RESEARCH

Do critically ill liver patients experience negative bias? A web-based survey examining doctors' opinions to critical care escalation

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ABSTRACT

Objective To test the hypothesis that there is negative bias towards escalating levels of care in decompensated cirrhosis, compared with other patient groups.

Design An electronic survey containing eight acute clinical scenarios with equivalent physiological derangement, in which respondents were asked to score the degree to which they would advocate for intensive care unit admission on a scale of 1–10. Scenarios included respiratory, haematology, vascular, renal, gastrointestinal, postoperative and hepatological conditions. Follow-up questions examined the reasons why the patient should or should not be transferred, and enquired about ceilings of care, end-of-life decisions, degree of organ support and healthcare financial rationing. 273 doctors responded.

Setting Secondary care hospitals in south of England.

Patients None involved.

Interventions None.

Main outcome measures Advocacy score (1–10) and subsidiary responses.

Results The hepatology patient ranked 4th of 8 with a mean advocacy score of 7.2. There were no significant differences between intensivists and physicians or between grades of seniority. Of those less likely to escalate (score 1–5, n=42), the reasons given were based on unsurvivability or excessive burden of treatment rather than aetiology. One-fifth cited 'lifestyle decision'. 25 (62.5%) respondents not favouring escalation would make the patient DNACPR, 17 (42.5%) would stipulate ward-based care only and a small minority would instigate active palliation. Of those favouring escalation (advocacy score 6–10), 70% (n=122) would consider unlimited organ support. Fifty-four (29.5% of those who answered) said they 'sometimes' or 'frequently'

consider resource allocation when making decisions about escalation of care.

Conclusions When compared with a variety of acute medical scenarios, doctors did not overly appear to exhibit therapeutic nihilism for patients with decompensated liver disease; however, significant variation in interpretation of the data and management approaches was identified.

INTRODUCTION

Patients with decompensated alcohol-related liver disease (ARLD) frequently present a challenging physiological profile in the acute hospital setting with episodes of severe organ dysfunction.¹ The common perception that this group have high mortality² despite aggressive treatment is cited as a reason to withhold organ support measures or escalation of care. Traditional markers of disease stage, such as Child–Pugh score, may be misleading in the acute setting,³ and studies continue to seek accurate ways of estimating prognosis at the time of admission, with Sequential Organ Failure Assessment (SOFA) score appearing to perform well.^{4–6} Recently, a study into the distinct syndrome of acute-on-chronic liver failure involving over 1300 patients has highlighted the importance of the number of organ failures, admission white cell count and the nature of the precipitant in determining outcome.⁷ The authors' anecdotal experience suggests that potential therapeutic opportunities may be missed for patients due to a degree of 'medically inherited' nihilism on the part of general and intensive care physicians of all grades. This problem may be compounded further due to a failure to differentiate end stage disease from acute-on-chronic

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liver dysfunction due to potentially reversible causes. There is growing opinion that early and aggressive management of identifiable acute precipitants (eg, sepsis, renal injury, gastrointestinal (GI) bleeding) confers improved prognosis, and indeed that the resource implication—another albeit rarely cited reason not to escalate—is acceptable.⁸

Alongside the perception of physiological futility, opinions differ regarding the deservings and appropriateness of expending healthcare resource on a group of patients with ‘lifestyle’-related or ‘self-inflicted’ disease. This debate has crystallised most clearly around the question of transplantation, but the role that such considerations play in the decision to escalate is hard to elucidate.^{9 10}

In an effort to provide a true snapshot of the prevailing attitude of physicians and intensivists working at the front line of general medicine, we designed a web-based survey to explore hospital doctors’ thresholds for advocacy in a number of clinical scenarios, including a case of ARLD. Depending on the initial response, further questions were designed to explore attitudes to ceilings of care and degree of organ support. Separate to the clinical assessment, respondents were also asked to pass comment on the influence financial rationing may have on their clinical decision making.

METHOD

The survey was introduced to medical staff in hospital trusts based in the south of England, via a web link advertised in an invitation email. The survey was presented as a general investigation into attitudes on the escalation of care for critically ill hospital inpatients.

Eight case scenarios were devised and presented in turn (box 1). Each focused on a different medical condition, including advanced chronic obstructive airways disease (COAD), haem-oncology, acute GI haemorrhage, pneumonia, postoperative collapse, ruptured abdominal aortic aneurysm (AAA) and chronic kidney disease (CKD).

Full details of each case are presented in box 1. The chronic liver disease case read as such:

A 45 year old man with alcoholic liver disease, who regularly attends the liver clinic, presents to the emergency department. The last letter reports that his health is much improved after 1-year abstinence, the patient having initially presented with jaundice and large ascites. Following the death of his mother 6 weeks ago, he has taken to drinking a bottle of vodka per day, and has now been admitted to hospital with tense ascites, episodic melaena and severe jaundice (bilirubin 410 µmol/L). White cell count is $21 \times 10^9/L$, haemoglobin (Hb) 10 g/dL, platelets $85 \times 10^9/L$ and international normalised ration (INR) 2.4. He has significant renal impairment (creatinine 260 µmol/L, urine output 10 mL/h). He is confused with grade II–III encephalopathy and Glasgow Coma Scale (GCS) is 11. An ascitic tap reveals a white cell count of 4580, which is consistent with spontaneous bacterial

peritonitis. An arterial blood gas demonstrates significant acidosis (pH 7.25, base excess (BE) –10, Lactate 5.2). BP is 80/45. Gas exchange is normal.

The physiological parameters were designed so that SOFA scores were equivalent (10–11). SOFA scores were not given to respondents.

For each scenario, respondents indicated their willingness to refer to the intensive care unit (ICU) on a scale of 1–10. A score of ‘1’ meant that they would *definitely not* refer, and ‘10’ meant that they would *insist*.

Those who chose a score within the range 1–5 were then directed to the question: ‘*Why you are less likely to advocate for ICU admission in this case?*’ and presented with options:

- ▶ Age
- ▶ Anticipated poor quality of life even if patient survives ICU
- ▶ Unfavourable burden of treatment relative to potential benefits
- ▶ Unlikely to survive ICU admission
- ▶ End stage organ disease
- ▶ Lifestyle decision contributing to clinical condition
- ▶ Evidence-based decision

These were followed by ‘*Which of the following decisions would you now make?*’ with options relating to ceilings of care and end-of-life management.

- ▶ Make patient not for NEWS/MEWS/MET/Track and Trigger score
- ▶ Stipulate that patient is for ward-based care only
- ▶ Stipulate that patient is for monitored environment (level 1) only
- ▶ Institute palliative care measures (eg. care of the dying pathway, parenteral analgesics and sedation as required)
- ▶ or None of the above

Those who scored within the range 6–10 were asked: ‘*Having referred this patient to ICU which organ support modalities would you regard as appropriate in this case?*’ and were presented with a series of options related to various organ support modalities or an option for ‘no limits’.

- ▶ No limits on care—for full escalation (no need to tick options below)
- ▶ Non-invasive ventilation
- ▶ Intubation and mechanical ventilation
- ▶ Low-dose vasopressors
- ▶ High-dose/multiple vasopressors and inotropes
- ▶ Renal replacement therapy

Finally, all respondents were asked, ‘*Overall, when you are considering patients for escalation in care does resource utilisation or cost play a part in your decision making?*’ Respondents were asked to choose from: ‘Frequently’, ‘Sometimes’, ‘Rarely’ or ‘Never’.

Statistical analysis

Advocacy scores between cases were compared with the Friedman test. Differences in response

Box 1 Eight clinical scenarios (scenario 4, the liver case, is in main article)

1. A 78-year-old man with a background of ischaemic heart disease (myocardial infarct (MI) and primary percutaneous coronary intervention (PCI) 3 years ago) and early Parkinson's disease presents with confusion. There are clinical and radiological features of right lower lobe pneumonia. On review, he appears to be tiring, RR=38 rpm, sats 90% ($pO_2=8.0$ kPa) on 60% oxygen and BP 105/65 mmHg. Glasgow Coma Scale (GCS) is 12. Creatinine is 128 μ mol/L and urine output is normal. Liver function is normal but platelets are reduced at $89\times 10^9/L$. C-reactive protein (CRP) is 385. Lactate is 2.6. Enquiry into home circumstances reveals that he lives with his wife, uses a motorised scooter for mobility outside the house and requires personal assistance from a professional carer once per day.
2. A 64-year-old woman with multiple myeloma presents with neutropenic sepsis 10 days after her third course of chemotherapy. She underwent a bone marrow transplant 2 years previously but suffered a relapse. She has never been referred to palliative care services. She undergoes fluid resuscitation (3 L Crystalloid), central venous catheter (CVC) insertion (central venous pressure (CVP) 8, no increment after fluid) and is commenced on broad spectrum antibiotics according to the hospital neutropenic sepsis protocol. On review, she is alert and seemingly well perfused, but urine output has tailed off to 10 mL/h. Sats are 93% on 3 L O_2/m (pO_2 9.1 kPa), RR 24 rpm, BP 108/45 mmHg, PR 115 bpm. Admission blood results reveal acute kidney injury: urea 26 mmol/L, creatinine 380 μ mol/L. Lactate is 3.8, platelets $85\times 10^9/L$, bilirubin elevated at 54 μ mol/L. She remains optimistic that a second marrow transplant will be offered, but there is no documentation regarding this in the notes.
3. A 62-year-old lifelong smoker with known COAD and home oxygen therapy is admitted with worsening breathlessness and cough productive of brown sputum. She is able to get to the shops in her motorised scooter and with portable oxygen, but cannot mobilise further than 30 m on the flat. She is disorientated, confused and drowsy (GCS 12). She also feels feverish and clinically dehydrated. She has a neutrophilia (18) and CRP is 160. Platelet count is $140\times 10^9/L$ and bilirubin 24 μ mol/L. Her arterial blood gas on 28% oxygen reveals pO_2 6.9, pCO_2 9.5, pH 7.29, bicarbonate (Bic) 38 and BE +6. She has an acute kidney injury with creatinine 190 μ mol/L (baseline 95). BP is 105/50. Chest x-ray (CXR) reveals hyperinflation and flattened hemidiaphragms.
4. See main article.
5. An 80-year-old woman deteriorates 48 h after emergency surgery for small bowel obstruction. A caecal cancer was found and removed, and a primary anastomosis was fashioned. She spent 24 h in intensive care unit and was then discharged to the ward; however, an emergency call is put out by a nurse after the patient was seen to vomit, aspirate and collapse. On arrival, she is unresponsive and cyanotic with poor respiratory effort. Her pupils are pinpoint, and it is noted that she received morphine subcutaneously during the day. With an airway adjunct and assisted ventilation through a bag and mask, her saturations improve from 65% to 85%, and Naloxone is given. On auscultation, there are widespread crackles bilaterally. Blood pressure is 135/80 mmHg. There were no concerns prior to the incident about her renal or liver function. There is mild coagulopathy on the last set of bloods (INR 1.5, platelets $95\times 10^9/L$). Current GCS is 5. Little is known about her background at this stage. Her notes contain no information about proposed ceilings of care or resuscitation.
6. A 73-year-old with severe osteoarthritis is admitted with large volume melaena and fresh haematemesis. She has been taking increasing doses of diclofenac and ibuprofen for joint pains in the preceding 3 weeks. She also has a history of pulmonary fibrosis with bilateral chronic changes seen on a chest CT 6 months previously. She is limited by exertional dyspnoea and requires a mobility scooter to leave the house. She has twice daily carers at home to help with activities of daily living. During assessment in the resus room, she becomes unresponsive and loses her cardiac output. She receives two cycles of CPR and achieves a return of circulation. She is hypotensive (BP 70/30 mmHg), tachycardic (HR 140), oliguric and has an acute kidney injury (Creat. 240 μ mol/L). She remains unconscious (GCS 6). Platelet count is normal ($170\times 10^9/L$) as is her liver function (Bili. 15 μ mol/L). pO_2 on 100% FiO_2 is 15 kPa. Lactate is 9.6.
7. An 81-year-old man with a past history of hypertension, hyperlipidaemia, transient ischaemic attacks (TIAs) and angina is admitted to the emergency department having been found collapsed at home by his daughter. He is drowsy, mumbling and confused. He is pale, has abdominal tenderness with a pulsatile mass on examination and cold peripheries. BP is 90/40 mmHg, GCS 12, creatinine 260 μ mol/L and he is oliguric. He is anaemic with haemoglobin 8.2 g/dL and platelets $148\times 10^9/L$. Bilirubin is 21 μ mol/L. He is on high-flow oxygen therapy (FiO_2 0.6) with a pO_2 15 kPa. Lactate is 5.3. CT scan reveals a large abdominal aortic aneurysm with an acute rupture. The vascular team and interventional radiologist will attempt endovascular aneurysm repair if the patient can be stabilised.
8. A 65-year-old man with known stage 3 (out of 4) chronic kidney disease secondary to hypertension is admitted feeling unwell. He reports having had diarrhoea and vomiting over the last 4 days. On assessment, he is visibly unwell, dehydrated and slightly drowsy. After resuscitation, a urinary catheter is inserted but there is minimal residual urine. Blood pressure after 2 L crystalloid is 75/40 mmHg, and an emergency department registrar commences the patient on a nor-epinephrine infusion in the department (0.08 μ g/kg/min, a low dose). Pulse is 78 bpm. He is slightly breathless on oxygen (pO_2 11 kPa on FiO_2 0.35). Blood results include creatinine 760 μ mol/L, urea 64 mmol/L and K^+ 7.8 mmol/L. Platelets are in the normal range and liver function is also normal.

between doctor types were analysed by Mann–Whitney U test. Statistical analysis was performed on IBM SPSS V.21.

RESULTS

Respondents

Two hundred and seventy-three physicians responded, of which (where given) 82 (30%) were specialty trainees, 51 (19%) consultant physicians, 48 (18%) consultant anaesthetists or intensivists and 41 (15%) Foundation Year (FY)1/2. Consultant and trainee specialties were poorly reported, but where stated included acute medicine (12, 15%), elderly care (15, 19%), endocrinology (8, 10%), respiratory (10, 13%), gastroenterology (7, 9%), anaesthetics/critical care (8, 10%) and emergency medicine (4, 5%). Some respondents did not answer all the questions, and there was a fall off from case 1 to case 8 (249, 233, 224, 217, 211, 207, 203, 201).

Advocacy scores

Table 1 shows the ‘league table’ of mean advocacy scores. The ARLD case ranked 4th. The patient least likely to be referred was the 62-year-old man with advanced COAD, and the most likely to be referred was a 65-year old man with CKD requiring vasopressors and haemofiltration. The overall difference in mean and median between cases was significant ($p < 0.005$).

Ceilings of care

With regard to the ARLD case, the overwhelming rationale for scoring in the 1–5 bracket was ‘unsurvivability’ (80%) and ‘end stage’ nature of the disease (82.5%). Poor quality of life (35%), ‘burden of treatment’ (30%), ‘lifestyle decision’ (22.5%) and ‘evidence-based decision’ (17.5%) were less commonly given reasons. Table 2 summarises these findings.

End-of-life decisions

Most (25, 62.5%) of those less likely to advocate for ICU recommended that the patient be made ‘not for

resuscitation’, while 17, (42.5%) suggested ‘ward-based care’ only. 4, (10%) would advocate institute palliative care measures.

Organ support

The proportion advocating for ICU admission who proposed ‘no limits’ on care in ARLD was 112 (69.7%), which was second only after the patient with a ruptured AAA.

Subgroups by specialty and seniority

The median advocacy score from anaesthetists and intensivists for the liver case appeared lower 7 (IQR 6–9) compared with consultant physicians 8(6–9), specialist trainees 8(7–9) and core trainee/FY doctors 8(6–9); however, the differences did not reach statistical significance. The spread of responses was larger in the more senior groups, as reflected by IQR. Qualitative analysis of individual advocacy score frequencies shows what might be interpreted as an ‘emphatic tail’, that is, a group of doctors with strong feeling that organ support should not be offered. This is illustrated by the fact that five intensivists/anaesthetists gave an advocacy score of 1, 2 or 3, compared with two consultant physicians and zero trainees.

When the responses of all consultants versus non-consultants were analysed, significant differences were seen in the advocacy scores for the patient with Parkinson’s and pneumonia ($p = 0.005$) and severe COAD ($p = 0.017$) only.

Other observations

We were surprised by the low ranking given to the COAD and post-cardiac arrest upper GI bleeding cases. Twenty-nine (13%) and 24 (11.6%) respondents gave these cases an advocacy score of 1, respectively, whereas no other case attracted more than 4% of the lowest possible score. The two authors who are gastroenterologists (PAB and SJT) felt strongly that the patient with GI bleeding should have been stabilised after return of spontaneous circulation, with a view to undergoing endoscopy.

Table 1 League table of advocacy scores

Scenario	Mean advocacy score (SD)	Median advocacy score (IQR)	Ranking	Respondents
Chronic kidney disease	8.58 (1.7)	9 (8–10)	1st	201
Post-op arrest	8.02 (1.9)	8 (7–10)	2nd	211
Abdominal aortic aneurysm	7.54 (2.4)	8 (6–10)	3rd	203
ARLD	7.21 (2.2)	8 (6–9)	4th	217
Parkinson’s and LRTI	7.08 (1.8)	7 (6–8)	5th	249
Relapsed myeloma	7.07 (2.1)	7 (6–8)	6th	233
GI bleed and cardiac arrest	5.58 (2.8)	6 (3–8)	7th	207
Advanced COAD	4.63 (2.5)	5 (2–6)	8th	224

ARLD, alcohol-related liver disease; GI, gastrointestinal; LRTI, lower respiratory tract infection.

Table 2 Reasons given for not escalating care

Case	Age	Anticipated poor quality of life	Burden of treatment	Unlikely to survive	End stage disease	Lifestyle decision	Evidence based	Total
Number of respondents (%) (more than one could be checked)								
1—pneumonia	3 (7)	33 (73)	16 (36)	20 (44)	6 (13)	1 (2.2)	2 (4.4)	45
2—myeloma	0 (0)	21 (50)	26 (62)	18 (43)	16 (38)	2 (4.8)	3 (7.1)	42
3—advanced COPD	2 (2)	84 (65)	53 (41)	98 (76)	100 (78)	7 (5)	18 (14)	129
4—liver disease	1 (3)	14 (35)	12 (30)	32 (80)	33 (83)	9 (23)	7 (18)	40
5—bowel obstruction and post-op arrest	7 (35)	14 (70)	7 (35)	15 (75)	1 (5)	0 (0)	0 (0)	20
6—upper GI bleed and arrest	5 (6)	63 (73)	49 (57)	75 (87)	35 (41)	5 (6)	6 (7)	86
7—abdominal aortic aneurysm	12 (35)	11 (32)	14 (41)	28 (82)	4 (12)	0 (0)	6 (18)	32
8—chronic kidney disease	0 (0)	3 (30)	4 (40)	5 (50)	7 (70)	0 (0)	1(10)	10

Rationing and resource allocation

One hundred eight-four (67.4%) answered the question about resource allocation. Twenty (11%) said they considered this *frequently*, 34 (18.5%) *sometimes*, 71 (38.6%) *rarely* and 59 (32%) *never*.

DISCUSSION

Although the ARLD case generated a spectrum of responses, the overall willingness to advocate for transfer to critical care was in the middle ground and largely favoured advocacy for an escalation in care. This would seem to contradict the authors' hypothesis that historical attitudes still prevail and offer encouragement for the future approach to this patient cohort.

However, it is notable and concerning that there remains a significant heterogeneity of opinion. A minority of respondents interpreted the scenario as an end-of-life situation, and stated that they would institute palliative care on the ward. A larger proportion (40% of those less likely to refer to ICU) stipulated that ongoing care be restricted to the ward, which for patients with significant organ dysfunction is potentially equivalent to end-of-life care. It is notable too that one-fifth (22%) of those less likely to advocate indicated that 'lifestyle decision' played a part in their thought processes. This, when allied to the fact that 54 (29.5%) of all respondents reported that they 'sometimes' or 'frequently' consider the impact of resources when deciding who to escalate, suggests that case-by-case rationing may be occurring, and may be based on value judgements.

The patient with liver disease as described had severe alcoholic hepatitis (AH), a potentially reversible cause of decompensated disease. This condition is incompletely understood and in general is diagnosed confidently by senior gastroenterology/hepatology trainees or consultants rather than general physicians, intensivists or foundation/core trainees. The patient with severe AH may respond to supportive care,

nutrition and steroids, and regarding such patients under a broad diagnostic umbrella that includes end stage cirrhosis may result in salvageable patients being deprived of the care required to see them through the initial phase of treatment. This is an example of how important it is for specialists to review patients early and for the 'benefit of the doubt' to be given with respect to escalation in care until that review has been provided.

The low ranking of COAD in the overall league table is deserving of comment. Ventilatory failure in the context of COAD has itself gone through a period of therapeutic nihilism, although recent evidence shows that intubation is not necessarily associated with a poor outcome. From a gastroenterological perspective, we were also intrigued that the patient who had a return of circulation from cardiac arrest due to haemorrhagic shock from active upper GI bleeding was also less favoured.

One potential weakness of this exercise includes the heterogeneity of the respondents in terms of experience and specialty; however, the authors were keen to obtain as broad a view as possible of those currently working in acute trusts. Another possible criticism is that the premise of equalising SOFA scores is flawed, and that equivalent survivability between cases cannot be inferred. We received critique during the design of the study that intensive care doctors would need more information on baseline functional and 'performance' status in the lead up to the acute event and on the collateral views of close family members. On the whole, we acknowledge this issue and would agree with the value of such information when making judgements on survivability, but it was not possible to fully complement this approach within the confines of an electronic survey. We did attempt to account for this in the survey's introduction by asking respondents to assume that the patient and family were 'open to advice' from the assessing clinician and encouraged respondents to make a judgement based on the physiological and

narrative data alone. We would also suggest that the intention was to present eight broadly equivalent cases in terms of acuity and background illness and that close attention was applied to achieving physiological equivalence with regard to the critical illness SOFA score during the design of each case scenario.

A third criticism is that of selection bias, whereby those doctors particularly interested in liver disease were more likely to respond. We would emphasise that the survey was distributed to a broad range of physicians who would ordinarily work on the acute medical take or provide ITU-based opinions. It was not presented as a study into attitudes regarding liver disease specifically. It is possible, though hard to prove, that such a selection bias would result in an overestimate of the general tendency to advocate for escalation in cases of severe liver disease.

Correction notice This article has been corrected since it published Online First. The ranges in the 'Subgroups by specialty and seniority' section have been corrected.

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Contributors PAB and SJT devised the study. TS and MP provided expert critical care advice. TS and PAB performed statistical analysis.

Competing interests None declared.

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Data sharing statement Data relating to the non-hepatological cases may be used in future publications.

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