



OPEN ACCESS

Refreshing the emergency medicine research priorities

Laura Cottey ¹, Thomas Alexander Gerrard Shanahan ², Toto Gronlund,³ Caroline Whiting,³ Moses Sokunbi,⁴ Simon David Carley,^{5,6} Jason E Smith ^{1,7} On behalf of the James Lind Alliance (JLA) Emergency Medicine (EM) Priority Setting Partnership (PSP) Refresh Steering Group

Handling editor Richard Body

► Additional supplemental material is published online only. To view, please visit the journal online (<http://dx.doi.org/10.1136/emermed-2022-213019>).

For numbered affiliations see end of article.

Correspondence to

Dr Laura Cottey, Academic Department of Military Emergency Medicine, Royal Centre for Defence Medicine, Birmingham B15 2SQ, UK; laurajcottey@gmail.com

Received 5 December 2022

Accepted 3 July 2023

Published Online First

25 July 2023

ABSTRACT

Background The priorities for UK emergency medicine research were defined in 2017 by a priority setting partnership coordinated by the Royal College of Emergency Medicine in collaboration with the James Lind Alliance (JLA). Much has changed in the last 5 years, not least a global infectious disease pandemic and a significant worsening of the crisis in the urgent and emergency care system. Our aim was to review and refresh the emergency medicine research priorities.

Methods A steering group including patients, carers and healthcare professionals was established to agree to the methodology of the refresh. An independent adviser from the JLA chaired the steering group. The scope was adult patients in the ED. New questions were invited via an open call using multiple communications methods ensuring that patients, carers and healthcare professionals had the opportunity to contribute. Questions underwent minisystematic (BestBETs) review to determine if the question had been answered, and the original 2017 priorities were reviewed. Any questions that remained unanswered were included in an interim prioritisation survey, which was distributed to patients, carers and healthcare professionals. Rankings from this survey were reviewed by the steering group and a shortlist of questions put forward to the final workshop, which was held to discuss and rank the research questions in order of priority.

Results 77 new questions were submitted, of which 58 underwent mini-systematic review. After this process, 49 questions (of which 32 were new, 11 were related to original priorities and 6 unanswered original priorities were carried forward) were reviewed by the steering group and included in an interim prioritisation survey. The interim prioritisation survey attracted 276 individual responses. 26 questions were shortlisted for discussion at the final prioritisation workshop, where the top 10 research priorities were agreed.

Conclusion We have redefined the priorities for emergency medicine research in the UK using robust and established methodology, which will inform the agenda for the coming years.

INTRODUCTION

The priorities for emergency medicine research were established in 2017 by a priority setting partnership (PSP) including patients, members of the public and clinicians, coordinated by the Royal College of Emergency Medicine (RCEM) in collaboration

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ The top 10 research priorities for emergency medicine were published in 2017 following a James Lind Alliance Priority Setting Partnership. Significant change has taken place in emergency medicine over this time, and research is underway (or in some cases complete) to address six of the top 10 priorities.

WHAT THIS STUDY ADDS

⇒ This is the first research priority refresh which has taken place in the UK. The refreshed top 10 research priorities for emergency medicine are described, and include the management of frail elderly trauma patients, head injuries, acute low back pain and the use of biomarkers in sepsis. Four of the original top 10 priorities remain, relating to mental health, end-of-life care, crowding and staff retention.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ Research prioritisation is an important collaboration between patients, healthcare professionals and researchers. The research priorities play an important role in developing emergency medicine research capacity and attracting funding.

with the James Lind Alliance (JLA).¹ From over 200 initial questions submitted, a longlist of 72 unanswered research priorities was then refined (by online ranking survey) to 30 questions that were taken to a final workshop, where the top 10 priorities were agreed.

The JLA works closely with health research funders to make them aware of the issues that matter most to patients and clinicians in areas where funding might be allocated. Indeed, the National Institute for Health and Care Research (NIHR) has a specific rolling funding call inviting grant applications that directly address research questions that have been prioritised during a JLA PSP.² While it would be difficult to prove a direct causal link to securing research grants, one of the outputs of a PSP is to report to funding and research agenda setting organisations such as the NIHR Evaluation, Trials and Studies Coordinating Centre (NETSCC). In addition, observers from NETSCC and other



© Author(s) (or their employer(s)) 2023. Re-use permitted under CC BY-NC. No commercial re-use. See rights and permissions. Published by BMJ.

To cite: Cottey L, Shanahan TAG, Gronlund T, et al. *Emerg Med J* 2023;**40**:666–670.



Table 1 Examples of studies funded and undertaken to address the 2017 top 10 emergency medicine research priorities¹

Research priority	Study title	Funding body and award	Status of research project
Priority 1 What is the best way to reduce the harms of ED crowding and exit block?	Refining the National Emergency Department Overcrowding Scale (NEDOCS) as an automated real-time ED crowding tool ⁶	RCEM research grant £8568	Project complete
Priority 4 With regard to how ED staff development is managed, what initiatives can improve staff engagement, resilience, retention, satisfaction, individuality and responsibility?	Trainee-led evaluation of the need for Inter-Shift Recovery among Emergency Department doctors in the United Kingdom (TIRED) study ⁷⁻⁹	RCEM via Trainee Emergency Research Network funding	Project complete
Priority 6 The effects of implementing new techniques in assessing patients with chest pain in practice. Would patients like a say in what is an acceptable risk, and should these tools be used alongside shared decision-making to provide safe and appropriate care, minimise unnecessary risk and inconvenience for patients?	Manchester Acute Coronary Syndromes (T-MACS) Choice Pilot Feasibility Trial ¹⁰	RCEM research grant £9369	In progress, April 2020 to present
Priority 8 Do early undifferentiated (broad spectrum) antibiotics in suspected severe sepsis have a greater benefit and cause less harm to patients than delayed focused antibiotics in the ED?	PROcalcitonin and NEWS evaluation for Timely identification of sepsis and Optimal use of antibiotics in the Emergency Department (PRONTO) ¹¹	NIHR HTA programme £2 360 235	In progress, December 2019 to June 2024
Priority 9 In adults who are fully alert (GCS 15) following trauma, does cervical spine immobilisation (when compared with no cervical spine immobilisation) reduce the incidence of neurological deficit, and what is the incidence of complications?	Spinal Immobilisation Study (SIS) ¹²	NIHR HTA programme £3 497 768	In progress, May 2022 to October 2025
Priority 10 Which trauma patients should be transferred to a major trauma centre rather than going to another hospital first?	A national prehospital major trauma tool/process—the Major Trauma Triage Tool Study (MATTS) ¹³⁻¹⁵	NIHR HTA programme £1 211 034	In progress, October 2018 to June 2023

HTA, Health Technology Assessment; NIHR, National Institute for Health and Care Research; RCEM, Royal College of Emergency Medicine.

research funding bodies were present at the final workshop in 2017. Furthermore, the NIHR launched a themed call across all of their funding streams addressing ‘injuries, accidents and urgent and emergency care’ in December 2019.

Since the original emergency medicine PSP was conducted, the NIHR and other research funders have awarded over £8 million to projects directly addressing some of these research priorities.³⁻⁵ **Table 1** highlights some of these projects and the original research addressing the top 10 questions.⁶⁻¹⁵

Much has changed in the last 5 years, not least a global infectious disease pandemic and a significant worsening of the crisis in the urgent and emergency care system in the UK. Despite these challenging circumstances, academic emergency medicine has gained momentum, performing large prospective randomised controlled trials alongside initiatives to support and engage developing researchers, such as the launch of the UK Trainee Emergency Research Network and NIHR Emergency Care Incubator.

As demonstrated, some of the research questions in the original list have been or are being addressed. The aim of this project was to review and refresh the research priorities after a 5-year period.

METHODS

Protocol development

In collaboration with the JLA, a steering group including patients, carers and healthcare professionals was established to agree to the methodology of the refresh (the first refresh of its kind among PSPs).^{16 17} An independent adviser from the JLA chaired the steering group. The scope was defined as relating to adult patients in the ED. Separate research prioritisation has been completed for prehospital emergency care,¹⁸ one is in progress for major trauma and another is planned specifically covering paediatric emergency medicine.

Measures were taken to minimise bias and conflicts of interest throughout the process and this was monitored by the independent JLA chair. The steering group included representatives

from diverse backgrounds and with a range of experiences of emergency medicine. The stepwise and sequential process of the prioritisation, together with the independent JLA facilitators, ensured that no one question had an advantage over another.

Survey participation and distribution

A broad approach was taken to contacting stakeholders (clinicians and patients or members of the public) to submit clinical uncertainties and unanswered questions via an online survey. An open invitation to participate was widely publicised on the RCEM and JLA website and through social media, direct email requests and promotional material, which was sent to steering group members to be displayed in EDs. Members of the steering group, JLA and RCEM staff, along with a partner organisation, the Faculty of Emergency Nursing, were additionally asked to identify any relevant patient groups or organisations they were aware of to assist in dissemination. We also approached the RCEM Lay Committee, the Equality, Diversity and Inclusion Committee and the Women in Emergency Medicine Special Interest Group. This process is summarised in **table 2**.

The online survey was open for 3 months from February to April 2022. Patients, carers and members of the public were invited to submit questions relating to their experience and

Table 2 Methods used for engagement and dissemination of the survey

Method 1	Use an online survey for submission of questions.
Method 2	Ensure diverse representation in the steering group for wider and inclusive dissemination of the survey.
Method 3	Develop a communications plan with RCEM including a communications pack to facilitate wider dissemination of the survey.
Method 4	Engage existing patient group networks.
Method 5	Reach out to partner organisations with a view to dissemination of the survey.

RCEM, Royal College of Emergency Medicine.

clinicians were asked to identify uncertainties immediately relevant to treating a patient in an ED. Survey respondents submitted a research question or topic in free text with the option to provide specific details in Population-Intervention-Comparator-Outcome format. Additional questions based on respondent role, region, age, ethnicity and gender identity were included in the survey. Submitted questions were tabulated, combined where applicable and categorised under themes by members of the steering group.

Data processing and refining the questions

Each question underwent a mini-systematic review using BestBETs methodology by two reviewers to establish whether evidence already existed.¹⁹ BestBETs methodology consists of a three-part question: (1) patient characteristic; (2) intervention(s) or defining question; and (3) relevant outcome(s), and a structured approach to finding and reviewing the literature. Volunteers from the emergency medicine community (including medical students and emergency medicine registrars) undertook the reviews. The outcomes of the minisystematic reviews were reviewed by members of the steering committee; if the research question was determined to be answered then the question was not included in the prioritisation survey. A review of the existing top 30 questions was also undertaken by the steering group and the team at the JLA to establish research completed (or underway) that answered the question.²⁰

On confirmation that submitted questions remained unanswered, and removal of duplicates, all unanswered questions, including those from the 2017 JLA PSP, were included in an interim list of questions. The steering group produced lay summaries of each along with a glossary of terms. Any questions identified by committee members as being out of scope were removed.

Prioritisation: interim and final

The questions then underwent interim prioritisation via an online survey, which was distributed to stakeholders including patients, carers and healthcare professionals, in a similar open call to the initial invitation to participate (online supplemental material 1). Participants were provided with the full list of research questions and asked to rank them based on their own perspective. Subsequently, two ranked lists of questions, one for each participant group, were produced based on the number of votes. The two lists ensured that equal weight could be given to participating groups (namely patients, caregivers/family, healthcare professionals), irrespective of the number of people participating in the prioritisation.

To generate a shortlist of 20–30 questions to take forward to the final prioritisation workshop, the steering group reviewed the top-ranking questions in each participating group. As several questions overlapped between participating groups, runner-up questions were then considered. Criteria for inclusion of other questions were those where the theme of the question was ranked highly but had not been covered in the existing list.

Independent JLA facilitators led the final prioritisation meeting in September 2022 in London, involving 16 participants who discussed and ranked the 26 questions on the shortlist to produce a top 10. Participants were a mix of patients, carers, lay members and clinicians. The workshop consisted of two rounds of small group discussions and a whole group session. Each group included representatives from all participant groups. Prior to attending, participants were provided with the 26 questions, in no particular order, to rank. Participants shared their

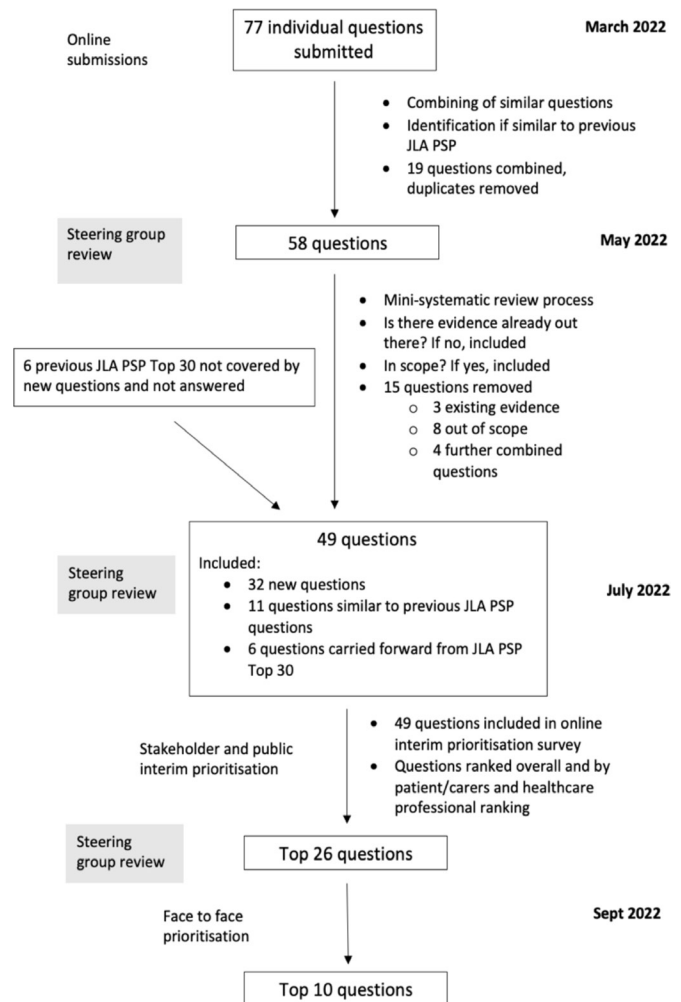


Figure 1 JLA PSP, James Lind Alliance Priority Setting Partnership.

ranking in the first small group round and through discussion, the small group agreed to rankings. After the first round, the small group rankings were aggregated using a simple arithmetic mean and checked using the geometric mean. The combined ranking formed the basis for the second round, in which newly formed groups provided the opportunity for participants to hear different voices and perspectives to reconsider their own and the group priorities. A final review of the combined ranking, led by a JLA facilitator, was undertaken with all participants present, providing opportunity for all to voice their views, and reach a consensus on the top 10. Any proposals for changing the top 10 at the final review were discussed, and if necessary, a vote was taken.

RESULTS

Seventy-seven questions were submitted and categorised into eight themes (eg, trauma, mental health) (figure 1). Once similar questions were combined, 58 questions underwent minisystematic review. After this process, 49 questions were reviewed by the steering group and included in the interim prioritisation survey.

The interim prioritisation survey attracted 276 individual responses, 227 from healthcare professionals, 39 from patients or carers with 10 not specified. Analysis produced overall question ranking with additional information on ranking by stakeholder demographics, for example, patients, the public and clinicians (available in online supplemental material 2). Following steering

Table 3 The refreshed top 10 emergency medicine research priorities

1*	How can care for mental health patients be optimised, whether presenting with either/both physical and mental health needs; including appropriate space to see patients, staff training, early recognition of symptoms, prioritisation and patient experience?
2	In older frail patients with injury, how can assessment (including specific trauma assessment/call activation), management, clinical outcomes and patient experience be optimised?
3	What is the optimal management strategy for patients taking antiplatelets and anticoagulants who sustain head injuries?
4	In patients with acute low back pain, are there signs and symptoms which should lead to emergency magnetic resonance imaging (MRI) being performed to rule out cauda equina syndrome, a condition which requires urgent management?
5*	How can excellence be achieved in delivering end-of-life care in the ED? How can patients, families and staff be best supported with handling bereavement issues?
6*	What measures and interventions can be used to reduce the harms of crowding in the ED and prioritise patient care most effectively?
7	How can patients who present to the ED with acute aortic syndrome be identified, and are there decision tools which can reduce overuse of CT scans to identify these patients?
8	In patients suffering traumatic injuries where bleeding is suspected, what are the most effective treatments in the ED setting to improve survival?
9	Can a blood test (biomarker) help identify those patients who present with sepsis to the ED that require early treatment and improve patient outcomes?
10*	How can work/life balance be improved among ED staff to better retain our staff, including rota design and other working conditions, and with regard to how ED staff development is managed, what initiatives can improve staff engagement, resilience, retention, satisfaction, individuality and responsibility?
*Denotes a question that was in the original top 10 emergency medicine (EM) research priorities.	

group review, 26 questions were shortlisted for discussion at the final prioritisation workshop, where a top 10 were agreed (table 3). The refreshed top 10 includes four questions that were in the original top 10 priorities.

DISCUSSION

This research priority refresh is the first of its kind to update the priorities from an earlier PSP. It is likely the methodology and lessons learnt from this refresh process, and a later Cystic Fibrosis PSP refresh in November 2022, will support other similar efforts in the future. We have defined the priorities for emergency medicine in the UK using robust and established methodology drawing on the existing protocols of the JLA, which will hopefully inform the research agenda for the coming years.

One of the key learning points from this process is how we might achieve meaningful and purposeful engagement with patients and carers to direct future research. Research prioritisation should be driven by all relevant stakeholders and ranking from our interim survey demonstrated a variation in prioritisation between patient/carers and healthcare professionals. In both the original PSP and its refresh, it was challenging to ensure appropriate patient engagement throughout the process, as it was not possible to target a specific patient advocacy group focused on a specific medical condition, unlike many other PSPs. Initiatives within specific EDs and regions to form emergency care patient groups have recently developed further patient and carer engagement opportunities.²¹ We were more successful in engaging patients, caregivers and the public in the ranking of research questions than submitting the questions themselves.

Within any research prioritisation process, there is a risk of bias from researchers or organisations with an interest in a particular topic. By adapting the rigorous JLA processes for this refresh, bias was minimised. Measures taken included reviewing any conflicts of interest for the steering group members, the use

of online open ranking during the interim survey and the input of independent JLA advisers throughout the process.

Several topics have remained in the top 10, including mental health, care of injured older frail patients, end-of-life care, crowding and staff well-being. These priorities reflect the current experiences and challenges within emergency medicine and signify concerns for clinicians and patients alike. They are challenging to research as they are complex and multifactorial, and often require a whole system healthcare approach. These questions may not be answerable with randomised controlled trials but may be more suited to observational or qualitative research methods. Often obtaining funding for this type of research is more challenging, but as a result of being highlighted by this prioritisation process, these topics may gain more prominence and funding to support research.

Mental health has now become the top research priority for emergency medicine, increasing from priority 3 in 2017, reflecting the rising number of mental health cases seen in EDs, on a background of increased population prevalence of alcohol and drug misuse, homelessness and acute mental health illness.²² Furthermore, patients with mental health problems are likely to experience delays to their care and are twice as likely to spend 12 hours or more in an ED compared with other patients.²² The academic community can play an important role in identifying evidence-based interventions and best practice for this group of patients.

Crowding and end-of-life care remain research priorities and continue to be key concerns for patients and clinicians alike. Both are complex challenges and are significantly impacted by external and internal factors. For end-of-life care, the impact of crowding and exit block leads to inability to care for patients in appropriate environments, exacerbating an already difficult situation to manage in an emergency setting. A recent RCEM report recommends that evidence-based interventions should be used to tackle overcrowding and research plays a central role in achieving this.²³

New questions highlight the management of older frail trauma patients and effective treatments for traumatic injury and bleeding. Reflecting the changing demographic and increased use of direct oral anticoagulation and antiplatelet therapy, a common clinical question pertaining to investigation following minor head injury in this patient group is also included.²⁴ Two new refresh priorities relate to low-frequency but high-impact presentations, where clinicians may be concerned about potential missed diagnosis. Acute aortic syndrome and cauda equina syndrome are rare but devastating diagnoses—indeed, aortic dissection and spinal cord compression were recently reported to be in the top five conditions accounting for 39% of serious misdiagnosis-related harms in the USA, and a key factor in high-value clinical negligence claims in EDs in England from 2014 to 2018.^{25 26} Alongside an increase in clinical negligence claims, rising public expectation and unprecedented demand, it is perhaps unsurprising that these priorities have reached the top 10 as clinicians look for answers to help them define risk in these presentations.

Following completion of the JLA PSP refresh, the next step is to review the priorities and define focused research questions from the broader topic areas, which might be developed as potentially fundable research studies in the future.

CONCLUSION

This research priority refresh has allowed us to determine which research priorities remain unaddressed as well as new ones that

have arisen due to changes and advances in healthcare. These priorities for emergency medicine in the UK, determined using robust and established methodology, will inform the research agenda for the coming years.

Author affiliations

- ¹Academic Department of Military Emergency Medicine, Royal Centre for Defence Medicine, Birmingham, UK
²School of Medical Sciences, Faculty of Biology, Medicine and Health, The University of Manchester, Manchester, UK
³James Lind Alliance, National Institute for Health and Care Research, School of Healthcare Enterprise and Innovation, University of Southampton, Southampton, UK
⁴Leicester School of Allied Health Sciences, Faculty of Health and Life Sciences, De Montfort University, Leicester, UK
⁵Emergency Department, Manchester University NHS Foundation Trust, Manchester, UK
⁶Postgraduate Medicine, Manchester Metropolitan University, Manchester, UK
⁷Emergency Department, University Hospitals Plymouth NHS Trust, Plymouth, UK

Twitter Laura Cottey @lauracottey and Thomas Alexander Gerrard Shanahan @clifford0584

Acknowledgements We thank all those individuals, including patients, carers, members of the public and clinicians, for submitting their research questions, responding to the survey requests and participating in the final prioritisation workshop.

Collaborators The JLA EM PSP Steering Group members include Simon Carley, Laura Cottey, Louise Dunford, Douglas Findlay, Melanie Gager, Toto Gronlund, Neil Henderson, Dan Horner, Liza Keating, Beccy Maeso, Ben McCullough, Hazel McCullough, Rachel O'Brien, Thomas Shanahan, Jason Smith, Moses Sokunbi and Caroline Whiting. The Royal College of Emergency Medicine staff members include Theo Chiles, Daisy Harmer, Nicole Kelly and Sam McIntyre.

Contributors JS was the clinical lead for the PSP. JS and LC drafted the initial version of the manuscript. TG chaired the steering group and edited the manuscript. All other authors were on the steering group and edited subsequent versions of the manuscript. LC is the guarantor for the manuscript.

Funding Funding was received from the Royal College of Emergency Medicine to support this PSP.

Competing interests TG was paid by the Royal College of Emergency Medicine for her role as chair of the steering group.

Patient and public involvement Patients and/or the public were involved in the design, or conduct, or reporting, or dissemination plans of this research. Refer to the Methods section for further details.

Patient consent for publication Not applicable.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement Data are available upon reasonable request. Full anonymised interim survey data are available from the corresponding author upon reasonable request.

Supplemental material This content has been supplied by the author(s). It has not been vetted by BMJ Publishing Group Limited (BMJ) and may not have been peer-reviewed. Any opinions or recommendations discussed are solely those of the author(s) and are not endorsed by BMJ. BMJ disclaims all liability and responsibility arising from any reliance placed on the content. Where the content includes any translated material, BMJ does not warrant the accuracy and reliability of the translations (including but not limited to local regulations, clinical guidelines, terminology, drug names and drug dosages), and is not responsible for any error and/or omissions arising from translation and adaptation or otherwise.

Open access This is an open access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited, appropriate credit is given, any changes made indicated, and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>.

ORCID iDs

Laura Cottey <http://orcid.org/0000-0002-4045-9444>
 Thomas Alexander Gerrard Shanahan <http://orcid.org/0000-0001-5613-2545>

Jason E Smith <http://orcid.org/0000-0002-6143-0421>

REFERENCES

- Smith J, Keating L, Flowerdew L, *et al*. An emergency medicine research priority setting partnership to establish the top 10 research priorities in emergency medicine. *Emerg Med J* 2017;34:454–6.
- NiHR. NiHR James Lind alliance priority setting partnerships rolling call. 2022. Available: <https://www.nihr.ac.uk/documents/nihr-james-lind-alliance-priority-setting-partnerships-rolling-call/28569>
- Corfield A. Early vasopressors in sepsis (EVIS). 2021. Available: <https://fundingawards.nihr.ac.uk/award/NiHR132594#summary-of-research>
- Lasserson D. Stopping anticoagulation for isolated or incidental sub-segmental pulmonary embolism (STOPAPE) Natl. Inst. Health Care Res. Funding awards. 2019. Available: <https://fundingawards.nihr.ac.uk/award/NiHR128073#/>
- Goodacre S. Accuracy, impact and cost-effectiveness of Prehospital clinical early warning scores for adults with suspected sepsis. Natl. Inst. Health Care Res. Funding awards. 2019. Available: <https://fundingawards.nihr.ac.uk/award/17/136/10#/>
- Hargreaves D, Snel S, Dewar C, *et al*. Validation of the national emergency department overcrowding score (NEDOCS) in a UK non-specialist emergency department. *Emerg Med J* 2020;37:801–6.
- Graham B, Cottey L, Smith JE, *et al*. Measuring 'need for recovery' as an indicator of staff well-being in the emergency department: a survey study. *Emerg Med J* 2020;37:555–61.
- Cottey L, Roberts T, Graham B, *et al*. Need for recovery amongst emergency physicians in the UK and Ireland: a cross-sectional survey. *BMJ Open* 2020;10:e041485.
- Cottey L, Roberts T, Graham B, *et al*. Need for recovery and physician well-being in emergency departments: national survey findings. *Eur J Emerg Med* 2021;28:386–93.
- Ward A, Berg P van den, Body R. 014 shared decision making: T-MACS choice for chest pain patients in the ED. *Emerg Med J* 2019;36:779–80.
- Euden J, Thomas-Jones E, Aston S, *et al*. Procalcitonin and NEWS2 evaluation for timely identification of sepsis and optimal use of antibiotics in the emergency department (PRONTO): protocol for a multicentre, open-label, randomised controlled trial. *BMJ Open* 2022;12:e063424.
- Natl. Inst. Health Care Res. Funding Awards. Spinal Immobilisation study (SIS). 2022. Available: <https://fundingawards.nihr.ac.uk/award/NiHR131430>
- Fuller G. Major trauma triage tool study. 2022. Available: <https://fundingawards.nihr.ac.uk/award/17/16/04#summary-of-research>
- Fuller G, Pandor A, Essat M, *et al*. Diagnostic accuracy of Prehospital triage tools for identifying major trauma in elderly injured patients: a systematic review. *J Trauma Acute Care Surg* 2021;90:403–12.
- Shanahan TAG, Fuller GW, Sheldon T, *et al*. External validation of the Dutch prediction model for prehospital triage of trauma patients in South West region of England, United Kingdom. *Injury* 2021;52:1108–16.
- Emergency Medicine Refresh PSP Steering Group. Emergency medicine research priorities refresh protocol. 2022. Available: <https://www.jla.nihr.ac.uk/documents/emergency-medicine-research-priorities-refresh-protocol/30582>
- James Lind Alliance. James Lind alliance guidebook. 2021. Available: <https://www.jla.nihr.ac.uk/jla-guidebook/downloads/JLA-Guidebook-Version-10-March-2021.pdf>
- Ramage L, McLachlan S, Williams K, *et al*. Determining the top research priorities in UK Prehospital critical care: a modified Delphi study. *Emerg Med J* 2023;40:271–6.
- Mackway-Jones K. Odds on favourite for evidence in emergency medicine reaches the world wide web. *Emerg Med J* 2000;17:235–a
- James Lind Alliance. Funded research: emergency medicine. Available: <https://www.jla.nihr.ac.uk/funded-research/emergency-medicine/24425> [Accessed 9 May 2023].
- Hirst E, Irving A, Goodacre S. Patient and public involvement in emergency care research. *Emerg Med J* 2016;33:665–70.
- RCEM acute insight series: mental health emergency care. 2022. Available: <https://rcem.ac.uk/wp-content/uploads/2022/09/RCEM-Acute-Insight-Series-Mental-Health-Emergency-Care.pdf>
- Royal College of Emergency Medicine. Resuscitating emergency care. 2023. Available: <https://rcem.ac.uk/resuscitating-emergency-care/>
- Fuller G, Sabir L, Evans R, *et al*. Risk of significant traumatic brain injury in adults with minor head injury taking direct oral anticoagulants: a cohort study and updated meta-analysis. *Emerg Med J* 2020;37:666–73.
- Newman-Toker DE, Peterson SM, Badhian S, *et al*. *Diagnostic errors in the emergency department: a systematic review*. Rockville, MD: Agency for Healthcare Research and Quality (AHRQ), 2022.
- NHS Resolution. Clinical negligence claims in emergency departments in England. Report 1 of 3: high value and fatality related claims. 2022. Available: <https://resolution.nhs.uk/wp-content/uploads/2022/03/1-NHS-Resolution-ED-report-High-value-and-fatalities.pdf>

Supplementary material 1: Interim survey questions

1. A pneumothorax is a collapsed lung and happens when air becomes trapped in the space between the lung and the chest wall. The air enters this space either from the lung or from outside the body. A haemothorax is when blood gets trapped in the same space. Both conditions can be treated with drainage. Are smaller, thinner drains as effective as large wider drains?
2. Following injury, which patients should undergo a whole-body CT scan for investigation and management, and what is the risk and predictors of significant injury?
3. After an injury some patients lose so much blood that their life is put at risk. We want to know whether replacing the lost blood with whole blood (red cells, plasma and platelets) can improve outcomes for patients and is cost effective compared to standard care (blood, plasma and platelets given individually)
4. Should adult trauma patients who are admitted to hospital with a sternal fracture be investigated and monitored for cardiac bruising?
5. After an injury to the leg, it may need to be fixed in place for a while to prevent using it. This can put a patient at risk of a blood clot in the leg or the lung. Which patients in this situation need blood thinning medications to prevent getting a blood clot? Is a blood thinning medication taken as a tablet more effective than an injection under the skin to reduce blood clots?
6. After an injury some patients lose so much blood that their life is put at risk. Current practice is to try and balance blood flow to the tissues with making sure any clots that have formed remain in place. This is called haemostatic resuscitation. We want to know if this approach is still applicable when patients receive a lot of blood transfusions and whether it improves outcomes for patients.
7. In patients suffering traumatic injuries where bleeding is suspected, what are the most effective treatments in the ED setting to improve survival?
8. What is the optimal care pathway for patients presenting with blunt chest wall trauma to the ED?
9. In older, frail patients with injury, how do we optimise assessment (including specific trauma assessment/call activation), management, clinical outcomes and patient experience?
10. In those patients who present over 24 hours after experiencing a mild head injury who should undergo a CT head scan?
11. What is the optimal management strategy for patients taking anti-platelets and anticoagulants who sustain head injuries?

12. What interventions (such as detailed information or digital cognitive behavioural therapy) can be given to patients with a mild head injury who are discharged from the ED that may reduce the severity and duration of post-concussion symptoms and number of patients who have persisting problems?
13. For patients with minor head injuries, can a blood test used alone or in conjunction with National Institute of Clinical Excellence (NICE) clinical decision rules be used to determine which patients require a CT scan to exclude a significant brain injury?
14. How can we predict which patients will have persisting symptoms following a mild head injury and therefore require further assessment and follow up?
15. In patients presenting to the ED with minor head injury which blood biomarker tests can predict long-term outcome?
16. After a mild head injury can we use a blood test to identify any problems with how the blood is clotting and what is the best way to address this through treatments or how we manage the care of the patient?
17. Does giving intravenous fluid to an elderly patient who has been lying on the floor for over two hours reduce the risk of developing an acute kidney injury or reduce their length of stay in hospital?
18. Current treatment for a paracetamol overdose is N-acetylcysteine. Are there other treatments available which may improve patient outcomes and experience?
19. Is flumazenil (a drug used to reverse sedative effects of benzodiazepines) safe to be used in the ED and given to patients to take home for patients presenting with recreational overdoses?
20. Point-of-care testing (POCT) is rapid laboratory testing conducted and analysed close to the site of patient care. Is POCT in the Emergency Department for cardiac troponin safe and beneficial to use?
21. In chest pain, how can we promote shared decision making around acceptable risk to provide safe and appropriate care and minimise unnecessary risk and inconvenience for patients?
22. The National Early Warning Score (NEWS) is used to monitor patients using clinical observations. Does the identification of those patients with a high NEWS in the ED allow for earlier treatments and improved outcomes for patients?
23. Can a blood test (biomarker) help identify those patients who present with sepsis to the ED that require early treatment and improve patient outcomes?
24. How do we identify patients who present to the ED with Acute Aortic Syndrome and are there decision tools which can reduce overuse of computer tomography scans to identify these patients?

25. Older patients are at increased risk of adverse drug reactions. Research is required to understand current ED practice in terms of identifying patients at risk and in those who present following an adverse drug reaction, identifying or developing tools that are suited for application in the ED.
26. Are decision aids that help a clinician to determine if a patient should be investigated or treated for a pulmonary embolism still helpful following COVID?
27. In patients who have small blood clots in the lung is blood thinning treatment necessary?
28. In patients with acute low back pain, are there signs and symptoms which should lead to an emergency magnetic resonance investigation (MRI) being performed to rule out cauda equina syndrome, a condition which requires urgent management?
29. In patients with low back pain, is a benzodiazepine drug more effective than simple analgesia e.g. paracetamol, ibuprofen at restoring mobility, reducing pain and allowing return to full function?
30. Do early undifferentiated (broad spectrum) antibiotics in suspected severe sepsis have a greater benefit and cause less harm to patients than delayed focussed antibiotics in the ED?
31. In patients with acute severe headache, can an early CT scan accurately identify those patients who might have suffered a bleed into the brain without needing to take a sample of spinal fluid through a needle at the base of the back
32. How does Emergency Medicine compare in cost/quality of care/patient experience compared to other healthcare options e.g. urgent care centres, GP hubs
33. What interventions (such as inpatient ward 'boarding') can be done to reduce the excess mortality risk of patients having to spend long hours in ED waiting for admission to inpatient wards?
34. How can we improve work/life balance amongst ED staff to better retain our staff, including rota design and other working conditions and with regard to how ED staff development is managed, what initiatives can improve staff engagement, resilience, retention, satisfaction, individuality and responsibility?
35. What measures and interventions can we use to reduce the harms of crowding in the ED and prioritise patient care most effectively?
36. Does having a senior emergency medicine clinician involved in triage of patients improve the flow of patients in the department and the experience and care that patients receive?
37. Does having a physiotherapy team in the ED improve patient flow and patient reported experience measures?

38. Can Artificial Intelligence be used for imaging e.g. x-rays, CTs in the ED to improve patient, clinician and department outcomes?
39. Does a departmental simulation training program (where mannequins are used to simulate patients) reduce medical error and improve quality of patient care?
40. How can we increase patient and public involvement and engagement to ensure Emergency Medicine research is patient directed and inclusive?
41. How can we make the Emergency Department environment better for patients and staff?
42. How do we optimise care for mental health patients whether presenting with either/both physical and mental health needs; including appropriate space to see patients, staff training, early recognition of symptoms, prioritisation, and patient experience?
43. What is the best way to care for people who attend emergency departments very frequently?
44. Does referral to advocacy/support services improve quality of life for victims of domestic abuse identified in ED?
45. How do we make sure different patient groups receive excellent care in the emergency department?
46. What tools can we use in the ED to improve communication with people who are hard of hearing or who are deaf - including people who don't realise they have hearing loss (e.g. the elderly)
47. How can we achieve excellence in delivering end of life care (recognising that a patient is dying, understanding patient and family views, and relieving patient symptoms) in the ED? How can we best support patients, families and staff with handling bereavement issues?
48. How do we improve care and experience for transgender patients attending the ED?
49. What is the prevalence of neurodivergence in the ED workforce and patient populations, and how do we improve the care experience for these patients?

Supplementary Material 2

Interim survey question top 3 ranking by stakeholder demographics e.g. healthcare professionals and patients/carers

Patients/ carers ranking	Healthcare professionals ranking	Interim survey questions
1	20	How do we optimise care for mental health patients whether presenting with either/both physical and mental health needs; including appropriate space to see patients, staff training, early recognition of symptoms, prioritisation, and patient experience?
2	1	How can we improve work/life balance amongst ED staff to better retain our staff, including rota design and other working conditions and with regard to how ED staff development is managed, what initiatives can improve staff engagement, resilience, retention, satisfaction, individuality and responsibility?
3	>25	Can a blood test (biomarker) help identify those patients who present with sepsis to the ED that require early treatment and improve patient outcomes?
3	17	How can we achieve excellence in delivering end of life care (recognising that a patient is dying, understanding patient and family views, and relieving patient symptoms) in the ED? How can we best support patients, families and staff with handling bereavement issues?
3	15	Do early undifferentiated (broad spectrum) antibiotics in suspected severe sepsis have a greater benefit and cause less harm to patients than delayed focussed antibiotics in the ED?
6	2	In older, frail patients with injury, how do we optimise assessment (including specific trauma assessment/call activation), management, clinical outcomes and patient experience?
>25	3	How do we identify patients who present to the ED with Acute Aortic Syndrome and are there decision tools which can reduce overuse of computer tomography scans to identify these patients?

Supplementary material 1: Interim survey questions

1. A pneumothorax is a collapsed lung and happens when air becomes trapped in the space between the lung and the chest wall. The air enters this space either from the lung or from outside the body. A haemothorax is when blood gets trapped in the same space. Both conditions can be treated with drainage. Are smaller, thinner drains as effective as large wider drains?
2. Following injury, which patients should undergo a whole-body CT scan for investigation and management, and what is the risk and predictors of significant injury?
3. After an injury some patients lose so much blood that their life is put at risk. We want to know whether replacing the lost blood with whole blood (red cells, plasma and platelets) can improve outcomes for patients and is cost effective compared to standard care (blood, plasma and platelets given individually)
4. Should adult trauma patients who are admitted to hospital with a sternal fracture be investigated and monitored for cardiac bruising?
5. After an injury to the leg, it may need to be fixed in place for a while to prevent using it. This can put a patient at risk of a blood clot in the leg or the lung. Which patients in this situation need blood thinning medications to prevent getting a blood clot? Is a blood thinning medication taken as a tablet more effective than an injection under the skin to reduce blood clots?
6. After an injury some patients lose so much blood that their life is put at risk. Current practice is to try and balance blood flow to the tissues with making sure any clots that have formed remain in place. This is called haemostatic resuscitation. We want to know if this approach is still applicable when patients receive a lot of blood transfusions and whether it improves outcomes for patients.
7. In patients suffering traumatic injuries where bleeding is suspected, what are the most effective treatments in the ED setting to improve survival?
8. What is the optimal care pathway for patients presenting with blunt chest wall trauma to the ED?
9. In older, frail patients with injury, how do we optimise assessment (including specific trauma assessment/call activation), management, clinical outcomes and patient experience?
10. In those patients who present over 24 hours after experiencing a mild head injury who should undergo a CT head scan?
11. What is the optimal management strategy for patients taking anti-platelets and anticoagulants who sustain head injuries?

12. What interventions (such as detailed information or digital cognitive behavioural therapy) can be given to patients with a mild head injury who are discharged from the ED that may reduce the severity and duration of post-concussion symptoms and number of patients who have persisting problems?
13. For patients with minor head injuries, can a blood test used alone or in conjunction with National Institute of Clinical Excellence (NICE) clinical decision rules be used to determine which patients require a CT scan to exclude a significant brain injury?
14. How can we predict which patients will have persisting symptoms following a mild head injury and therefore require further assessment and follow up?
15. In patients presenting to the ED with minor head injury which blood biomarker tests can predict long-term outcome?
16. After a mild head injury can we use a blood test to identify any problems with how the blood is clotting and what is the best way to address this through treatments or how we manage the care of the patient?
17. Does giving intravenous fluid to an elderly patient who has been lying on the floor for over two hours reduce the risk of developing an acute kidney injury or reduce their length of stay in hospital?
18. Current treatment for a paracetamol overdose is N-acetylcysteine. Are there other treatments available which may improve patient outcomes and experience?
19. Is flumazenil (a drug used to reverse sedative effects of benzodiazepines) safe to be used in the ED and given to patients to take home for patients presenting with recreational overdoses?
20. Point-of-care testing (POCT) is rapid laboratory testing conducted and analysed close to the site of patient care. Is POCT in the Emergency Department for cardiac troponin safe and beneficial to use?
21. In chest pain, how can we promote shared decision making around acceptable risk to provide safe and appropriate care and minimise unnecessary risk and inconvenience for patients?
22. The National Early Warning Score (NEWS) is used to monitor patients using clinical observations. Does the identification of those patients with a high NEWS in the ED allow for earlier treatments and improved outcomes for patients?
23. Can a blood test (biomarker) help identify those patients who present with sepsis to the ED that require early treatment and improve patient outcomes?
24. How do we identify patients who present to the ED with Acute Aortic Syndrome and are there decision tools which can reduce overuse of computer tomography scans to identify these patients?

25. Older patients are at increased risk of adverse drug reactions. Research is required to understand current ED practice in terms of identifying patients at risk and in those who present following an adverse drug reaction, identifying or developing tools that are suited for application in the ED.
26. Are decision aids that help a clinician to determine if a patient should be investigated or treated for a pulmonary embolism still helpful following COVID?
27. In patients who have small blood clots in the lung is blood thinning treatment necessary?
28. In patients with acute low back pain, are there signs and symptoms which should lead to an emergency magnetic resonance investigation (MRI) being performed to rule out cauda equina syndrome, a condition which requires urgent management?
29. In patients with low back pain, is a benzodiazepine drug more effective than simple analgesia e.g. paracetamol, ibuprofen at restoring mobility, reducing pain and allowing return to full function?
30. Do early undifferentiated (broad spectrum) antibiotics in suspected severe sepsis have a greater benefit and cause less harm to patients than delayed focussed antibiotics in the ED?
31. In patients with acute severe headache, can an early CT scan accurately identify those patients who might have suffered a bleed into the brain without needing to take a sample of spinal fluid through a needle at the base of the back
32. How does Emergency Medicine compare in cost/quality of care/patient experience compared to other healthcare options e.g. urgent care centres, GP hubs
33. What interventions (such as inpatient ward 'boarding') can be done to reduce the excess mortality risk of patients having to spend long hours in ED waiting for admission to inpatient wards?
34. How can we improve work/life balance amongst ED staff to better retain our staff, including rota design and other working conditions and with regard to how ED staff development is managed, what initiatives can improve staff engagement, resilience, retention, satisfaction, individuality and responsibility?
35. What measures and interventions can we use to reduce the harms of crowding in the ED and prioritise patient care most effectively?
36. Does having a senior emergency medicine clinician involved in triage of patients improve the flow of patients in the department and the experience and care that patients receive?
37. Does having a physiotherapy team in the ED improve patient flow and patient reported experience measures?

38. Can Artificial Intelligence be used for imaging e.g. x-rays, CTs in the ED to improve patient, clinician and department outcomes?
39. Does a departmental simulation training program (where mannequins are used to simulate patients) reduce medical error and improve quality of patient care?
40. How can we increase patient and public involvement and engagement to ensure Emergency Medicine research is patient directed and inclusive?
41. How can we make the Emergency Department environment better for patients and staff?
42. How do we optimise care for mental health patients whether presenting with either/both physical and mental health needs; including appropriate space to see patients, staff training, early recognition of symptoms, prioritisation, and patient experience?
43. What is the best way to care for people who attend emergency departments very frequently?
44. Does referral to advocacy/support services improve quality of life for victims of domestic abuse identified in ED?
45. How do we make sure different patient groups receive excellent care in the emergency department?
46. What tools can we use in the ED to improve communication with people who are hard of hearing or who are deaf - including people who don't realise they have hearing loss (e.g. the elderly)
47. How can we achieve excellence in delivering end of life care (recognising that a patient is dying, understanding patient and family views, and relieving patient symptoms) in the ED? How can we best support patients, families and staff with handling bereavement issues?
48. How do we improve care and experience for transgender patients attending the ED?
49. What is the prevalence of neurodivergence in the ED workforce and patient populations, and how do we improve the care experience for these patients?

Supplementary Material 2

Interim survey question top 3 ranking by stakeholder demographics e.g. healthcare professionals and patients/carers

Patients/ carers ranking	Healthcare professionals ranking	Interim survey questions
1	20	How do we optimise care for mental health patients whether presenting with either/both physical and mental health needs; including appropriate space to see patients, staff training, early recognition of symptoms, prioritisation, and patient experience?
2	1	How can we improve work/life balance amongst ED staff to better retain our staff, including rota design and other working conditions and with regard to how ED staff development is managed, what initiatives can improve staff engagement, resilience, retention, satisfaction, individuality and responsibility?
3	>25	Can a blood test (biomarker) help identify those patients who present with sepsis to the ED that require early treatment and improve patient outcomes?
3	17	How can we achieve excellence in delivering end of life care (recognising that a patient is dying, understanding patient and family views, and relieving patient symptoms) in the ED? How can we best support patients, families and staff with handling bereavement issues?
3	15	Do early undifferentiated (broad spectrum) antibiotics in suspected severe sepsis have a greater benefit and cause less harm to patients than delayed focussed antibiotics in the ED?
6	2	In older, frail patients with injury, how do we optimise assessment (including specific trauma assessment/call activation), management, clinical outcomes and patient experience?
>25	3	How do we identify patients who present to the ED with Acute Aortic Syndrome and are there decision tools which can reduce overuse of computer tomography scans to identify these patients?