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Who is doing the tap? A multicentre audit and trainee survey exploring barriers to performing diagnostic paracentesis.

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The datasets generated during this study, including de-identified clinical data and clinician survey results, are available from the corresponding author Dr Gemma Wells (gemma.wells3@nhs.net) on reasonable request. This would include verification of the

findings of the study, conducting secondary analyses, or contributing to systematic reviews and meta-analyses, provided that the proposed use is scientifically sound and ethically appropriate. Requests for data access will be subject to review and approval by the corresponding author and where necessary ethical approval.

Contributions

All authors were involved in the conception of the manuscript, made critical revisions and approved the final manuscript.
GW oversaw the project, wrote the initial draft and is guarantor. HM and AP co-led the statistical analyses. LT created figures and tables to accompany the manuscript. Authors 1-5 were site leads for each hospital trust included in the clinical audit and survey. Authors 1-16 made significant contributions to data acquisition.

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ABSTRACT

Objective:

Spontaneous bacterial peritonitis (SBP) is a serious complication of liver cirrhosis and diagnostic delay is associated with increased mortality. National guidance recommends diagnostic paracentesis within six hours of presentation. We hypothesised that inadequate training and awareness among admitting clinicians contribute to this target not being met and designed a study to assess potential factors underlying procedure delay.

Method:

A two-part multicentre study was conducted: (1) a survey assessing doctors' knowledge, confidence, and attitudes towards diagnostic paracentesis across four United Kingdom (UK) hospitals; (2) a retrospective audit across seven UK hospitals in which time to paracentesis was benchmarked against national guidance. Associations

between delay, outcomes, and systemic factors were assessed using SPSS v30 and RStudio 4.5.0.

Results:
Of 105 doctors responding to the survey, 85% of foundation year 1 doctors and 78.6% of senior house officers lacked confidence to perform a tap independently, as did 20% of specialist registrars. In a hypothetical clinical scenario, only 51.4% would perform a tap; 25.7% were deterred by coagulopathy, and 21.9% cited lack of confidence.
207 patients were admitted with cirrhosis and ascites. Median time to paracentesis was 10 hours 51 minutes, and no centre met the 6 hour standard. Delays in paracentesis correlated with longer waits for clerking, antibiotic administration, and specialist review [$p<0.05$].

Conclusions:
Lack of confidence, knowledge and systemic delays were key barriers to timely diagnostic paracentesis. Targeted training and education may improve care for patients with decompensated cirrhosis and ascites.

Key messages

- **What is already known on this topic** – diagnostic paracentesis within 6 hours of admission in patients presenting with liver cirrhosis and ascites is recommended in national guidelines, with evidence that delays in diagnosis of spontaneous bacterial peritonitis are associated with increased mortality
- **What this study adds** – we showed poor compliance with this recommendation and assessed a range of possible causative factors for delay or non-completion of this procedure
- **How this study might affect research, practice or policy** – our findings of low confidence and experience in diagnostic paracentesis amongst resident doctors across multiple sites, as well as an association between delays in diagnostic paracentesis and longer wait times for specialist review, support a review of current medical education and training in this area to improve awareness and procedural competence

Introduction

Spontaneous bacterial peritonitis (SBP) is a serious and life-threatening complication of chronic liver disease, with a high in-hospital mortality rate [1, 2]. Previous research has demonstrated that delays in performing diagnostic paracentesis associated with increased mortality in patients presenting with SBP [3]. The 2013 National Confidential Enquiry into Patient Outcomes and Deaths (NCEPOD) report on alcohol-related liver disease described widespread poor care and excess avoidable deaths in United Kingdom (UK) [4]. An admission care bundle for decompensated cirrhosis has been developed, endorsed by the British Society of Gastroenterology (BSG) and British Association for the Study of the Liver (BASL), aimed at improving care for patients presenting with liver cirrhosis [5]. However, results from the Trainee Collaborative for Research and Audit in Hepatology UK (ToRcH-UK) multicentre audit in 2019 demonstrated that implementation of the BSG/BASL admission care bundle was poor across the UK, and that completion of diagnostic paracentesis was low, at 53.79% [6].

Previous research showing an association between delay in diagnostic paracentesis and increased mortality defined ‘early’ paracentesis as <12 hours and ‘delayed’ as >12 hours [3]. The BSG/BASL bundle [5] recommends that an ascitic tap should be performed within the first 6 hours of presentation in all patients with ascites and decompensated liver disease, with national guidance for the management of patients presenting with cirrhosis and ascites stating that diagnostic paracentesis should be performed ‘without a delay’ [7]. We hypothesised that in view of the lack of improvement in admission rates or mortality for patients with alcohol-related liver disease in the 2022 update to the NCEPOD report [8], we would find poor compliance with national standards for timely performance of diagnostic paracentesis in decompensated cirrhosis admissions with ascites. We designed our study to assess current compliance with national guidelines, and identify barriers to timely completion to inform targeted quality improvement interventions. Given the association of delayed diagnostic paracentesis with increased mortality in patients with SBP [3], we also investigated whether this association held true in this cohort and whether there were any other adverse outcomes associated with a delay in paracentesis in patients presenting with decompensated cirrhosis and ascites.

Methods

We aimed to gain a representative sample of normal clinical practice across multiple hospital sites. There were two components, a survey and a clinical audit.

Survey

The baseline survey was developed by the investigators, utilising structured questions and an example clinical case to identify possible explanations for delayed diagnostic paracentesis. The survey was created using Google Forms and circulated to doctors working in acute and general medicine at four different hospital sites via WhatsApp groups and using Quick Response (QR) code links prior to a teaching intervention. Limited demographic data was collected, recording respondents' current site and training grade or equivalent. Respondents were asked about their training level, previous gastroenterology experience, confidence in performing diagnostic paracentesis, and attitudes towards ultrasound use. They were also given a clinical scenario (see case vignette) involving a patient with a clear indication for diagnostic paracentesis but abnormal coagulation parameters, and asked whether they would perform the procedure.

Case vignette:

A patient with known alcohol-related liver disease presents to ED with abdominal pain and increasing abdominal distension. He has an INR of 2.1 and a platelet count of 65.

Question:

Would you perform an ascitic tap?

Response options

- No - not necessary
- No - clotting is deranged therefore it would not be safe
- No - I am not confident in ascitic taps
- Yes - it is safe to perform the tap and I feel able to do so

Clinical audit

We conducted a retrospective audit across seven English hospitals, including three of the four hospitals where the survey was conducted. The audit was designed to assess whether national guidance for diagnostic paracentesis was being followed, identify

potential contributing factors to delayed paracentesis and establish a baseline to compare with following quality improvement intervention. As per the Health Research Authority Decision Tool the project was defined as audit rather than research and therefore ethical review was not required. Each participating site gained local audit approval. Registration and execution of the project was carried out with reference to a shared guidance document to ensure maximum concordance between sites.

Adult emergency admissions with decompensated cirrhosis and ascites between 23 April - 23 October 2024 were identified using clinical codes for liver disease and ascites. Patients were included from screening if there was a documented clinical assessment or imaging result within the first 24 hours of admission compatible with significant ascites. Exclusion criteria included previous liver transplantation, transfers from another hospital, pregnancy, active non-hepatic malignancy or another explanation for ascites felt to be clinically more likely than chronic liver disease. Patients were excluded if ascites was suspected clinically but imaging within the first 24 hours of admission excluded significant ascites, or a documented bedside ultrasound demonstrated insufficient fluid for an ascitic tap.

Demographic and clinical data were extracted from electronic patient records. Patient identifiable information was not retained in the dataset, with each participant assigned a pseudonymised identification code. Limited demographic data (age, gender and main aetiology of chronic liver disease) were collected. Baseline blood tests (platelets, international normalised ratio (INR), creatinine, bilirubin) were collected and used to calculate Model for End-Stage Liver Disease (MELD) scores. Relevant clinical outcomes were recorded for all patients, including diagnosis of SBP, intensive care admission and in-hospital mortality. For those patients in whom an SBP diagnosis was confirmed, additional data to assess compliance with national guidance for the management of SBP, namely antibiotic prescribing and the use of human albumin solution (HAS) were also recorded [7].

Timings of key clinical interventions were collected pragmatically from electronic patient records. The completion time of the emergency department triage document was used as a surrogate for time of presentation to hospital and as a baseline for all subsequent timings. Admission clerking and diagnostic paracentesis times were recorded based on the time of documentation in the medical notes, unless an earlier time was specified

within the note. If the procedure was documented within the admission clerking, it was assumed to have occurred simultaneously. Time to first antibiotic administration was as per the electronic medication chart. Time to gastroenterology review was recorded to the nearest hour from triage. We grouped admissions into four groups of <6 hours, 6-12 hours, 12-24 hours and >24 hours until diagnostic paracentesis.

Statistical analysis

The clinical audit data were assessed for normality using the Shapiro-Wilk test and survey results were assumed to be not normally distributed. Data are expressed as median (IQR) or mean (±SE) according to the distribution. Kruskal Wallis test was used to compare median values between groups and ANOVA was used to compare mean values between groups. Spearman's correlation was used to compare associations between time taken to perform ascitic tap and variables including time to admission clerking, time to antibiotic prescription and time to review by gastroenterology. P values less than 0.05 were considered significant. Statistical analyses were performed using RStudio version 4.5.0 and SPSS v30.

Results

Survey results

Survey responses were collected from 105 doctors, with results outlined in Table 1. 5% were consultants, 28.6% registrars (SpR), 53.3% senior house officers (SHO) and 13.3% were foundation year 1 (F1). 27.6% had never performed an ascitic tap, with another 33.3% having performed the procedure less than 5 times. 61% responded that they would not be confident to do an ascitic tap independently, with confidence significantly increased in those who had done a higher number of procedures [p<0.001]. 59% would not do an ascitic tap without ultrasound. In the clinical case of a patient presenting with known alcohol related liver disease, abdominal pain and distension, only 51.4% of doctors would do an ascitic tap with 25.7% not doing the procedure due to abnormal clotting and 21.9% due to lack of confidence. Clinicians who were more senior, had worked on a gastroenterology job and those with higher self-reported confidence were more likely to perform the diagnostic paracentesis in the clinical vignette [p<0.001]. Of the 14 F1s who responded, 85% had never done an ascitic tap and none would do one in the described clinical case. Of the 56 SHOs, 30.4% had never performed an ascitic tap and 78.6% would not be confident to do this

independently. Of the 30 SpR doctors, 20% were not confident to do the procedure independently.

Audit results

207 patients were included in the clinical audit following screening and exclusions. Baseline demographic information and outcomes are recorded in Table 2. The mean age was 60 years old, 71% of patients were male, and 62.8% had a primary aetiology of alcohol related liver disease. For 20.8% of patients this was an index decompensation event. The median MELD score was 16.3, equating to an expected 3-month mortality of 6%. 74.8% were admitted under gastroenterology or hepatology as the primary team. 15.5% of patients were admitted to intensive care during their hospital stay, with an median length of ICU stay of 2.5 days. 18% of patients died during admission, with higher MELD scores on presentation and admission to ICU both associated with higher mortality [$p<0.001$]. No association was found between mortality and age, gender or aetiology of liver disease.

Diagnostic paracentesis was performed in 91.8% of patients. In those who underwent diagnostic paracentesis, the median time to tap was 10 hours and 51 minutes. Only 27.4% of patients had a tap within 6 hours of triage, and 29.5% of patients waited more than 24 hours. There was no significant difference in MELD scores nor clotting parameters (INR and platelet count) between patients undergoing early versus late paracentesis. The median time to admission clerking was 3 hours and 41 minutes. The median time to the first administration of antibiotics was 9 hours and 48 minutes, over an hour less than the median time to tap. Patients who had an ascitic tap in under 12 hours on average had antibiotics administered following the procedure, but in the groups where paracentesis was delayed by over 12 hours antibiotics were on average given prior to the procedure. The procedure was performed using ultrasound in 133/190 patients (70%), without ultrasound in 16/190 (8.4%), and not documented in enough detail to be able to establish whether ultrasound was used in 41/190 (21.6%). The median time to tap was 12 hours and 22 minutes when ultrasound was used and 12 hours and 23.5 minutes when it was not [$p=0.93$]. Timings of key clinical interventions (admission clerking, antibiotic administration and review by gastroenterology) broken down by paracentesis timing (<6 hours, 6-12 hours, 12-24 hours and >24 hours from ED triage) are displayed in table 3. Delay in paracentesis beyond 6 hours was

associated with increased times to admission clerking, antibiotic administration and initial review by gastroenterology [p<0.05].

Significant variability between centres was observed in both median time to tap [p<0.001] and in the proportion of patients being tapped within 6, 12 and 24 hours. No centre had a majority of patients tapped within 6 hours. The only transplant centre included was the best performing, with a median time to tap of 7 hours 6 minutes but only 43.2% of patients tapped within 6 hours. There were differences in the mean age [p<0.001] but not the median MELD scores of patients admitted to different hospitals. There was no significant difference in time to admission clerking between hospitals. A gastroenterology review occurred in >90% of patients in all the hospitals included, but there was significant variation in time to review [4-24 hours, p<0.001].

16 patients in the cohort (7.7%) were found to have SBP, 15 on the basis of a neutrophil count of 250 or greater and 1 who had bacterascites and was managed as SBP by their treating team. 5 of these patients died during admission (31.3%) and 6 were admitted to ICU (37.5%). Median time to tap was 7 hours 52 minutes (IQR 9 hours 13 minutes) and time to initial antibiotics was 4 hours and 12 minutes (IQR 7 hours 21 minutes). The initial antibiotic was a third-generation cephalosporin in 12 patients (75.0%) (ceftriaxone 6, cefotaxime 6) and piperacillin-tazobactam in the remaining 4 (25.0%). Antibiotics were changed to an alternative broad-spectrum agent in 6 patients, and an aminoglycoside was added in 4. 9 patients (56.3%) had a causative organism identified from their initial diagnostic paracentesis (*Escherichia coli* 6*, Streptococcus (pneumoniae, anginosus, bovis)* 3*).* 4 of 6 *E. coli* cultures demonstrated at least amoxicillin resistance. HAS was prescribed and administered as per guidelines on day 1 and day 3 of admission in 8 (50%) of patients. Of the 10 patients who survived to hospital discharge and were not transferred to another centre, 5 (50%) were discharged with secondary prophylactic antibiotics.

Discussion

Our results demonstrate that despite efforts to improve care since the 2013 NCEPOD report into alcohol-related liver disease (ArLD) [4], a key component of the initial management of patients hospitalised with cirrhosis and ascites remains below the recommended standard in the centres we studied. Alarmingly, our survey highlighted that almost half of the clinicians surveyed would not be comfortable performing

diagnostic paracentesis independently, including 20% of higher specialty trainees. Our main audit findings are therefore perhaps unsurprising. Time to paracentesis correlated with the timing of the initial gastroenterology review and, on average, the procedure was performed more than seven hours after the patient was first clerked by the admitting clinician. This suggests that the procedure was infrequently performed at the time of initial assessment, and more often delayed until advised or performed by a gastroenterology specialist. This explanation is supported by the finding that the only transplant centre included in the audit, where the majority of decompensated cirrhosis patients are admitted directly by a gastroenterology specialty trainee rather than a generalist, had a significantly shorter median time to diagnostic paracentesis than the others. As there was limited confidence and experience in non-specialist doctors surveyed across all centres, and recognising that it is not practical for all cirrhosis patients in the UK to be admitted directly by a gastroenterology specialist, a significant improvement in education and training for doctors caring for patients with cirrhosis in acute settings is urgently required to improve compliance with national standards. This is especially important as liver disease is the only common cause of death in the UK that is increasing in numbers [9], and the 2022 update to the NCEPOD report on care for patients with ArLD (Remeasuring the Units) found that more than a quarter of these patients were not looked after by a gastroenterologist or hepatologist during their admission to hospital [8]. Due to the rotational nature of medical training and the fact that not all doctors will rotate through a gastroenterology placement during foundation and core training, we propose that procedural skill training should be introduced earlier, for example during medical school and as a core procedural competency for the foundation programme, to encourage early skill acquisition and consolidation.

Although it is well recognised that conventional measures of coagulation such as the INR do not accurately reflect the risk of bleeding in cirrhotic patients, [10, 11], our survey suggests that this knowledge is not ingrained in general medical training. 25.7% of survey respondents were discouraged from performing diagnostic paracentesis, a low risk procedure [10], due to abnormal coagulation. It is reassuring that in our audit the time to paracentesis did not correlate with INR or platelet count, but it may be that the abnormal coagulation parameters of patients included did contribute to the delay in carrying out the procedure. This has potential implications beyond the scope of our study, as it could result in delays for other procedures and inappropriate administration of blood products such as fresh frozen plasma. Training in diagnostic paracentesis must

therefore include specific education around the interpretation of coagulation tests in cirrhotic patients. Another key finding from the survey was that the majority of respondents would not be comfortable performing diagnostic paracentesis without ultrasound and this was reflected in the results of the clinical audit, where at least 70% of procedures were carried out using ultrasound. Given that timings for procedures done with and without the use of ultrasound were essentially identical, we cannot demonstrate that preference for ultrasound use caused delays in this cohort. BSG guidance on ascites management recommends that the use of ultrasound 'should be considered where available' for large volume paracentesis but ultrasound is not mentioned in the same guidance in regard to diagnostic paracentesis [7]. There is evidence to suggest that the use of ultrasound improves the success rate of diagnostic paracentesis [12] and can be implemented safely in an NHS day unit setting [13], and future work could explore the introduction of ultrasound use into clinical skills teaching.

Both in our overall cohort and in the subcohort of patients with SBP there was a significant length of time to antibiotic administration from both ED triage and admission clerking, which suggests that a potential diagnosis of SBP and its clinical urgency may be underestimated by admitting doctors. We found that patients with higher MELD scores were no more likely to undergo early diagnostic paracentesis, possibly implying that identification, recognition and prioritisation of patients with more advanced liver disease and a higher risk of death [14] was poor. Importantly, we also showed that despite delays, the time to antibiotic administration was on average shorter than the time to diagnostic paracentesis. Administration of broad-spectrum antibiotics prior to diagnostic paracentesis may have affected the numbers of patients who had a cell count diagnostic for SBP, and reduced the number of positive cultures in the SBP group. Our finding that 44% of organisms isolated from ascitic fluid cultures had some degree of antimicrobial resistance is in line with previous studies showing high rates of resistant organisms in UK patients with cirrhosis [15] and provides support for the need to promptly culture, identify and appropriately treat causative pathogens rather than empirically prescribing potentially unnecessary courses of broad-spectrum antibiotics in this patient group. Recognition of this issue in other specialties has previously led to campaigns aimed at reducing time to cultures and antibiotic administration in septic shock and neutropenic sepsis [16, 17]. Given that there is a lack of a consistent definition or target for early diagnostic paracentesis nationally and internationally [3, 5, 18], we suggest that specialty consensus on an acceptable target time and subsequent

awareness campaigns targeting emergency and acute medicine clinicians could contribute to improvements in the time to paracentesis as well as appropriate antibiotic administration or cessation. Cross-specialty collaboration on this issue could also be sought, for example exploring with the Royal College of Emergency Medicine whether diagnostic paracentesis could be added as a core competency of the Acute Care Common Stem curriculum alongside existing diagnostic procedures such as pleural aspiration and lumbar puncture [19], encouraging a diagnostic paracentesis to be done as part of the initial assessment of these patients in the emergency department.

There are limitations to our study, primarily the retrospective nature of the study and reliance on clinical documentation to establish patients for inclusion, which may have led to an underestimation of how many patients should have undergone paracentesis on admission. The retrospective design also hampered our ability to ascertain the seniority and primary specialty of the clinician who performed the tap in the clinical audit, both factors that may have influenced the delays seen in performing the procedure. In addition, survey respondent training grade was self-reported, not always including exact level of seniority by year of training. We could not assess what the physical location of the included patients was within the emergency department at the time of their initial assessment and medical admission clerking, so the potential impact of emergency department overcrowding, corridor care and lack of access to procedure rooms could not be specifically assessed. As SBP occurs in a relatively small percentage of patients with advanced chronic liver disease [20], we were not able to ascertain whether the procedural delays in our cohort caused harm due to low numbers. As all sites participating were in large cities in the South East of England our findings may not be representative for the UK as a whole, given the known regional variations in inpatient cirrhosis care [21].

Despite these limitations, with collaborative working across hospitals we have successfully audited performance against national standards in multiple centres with inclusion of district general, tertiary and transplant centre hospitals. Our cohort had demographics consistent with previous UK data in terms of age, gender and primarily alcohol-related liver disease aetiology [21]. The use of clinical codes to identify patients for inclusion was used to include as many patients as possible presenting with indications for diagnostic paracentesis. Although a previous UK audit [6] and ongoing initiatives like the IQILS accreditation scheme [22] have identified issues with care and

targeted performance improvements, to our knowledge, none have specifically aimed to investigate underlying and potentially modifiable causes for delay in diagnostic paracentesis in the UK. Our project has achieved this by combining clinician survey data with a clinical audit across multiple sites, and provides valuable insights for service improvement.

Future work might explore trainee attitudes to ultrasound and experience of its use, and whether it can be used to enhance procedural safety and success. We suggest that future measures to reduce the time to diagnostic paracentesis might include: 1) achieving consensus on, and improving awareness of, a target timeframe for completing the procedure, to be agreed upon by gastroenterology, acute medicine and emergency medicine; 2) collaborating with emergency medicine colleagues to explore whether diagnostic paracentesis could be included in their core competencies and completed if needed as part of initial assessment; 3) introduction to the procedure in medical school or the foundation programme, alongside clinical teaching sessions that also educate trainees on the interpretation of coagulation parameters in cirrhosis.

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Figures

Table 1

Results from the multicentre clinician survey of doctors working in acute and general medicine

Category	n (%)
Grade of Respondents	
F1	14 (13.3%)
SHO	56 (53.3%)
SpR	30 (28.6%)
Consultant	5 (4.8%)
Ascitic Tap Experience	
Never performed an ascitic tap	29 (27.6%)
Performed <5 ascitic taps	35 (33.3%)
Performed >5 ascitic taps	41 (39.0%)
Not Confident to Perform Ascitic Tap Independently	
Overall	64/105 (61.0%)
F1	14/14 (100.0%)
SHO	44/56 (78.6%)
SpR	6/30 (20.0%)

Use of Ultrasound				
Would always use ultrasound	62 (59.0%)			
Ultrasound not always necessary	43 (41.0%)			
Response to the clinical vignette: "Would you perform an ascitic tap?"				
Response option	**Total**	**F1**	**SHO**	**SpR**
No - not necessary	1 (1.0%)	0/14 (0%)	0/56 (0%)	1/30 (3.3%)
No - clotting is deranged therefore it would not be safe	27 (25.7%)	7/14 (50.0%)	16/56 (28.6%)	3/30 (10.0%)
No - I am not confident in ascitic taps	23 (21.9%)	7/14 (50.0%)	14/56 (25.0%)	2/30 (6.7%)
Yes - it is safe to perform the tap and I feel able to do so	54 (51.4%)	0/14 (0%)	26/56 (46.4%)	24/30 (80.0%)

Table 2

Results from the clinical audit, with baseline demographics, key clinical outcomes and timings of key interventions

Baseline information (n (%) unless otherwise specified)	
Number of participants	207
Gender (male)	148 (71.0%)
Age (y) (Mean ± SE)	60.05 ± 0.88
Aetiology	
ArLD	130 (62.8%)

MASLD	33 (15.9%)
MetALD	10 (4.8%)
Viral hepatitis	11 (5.3%)
Autoimmune/PBC/PSC	13 (6.3%)
Unknown/other	10 (4.8%)
Index Presentation	43 (20.8%)
Anticoagulated	12 (5.8%)
Previous SBP	15 (7.3%)
SBP Prophylaxis	10 (13.5%)
MELD Score median (IQR)	16.30 (9.07)
INR median (IQR)	1.40 (0.50)
Platelets (×10⁹/L) median (IQR)	143.00 (106.50)
Creatinine (µmol/L) median (IQR)	77.50 (63.75)
Sodium (mmol/L) median (IQR)	133.00 (10.00)
Bilirubin (µmol/L) median (IQR)	47.00 (85.50)
Admission information (n (%) unless otherwise specified)	
Ascitic Tap Performed	190 (91.8%)
SBP Diagnosed	16 (8.0%)
Seen by Gastroenterology	200 (96.6%)
Primary Team	
ICU	9 (4.4%)
Acute medicine	32 (15.5%)
Gastroenterology/Hepatology	154 (74.8%
Other	11 (5.3%)
ICU Admission	32 (15.5%)
Death (inpatient)	37 (18.0%)
Time of key clinical interventions (n (%) unless otherwise specified)	
Ascitic Tap Timing n (%)	
< 6 hours	52 (27.4%)
6–12 hours	51 (26.8%)
12–24 hours	31 (16.3%)
> 24 hours	56 (29.5%)

Time to clerking (h) median (IQR)	3.68 (4.41)
Time to Tap (h) median (IQR)	10.85 (22.45)
Time to Antibiotics (h) median (IQR)	9.80 (17.79)
Gastro Review Time (h) median (IQR)	12.00 (19.00)
ICU Length of Stay (d) median (IQR)	2.50 (10.00)

Table 3

Timings of key clinical interventions grouped by time from admission to ascitic tap (Group 1: <6 hours, Group 2: 6-12 hours, Group 3: 12-24 hours, Group 4: >24 hours)

Time in hours from triage to event (Median (IQR))					
	<6h	6-12h	12-24h	>24h	P value
Time to tap	3.09 (2.87)	7.72 (2.36)	19.53 (7.75)	49.68 (81.70)	0.0000
Time to antibiotics	6.22 (9.72)	12.37 (18.51)	14.84 (8.73)	15.48 (49.11)	0.0146
Time to clerking	2.65 (2.62)	4.20 (3.93)	4.90 (6.36)	4.10 (5.16)	0.0003
Time to specialist review	4.00 (8.00)	10.00 (18.50)	15.50 (16.75)	20.25 (18.25)	0.0000