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Original article

Performance of admission pathways within acute medicine services: Analysis from the Society for Acute Medicine Benchmarking Audit 2022 and comparison with performance 2019 - 2021

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ABSTRACT

Urgent and emergency care services face increasing pressure, impacting patient care. We evaluated the performance of acute medicine services, assessing clinical quality indicators for unplanned medical admissions to acute hospital services.

152 acute UK hospital services accepting unplanned admissions to acute and general internal medicine completed a day-of-care survey incorporating organisational structure questionnaire and patient-level data over a pre-defined 24-hour period in June 2022. Clinical quality indicators were: Early Warning Score (EWS) measurement within 30 min of hospital arrival; clinician assessment within 4 h; assessment by consultant physician within 6 h (daytime) or 14 h (night-time). Results were compared with 2019, 2020, 2021.

7293 sequential patients were included (and compared with 19,817 patients across 2019–2021). In 2022, 69% of patients (95%CI 67.7–69.9%) had an EWS documented within 30 min. 79% of patients (95%CI 77.8–79.7%) were reviewed by a clinical decision maker within 4 h of hospital arrival. Patients assessed in Same Day Emergency Care services were more likely to meet this target than those assessed in Acute Medical Units or Emergency Departments (OR 2.4, 95%CI 2.02–2.87, $p<0.001$). Overall, 50% of patients received consultant physician review within the target time (3065/6161, 95%CI 48.5–51.0%); performance varied with time of arrival and location of initial assessment. Performance against all three clinical quality indicators was lower than 2019, 2020 and 2021 ($p<0.001$ for all).

Performance against all quality indicators within acute medicine services is deteriorating. However, performance in Same Day Emergency Care Units is greater than in Acute Medical Units or Emergency Departments.

1. Introduction

Healthcare services are under huge strain, with rising Emergency Department (ED) attendances, increased waiting times for ED assessment and increasing pressures within inpatient services in acute hospitals, where medical emergencies are the most frequent cause of inpatient admission [1]. Within the UK, acute medicine services deliver specialist assessment and management of internal medicine patients referred from Emergency Medicine (EM), primary care, community services and from direct paramedic referral [2].

Admission pathways for internal medicine patients are ideally provided within dedicated Acute Medical Units (AMUs), which deliver

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assessment, investigation and stabilisation of admitted patients [2], and within Same Day Emergency Care (SDEC) services, which facilitate assessment of patients who can be assessed and discharged through pathways not requiring overnight admission to an inpatient bed [3,4]. Although processes vary between hospital, all patients within these pathways require prompt assessment to ensure they are rapidly identified and stabilised if unwell, and to facilitate timely and appropriate investigation and treatment as soon as possible [2].

Performance of acute medicine services is evaluated through clinical quality indicators which assess delivery of key clinical assessments within appropriate time-frames [5]. Although applicable to most inpatient hospital admissions, these indicators are not included within routinely reported urgent and emergency care datasets nationally. The Society for Acute Medicine Benchmarking Audit (SAMBA), a priority audit within the NHS England Quality Accounts, provides evaluation of performance annually using a "day of care" methodology to assess performance and process for medical attendances over a 24 hour period. Data from the Society for Acute Medicine Benchmarking Audit 2022 (SAMBA22) was used to assess performance of acute medicine services in the delivery of care for unplanned medical attendances and compare to performance since 2019.

2. Methods

SAMBA22 took place on 23rd June 2022. Participation in SAMBA was open to all hospitals accepting unplanned admissions to acute and general internal medicine; community hospitals and those without unplanned medical attendances were excluded. Multiple units could register separately within each individual hospital or NHS Trust/Board, including AMUs, SDEC units and frailty units accepting unplanned medical admissions. Registration was available via the Society for Acute Medicine (SAM) website, advertised through social media and emails from SAM [6].

All medical attendances arriving to hospital within a 24-hour period (00:00–23:59) were included, with data for collected for each patient describing demographic variables and processes of care.

Local registration and approvals are obtained by individual sites, including Caldicott Guardian approval. The full protocol for SAMBA22 is available through the SAM website [6]. Health Research Authority (HRA) approval was obtained for secondary longitudinal data analysis of non-identifiable data (21/HRA/4196).

Study data were collected and managed using REDCap electronic data capture tools hosted at University of Birmingham [7,8]. No patient identifiable data are transferred from participating sites. Data was collected at local sites from electronic health record and patient administration systems and/or paper admission records.

2.1. Pathways for patients with acute medical problems in the UK

In the UK, acute medical problems requiring assessment in secondary

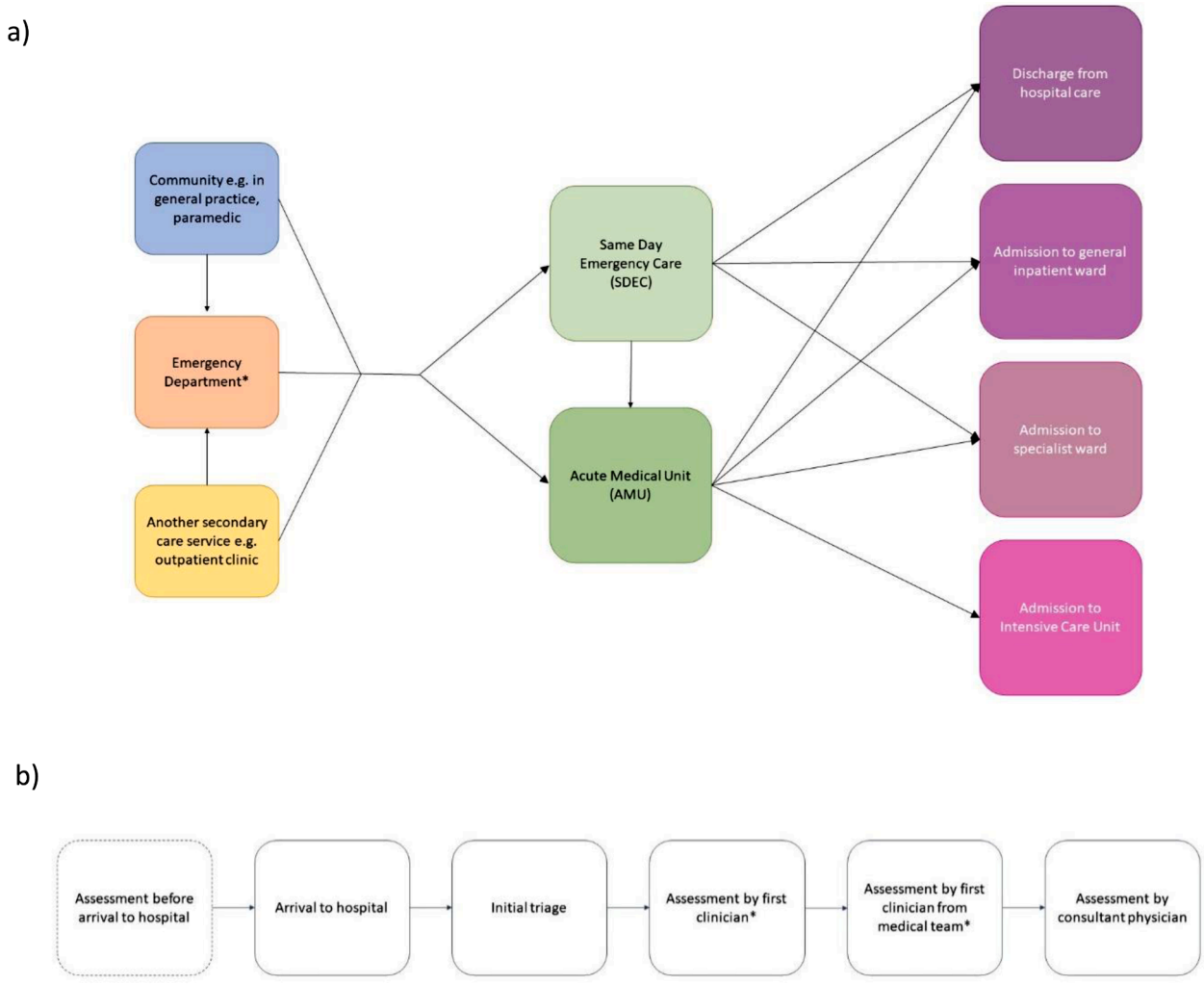

Fig. 1. Patient pathways for admissions to acute medicine services. View of access routes into acute medicine servies (1a) and assessment steps for an individual patient (1b). *first clinician and first clinician from the medical team may be the same clinician for those assessed directly by the medical team.

care are admitted through acute medicine services, which can only be accessed via referral through other services (Fig. 1a). Most commonly, patients are referred from emergency medicine (EM), particularly emergency departments (EDs), following an initial triage or assessment by EM clinician. Patients, including care home residents, access EM services by self-presentation or referral from paramedics. Emergency departments cannot register separately for SAMBA, although some of the measured Clinical Quality Indicators assess performance of these services as they relate to medical patients.

Primary care or community services, including general practitioners (GP), paramedics, outpatient services or other hospitals, for example specialist clinics or inpatient psychiatric hospitals, can also refer to acute medicine services.

Acute medicine is delivered in multiple locations, including Acute Medical Units (AMUs) and Same Day Emergency Care (SDEC). Patients are directed through these services based on initial assessment of acuity and likelihood for overnight inpatient admission. Those expected to be discharged without overnight admission are assessed through SDEC services, receiving assessment, investigations, and management without admission to an inpatient bed. AMUs are the recommended care model for unplanned medical admissions in the UK; patients can remain on AMUs for the first 48–72 h of their admission, transferred to inpatient wards if requiring admission beyond 48 h.

An organisational questionnaire was completed by each participating unit, describing the structure of their acute medical services, including total number of inpatient beds per hospital, and markers of service pressure as measured on the day of the audit, assessed through hospital bed occupancy, availability of AMU beds for new referrals at 08:00, and whether SDEC Units had used their capacity for in-patient care (to support flow all capacity should be available for patients not admitted overnight).

2.2. Patient level data

Patient level demographics included age (grouped bands), Clinical Frailty Scale (CFS), gender, and care home residence; comorbidity data was not collected. Data collectors also recorded whether patients were discharged from hospital in the preceding 30 days. Early warning scores (EWS) were recorded as NEWS2 score, with NEWS2 $\leq$2 indicating 'normal' as this would not trigger any additional clinical response [9]. Frailty was assessed using CFS for patients aged $\geq$70 years [10], with CFS $\geq$5 identifying patients with frailty.

The assessment pathway for an individual unplanned attendance is shown in Fig. 1b. Many SDEC services also deliver investigations and follow-up for selected cohorts of patients, as planned attendance to hospital [3]. These patients were excluded from analysis of pathway intervals, as the unplanned patient pathway does not apply.

Pathway data included time of hospital arrival (grouped), location of clinician assessment (by first clinician and by clinician from internal medicine team), and time from arrival to key assessment points (in grouped bands). Time to initial assessment was grouped in bands <1 h, 1–2 h, 2–4 h, 4–6 h, 6–12 h and >12 h; time to consultant physician assessment was measured in 2-hour time bands up to 24 h with a separate band >24 h. Outcome data at 14 days was also collected.

The primary aim was to assess performance against the Clinical Quality Indicators (CQIs) for acute medicine as recommended by SAM [5], which incorporate relevant recommendations from national bodies, including the Royal College of Physicians of Edinburgh [11], the Royal College of Physicians [2] and the National Institute for Health and Care Excellence (NICE) [12]. All time intervals are assessed from the time of patient arrival to the hospital. Definitions for clinical quality indicators have remained consistent for SAMBA data collection since 2019 [13,14,15].

Clinical quality indicators for acute medicine services are:

1 All patients should have an early warning score measured upon arrival (within 30 min)
2 All patients should be seen by a competent clinical decision maker within 4 h of arrival. Competent clinical decision maker includes Advanced Nurse Practitioner/Advanced Clinical Practitioner, Physician Associate, Foundation Year 1 doctor with supervision, or any other grade of doctor [5].
3 All patients should be seen and their management plan reviewed by a consultant physician, within 6 h for patients admitted to hospital between 08:00–20:00 and within 14 h for those admitted between 20:00–08:00.

Performance against clinical quality indicators was performed between SAMBA data collection periods in 2019, 2020 and 2021. As in 2022, data collection in 2019 and 2021 took place on the penultimate Thursday in June. Data collection in 2020 took place over 24 h on 30th January 2020. This date was chosen to be 6 months from June data collection rounds. Data collection did not take place in June 2020 due to pressures related to Covid-19; no rounds of SAMBA data collection have taken place during peaks of Covid-19 infection.

2.3. Patient and public involvement

There was no specific patient or public involvement in the design of this project.

2.4. Statistics

Descriptive statistics were calculated using Stata/SE V.15.1. Data are summarised with mean and standard deviation (SD) where normally distributed, and otherwise as median and interquartile range (IQR). 95% confidence intervals (CI) were calculated for proportions. Comparison of performance between categories of initial assessment location was performed using Chi square. Odds ratios were calculated using univariable comparison unless otherwise stated. Multivariable analysis was performed using logistic regression. Comparison to previous rounds of SAMBA was performed using all unplanned attendances, with comparison to 2019, 2020 and 2021. A sensitivity analysis was performed comparing 2022 and 2021, including only those units that participated in both SAMBA21 and SAMBA22, to account for potential systematic differences in the sites that participated in each round.

3. Results

152 units participated in SAMBA22, from 149 hospitals. Most hospital sites (131, 88%) were in England, with 5% [8] in Scotland, 4% [6] in Wales and 3% [4] in Northern Ireland (Supplementary Figure 1). Organisational questionnaire was completed by 143 hospitals.

3.1. Unit demographics

The median number of AMU beds at participating hospitals was 40 (IQR 29 to 52, range 19 to 76), and the median total number of inpatient beds was 520 (IQR 380 to 683, range 120 to 1700).

98% of units (137/140) reported providing an SDEC service. 98% (140/143) of participating sites were at hospitals that had an Emergency Department; 96% (137/143) reported access to an Intensive Care Unit on site.

3.1.1. Markers of service pressure

Reponses to some or all questions regarding service pressures on the day of data collection were provided by 138 units.

On the day of SAMBA22, 113 units reported hospital bed occupancy; mean bed occupancy was 97.9% (SD 6). Bed occupancy of 95% or higher was reported by 77% of units (87/113), including 45 units (39.8%) reporting occupancy levels of $\geq$100%. At 8am, 74.4% of units (99/133)

had no available beds on AMU; 89.3% of units reported patients in ED awaiting transfer to inpatient beds, with 10–19 patients awaiting transfer in 29.0% and ≥20 in 25.2% of units.

Areas allocated for SDEC services were used in providing inpatient beds in 25.4% of units (35/138). This is comparable to the proportion of units using SDEC areas for inpatient delivery in WinterSAMBA20 (25.0%, Chi square $p = 0.951$).

3.1.2. Patient level data

Patient-level data was available for 8345 patients: 7293 unplanned attendances (87%), and 1051 scheduled re-attendances (13%). Comparison with previous rounds of SAMBA is shown in Table 1; sensitivity analysis is shown in Supplementary Table 1. The median number of patients per unit was 53 (IQR 39–68, range 5–130); the median number of unplanned attendances submitted per unit was 45 (IQR 34–59, range 4–118). Scheduled re-attendances were excluded from further analysis.

3.2. Unplanned attendances

Patient demographics are shown in Table 1, compared to previous rounds of SAMBA. Prior to arrival, 92.6% of patients were in their own home or sheltered accommodation, 2.3% in a residential home and 2.7% in a nursing home. The proportion of patients discharged from hospital in the preceding 30 days (20.4%) was higher in SAMBA22.

Overall, most patients (68%) were referred via the Emergency Department. The proportion referred from primary care varied between units (median 20%, IQR 9–33%, range 0–92%).

3.2.1. Patient arrival

73.5% of unplanned attendances (5349 patients) arrived to hospital between 08:00–19:59. Overall, 71% of unplanned attendances (5183) had their initial assessment within an ED. The first medical team assessment was within ED in 52% (3776), higher than in previous years (2019: 37.5%, 2020: 44.1%, 2021: 40.6%, Chi square $p<0.005$). Initial assessment occurred directly in SDEC for 19.4% of patients; this varied between units, with a median 17.1% per unit seen directly in SDEC (IQR 4.7 to 28.2%). Initial assessment was performed in AMU for 8.3% of unplanned attendances; 75 units (49.3%) did not see any patients in AMU for their initial assessment. Supplementary Table 2 shows assessment locations for those arriving in each time band.

3.3. Clinical quality indicators

3.3.1. CQI1: early warning scores

An early warning score was recorded within 30 min of arrival to hospital in 68.8% of unplanned attendances (95%CI 67.7–69.9%). Performance varied between sites (Fig. 2a).

EWS within target time was more likely in those assessed directly in SDEC services compared to those with initial assessment in AMU or ED (OR 1.31, 95%CI 1.15–1.49, $p<0.001$). Performance against CQI1 dependant on initial assessment location and arrival time is shown in Table 2.

Performance against this indicator was lower than in previous rounds of SAMBA (Chi square $p<0.001$; Table 3, Supplementary Table 3).

On arrival, 71.3% of unplanned attendances (5175 patients) had NEWS2 score ≤2, 19.4% (1411) of 3–5, and 9.2% (670) of ≥6.

3.3.2. CQI2: review by clinical decision maker

78.7% of patients were reviewed by a clinical decision maker within 4 h of hospital arrival (95%CI 77.8–79.7%). Performance varied between sites (Fig. 2b). Initial clinical assessment was performed by an EM clinician in 61.9%. Those receiving initial assessment directly in SDEC services were more likely to have initial clinician assessment within 4 h compared to those seen in AMU or ED (OR 2.4, 95%CI 2.02–2.87, $p<0.001$). Table 2 shows performance against CQI2 dependant on initial assessment location and arrival time.

The proportion of patients reviewed by a clinician within 4 h of arrival was lower than previous rounds of SAMBA (Chi square $p<0.001$; Table 3, Supplementary Table 3).

48.6% of patients were reviewed by a member of the medical team within 4 h of arrival to hospital. Those initially assessed in AMU were

Table 1
Demographics of unplanned attendances in SAMBA22 with comparison to previous rounds of SAMBA. SD: standard deviation; IQR: interquartile range; CI: confidence interval; CFS: Clinical Frailty Scale; ED: Emergency Department. Note – CFS was not collected in SAMBA19.

Unit demographics	SAMBA22		SAMBA21		SAMBA20 (Winter)		SAMBA19	
Patients per unit								
Mean (SD)	55 (25)		57 (28)		53 (26)		51 (24)	
Planned reattendances (%)								
Median (IQR)	8.7% (1.8-15.6%)		5.7% (2.2-12.1%)		5.4% (0-10.0%)		6.8% (1.5-13.4%)	
Unplanned attendances per unit								
Mean (SD)	48 (22)		52 (24)		49 (24)		46 (22)	
Patient demographics (unplanned attendances)	N= 7293		N= 8139		N=5195		N=6483	
	%	95% CI	%	95% CI	%	95% CI	%	95% CI
Age								
16-29	7.0%		8.9%		7.4%		7.3%	
30-39	7.5%		8.5%		7.1%		7.1%	
40-49	7.9%		9.6%		8.8%		8.7%	
50-59	12.4%		12.1%		11.4%		12.6%	
60-69	15.3%		14.0%		14.6%		14.7%	
70-79	21.1%		20.3%		19.8%		21.1%	
80-89	22.1%		19.6%		22.5%		21.4%	
90+	6.8%		7.0%		8.3%		7.2%	
70+	50.0%	48.8-51.2%	46.9%	45.8-48.0%	50.7%	49.3-52.0%	49.7%	48.4-50.9%
Gender								
Male	48.3%	47.2-49.5%	46.9%	45.8-47.9%	45.6%	44.3-47.0%	46.7%	45.5-47.9%
CFS (in patients over 70)								
5+	48.3%	46.6-50.2%	52.5%	50.8-54.2%	48.5%	46.6-50.4%	-	-
Discharge from hospital in last 30 days	20.4%	19.5-21.3%	18.3%	17.5-19.2%	18.0%	16.9-19.0%	17.5%	16.4-18.4%
Location before arrival								
Care home	5.0%	4.5-5.5%	5.8%	5.3-6.3%	6.8%	6.1-7.5%	6.5%	5.9-7.1%
Referral source								
ED	67.6%	66.5-68.7%	70.0%	69.0-71.0%	66.1%	64.8-67.4%	63.2%	62.0-64.4%
Primary care	23.4%	22.4-24.3%	21.8%	20.9-22.7%	25.9%	24.8-27.2%	27.9%	26.9-29.0%

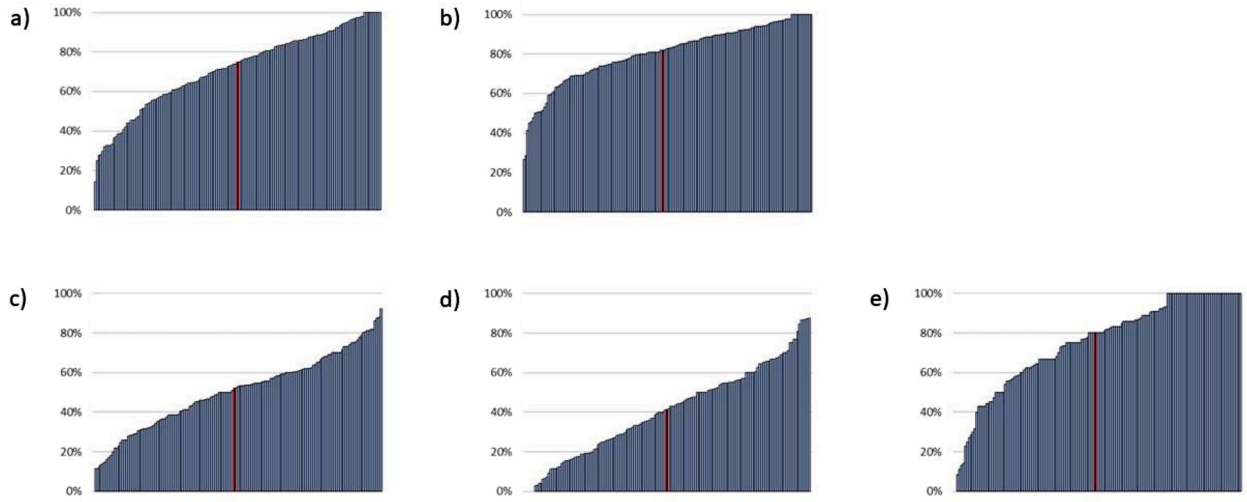

Fig. 2. Performance against clinical quality indicators at participating sites. Sites ordered along x-axis by performance against CQI, with highest performance on the right. Red column marks median unit performance. a) Early Warning Score measurement within 30 min of arrival (CQI 1); b) Assessment by clinician within 4 h of arrival (CQI2); c) review by consultant physician within target time (all unplanned admissions), d) review by consultant physician within 6 h for patients arriving 08:00–19:59; e) review by consultant physician within 14 h for patients arriving 20:00–07:59.

more likely to see the medical team within 4 h than those attending via ED (76.2% vs 34.4%, OR 6.1, 95%CI 5.03–7.44, $p<0.001$); as were those assessed directly in SDEC (87.6%, OR 13.4, 95%CI 11.4–15.9, $p<0.001$).

Assessment by another clinician before assessment by the medical team occurred in 62.8% of patients (4546); 29.4% of those who had seen a prior clinician were reviewed by the medical team within 4 h, compared to 80.2% of those who were seen directly by the medical team (Chi square, $p<0.005$).

Medical team assessment occurred while the patient was in the Emergency Department for 51.9%, in SDEC for 24%, and in AMU for 21.6%. In 25 units (16.4%) no patients had medical team assessment on AMU. The proportion of patients with medical team review in ED varied between units (mean 52.6%, SD 29.4).

3.3.3. CQI3: review by consultant physician

Overall, 49.8% of patients requiring consultant review received this within the target time (95%CI 48.5–51.0%); 1112 patients (15.3%) did not require consultant review, including 41.3% of those receiving medical assessment in SDEC services (720 patients). Of those requiring consultant review, 4.6% waited ≥24 h.

Of arrivals between 08:00–19:59, 41.1% were reviewed within 6 h (95%CI 39.6–42.6%); 71.5% of those arriving between 20:00–07:59 were reviewed within the 14 hour 'out of hours' target time (95%CI 69.4–73.6%). Performance varied between sites (Fig. 2c-e).

The proportion of patients reviewed by a consultant physician within target time was lower than previous rounds of SAMBA (Chi square $p<0.001$; Table 3, Supplementary Table 3).

Those initially assessed in AMU were more likely to see a consultant physician within the target time than those attending via ED (60.2% vs 41.9%, OR 2.10, 95%CI 1.75–2.53, $p<0.0005$); as were those assessed directly in SDEC (87.8%, OR 10.02, 95%CI 8.06–12.46, $p<0.001$). Time to consultant review varied depending on arrival time (Fig. 3) and by initial assessment location. Performance against CQI3 dependant on initial assessment location and arrival time is shown in Table 2 and Supplementary Figure 2. Those who arrived between 16:00–19:59 and initially assessed in the ED were least likely to be seen within the target time; this group were also less likely to be seen within 14 h of arrival than any other group.

Assessment by two or more clinicians prior to consultant physician review occurred in 53.4% (3878/7282), and in 71.1% of patients receiving their initial assessment in the ED (3675/5172). In multivariable regression models including time of arrival and location of initial assessment, assessment by two or more clinicians prior to consultant review was associated with decreased likelihood of assessment by a consultant within 6 h (adjusted OR 0.36, 95%CI 0.31–0.42, $p<0.005$) and within 14 h (adjusted OR 0.52, 95%CI 0.46–0.60, $p<0.001$)(Supplementary Table 4).

3.4. Outcomes

Overall, 28.9% of unplanned attendances were discharged on day of arrival (95%CI 27.8–30.0%); the proportion varied between units (mean 27.6%, SD 17.1). This was lower than the previous year, but similar to 2019/20 (2021: 31.4%, 95%CI 30.4–32.4%; 2020: 28.1%, 95%CI 26.9–29.4%; 2019: 28.5%, 95%CI 27.4–29.7%). Of those receiving their initial assessment in SDEC services, 82.1% were discharged the same day (1135/1382). In multivariable regression models including time of arrival and location of initial assessment, likelihood of discharge on day of arrival was not associated with EWS within target time or initial review within 4 h, but was more likely in those receiving consultant physician review within 6 h and within 14 h (Supplementary Table 5).

At 7 days, 22.7% of patients were still in hospital; this had not increased from SAMBA21 (22.7%). Eighty-two patients (1.1%) were admitted to an intensive care unit during their admission; this was lower in patients assessed in SDEC (0.1%) compared to AMU (0.7%, $p = 0.015$) or ED (1.7%, $p<0.001$).

Fourteen-day mortality was 3.4%, and varied with initial assessment location, with higher mortality in those assessed in ED than in AMU or SDEC (ED: 4.5%, AMU: 1.8%, SDEC: 0%; $p<0.005$).

4. Discussion

Performance against key clinical quality indicators for unplanned medical admissions has fallen in comparison to previous years, with an Early Warning Score documented within 30 min in only 69% of attendances and only 50% of attendances undergoing review by a consultant physician within target times. Although performance has changed, there has not been significant change in the number or demographics of unplanned attendances, suggesting that performance is not solely reflecting a change in patient population, but may relate to other factors affecting service delivery, including overall health system pressures.

Most patients (68%) accessed medical assessment through Emergency Medicine (EM) services; more than half of patients were assessed by the acute/general medical team while still physically within EM

Table 2
Performance against Clinical Quality indicators by initial assessment location and time of arrival for SAMBA22. CQI3 target time: 6 hours for patients arriving 08:00-19:59, 14 hours for patients arriving 20:00-07:59. ED: Emergency department; AMU: Acute Medical Unit; SDEC: Same Day Emergency Care; CQI: Clinical Quality Indicator. Note – N/A used to denote unplanned attendances not requiring consultant physician review. p values shown for Chi square comparison of proportion meeting target within each assessment location (all arrival times).

	ED N=5183 (71.2%)		**AMU** N= 606 (8.3%)		**SDEC** N= 1410 (19.4%)		**Other** N= 82 (1.1%)		
Clinical quality indicators	%	N	%	N	%	N	%	N	P value
CQI 1: EWS within All **30 minutes**	62.9%	3515/5179	67.2%	407/606	73.3%	1033/1409	63.4%	52/82	0.001
00:00-07:59	71.1%	704/990	71.4%	30/42	71.1%	32/45	80%	8/10	
08:00-11:59	74.7%	763/1021	73.9%	65/88	77.3%	429/555	47.6%	10/21	
12:00-15:59	64.5%	827/1283	69.5%	121/174	70.8%	397/561	71.4%	15/21	
16:00-19:59	65.0%	747/1150	63.4%	137/216	69.5%	162/233	66.7%	14/21	
20:00-23:59	64.6%	474/734	62.8%	54/86	86.7%	13/15	55.6%	5/9	
missing		*5*		*0*		*1*		*0*	
CQI 2: Clinician All **assessment within 4 hours**	76.1%	3943/5179	77.9%	472/606	88.6%	1248/1409	80.3%	65/81	<0.001
00:00-07:59	66.8%	661/990	81.0%	34/42	44.4%	20/45	60.0%	6/10	
08:00-11:59	85.2%	870/1021	85.2%	75/88	89.8%	499/556	85.7%	18/21	
12:00-15:59	81.2%	1051/1283	79.9%	139/174	90.4%	506/560	90.5%	19/21	
16:00-19:59	74.2%	853/1150	78.7%	170/216	89.7%	209/233	85.0%	17/20	
20:00-23:59	69.1%	507/734	62.8%	54/86	93.3%	14/15	55.6%	5/9	
missing		*5*		*0*		*0*		*1*	
CQI 3^: Consultant All **physician review within target time**	41.9%	1993/4762	60.2%	313/520	87.8%	714/813	68.2%	45/66	<0.001
00:00-07:59*	71.3%	646/906	93.9%	31/33	100%	25/25	88.9%	8/9	
08:00-11:59	38.5%	353/917	69.9%	51/73	91.5%	280/306	75.0%	12/16	
12:00-15:59	34.7%	413/1191	62.6%	97/155	86.3%	276/320	68.8%	11/16	
16:00-19:59	11.4%	121/1062	37.0%	67/181	80.5%	120/149	44.4%	8/18	
20:00-23:59*	67.1%	460/686	85.9%	67/78	100%	13/13	85.7%	6/7	
N/A		*415*		*86*		*595*		*16*	
missing		*6*		*0*		*2*		*0*	
Additional measures									
Medical review All **in 4 hours**	34.4%	1774/5162	76.2%	461/605	87.6%	1232/1407	75.6%	59/78	<0.001
00:00-07:59	27.0%	267/989	81.0%	34/42	48.9%	22/45	50.0%	5/10	
08:00-11:59	44.6%	453/1015	85.2%	75/88	89.0%	493/554	70.0%	14/20	
12:00-15:59	40.3%	515/1279	79.9%	139/174	88.8%	497/560	90.5%	19/21	
16:00-19:59	29.5%	338/1147	78.7%	170/216	89.3%	208/233	79.0%	15/19	
20:00-23:59	27.5%	201/731	62.8%	54/86	80.0%	12/15	75.0%	6/8	
missing		*22*		*0*		*3*		*3*	
Consultant review All **in 6 hours**	21.5%	1024/4763	43.7%	227/520	85.1%	692/813	51.5%	34/66	<0.001
00:00-07:59	14.2%	219/906	30.3%	10/33	48.0%	12/25	22.2%	2/9	
08:00-11:59	38.5%	353/917	69.9%	51/73	91.5%	280/306	75.0%	12/16	
12:00-15:59	34.7%	413/1191	62.6%	97/155	86.3%	276/320	68.8%	11/16	
16:00-19:59	11.4%	121/1062	37.0%	67/181	80.5%	120/149	44.4%	8/18	
20:00-23:59	1.2%	8/686	2.6%	2/78	30.8%	4/13	14.3%	1/7	
Consultant review All **in 14 hours**	57.7%	2748/4763	77.9%	405/520	93.6%	761/813	72.7%	48/66	<0.001
00:00-07:59	71.3%	646/906	93.9%	31/33	100%	25/25	88.9%	8/9	
08:00-11:59	74.7%	685/917	94.5%	69/73	99.4%	304/306	75.0%	12/16	
12:00-15:59	51.9%	618/1191	81.3%	126/155	90.9%	291/320	81.3%	13/16	
16:00-19:59	31.8%	338/1062	61.9%	112/181	85.9%	128/149	50.0%	9/18	
20:00-23:59	67.1%	460/686	85.9%	67/78	100%	13/13	85.7%	6/7	

Table 3
Comparison of performance against Clinical Quality Indicators in SAMBA22 and previous rounds of SAMBA. CQI: Clinical Quality Indicator; CI: confidence interval. *CQI3 target time: 6 h for patients arriving to hospital from 08:00–19:59; 14 h for patients arriving to hospital from 20:00–07:59.

Percentage (unplanned attendances) meeting Clinical Quality Indicator	Year SAMBA22		SAMBA21		SAMBA20 (Winter)		SAMBA19	
	%	95% CI	%	95% CI	%	95% CI	%	95% CI
CQI 1: Early Warning Score within 30 min	68.8%	67.7–69.9%	78.6%	77.7–79.5%	74.9%	73.7–76.1%	81.3%	80.4–82.3%
CQI 2: Assessment by Tier 1 Clinical decision maker within 4 h of arrival	78.7%	77.8–79.7%	87.4%	86.6–88.1%	84.4%	83.3–85.3%	87.7%	86.8–88.5%
CQI 3: Review by consultant within target time*	49.8%	48.5–51.0%	67.8%	66.6–68.9%	61.9%	60.5–63.3%	68.6%	67.3–69.8%

departments. Performance against clinical quality indicators was lower for patients presenting to the Emergency Department, with only 42% of patients assessed by a consultant physician within the target time. Medical patients attending via EM services were more likely to be assessed by multiple clinicians prior to review by a consultant physician, and less likely to be reviewed by a consultant physician within target

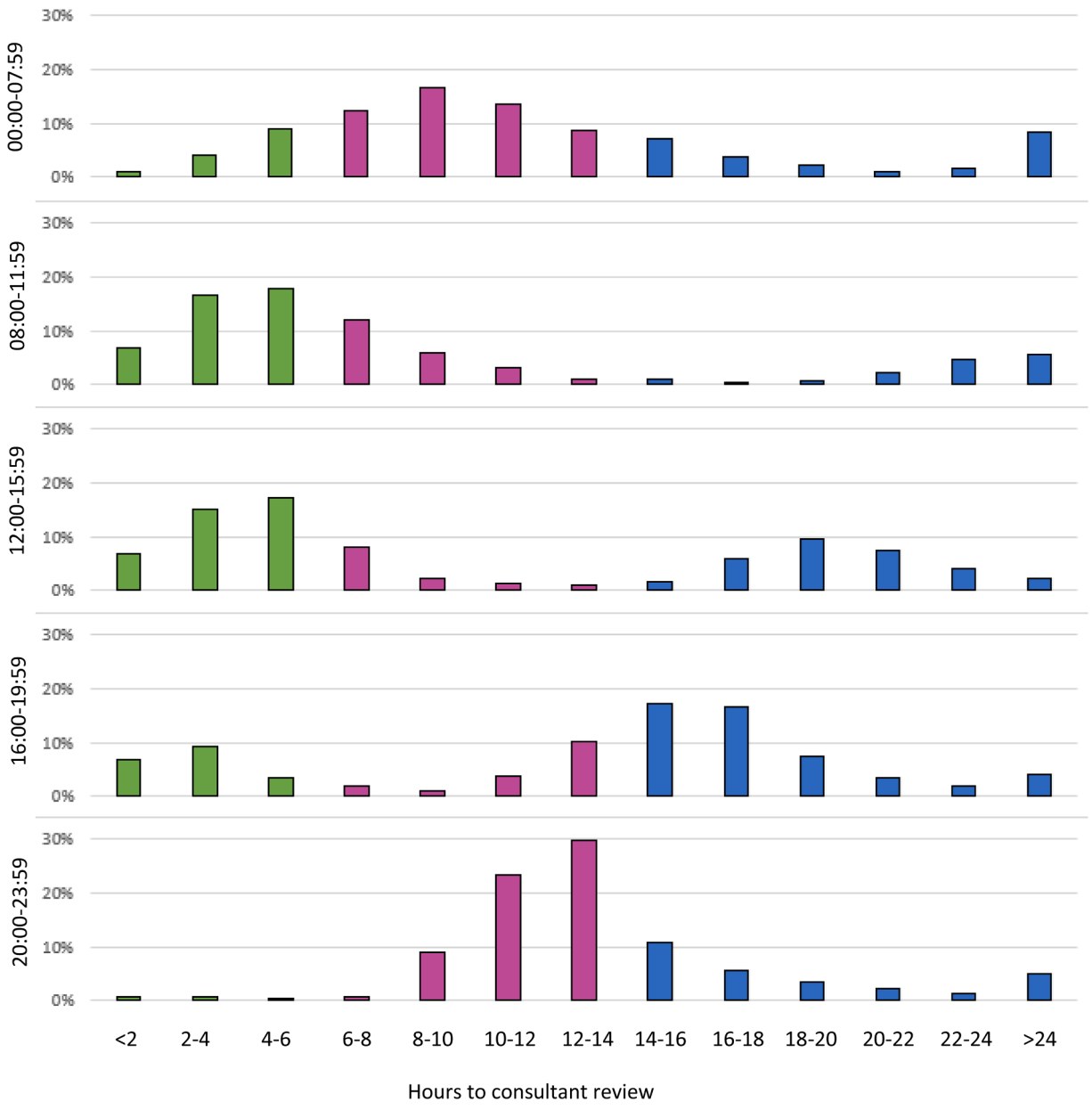

Fig. 3. Time to consultant physician review by time of arrival to hospital. Results shown as percentage of patients within each time band for arrival time, excluding those who did not require consultant physician review. Green: consultant review within 6 h; purple: consultant review within 6–14 h; blue: consultant review in 14 h or more. Note: the number of patients within each arrival time band varies (00:00–07:59: 973; 08:00–11:59: 1312; 12:00–15:59: 1682; 16:00–19:59: 1410, 20:00–23:59: 784).

times.

A fifth of medical patients were assessed through Same Day Emergency Care (SDEC) services. This remains below the target for a third of attendances to be managed through SDEC suggested within the NHS Long Term Plan [4], and despite this national aim, the proportion of patients discharged without overnight admission was lower than in the preceding year. Patients attending through SDEC services were more likely to meet the clinical quality indicators than those admitted via other routes. However, areas for delivery of SDEC were allocated to provide inpatient care in a quarter of hospitals. This likely reflects pressure on acute medical services, particularly considered alongside the reported high bed occupancy and absence of space to accommodate new admissions on most participating assessment units, with three quarters of acute medical units reporting that there were no available beds at the start of the day. These service pressures are normally more commonly recognised in winter than summer, and a similar proportion of units reported repurposing of SDEC spaces in winter 2020 [14].

The intervals within the acute care pathway for emergency medical attendances reported here are not represented by other urgent and emergency care reports, which often focus on physical transfer to inpatient beds or do not explore patient pathways beyond referral to inpatient medicine services [16]; this study therefore addresses a gap in knowledge regarding assessment pathways for medical patients, particularly in those who bypass Emergency Departments. Although this study focuses on service performance and pressure within acute internal medicine, most patients were admitted via EM and so the performance described here, particularly in initial clinician review timing, also reflects performance of EM services, reflecting patient experience of pathways.

There are approximately 225 AMUs within the UK; our evaluation therefore represents approximately two thirds of services, including over 75% of services within England. There may however be systematic

differences in those hospitals that did not participate. Our data represents a single day, and variation in performance may be expected across time. Where measures such as patient proportion discharged without overnight admission have reported elsewhere across longer time periods, these have been consistent with our findings [17].

Additional factors may account for variation in performance that cannot be accounted for within this analysis, within the patient population served by each hospital (including ethnicity, casemix, rates of multimorbidity and socioeconomic factors) and within the clinical and operational processes at each hospital. These factors require further exploration; variation in performance between units is consistently highlighted within SAMBA [13–15], suggesting scope to identify features of service structure and process that may drive higher performance. Within this analysis, multiple factors independently affected the likelihood of consultant review within 6 and 14 h, including the location of initial assessment and assessment by multiple clinicians prior to consultant review. This may provide an opportunity to streamline admission processes. Limited evaluations of pathways reducing duplicated assessment via 'single clerking' have been performed previously [18,19]. Although our analysis demonstrates longer pathways for patients receiving multiple reviews, the impact on the quality of patient care cannot be assumed. Exploring the rationale for repeat assessment, such as clinical deterioration, or the value added, such as treatment modifications, is beyond the scope of this study and requires further appraisal.

This evaluation focuses on time intervals to defined assessment points. To fully understand how these time-based indicators relate to patient outcomes, further research should incorporate other measures of the quality of the care received, as it should not be assumed that faster care always equates to better care. Evaluating the impact of delay on mortality is outside the remit of this work, however previous evidence demonstrates that patients delayed in EM services awaiting admission to inpatient services have higher 30-day mortality, and that consultant physician input to patient care has benefits for patient safety and length of hospital admission [20]. Our analysis demonstrates that those reviewed by a consultant physician within 6 or 14 h were more likely to be managed without overnight admission. Whether this association is influenced by prioritisation of patients initially assessed as potentially suitable for discharge requires further exploration.

It is widely recognised that pressures within NHS services are increasing, in all areas including urgent and emergency care and unplanned inpatient care [21,22]. Although additional pressures due to the COVID-19 pandemic have likely exacerbated problems within urgent and emergency care services, the rise in demand and decrease in performance within emergency medicine services precedes the COVID-19 pandemic by several years [23–25]. There has been a marked increase in ED attendances in the last 12 months, which has continued since the data discussed here has been collected. Despite the decreased performance demonstrated here, the number of unplanned attendances to acute medical services did not appear to have increased. Change in performance may in part reflect whole system pressure, rather than increased unplanned attendances alone. This is supported by the high bed occupancy reported here, which is known to adversely impact patient flow, and by the increased proportion of patients reviewed within the ED. This pressure is likely to be exacerbated by shortages of appropriately skilled healthcare professionals, including both doctors and nursing staff, that have been demonstrated within the healthcare service [26,27]. Our results suggest that initial assessment of newly admitted patients is largely being provided by the medical team in two locations – within the ED and in SDEC services. The relative scarcity of unoccupied inpatient beds in AMUs likely contributes to the low number of patients receiving their first medical review in these units. This is both a marker of service pressure and reduced flow through systems, and detrimental to pressure and performance within ED, increasing physical number of patients within departments with finite capacity and impacting use of streamlined medical assessment pathways for which AMUs were designed [2]. Careful consideration must be given to how acute and emergency medicine services can work together to improve clinical care and patient pathways, and to how these pathways can be adapted, for example by reducing duplication and streaming patients to acute medicine services earlier in the process, to the benefit of both acute and emergency services.

5. Conclusion

Medical attendances to acute hospitals were less likely to receive assessment, including consultant physician review, within target times in comparison to previous years. Performance varies between hospitals, dependant on arrival time to hospital, and depending on the service providing initial assessment.

Contributorship

All authors (CA, TK, TC, CS, MH, AK, RV, AG, DSL) contributed to design of the study, interpretation of the data, and approved the final manuscript. Data analysis was performed by CA. The corresponding author attests that all listed authors meet authorship criteria and that no others meeting the criteria have been omitted. CA acts as guarantor.

Transparency declaration

The lead author affirms that this manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned have been explained.

Ethics statement

This research was performed in accordance with the Declaration of Helsinki. Ethical approval was not required for data collection. Health Research Authority (HRA) approval was obtained for secondary longitudinal data analysis of non-identifiable data (21/HRA/4196).

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Data sharing

The data that support the findings of this study are available from the corresponding author, [CA], upon reasonable request.

Declaration of Competing Interest

All authors have completed the ICMJE uniform disclosure form at http://www.icmje.org/disclosure-of-interest/ and declare: no support from any organisation for the submitted work; CA is funded by an NIHR clinical lectureship. DSL declares salary support from National Institute for Health Research (NIHR) Applied Research Collaboration (ARC) West Midlands; no other relationships or activities that could appear to have influenced the submitted work.

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Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.ejim.2023.07.038.

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