ≥2 versus 0) and the presence of AKI (0.67; 95% CI: 0.63–0.72, p<0.001, AKIN score 1 versus 0) and increasing deprivation (1.10; 95% CI: 1.04–1.17, p=0.001; most affluent versus most deprived SIMD quintile) (Table 1, Fig 1). There was also a negative association with increasing number of previous admissions (OR 0.98; 95% CI: 0.97–0.98, p<0.001, per previous admission over 5 years). There was no significant association between the likelihood of AMU discharge and other consultant-level variables of physician male gender (1.14; 95% CI: 1.00–1.30; p=0.057) and AIM accreditation (95% CI: 0.82–1.11; p=0.524).

Expected associations with 30-day inpatient mortality were identified with increasing age, male sex, increasing AKIN score, Charlson index (supplementary material S1). However, consultant experience, consultant gender and AIM accreditation had no significant association with mortality (OR 1.01; 95% CI: 0.97–1.04; p=0.697; OR 1.00; 95% CI: 0.91–1.1; p=0.981; and OR 1.05; 95% CI: 0.95–1.16; p=0.3, respectively). Patients admitted at the weekend (Saturday 00:00 h to Sunday 23:59 h) displayed a 18% increased likelihood of inpatient 30-day mortality compared with admissions on other days of the week (OR 1.18; 95% CI: 1.08–1.29; p<0.001).

Factors increasing the likelihood of readmission within 7 days of discharge were limited to increasing age, the presence of a Charlson index ≥2 and an increased number of admissions over the previous 5 years (supplementary material S2).

Interestingly, the presence and severity of AKI at presentation was strongly associated with an increase in likelihood of death within 30 days of AMU discharge (OR 1.56; 95% CI: 1.12–2.16; p<0.001; OR 4.07; 95% CI: 1.59–10.40, p=0.003; and OR
Table 1. Binary logistic regression output of AMU admissions

<table>
<thead>
<tr>
<th>Label</th>
<th>Level</th>
<th>Not discharged</th>
<th>AMU discharge</th>
<th>Total</th>
<th>OR (univariable) (95% CI, P value)</th>
<th>OR (multilevel) (95% CI, P value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consultant experience (5 years)</td>
<td>Median (IQR)</td>
<td>1.2 (0.7–2.0)</td>
<td>1.3 (0.7–2.0)</td>
<td>1.2 (0.7–2.0)</td>
<td>1.08 (1.07–1.10, p&lt;0.001)</td>
<td>1.06 (1.01–1.11, p=0.010)</td>
</tr>
<tr>
<td>Consultant gender</td>
<td>female</td>
<td>20,723 (42.5%)</td>
<td>6,878 (37.8%)</td>
<td>27,601 (41.2%)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>male</td>
<td>28,034 (57.5%)</td>
<td>11,294 (62.2%)</td>
<td>39,328 (58.8%)</td>
<td>1.21 (1.17–1.26, p&lt;0.001)</td>
<td>1.14 (1.00–1.30, p=0.057)</td>
</tr>
<tr>
<td>AIM CCT</td>
<td>Not AIM accredited</td>
<td>37,080 (76.1%)</td>
<td>14,211 (78.2%)</td>
<td>51,291 (76.6%)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>AIM accredited</td>
<td>11,677 (23.9%)</td>
<td>3,961 (21.8%)</td>
<td>15,638 (23.4%)</td>
<td>0.89 (0.85–0.92, p&lt;0.001)</td>
<td>0.95 (0.82–1.11, p=0.524)</td>
</tr>
<tr>
<td>Age (years)</td>
<td>Median (IQR)</td>
<td>75.0 (60.0–84.0)</td>
<td>66.0 (49.0–79.0)</td>
<td>73.0 (57.0–83.0)</td>
<td>0.98 (0.98–0.98, p&lt;0.001)</td>
<td>0.98 (0.98–0.98, p&lt;0.001)</td>
</tr>
<tr>
<td>Sex</td>
<td>Female</td>
<td>26,950 (55.3%)</td>
<td>9,604 (52.9%)</td>
<td>36,554 (54.6%)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>21,807 (44.7%)</td>
<td>8,568 (47.1%)</td>
<td>30,375 (45.4%)</td>
<td>1.10 (1.07–1.14, p&lt;0.001)</td>
<td>1.11 (1.07–1.15, p&lt;0.001)</td>
</tr>
<tr>
<td>Deprivation quintile</td>
<td>1</td>
<td>7,382 (15.1%)</td>
<td>2,789 (15.3%)</td>
<td>10,171 (15.2%)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>12,985 (26.6%)</td>
<td>4,571 (25.2%)</td>
<td>17,556 (26.2%)</td>
<td>0.93 (0.88–0.98, p=0.012)</td>
<td>0.97 (0.91–1.03, p=0.315)</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>7,909 (16.2%)</td>
<td>3,056 (16.8%)</td>
<td>10,965 (16.4%)</td>
<td>1.02 (0.96–1.09, p=0.466)</td>
<td>1.06 (1.00–1.13, p=0.068)</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>7,820 (16.0%)</td>
<td>3,005 (16.5%)</td>
<td>10,825 (16.2%)</td>
<td>1.02 (0.96–1.08, p=0.583)</td>
<td>1.06 (0.99–1.13, p=0.086)</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>12,661 (26.0%)</td>
<td>4,751 (26.1%)</td>
<td>17,412 (26.0%)</td>
<td>0.99 (0.94–1.05, p=0.808)</td>
<td>1.10 (1.04–1.17, p&lt;0.001)</td>
</tr>
<tr>
<td>Weekend admission</td>
<td>Weekday</td>
<td>37,239 (76.4%)</td>
<td>13,668 (75.2%)</td>
<td>50,907 (76.1%)</td>
<td>1.07 (1.02–1.11, p=0.002)</td>
<td>1.09 (1.05–1.14, p&lt;0.001)</td>
</tr>
<tr>
<td></td>
<td>Weekend</td>
<td>11,518 (23.6%)</td>
<td>4,504 (24.8%)</td>
<td>16,022 (23.9%)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>AKIN score</td>
<td>0</td>
<td>39,884 (82.3%)</td>
<td>16,053 (89.5%)</td>
<td>55,937 (84.3%)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>6,422 (13.3%)</td>
<td>1,593 (8.9%)</td>
<td>8,015 (12.1%)</td>
<td>0.62 (0.58–0.65, p&lt;0.001)</td>
<td>0.67 (0.63–0.72, p&lt;0.001)</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>1,250 (2.6%)</td>
<td>184 (1.0%)</td>
<td>1,434 (2.2%)</td>
<td>0.37 (0.31–0.43, p&lt;0.001)</td>
<td>0.36 (0.31–0.42, p&lt;0.001)</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>878 (1.8%)</td>
<td>98 (0.5%)</td>
<td>976 (1.5%)</td>
<td>0.28 (0.22–0.34, p&lt;0.001)</td>
<td>0.30 (0.24–0.37, p&lt;0.001)</td>
</tr>
<tr>
<td>Charlson index</td>
<td>0</td>
<td>33,381 (68.5%)</td>
<td>14,081 (77.5%)</td>
<td>47,462 (70.9%)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>11,191 (23.0%)</td>
<td>3,035 (16.8%)</td>
<td>14,236 (21.3%)</td>
<td>0.65 (0.62–0.67, p&lt;0.001)</td>
<td>0.89 (0.84–0.93, p&lt;0.001)</td>
</tr>
<tr>
<td></td>
<td>≥2</td>
<td>4,185 (8.6%)</td>
<td>1,046 (5.8%)</td>
<td>5,231 (7.8%)</td>
<td>0.59 (0.55–0.64, p&lt;0.001)</td>
<td>0.91 (0.84–0.98, p=0.014)</td>
</tr>
<tr>
<td>No. of previous admissions (5 years)</td>
<td>Median (IQR)</td>
<td>2.0 (1.0–5.0)</td>
<td>1.0 (0.0–4.0)</td>
<td>2.0 (0.0–5.0)</td>
<td>0.98 (0.98–0.98, p&lt;0.001)</td>
<td>0.98 (0.97–0.98, p&lt;0.001)</td>
</tr>
</tbody>
</table>
### Table 1. Binary logistic regression output of AMU admissions

<table>
<thead>
<tr>
<th>Label</th>
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<th>OR (univariable) (95% CI, P value)</th>
<th>OR (multilevel) (95% CI, P value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disease code</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Circulatory system</td>
<td></td>
<td>6,576 (13.5%)</td>
<td>2,573 (14.2%)</td>
<td>9,149 (13.7%)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Digestive system</td>
<td></td>
<td>2,995 (6.1%)</td>
<td>840 (4.6%)</td>
<td>3,835 (5.7%)</td>
<td>0.72 (0.66–0.78, p&lt;0.001)</td>
<td>0.60 (0.55–0.66, p&lt;0.001)</td>
</tr>
<tr>
<td>Diseases of the blood&lt;sup&gt;d&lt;/sup&gt;</td>
<td></td>
<td>430 (0.9%)</td>
<td>290 (1.6%)</td>
<td>720 (1.1%)</td>
<td>1.72 (1.47–2.01, p&lt;0.001)</td>
<td>1.58 (1.34–1.85, p&lt;0.001)</td>
</tr>
<tr>
<td>Endocrine, nutritional and metabolic</td>
<td></td>
<td>1,429 (2.9%)</td>
<td>848 (4.7%)</td>
<td>2,277 (3.4%)</td>
<td>1.52 (1.38–1.67, p&lt;0.001)</td>
<td>1.32 (1.19–1.47, p&lt;0.001)</td>
</tr>
<tr>
<td>Genitourinary system</td>
<td></td>
<td>2,897 (5.9%)</td>
<td>858 (4.7%)</td>
<td>3,755 (5.6%)</td>
<td>0.76 (0.69–0.83, p&lt;0.001)</td>
<td>0.72 (0.65–0.79, p&lt;0.001)</td>
</tr>
<tr>
<td>Infectious and parasitic diseases</td>
<td></td>
<td>2,840 (5.8%)</td>
<td>1,037 (5.7%)</td>
<td>3,877 (5.8%)</td>
<td>0.93 (0.86–1.02, p=0.109)</td>
<td>0.78 (0.71–0.85, p&lt;0.001)</td>
</tr>
<tr>
<td>Injury, poisoning</td>
<td></td>
<td>3,238 (6.6%)</td>
<td>1,018 (5.6%)</td>
<td>4,256 (6.4%)</td>
<td>0.80 (0.74–0.87, p&lt;0.001)</td>
<td>0.81 (0.75–0.89, p&lt;0.001)</td>
</tr>
<tr>
<td>Mental, behavioural and neurodevelopmental</td>
<td></td>
<td>2,052 (4.2%)</td>
<td>608 (3.3%)</td>
<td>2,660 (4.0%)</td>
<td>0.76 (0.68–0.84, p&lt;0.001)</td>
<td>0.70 (0.63–0.78, p&lt;0.001)</td>
</tr>
<tr>
<td>Musculoskeletal system</td>
<td></td>
<td>1,697 (3.5%)</td>
<td>751 (4.1%)</td>
<td>2,448 (3.7%)</td>
<td>1.13 (1.03–1.25, p=0.013)</td>
<td>1.04 (0.94–1.15, p=0.418)</td>
</tr>
<tr>
<td>Neoplasms</td>
<td></td>
<td>1,440 (3.0%)</td>
<td>137 (0.8%)</td>
<td>1,577 (2.4%)</td>
<td>0.24 (0.20–0.29, p&lt;0.001)</td>
<td>0.23 (0.19–0.27, p&lt;0.001)</td>
</tr>
<tr>
<td>Nervous system</td>
<td></td>
<td>1,123 (2.3%)</td>
<td>1,218 (6.7%)</td>
<td>2,341 (3.5%)</td>
<td>2.77 (2.53–3.04, p&lt;0.001)</td>
<td>2.05 (1.86–2.26, p&lt;0.001)</td>
</tr>
<tr>
<td>Not elsewhere classified</td>
<td></td>
<td>7,799 (16.0%)</td>
<td>5,071 (27.9%)</td>
<td>12,870 (19.2%)</td>
<td>1.66 (1.57–1.76, p&lt;0.001)</td>
<td>1.56 (1.47–1.66, p&lt;0.001)</td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td>221 (0.5%)</td>
<td>239 (1.3%)</td>
<td>460 (0.7%)</td>
<td>2.76 (2.29–3.34, p&lt;0.001)</td>
<td>2.13 (1.75–2.59, p&lt;0.001)</td>
</tr>
<tr>
<td>Respiratory system</td>
<td></td>
<td>12,626 (25.9%)</td>
<td>2,334 (12.8%)</td>
<td>14,960 (22.4%)</td>
<td>0.47 (0.44–0.50, p&lt;0.001)</td>
<td>0.43 (0.41–0.46, p&lt;0.001)</td>
</tr>
<tr>
<td>Skin and subcutaneous tissue</td>
<td></td>
<td>1,394 (2.9%)</td>
<td>350 (1.9%)</td>
<td>1,744 (2.6%)</td>
<td>0.64 (0.57–0.73, p&lt;0.001)</td>
<td>0.47 (0.41–0.53, p&lt;0.001)</td>
</tr>
</tbody>
</table>

AIM CCT = Certificate of completion of acute internal medicine training; AKIN = Acute kidney injury network score; AMU = acute medical unit; OR = odds ratio.

<sup>a</sup> Dependant variable is discharge before the end of on-call period. With the exception of age, all other variables are represented as n (column percentage for variable). Univariate and multilevel regression analysis adjusted for patient, clinician and hospital factors displayed.

<sup>b</sup> Consultant experience is per 5 years from admission to the specialist register.

<sup>c</sup> No. of previous admissions (5 years) is the number of unscheduled hospital care admissions over the previous 5 years.

<sup>d</sup> Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism.
Consultant experience (5y) 1.06 (1.01–1.11, p=0.010)
Consultant gender Female 1.14 (1.00–1.30, p=0.057)
AIM CCT Male 0.95 (0.82–1.11, p=0.524)
Not AIM accredited 0.98 (0.98–0.98, p<0.001)
AIM accredited 1.11 (1.07–1.15, p<0.001)
Age (years) 1.06 (1.00–1.13, p=0.068)
Sex 1.06 (0.99–1.13, p=0.086)
Female Male 1.10 (1.04–1.17, p=0.001)
Deprivation quintle 1.09 (1.05–1.14, p<0.001)
1 0.97 (0.91–1.03, p=0.315)
2 1.06 (1.00–1.13, p=0.068)
3 1.06 (0.99–1.13, p=0.086)
4 1.10 (1.04–1.17, p=0.001)
5
Weekend admission Weekday 1.09 (1.05–1.14, p<0.001)
Weekend 0.97 (0.91–1.03, p=0.315)
AKIN score 1.06 (1.00–1.13, p=0.068)
0 0.97 (0.91–1.03, p=0.315)
1 0.97 (0.91–1.03, p=0.315)
2 1.06 (1.00–1.13, p=0.068)
3 1.06 (0.99–1.13, p=0.086)
4 1.10 (1.04–1.17, p=0.001)
Charlson score 0.89 (0.84–0.93, p<0.001)
1 0.91 (0.84–0.98, p=0.014)
2 0.91 (0.84–0.98, p=0.014)
3 0.91 (0.84–0.98, p=0.014)
4
Number of previous admissions (5y) 0.98 (0.97–0.98, p<0.001)
Disease code Circulatory system
Digestive system 0.60 (0.55–0.66, p<0.001)
Diseases of the blood* 1.58 (1.34–1.85, p<0.001)
Endocrine, nutritional and metabolic 1.32 (1.19–1.47, p<0.001)
Genitourinary system 0.72 (0.65–0.79, p<0.001)
Infectious and parasitic diseases 0.78 (0.71–0.85, p<0.001)
Injury, poisoning 0.81 (0.75–0.89, p<0.001)
Behavioral and neurodevelopmental 0.70 (0.63–0.78, p<0.001)
Musculoskeletal system 1.04 (0.94–1.15, p=0.418)
Neoplasms 0.23 (0.19–0.27, p<0.001)
Nervous system 2.05 (1.86–2.26, p<0.001)
Not elsewhere classified 1.56 (1.47–1.66, p<0.001)
Other 2.13 (1.75–2.59, p<0.001)
Respiratory system 0.43 (0.41–0.46, p<0.001)
Skin and subcutaneous tissue 0.47 (0.41–0.53, p<0.001)

Fig 1. Forrest plot of variables associated with likelihood of early AMU discharge. Acute medical unit (AMU) Discharge: odds ratio (OR) (95% confidence interval, p-value). AIM CCT = Certificate of completion of acute internal medicine training; AKIN = acute kidney injury score. *Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism.

15.16: 95% CI: 7.71–29.82; p<0.001 for scores of 1, 2 and 3, respectively versus 0) as was increasing Charlson index (1.54; 95% CI: 1.09–2.16; p=0.013) and OR 3.13; 95% CI: 2.12–4.64; p<0.001 for Charlson index a and ≥2 versus 0, respectively) (supplementary material S3).

Consultant experience effect

Univariate analysis identified an increased likelihood of AMU discharge with increasing consultant experience (1.08; 95% CI: 1.07–1.10; p<0.001) which persisted after adjustment for confounders (OR 1.01; 95% CI: 1.01–1.11; p=0.01 per 5 years’ experience) (Fig 1, Fig 2a and Table 1). Increasing consultant experience was not associated with change in the rate of in-hospital mortality, 7-day readmission or 30 day mortality following discharge (OR 1.01; 95% CI 0.97–1.04; OR 1.03; 95% CI: 0.96–1.09; OR 1.07; 95% CI: 0.95–1.21; all p>0.1) (Fig 2b–d; supplementary material S1–S3). Application of the marginal effects estimates to patient numbers discharged who did not die and were not readmitted translates into 31 (95% CI: 25–36), 41 (95% CI: 30–53) and 52 (95% CI: 35–71) additional safe discharges per 1,000 admissions for clinicians of 15, 20 and 25 years, respectively compared with those recently completing training (Table 2). In the study cohort across two hospital sites, this equates to 692, 915 and 1,161 additional discharges annually.
Duration of consultant experience and patient outcome

A role. Experiential knowledge and use of outpatient and community-based facilities, such as ambulatory care and hospital-at-home pathways, might also be important. These data suggest that maintaining experience within the acute medical service is an important factor in meeting the continually increased demands on unscheduled care services. The loss of consultants because of physician ‘burnout’ is widely reported, as are more recent concerns regarding early retirement.

These data suggest that loss of accrued experience will negatively impact patient flow in the AMU setting, emergency care services and, subsequently, patient experience. Therefore, the creation of sustainable job plans and appropriate support services for physicians participating in acute care is essential if the escalating demands on unscheduled care are to be met.

The financial implications are also significant. Assuming a conservative estimate of one additional bed day per patient and estimated cost of £1,190.00 per bed day, additional discharges for consultants of 20 and 25 years’ experience equates to £1.08 million and £1.38 million per year, respectively across the two subject hospital sites. This estimate does not account for any addition primary care costs incurred following discharge.

There might also be important implications for rota management and shared learning. Lothian, as with other regions, frequently operates with two or more consultants during each on-call period. Pairing experienced consultants with more recent appointments could result in more consistent discharge rates and allow for more reliable site discharge planning.

Discussion

This study demonstrates for the first time a significant association between consultant physician experience and early safe discharge within the AMU model, a framework predominating unscheduled care admissions within the UK. There was no demonstrable association with readmission or death following discharge, suggesting that this more proactive discharge behaviour results in safe transfer to community care and reduces inpatient stay. These findings were consistent across two sites and were adjusted for markers of comorbidity, previous healthcare utilisation and clinical acuity. These data build on previous work suggesting a reduced length of stay and in-hospital mortality in more clinically unwell general medical inpatients cared for by consultants with greater than 20 years experience, but conflicts with others suggesting either no effect or an association with negative outcome.

There were expected negative associations between discharge rate and markers of increased frailty and acuity, such as age, Charlson index, recurrent hospital admissions and the presence of AKI. The stepwise increase in likelihood of discharge with increasing deprivation is marked and warrants further research.

This is an important observation for healthcare staffing policy. It is perhaps expected that, with increasing experience, diagnostic acumen will increase as will the ability to negotiate the complexities of admission and safe discharge. Greater confidence in the diagnosis with a reduced requirement for further investigation or observation periods might also have

![Graph](https://example.com/graph.png)

Fig 2. Association between duration of consultant experience and AMU patient outcomes. Solid line = marginal effect estimate; shaded area = 95% CI. AMU = acute medical unit; DC = discharge.

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We did not identify an association between consultant experience and inpatient mortality as previously reported. However, we did identify a significant ‘weekend effect’, supporting published works describing an increased adjusted 30-day mortality in patients admitted over the weekend period. We further identified a striking incremental increase in 30-day discharge mortality in patients presenting with an AKI and subsequently discharged from the AMU. We speculate that this reflects a likely ongoing pathological process and the normalisation of biochemical resuscitation or perhaps dilution might be falsely reassuring during the early stages of admission. Although the association of renal dysfunction and mortality in hospitalised patients is well documented, the persistent risk after discharge warrants further study.

Conclusion

Physician consultant experience in the AMU associates with an increase in rate of early discharge to community care without influencing readmission or post discharge mortality. These findings support the need for sustainable careers to maintain experience within acute care services.

Summary

What is known?

AMUs are the dominant route of unscheduled care admission in the UK. The effect of consultant duration of experience on patient outcome within the AMU model remains unclear. Given concerns around early consultant retirement and attrition from acute medical services, understanding the effect of experience on patient care is vital.

What was found?

There was a strong continuous association between increasing consultant experience and early discharge from the AMU without a resultant increase in readmission or postdischarge death. There was no association between consultant experience and inpatient mortality.

What is the implication for practice now?

Retention of experienced consultants within AMU services is of value in maintaining patient flow and provides opportunity for shared learning and peer-to-peer support.

Table 2. Predicted outcomes of a 1,000-AMU admission sample estimated from model marginal effects

<table>
<thead>
<tr>
<th>Years’ consultant experience</th>
<th>Discharges (per 1,000 AMU admissions) (95% CI)</th>
<th>30-day inpatient mortality (per 1,000 AMU admissions) (95% CI)</th>
<th>7-day readmissions (per 1,000 AMU admissions) (95% CI)</th>
<th>Deaths within 30 days of discharge (per 1000 AMU admissions) (95% CI)</th>
<th>Patients remaining in community care (per 1,000 AMU admissions) (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>243 (212–277)</td>
<td>33 (26–41)</td>
<td>11 (9–15)</td>
<td>1 (1–2)</td>
<td>225 (197–257)</td>
</tr>
<tr>
<td>5</td>
<td>254 (224–288)</td>
<td>33 (26–42)</td>
<td>12 (10–16)</td>
<td>1 (1–3)</td>
<td>235 (207–266)</td>
</tr>
<tr>
<td>10</td>
<td>266 (233–301)</td>
<td>33 (26–42)</td>
<td>13 (10–17)</td>
<td>2 (1–3)</td>
<td>245 (215–278)</td>
</tr>
<tr>
<td>15</td>
<td>277 (241–317)</td>
<td>34 (26–42)</td>
<td>14 (11–19)</td>
<td>2 (1–3)</td>
<td>256 (222–293)</td>
</tr>
<tr>
<td>20</td>
<td>289 (247–336)</td>
<td>34 (26–43)</td>
<td>15 (11–20)</td>
<td>2 (1–4)</td>
<td>266 (227–310)</td>
</tr>
</tbody>
</table>

AMU = acute medical unit.

Strengths and limitations

Strengths of this study include its size, duration and adjustment for patient-level factors of prehospital comorbidity and healthcare access as well as admission acuity; factors that are likely to account for the contrast in findings to the only similar published study in the UK. A key weakness in this study is the simplified outcome measure. Discharge rate and readmission rate are important, but not paramount indices of patient care and risk simplifying what is a complex and emotive issue. Limitations of available data do not capture patient and carer experience, quality of communication, subsequent primary care contact or diagnostic accuracy. Inpatient admission is associated with adverse events, including falls with injury, drug error, hospital-acquired infection, isolation and distress in patients with cognitive impairment and delirium. In this context, a higher safe discharge rate is an attractive goal and is aligned with the current UK national health strategy of predominantly community-based care.

However, evidence is lacking that expediting discharge at the AMU interface ultimately results in better patient care, patient experience or cost saving and, as such, overinterpretation of this study to drive an increase in discharge rates and an increase in risk tolerance by individual consultants is not warranted. A further weakness is that there are no data on inpatient subspecialty referral, use of radiological investigation or junior doctor numbers and grade supporting each medical take. However, it was felt that, given the high numbers of patients analysed per consultant (mean n=1178) and the study duration of over 3 years, there is no reason why staffing levels should bias one consultant over another of differing clinical experience. Finally, we do not account for consultant attrition from acute medical services. Historically, consultants can and do opt out of acute medical unit cover with career progression and, therefore, there might be a selection bias in the more experienced consultants remaining in acute medicine within our cohort.

We did not identify an association between consultant experience level and inpatient mortality as previously reported. Although the importance of early therapy on outcome in time-sensitive pathologies is well established, the infrastructure of the acute medical care system in this analysis means the window for these treatments occurs predominantly in emergency medicine areas before admission without the input of the receiving consultant. Similarly, beyond the 48–72 h acute medical on-call shift in acute medicine, the care of each patient will typically be delivered by downstream internal medicine teams and, as such, mortality beyond the first few days of admission will be greatly influenced by other caregivers. However,
Supplementary material

Additional supplementary material may be found in the online version of this article at www.rcpjournals.org/content/clinmedicine:

S1 – Multilevel binary logistic regression analysis of inpatient 30-day mortality and association with patient and consultant level variables.

S2 – Multilevel binary logistic regression analysis of 7-day readmission in the AMU discharged population and association with patient and consultant level variables.

S3 – Multilevel binary logistic regression analysis of death within 30 days of AMU discharge in the AMU discharged population and association with patient and consultant level variables.

S4 – Multilevel binary logistic regression analysis of safe transfer to community care following AMU admission (AMU discharge without 7 day readmission or 30 day death) and association with patient and consultant level variables.

Data availability statement

The component datasets used here are available via the Public Benefits Privacy Panel for Health at www.isdscotland.org/Health-T opics/Finance/

Solutions. For researchers who meet the criteria for researchers who meet the criteria for access to confidential data. All source code use for variable derivation, analysis, and plot generation is available at https://github.com/marcus-lyall/

Acknowledgement

Our sincerest thanks go to the team from Lothian Analytics Services at NHS Lothian for technical advice and expertise in data extraction.

References


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