

Respondent/ Question number	Question	PICO	Why is this important?	Additional comments	Area(s) of expertise?
1.1	Can we improve cognitive dysfunction post ICU? Do we have a duty of care to these patients post ICU?		Long term outcomes and quality of life		Critical care
1.2	Resus end points what or how to monitor		Much confusion and variations in practice		Critical care
1.3	Best ventilation mode		Copious variations in practice		Critical care
2.1	Prevention of critical care delirium	All Crit care patients, give melatonin from admission -test CAM ICU, randomise according to premonitory risk factors,	Delirium increases Crit Care and hospital stay as well as mortality. Decreases IQ and increases dependence.		Neuro, Trauma, Delirium.
2.2	Large scale frailty outcome study	Patients who are admitted as level 2 patients with increased frailty, evaluate outcomes and 3/6 months mortality and QoL. Controls are patients who are comparable with no or minimal frailty.	Increase demand and expectations - often unrealistic, costing NHS large amounts of resources.		Neuro, Trauma, Delirium.
2.3	Outcomes of patients who have delayed discharge times from Crit care.	Delayed discharge population, observational against no delays and outcomes including infections, psychological, input needed post discharge.	The longer the patient stays in critical care the more it costs and it cannot be psychologically sound for the patients to stay longer than needed.		Neuro, Trauma, Delirium.
3.1	To assess the benefit of transferring patients requiring prolonged mechanical ventilation following an acute intensive care admission to a specialist weaning centre. Assessment to include benefits to the patient directly (successful weaning) and also benefits/impact on the intensive care unit (e.g. increased capacity and improvements in patient flow).	1. Acute intensive care population failing wean 21 days after resolution of acute presenting illness and with a tracheostomy in situ. 2. Intervention would be transfer to a specialist weaning unit for continued weaning process. 3. Comparator is outcomes for patients fulfilling same criteria of failing to wean after 21 days remaining in their parent ICU. 4. Primary outcomes would be clinical benefits including liberation from mechanical ventilation and cost analysis of staying in acute ICU compared with transfer to a specialist weaning unit. Secondary outcomes to include - duration of mechanical ventilation, length of stay in ICU, length of stay in hospital, destination post hospital, functional status and QoL. Operational research question of impact on critical care pathway, capacity and flow in acute intensive care units.	There has been a clear focus on early mobilisation and rehabilitation for patients within critical care to enhance recovery. The guidance for weaning and particularly in those patients defined as difficult weaning centres would support a benefit for patients to be considered for transfer to a specialist weaning centre. It is important to know if there are improved outcomes for patients, leaving hospital in an improved functional status with longer term outcome benefits as well as reduced costs from being in a specialist weaning centre compared with an acute ICU. Understanding additional benefits to the general critical care population by effecting patient flow and creating capacity in acute intensive care units is also very important. The percentage of patients meeting the criteria of difficult weaning is in the range 2-6% but they occupy a significant number of acute intensive care bed days. Observational data to identify accurate size of the population and demographic, current outcomes length of stay in ICU, hospital. Feasibility of transferring to weaning centres, clinical outcomes, cost benefit analysis and operational research to understand impact on wider ICU population could change the way we manage this group of patients.		Intensive Care Medicine & Respiratory Medicine (specialist interest in long term ventilation and weaning)
4.1	Reduction of oversedation in mechanically ventilated patients	P: Emergency admissions requiring mechanical ventilation (not major or cardiac elective surgery) I: Nurse-led sedation delivery, to include appropriate pharmacological management of agitation if required, training, practice based learning and sedation champions with network vs. C: standard practice O: Long-term patient cognitive outcomes, Time spent optimal sedation Duration of delirium. Family mental health outcomes Safety outcomes	National recommendations to maintain patients awake or easily aroused are evidence based, but rarely adhered to in practice. Critically ill patients usually require sedative and analgesic drugs to tolerate mechanical ventilation. Bedside nurses are expected to reduce sedation in mechanically ventilated patients without the understanding, means and support to achieve this aim by the sole use of infusions of sedative and analgesic drugs. Under sedation can present safety concerns such as unnecessary tube removals especially in those patients who experience agitation. Sedation delivery is a complex health care intervention with a persistent evidence to practice gap. There is a lack of appropriate sedation guidelines for UK clinicians. Critically ill patients, who are maintained in deeper levels of sedation, such that they cannot be easily aroused, are more likely to spend more days on a ventilator, require a tracheostomy, and have an increased risk of death. Feedback from patients indicates they prefer to be awake with the ability to communicate than sedated. From the published literature those studies that have been successful in improving sedation practice have shown reduction in intensive care unit (ICU) and hospital length of stay, duration of mechanical ventilation and costs. There was also a reduction in mortality and the incidence of nosocomial infections. Critical care nurses are present at a single patient's bedside for up to 12 hours at a time. They routinely prepare and administer bolus intravenous drugs according to patient's clinical requirements including opiates, antipsychotics and sedatives such as propofol or benzodiazepines. Studies that have been more successful in improving sedation practice have left it to nurses to adapt drug doses and administrations in a timely manner, having transferred the responsibilities of sedation management to the nurses. Oversedation is associated with delirium. Delirium was a James Lind Alliance ICU research priority. Patients who develop delirium have worse outcomes including cognitive impairment and it is distressing for families who have adverse mental health outcomes including depression and PTSD. We know patients are over sedated in UK, we know the barriers, we know less sedation results in less delirium.		ICU delirium
4.2	Family support	P: Families of patients who are critical care inpatients for more than 48 hours. I: Family support sense making intervention as used in North America feasibility trial - to include communication aids, delirium information and engagement at the bedside by nurse with option of being involved in care activities (if would like to) and non pharmacological interventions to reduce delirium and cognitive activities, opportunity for reflective thinking to clear misunderstandings and support. C: Standard practice. O: Distress, depression, PTSD, economic outcomes in family members at 6 months. Delirium in patients (important to family experience in ICU)	Caregivers of patients requiring mechanical ventilation report similar depression scores than caregivers of patients with Alzheimer's, spinal cord injury, or the elderly. Other outcomes include anxiety and generalised anxiety disorder, panic disorder, clinically significant post traumatic stress disorder symptoms (PTSD), complicated grief and deterioration in general health. The prevalence of PTSD and depressive symptoms at six months in family members of patients who die after an intensive care unit (ICU) stay is two to three fold that in the general population when bereaved; 46% of these family members experience complicated grief. These symptoms can persist for years. In patients requiring two or more days of mechanical ventilation, 75% of survivors require caregiving at two months. This is usually provided by family members. One of top three research questions important to patients, carers and providers of critical care from the James Lind Alliance/Intensive Care society project was 'How can patients and their families be best supported as they start living at home again?'		ICU delirium
5.1	There are non-pharmacological interventions that could be effective for delirium management in critically ill patients?	- Critically ill patients - Non-pharmacological interventions just existing care - The number of cases with Delirium?	Delirium is exceptionally prevalent in ICU and it doesn't have to be. Non-pharmacological interventions have been effective in reducing delirium in hospitalised acute medical patients according to some recent research. They could be a potential low-risk, low-cost strategy for delirium management in critically ill patients if they were tested properly.	Thank you for talking the time to consult on this	
6.1	How to translate and implement basic research and new developments into clinical practice.	Targeted intervention at clinicians, nurses, finance, procurement, senior executives to allow a permissive approach to trying out new technologies. Should not need to have 110% proof before any adoption - maybe 50%	There is no point investing in basic research without research into improving barriers to implementation.		ICU, Patient Safety. "VAP"
6.2	Application of safety and human factors, systems approaches to ICU.		Enables actual delivery to patients		ICU, Patient Safety. "VAP"
6.3	Would a quality standard to stop oral and tracheal colonisation improve standards in the ICU	Weekly oral and tracheal sputum traps in invasively ventilated patients. Compare preventative measures and nursing care - similar to campaigns with Cvc infection and pressure sores. How best to institute prevention.	80-90% of tracheas become colonised with pathogenic bacteria. No data to suggest this is safe or appropriate but received wisdom is to suggest this is ok unless there is proof it is not. Real world fast improvement of biggest nosocomial cause of mortality in the ICU.		ICU, Patient Safety. "VAP"
7.1	Quality of life in critical care survivors				critical care
8.1	are non-pharmacological interventions effective for delirium management in critically ill patients	- critically ill patients - non-pharmacological interventions standard care - delirium	Delirium is common in ICU and associated with serious negative outcomes such as increased mortality and morbidity.		ICU
8.2	If we reduce delirium in ICU, do we reduce the negative outcomes that are associated with delirium?	critically ill patients non-pharmacological interventions standard care cognitive function, mortality, physical function, delirium.	Delirium is common in critically ill patients and associated with negative outcomes such as increased mortality and morbidity. If interventions are effective in reducing delirium then they may also improve outcomes for patients and reduce costs for the NHS.		ICU
8.3	What is the best tool to assess pain in non-verbal ICU patients?	critically ill patients pain tool eg CPOAT Another pain tool eg abbey pain scale versus numerical pain score Patient satisfaction	Patients are often unable to communicate their pain while in ICU. Determining the most appropriate tool to use could help improve patient satisfaction		ICU
9.1	Is permissive hypoxaemia better for patients?	all adults in critical care, hypoxaemia vs standard care, mortality and morbidity			POCUS
10.1	How much should we strive to keep patients alive?	Use quality adjusted life years to assess the costs and benefits of intensive care provision	High cost procedures that have little benefit are not a good use of resources		Cardiothoracic Intensive Care
11.1	How do we 'heal' the fracture points along the acute care pathway between the ICU to the ward and the ward to home?	P: ICU patients (survive ICU) I: Effect of an ICU discharge and Ward discharge facilitator C: Standard Care O: Cost effectiveness	Important to enhance patient satisfaction Important to enhance cost effectiveness across the NHS	Improvement in critical care survivorship must be a key priority for the NHS	Professor of Respiratory and Critical Care Medicine
11.2	Are complex weaning centres cost effective?	P: ICU prolonged weaning patients I: Comparison of General ICU vs. Complex Weaning Centres C: General ICU O: Cost effectiveness	To enhance patient clinical outcome (physical, mental, cognitive and social) To enhance cost effectiveness		Professor of Respiratory and Critical Care Medicine
11.3	Is targeted rehabilitation useful to improve long term outcome post critical illness?	P: ICU patients with persistent critical illness I: Personalised rehabilitation programme based on physical, cognitive and psychological deficit C: Standard care O: Cost effectiveness	To enhance long term outcome post critical illness To enhance clinical and cost effectiveness		Professor of Respiratory and Critical Care Medicine
12.1	Impact of age, functional status and pre-ICU LOS in hospital on outcome and QALY of ICU patient.	Complex and multiple intervention/control study and evaluation of service	services to both examine basics science and service delivery at large scale	Good luck!	ICM
12.2	Likes of Sepsis and ARDS intervention	RCTs of intervention of selected patient population. e.g. abdominal sepsis due to leaked anastomosis in young people. Another example is HAP due to MDR organism	Future problem with MDR		ICM
12.3	Staffing of ICU Ratio of doctors (consultants, training and nurses) in and out-of-hours to patients in tertiary, secondary and HDU facilities. weekdays vs weekends and impact on outcome and QALY.	Service evaluation QALY Patient/family Satisfaction Mortality and morbidity	cost, safety and efficacy		ICM
13.1	Is it worth offering critical care support to the very elderly	Review of outcomes in over 80s over a range of conditions and organ support	Limited resource that needs to be utilised appropriately. Pursuing futile treatments is unkind to patients		Neuro critical care
14.1	Does occupational therapy daily rehab impact on functional outcomes and LOS in hospital and ICU. What is the cost analysis.	Rct with and without OT in critical care mech vent and and not	if this helps then patients are missing out		

Respondent/ Question number	Question	PICO	Why is this important?	Additional comments	Area(s) of expertise?
14.2	What activities in ICU would reduce boredom and improve outcomes				
15.1	Benefits of critical care outreach teams.	Acutely ill/deteriorating ward patient. Critical care outreach service. Escalation plans. Improved patient experience, patient outcomes, length of time taken to be admitted to high care area.	Currently no evidence to support crit care outreach services.		Critical care outreach
16.1	When to stop treatment/start palliative care.	Best/kindest resolution for the patient.	To allow a dignified end,	I think my 1st answer is paramount to patient care.	general Critical care
16.2	Differing opinions/goals between teams/consultants.	Not constantly changing treatments etc. Sometimes daily on shift/consultant change.			general Critical care
17.1	How best to support patients and their families during the rehabilitative phase	P=ICU survivors and their families/ care givers upon discharge home, I= supportive intervention, C= standard care, O= Psychological morbidity in both patient and carer and also rehab potential of patient	ineffective rehab from critical illness has huge impact on patients and carers wellbeing and health. In addition, to society in terms of employment		Critical Care
17.2	How to prevent medical device related pressure injury	P= Patients in ICU I= Risk assessment tool or prophylactic dressing/ pressure relieving devices C= standard care O= incidence of pressure injury	Pressure injuries and associated sepsis kills patients needlessly and the NHS spends BILLIONS treating pressure injuries		Critical Care
17.3	How best to implement early mobilisation- we know it is good and reduces mortality/ morbidity but it is still not happening in all of our units. Why not? What are the barriers to implementing?	Staff in ICU Implementing early mobilisation protocols Barriers to implementation	Promotes better outcomes for patients, reduces complications and would save a load of money		Critical Care
18.1	Just because we can do it, should we. Making decisions in healthcare	Comparing conservative and aggressive treatments. Or patient opinion.	Wasteful treatment options. Not best for patients or futile, life is for living not just existing but subjective decisions are difficult. Advance directive promotion? Good admission criteria?	Issues of aging population. A third way in conservative treatment. Care options, to get people back home who don't want to be in hospital	ICU,
18.2	Psychological support versus physical support. Which is most effective. Should NHS prioritise psychological /mental health above physical??	Control study offering psychological support or health coaching, versus normal practice.	Because ICU treatment is expensive and could be avoided with early intervention for drug, alcohol, mental health, smoking cessation and health promotion?		ICU,
18.3	Rehabilitation nice 83 implementation. Complex problems, need complex teamwork solutions and patient centred care. Should we take more risks to achieve better function post ICU.	Quality of life, physical function, delirium onset, delirium symptoms, delirium cessation. Mobilisation dose, duration, passive range of movement. Restory process starting in ICU. Recovery starting at admission.	It's money saving but costs in staff time, but will reduce nhs costs, paradigm shift in approach to patient centred		ICU,
19.1	How much oxygen we should be giving to critically ill patients	All unplanned admissions to ICU (not elective surgery) Evaluate normal vs. low oxygenation targets (i.e. permissive hypoxaemia) - e.g. SpO2 >96% vs. SpO2 88-92% Outcome should ultimately be medium term mortality	Because gathering embarrassingly, oxygen is the commonest drug given to our patients and we lack any guidance to help us determine the dose we should prescribe. The reason for this is that the administration of oxygen to critically ill patients remains an evidence free zone. The public is usually quite surprised to hear this. Initial trials are underway to understand the safety and feasibility of permissive hypoxaemia and what is undoubtedly required is a global approach to rapidly answering such a fundamental question.	Regular priority setting exercises (and updates on their impact) would be a useful process in the UK.	ICU, physiology, altitude, exercise, oxygen
19.2	Delirium. Why can't we effectively reduce its incidence in our patients.	I'm not really sure but we need to put a lot more energy into testing simple, cost-effective solutions to improving sleep and circadian rhythms such as: Light control Sound (noise) control Feeding patterns The use of melatonin	Because ICU delirium is devastating and we cause it through well meaning treat of our patients. We must reduce the long-term burden this causes to society.		ICU, physiology, altitude, exercise, oxygen
19.3	Intensive care utilisation - how can we optimise this high cost intervention for best outcomes	I have no idea I'm afraid! Very complex problem. But a very important one.	Because the NHS is resource limited and ICU is expensive. In the same way that expensive cancer therapies are rationalised, we need to rationalise our own service in an evidence-based manner. Treating the right people at the right time, with the right interventions. Avoiding treating people for whom ICU is perhaps not the best option, and finding alternatives for them.		ICU, physiology, altitude, exercise, oxygen
20.1	How to implement earlier and structured rehabilitation within critical care	Population - Patients with a length of stay of >4 days within critical care Intervention - early and structured rehabilitation Comparator - control subjects from a stepped wedge trial design Outcomes - reduced critical care and hospital length of stay and quality of life at 3 months following discharge	The feasibility and safety of early mobilisation during critical illness is now well established (Bailey et al, 2007; Thomsen et al, 2008). When introduced, programmes of early mobilisation have been associated with a reduction in both ICU and hospital length of stay, as well as improved functional ability at the point of hospital discharge (Schweickert et al, 2009). Early and structured rehabilitation has also been associated with reduced incidence of delirium, improvements to respiratory parameters such as peak inspiration and peak expiration, and improved peripheral muscle strength in comparison with patients who receive no physiotherapy. Although there is a growing evidence base in North American populations, there is a paucity of European-based research into the impact of early rehabilitation programs within critical care, particularly when applied to mechanically ventilated patients. The delivery of physiotherapy within critical care in the United States is very different from that in Europe, with recent US-based studies suggesting that as few as 13% of patients received any physiotherapy within the ICU, with treatment provided usually limited to a median of 1 session per patient. This differs from that provided within Europe and Australia where daily physiotherapy is already an established standard of care. It is therefore unclear whether improvements seen in the United States are applicable to European-based models of health care delivery and processes of physiotherapy practice, or whether it was the similar introduction of daily physiotherapy and the focus on rehabilitation which was having a positive impact. Consequently there is little evidence supporting how best to deliver rehabilitation in those units with already established physiotherapy services.	Critical Care, Physiotherapy, Rehabilitation	
21.1	How to achieve sedation minimization in intensive care.	In critically ill patients, does a behavioural intervention (yet to be developed) compared to current standard practice minimise the amount of sedation administered, as well as long term physical, psychological and cognitive recovery?	We have evidence that sedation type, amount and depth all affect patient outcomes to some extent. Patient outcomes that are affected include a range of aspects including physical, psychological and cognitive long term outcomes, so finding one or more effective methods of minimising sedation will affect multi-dimensional aspects of patient recovery.		Critical care
21.2	How do we best support psychological recovery after critical illness?	In survivors of critical illness, does the use of various information giving strategies (e.g. discharge summary, ICU diary) compared to current usual care improve psychological outcomes?	We currently have insufficient evidence about the best way to improve psychological health in survivors of critical illness. A number of centres have chosen to use ICU diaries but there is insufficient evidence to support the safety and effectiveness of these (with the 1 large study presenting inconsistent results). Early work has been undertaken using other strategies, e.g. discharge summaries however no efficacy work has been undertaken and these may provide a safer, more cost-effective means of supporting our patients. There may also be other mechanisms that could be developed through a strategy such as co-production.		Critical care
21.3	Can we improve recovery for survivors of critical illness through optimisation of self-help behaviours such as self-efficacy and illness perception?	In survivors of critically illness, does a programme directed towards increasing self-efficacy or decreasing illness perception, compared to usual care, lead to improved physical and psychological recovery?	Many strategies to improve recovery after critical illness have not been effective in heterogeneous groups, however some patients do benefit from these interventions. Concurrently, there is some evidence that self-help behaviours influence how individuals recover. Optimising these self-help behaviours may assist recovery, either alone or in the context of specific recovery interventions.		Critical care
22.1	Should sedation holds be used on critical care.	All patients sedated on critical care.	When the ventilator care bundle was introduced sedation holds and following a protocol were both known to be better than standard care but no evidence which is better. Some evidence that following a protocol is better than sedation holds but most units use sedation holds. If this is the case then we would improve care for all units. If not then can conclude that single study so far was classic initial study with wrong conclusion.		
23.1	What benefit is Critical Care according to frailty?	P - Patients referred to Critical Care I - Critical Care admission C - Comparison of patients admitted v not admitted, controlled for physiological derangement (e.g. NEWS), age, diagnosis, etc. and stratified according to frailty O - mortality and resource utilisation (e.g. according to LOS)	1. Where poor outcome anticipated, a cohort of older patients may wish not to undergo critical care intervention 2. Finite resources 3. Current difficulty with prognostication in older age groups		Interests in Critical Care (healthcare-associated infection; epidemiology; human factors)
23.2	Do VAP prevention measures improve outcome?	Patients ventilated more than 48 hours Variations of VAP prevention intervention bundles. Comparison between units Duration of ventilation/ventilator-free days, antibiotic-free days/ antibiotic utilisation, mortality, diagnosis of VAP/ VARTI	VAP may be associated with additional morbidity, mortality and costs - but the effectiveness of VAP prevention measures in terms of objective (rather than diagnostic) outcomes not clear.		Interests in Critical Care (healthcare-associated infection; epidemiology; human factors)
23.3	What difference does compliance with FICM/ ICS medical and nursing staffing standards make to patient outcomes?	Critically ill patients in UK Variations in compliance with staffing standards (e.g. dedicated ICU consultant, dedicated resident for x beds, nursing ratios, supernumerary nurse) versus unit and hospital outcomes (e.g. LOS, mortality)	There is variation in compliance with staffing standards across the UK. Allowing for differences in case-mix, this potentially should have a significant effect on processes (e.g. prevention of harm, timeliness of intervention) and thus outcome. This is an issue of great importance to patients and to staff working in those units.		Interests in Critical Care (healthcare-associated infection; epidemiology; human factors)
24.1	Optimal means of pre-oxygenation for intubation in critically ill patients.	ICU	Avoid unnecessary morbidity / mortality.		ICU and Anaesthesia
24.2	Role of videolaryngoscopy in critically ill patients.	ICU	Avoid morbidity and mortality.		ICU and Anaesthesia
24.3	Optimal emergency airway (cricothyroidotomy) technique in ICU population.	ICU.	Avoid morbidity and mortality.		ICU and Anaesthesia
25.1	Outcomes in the elderly population	Elderly patients (>75yrs of age), with various different underlying chronic disease states Provision of critical care (organ support system) to treat episode of an acute de-compensation, related either to further deterioration of their chronic illness or an acute-on-chronic deterioration. Controls could be elderly patients with minimal chronic ill-health, or younger patients with the same chronic disease process. Outcomes to determine survival to hospital discharge and 6, and 12 month mortality. Also the quality of life for the long-term survivors.	With increasing number of elderly people in the society, and a parallel increase in the hospital and ICU admission of elderly patients, it is essential that there is more robust data/evidence about their outcomes and prognostication to inform clinical practice.	For service delivery, there seems to be a major confusion (once again) regarding aspects of fluid therapy in critically ill patients, and management of sepsis. Some guidance which could help avoid unwarranted variations in practice would be very useful.	Critical care of patients with liver disease and liver transplantation, extracorporeal therapies in ICU, infectious diseases and sepsis

Respondent/ Question number	Question	PICO	Why is this important?	Additional comments	Area(s) of expertise?
25.2	Long term outcomes of cardiac arrest survivors	All patients who present with an out of hospital cardiac arrest or those who have an arrest while in-patient. To study short and long term mortality outcomes, but more importantly the quality of life of the survivors and their level of dependence post hospital discharge. Assess newer prognostication tools with a higher acuity to predict outcomes. It would be difficult to choose a comparator group for such studies but perhaps patients with traumatic brain injury could be one of potential control group.	This is particularly important to avoid unnecessary suffering for these patients, not to mention the resource burden inflicted on the NHS.		Critical care of patients with liver disease and liver transplantation, extracorporeal therapies in ICU, infectious diseases and sepsis
25.3	Because of my personal interest in patients with liver disease, I would like more done to develop or test existing devices for liver function support for these patients.	All patients with acute and acute-on-chronic liver failure. Liver support systems (biological and non-biological) Controls would be the same patients but without this support. The capacity of these devices to act as a 'holding measure' by supporting liver function until spontaneous resolution or until transplantation.	Liver disease is rapidly rising with increasing number of cirrhotics admitted to intensive care either following a flare of their chronic illness through acute deterioration of their pre-existing (often stable) liver function due to non-liver precipitating event such as infection.		Critical care of patients with liver disease and liver transplantation, extracorporeal therapies in ICU, infectious diseases and sepsis
26.1	Long term functional outcomes in frail patients/elderly cohorts/multiple comorbidities. ie. who really benefits from critical care- not just who survives.	C: long-term outcomes- cognition, physical function, patient perception of quality of life at 1 year onwards. C: outcome priorities of at risk populations- how can we ensure patients are involved early in their life-limiting illnesses in decisions about future intensive care interventions.	ITU is hugely costly- both £ and physical/psychological impact on patients and families. We need to know when it is worth it, that we have robust data about what ITU survival really means when frail so we can communicate true risks and benefits to patients, and we need to develop processes where ITU treatments can be discussed early with patients likely to be referred in future		end of life care in ITU, esp terminal discharge, delirium, ethics and law
26.2	Not necessarily "most" important, but simple to investigate: would like to know how many patients get clots from central line placement, what happens to the clots and if there are benefits from anticoagulation if we find a clot.	ITU patients who have had central access	increasingly diagnosing clots with USS during repeat line insertions, but no idea what we should do about them.		end of life care in ITU, esp terminal discharge, delirium, ethics and law
26.3	optimal (if any?) critical care for alcoholic hepatitis patients	Patients who develop second organ failure as a result of alcoholic hepatitis	Large proportion of our referrals. Seem to do badly.		end of life care in ITU, esp terminal discharge, delirium, ethics and
27.1	Blunt chest trauma: possible role for nebulised antibiotics in preventing HAP?	Patients admitted to acute hospitals with blunt chest trauma. Need a predictive model of risk/outcome (possibly related to admission to ITU but this is likely to exclude some with isolated chest trauma who might benefit—needs some thought!). High risk patients (of mortality/morbidity associated with infection/pneumonia) randomised into placebo or active nebulised antibiotic therapy. Outcomes dependent on phase of study.... proof of concept/pilot with LOS/need for mechanical ventilation....later phases incidence of HAP requiring antibiotic therapy, incidence and duration of mechanical ventilation, LOS ITU/Hosp, economics, etc	Common cause for admission, considerable uncertainty about preventative measures but for good analgesia, role of rib fixation an uncertainty.	We desperately need more nuanced research techniques that offer the understanding of variance of effect in different patients/patient groups. Frequentist theory is letting us down because we are looking for relatively small effects of interventions in heterogenous patient groups. We will need to explore if big data / genomics / other approaches (possibly playing down 30 or 60 day mortality) opens new horizons for critically ill patients.	Resp support / trauma and burns / neuro
27.2	Can we develop an objective measure of lung injury associated with smoke inhalation, that correctly predicts impact on outcomes?	Burn injured patients admitted to burn units and centres with possible exposure to smoke. Evaluation of non-endoscopic measures of potential smoke inhalation injury on admission and within the first 24 hours of admission (radiology, serum/urine/sputum markers, exhaled breath markers of smoke related lung injury) and of possible objective endoscopic markers (topographic, histological, cytological, other??)	Area of considerable clinical uncertainty about incidence and impacts on clinical outcome, as well as potential interventions. I accept that this is fortunately an uncommon cause for admission, but the care of significant burn injuries is burdensome for patients, families and the wider NHS. Developing an objective measure of injury should allow the development and evaluation of new treatments and approaches to the management of these patients.		Resp support / trauma and burns / neuro
27.3	Can we develop a decision aid that better supports the delivery of safer mechanical ventilation for patients in intensive care?... This might include better understanding of risk stratifying patients for the development of VILI, defining appropriate goals of mechanical ventilatory support in different patient groups, the relative risk burden of making adjustments to the ventilator (vs not making an adjustment, or making an alternative adjustment), and when to adopt alternative/additional measures including proning, ECCOR, ECMO, rescue HFOV (including the evidence base for such decisions)	Computer modelling of various Not sure... maybe computer modelling of decision web that quantifies uncertainty of both the direction of a decision and the magnitude of the intervention (trade off for example of increasing respiratory rate vs small increments of Vt in managing hypercarbia when pH 7.1 vs living with current pH). This may better define the limits of our knowledge and consequently allow us to pose appropriate research questions, rather than primarily improve our decision making, but even that would be a help!	I believe that we have in general oversimplified decisions around ventilation into things that are 'good' or 'bad'. A good example is the almost complete abandonment of HFOV in patients with ARDS (we have oversimplified both the intervention (HFOV is not a single intervention) and its context (Oscillate and OSCAR each tested a marginally different recipe for HFOV in patients with hypoxaemic resp failure, not ARDS). We may be losing potentially beneficial interventions in important conditions because of our inability to understand the presence of significant uncertainties.		Resp support / trauma and burns / neuro
28.1	What is the safest way to use oxygen on critical care units?	All Critical Care patients with sub-group analysis. Randomise patients to different targeted oxygen levels (e.g target range 88-92% versus 92-98%) Main outcome mortality. Secondary outcomes length of stay and long term outcomes.	The only RCT to date of oxygen use in Critical Care (Girardis et al), showed a potential 50% reduction in mortality with controlled oxygen therapy compared with "old fashioned" high dose oxygen therapy in Critical Care		Respiratory medicine
29.1	180 day outcomes of patients on ICU	All ICU studies need to look at death and disability at 180 days as primary outcome	Ensure treatment is not leading to survival from ICU but subsequent death or disability		
30.1	Appropriate antibiotic use	Patients with suspected infection Antibiotic duration Other antibiotic duration Mortality, cure rate	To define and minimize inappropriate antibiotic use and subsequent resistance		Critical care
31.1	The role of ECMO in the treatment of severe ARDS vs HFOV	Patient population: severe ARDS I.e P:F ratio <100 mmHg Intervention: ECMO Comparator Control: HFOV Outcomes: Primary= 30-mortality, secondary=length of itU stay, 90-day mortality, pulmonary function at 12 months	To provide evidence base for the role of ECMO in severe ARDS which in turn may broaden its availability if the benefit is shown.		Critical Care
32.1	Use of big data to improve delivery of care	Access to routinely collected electronic health record data to develop smart clinical decision rules. Compare standard of care delivered, for eg: weaning protocol compliance using the smart alerts vs current unsupported care delivery.	Translation of best evidence to clinical practice is still quite poor. Supporting this by leveraging already existing data sources has the potential for both patient and NHS benefit that will also be cost effective.	The topics above have a broad range. Topic 1 big data has the potential for significant improvement in efficiency and service delivery. Topic 2 is a key research question on inhaled therapy in critical care which is widely used without evidence. Topic 3 is more towards discovery science, in the sphere of immunodysfunction and proposes a different approach to understanding the disease mechanism in sepsis.	Critical care research
32.2	Use of mucolytics either inhaled or systemic in patient in severity hypoxic respiratory failure. There is no consensus nor robust evidence.	Patient population - Intubated or unintubated patients with acute respiratory failure Intervention/control - Hypertonic saline/DNAase/carbocysteine vs placebo (RCT or cluster randomised trial design) Outcomes - Depending on whether intubated or not, Time to extubation or intubation rates and other secondary outcomes such as reintubation rates, antibiotic use, ICU stay	Mucolytics is an area of lack of consensus but wider spread use without robust evidence. There is a potential for harm to patients as well as associated costs from expensive inhaled therapies		Critical care research
32.3	Immunodysfunction post non-infective insults such as surgery and trauma. Current studies of immunodysfunction have focused on infective models. Heterogeneity of patients, lack of control over the timing of the insult and host response variability make mechanistic studies difficult to run and interpret. Use of a timed, non-infective model will support in depth mechanistic studies which could also be translated to septic patients.	Population: Young fit patients undergoing elective surgery, older patients undergoing elective surgery, controls. Intervention: N/A but once temporal changes is deciphered, GCSF, AntiTNF, Statins could be potential interventions depending on the underlying mechanism to support immune dysfunction or suppress a heightened inflammatory response. Comparator/Control - As above Outcomes - Post-operative infective complications	Our understanding of disease mechanisms in sepsis is still quite poor. For a research model to be relevant, a human model is the best compromise when compared to in vitro and animal models. Mechanistic studies in patients with sepsis is very poor to decipher due to the variability in patients, presentation and also the time critical nature of the disease. A surgical model presents the opportunity to study the inflammatory response and subsequent immune dysfunction which could be translated to critical care. This will also directly benefit surgical patients where post-op immune dysfunction and associated infections is common.		Critical care research
33.1	What is the optimum bowel care practice for critically ill patients?	Those identified as level 2 & 3 patients on critical care, without any bowel or hepato-biliary related problems. Methods of promoting optimum bowel care. Current guidance in practice Vs more modern evidence based methods. Pharmacological/non-pharmacological. The number of stools and number days between each, along with the volume and consistency of defaecation.	Bowel care has a major impact on patients recovery time in critical care, length of time on a ventilator, mobility, pain etc. and in some severe case the risk of bowel perforations. The most recent valuable bowel care study has become dated- Mofstafa et al, 2003 and would be beneficial to have more current EBP.		critical care nursing
34.1	How to improve sleep deprivation and the impact on CCU delirium prevalence.	Cluster randomised trial with an intervention promoting normal sleep in the CCU environment. Preceded by education package for intervention sites. Outcome=delirium prevalence and additional ccu days.	Important as many patients have to be sedated due to delirium and spend longer in CCU as cannot be managed on wards and therefore are at risk of developing complications. There is a financial impact, more CCU days.		CCU Research

Respondent/ Question number	Question	PICO	Why is this important?	Additional comments	Area(s) of expertise?
34.2	Best mouthcare	CCU patients, tubed and untubed. Cluster randomised to number of arms. Standard mouthcare procedure across all sites but frequency would differ in arms. Patient comfort, appearance and incidence of infection	CCU patients can feel very traumatised by the CCU experience. This simple task of mouthcare can feel so refreshing to a very sick patient who cannot eat or drink or have limited oral intake. It allows patients to communicate better having a clean refreshed mouth and psychologically better. Also having oral thrush on top of severe health conditions is rotten.		CCU Research
35.1	How do we prevent functional disability post critical care discharge?	critically ill patients admitted as an emergency in multi-organ failure. Intervention: Primary prevention of muscle wasting or delirium, the two major determinants of functional disability Control: critically ill patients Outcome: Physical Activity, Discharge destination, return to work, muscle mass, Health related quality of life	Mortality from critical illness is decreasing steadily ~20%. Many of our patients suffer significant functional disability which can persist for years (approx 70%, and 50% of those of a working age do not work again). Rehabilitation trials have not improved this, and so we need to focus on primary prevention- limiting disability and joblessness. To the NHS, these patients utilise a significantly greater time/cost of both primary and secondary care compared to those who haven't been critically ill, so significant cost savings can be seen by addressing this.		Critical Care Muscle physiology, rehabilitation, chronic critical illness
35.2	How do we manage or treat chronic critical illness?	Patients that have been intubated and ventilated on the ICU for >10 days	While this group of patients account for 16-20% of all admissions, they consume 50% of resources. Further they go on to have poor quality of life, and rarely return home. This represents a life-changing survival (with a drastic change in quality of life) and a significant financial burden.		Critical Care Muscle physiology, rehabilitation, chronic critical illness
35.3	How do we prevent muscle wasting in the critically ill?	How do we ensure ICU survivors increase their physical activity post discharge?	Physical activity is a prime determinant of health, longevity, quality of life and employment. ICU survivors not only have poor physical activity, but this is resistant to conventional rehabilitation (as demonstrated by multiple neutral trials). Increasing physical activity will improve multiple aspects of our patients' lives, and help them return to contributing to society		Critical Care Muscle physiology, rehabilitation, chronic critical illness
36.1	Does early tracheostomy (within 24 hours) improve quality of life in ICU survivors particularly muscle strength	Pls randomised to <24 v >4 days to have trache. In hospital delirium, muscle power looked at. Long term 6 and 12 months quality of life indicators and whether independent living	ICU survivors often have poor quality of life, weak, short of breath and PTSD and require huge amount of support at home- nursing social care etc. Improved outcome = improved quality of life for individual and huge potential savings to NHS and social care		Critical care
37.1	What is the optimal level of ICU occupancy which provides the best outcome?	This can't be tested in an RCT. First we would need well granulated epidemiology data if this makes any difference to patient outcomes. Built in we should evaluate the staff wellbeing at different levels of activity.	The issue of overcrowding, potential early discharges from ICU and lack readily available ICU beds are a common problem, but we don't know if this actually matters in patient-centred outcomes.		Sepsis
37.2	Could telemedicine/teleICU claim the same benefits as it has done in the US?	Cluster randomised trial of ICUs with electronic patient information systems on the unit, which could be networked to a remote telecom/ ICU centre providing out-of-hours Consultant cover, with the teleICU Consultant doing a nightshift. Comparator: current practice of on-call Outcomes: patient safety, time to review of new admissions, cost of service including deployment and ongoing support, staff, patient and external ICU stakeholder satisfaction	Telemedicine has a potential to transform our way of providing care, but it is unclear if it can work in the UK.		Sepsis
37.3	Can the reversal of ICU acquired immunosuppression improve outcomes in sepsis?	Patients with documented immunosuppression (using extended immunology profile, such as cd64 expression and molecular biomarkers) admitted to the ICU with sepsis Combined treatment to reverse immunosuppression with G-CSF and interleukins Standard care Short and long term outcome and HRQoL cost	No other sepsis specific treatment has worked in the last two decades. This approach has got biological plausibility, but never been tested beyond a single centre study.		Sepsis
38.1	how to decide on futility and limit escalation of treatment appropriately	inform patients better relative rates of futile admissions to critical care	prevents suffering and unrealistic expectations costs too much		
38.2	are we getting too high tech	outcomes on ICU patients treated with more basic care levels (fluids, basic ventilation, basic inotropes, antibiotics) and not much more. Does it make any difference to	Make better use of resources		
38.3	are we giving too much oxygen				
39.1	Why do we not have enough nurses to staff the beds we have	compare and control different nursing models to those who keep staff in ICU/HDU environment and those that don't when ICU not at full capacity at beginning of their shift	Nursing morale is rock bottom. It affects units hard and poor staff retention means less safe patient care and less beds available to critical ill patients, despite adequate medical cover.		
40.1	post cardiac arrest care (OOHCA)	post cardiac arrest patients admitted by ambulance from A&E with a maintained CO on minimal inotropic support, ventilated	Prognostication remains unclear. best method of prognostication (EEG, CT, MRI) remains unclear.		Critical Care / Anaesthesia
40.2	management of rib fracture pain	Patients admitted only with rib fractures as an isolated injury	best method of analgesia is unclear. Epidurals may not be required in all patients; the minute an epidural or regional technique is used the patient can't stay on medical ward; incidence of injury; best non epidural management		Critical Care / Anaesthesia
40.3	have medical ward staff become so unskilled in techniques? eg venous access, lumbar puncture, chest drain	patients referred to the ITU anaesthetic service for generic procedures as above, and evaluating why home medical team could not/would not do them	rather than bounce procedures to others, making sure that the home medical team has a basic skill competence (which must dwell in the consultant) will increase timeliness of intervention		Critical Care / Anaesthesia
41.1	Long term functional outcome of patients in age cohorts following ICU admission	Post operative cardiac surgical patients - prospective longitudinal observational study - those requiring less than or more than 3 days in ICU by age decades - Activities of daily living at 6, 12, 24 months as well using the Whodas score	Value of ICU admission to quality of life		Cardiac ICU
41.2	Long term follow up of patients with AKI after ICU				Cardiac ICU
42.1	1. Longitudinal studies of outcome in detail- in hospital and after discharge. We STILL don't know what happens if health service utilisation, life length, dependency etc in anywhere NEAR enough detail.	All ICU admissions in England (or at least in representative units). Detailed granular admission data collated and curated in one data safe haven. Long term OPNS tagging and more of health service use, readmissions and mortality, and social/functional status.	Patients and relatives are more demanding of ICU and 'all treatments' than ever. Our inability to offer evidence of true likely outcomes hampers trust and relatives accepting guidance on treatment limitation. In addition, such data would help predict future health service needs, whilst also allowing informed public discussion about advanced directive and advanced treatment planning/ end of life planning. Accurate SMRs (using data for AI/ ML approaches) would also allow proper benchmarking (as current SMRs probably use inadequate data).	ICU has changed. The cases we now see so often revolve around complex diagnoses, and around ethical/legal issues. Better data will help... as will the ability to mitigate the harmful consequences of the care we deliver- no matter how well intentioned.	Intensive Care Medicine; cardiology. Muscle function. Big data. Nutrition.
42.2	2. Optimal nutrition on ICU (esp as a means to prevent muscle wasting) We don't yet know whether NOT feeding might be better for some early on than feeding... or what strategies might help prevent muscle wasting and debility development.	Patients: those needing tube or TPN feeding; those at greatest risk of debility and wasting (ie >7 day stay, >2 system failure). Intervention: no feed vs feed? Continuous vs intermittent feed? Ketones or ketogenic content for calories?	Wasting and debility are common and costly. Optimal feeding regimens are still not known.	ICU has changed. The cases we now see so often revolve around complex diagnoses, and around ethical/legal issues. Better data will help... as will the ability to mitigate the harmful consequences of the care we deliver- no matter how well intentioned.	Intensive Care Medicine; cardiology. Muscle function. Big data. Nutrition.
42.3	Can in-hospital decline be predicted PRIOR to ICU admission, and before MEWS/NEWS triggers?	All comers; big data/ AI/ML approach to all EPR datasets.	The inability to anticipate decline makes it impossible to 'head off'. We know that early intervention is good. Preventing decline in the first place would be even better.	ICU has changed. The cases we now see so often revolve around complex diagnoses, and around ethical/legal issues. Better data will help... as will the ability to mitigate the harmful consequences of the care we deliver- no matter how well intentioned.	Intensive Care Medicine; cardiology. Muscle function. Big data. Nutrition.
43.1	human resources, training, catching up the level of care generally available in the continental Europe and elsewhere, availability of test/imaging	intervention/service to test/evaluate	patients don't get what they need and deserve due to limited resources and inadequate availability of support ICU clinicians need - ultrasound, Echo etc.		Intensive care/anaesthesia
44.1	Surgical problems in the ICU patient - i.e. post-ops. I have come to ICM training through medicine and have no surgical experience and I am not an anaesthetist. I therefore find it very hard to understand specific surgical procedures that have been carried out, and their particular implications on the patient.	Surgical training app for ICM doctors	If I can better understand the specific needs that relate to a particular surgical operation, I can better address them.		ICM, general and acute medicine.
44.2	Pain in critical care	Patient population and assessment of pain / test/ evaluate.	There is a lot of under-diagnosed pain on the ICU that has direct implications for patient recovery and morbidity.		ICM, general and acute medicine.
44.3	Nutrition on ICU	Test- evaluate comparator outcomes statistics.	We are pretty rubbish at assessing nutrition in our patients, and meeting their needs.		ICM, general and acute medicine.
45.1	What is the 6 month survival for patients with decompensated alcoholic liver disease admitted to critical care in the UK? What factors are associated with poor outcomes?	Population- patients with decompensated alcoholic liver disease admitted to critical care. Intervention- full organ support for a minimum of 48 hours (including renal support) Outcome measures- 28 day and 6 month survival	Decompensated alcoholic liver disease is a common reason for referral to critical care in the UK. These patients have a requirement for significant resources and often require multiple admissions to hospital and to critical care. The long term outcome for this group of patients has traditionally been thought to be poor. A better understanding of which patients are likely to benefit from critical care would be helpful to clinicians trying to decide the best treatment for this group of patients		Anaesthetics and Critical Care
46.1	what causes (and could be done to prevent) the further 10% mortality which occurs between ICU discharge and hospital discharge?	P: All admissions to ICU I: features at admission or discharge which are associated with not surviving to hospital discharge C: O: developing an "admission" outcome prediction tool (alive+ home / survive ICU but die on ward / die on ICU) and a "discharge" probability of successful discharge home.	huge financial burden / patient morbidity from prolonged treatment of patients who arrive but never leave		Nephrology and Intensive Care Medicine

Respondent/ Question number	Question	PICO	Why is this important?	Additional comments	Area(s) of expertise?
46.2	Is there a difference in quality of care and outcomes between small, well-run units and larger teaching hospital units (however run, but in prestigious institutions) ?	P: comparable ICU admissions (i.e. local population, not tertiary care) I: teaching hospital C: small but demonstrably successful GPICs-compliant hospital O: mortality / morbidity / LoS / satisfaction	would help inform the issue over keeping smaller hospital ICU's open despite the difficulty in staffing them with full-time intensivists and trainees.		Nephrology and Intensive Care Medicine
46.3	Is a combination of inodilator / betablocker / vasopressor superior to standard care in septic shock	P: septic shock I: protocolised combination of Levosimendan, Esmolol and Vasopressin C: Noradrenaline to maintain MAP, with other therapies as indicated by local clinical team	Still looking for a magic bullet in sepsis - is there a problem with sympathomimetic therapy which limits our success ?		Nephrology and Intensive Care Medicine
47.1	Predicting prognosis in an elderly frail population and using this as a basis for conversations with family and patient as regards appropriateness for admission	Frailty scoring	Patients are being operated on who will not benefit from ICU in the longterm. Also should we be saying No to more patients.		Anaesthesia/ICU
47.2	What is the optimal number of beds per number of acute beds		Providing adequate resources per hospital		Anaesthesia/ICU
48.1	Are we treating/supporting the right patients or just prolonging life in those coming to the end of theirs.	Age or comorbidity cohort 0 - 6 & 12 month functional assessment and QoL		For many years we have focused on easily measured parameters e.g ARDS and forgotten about the important questions such as are these interventions in our patients best interests	ICU
49.1	What is the optimum way use of fluid (balanced crystalloid) in the critically unwell?	All critically unwell, with a priori subdivision into surgical, various types of sepsis, etc. Use factorial design, with echo, straight leg raise, Swan/PiCCO Control- clinical judgement Outcome: survival, ICU LOS, renal outcome	One of the commonest interventions, little consensus on what to do. We really don't know if making the numbers better with fluid actually fixes the patient		Anaesthesia/ICU
49.2	Furosemide in AKI	Oliguric AKI Intervention: furosemide or placebo Comparator: Placebo (may as well be open label as urine output will unblind a lot of people) Renal outcomes (CVVH, long term renal function, mortality, etc)	We spend a lot of time trying to make patients produce urine, but it's not clear if this is good for some/all of them		Anaesthesia/ICU
49.3	Rotas for junior and senior staff	Consultant, registrar and SHO rotas Factorial design for differing rota schedules and levels of support on the unit (free accommodation on site, night-time on call rooms, occy health and physio consults, cheap access to leisure activity, rota'd work days specifically for leisure time) Control: current rotas Outcome: reported welfare, outcomes on units	Current rota'd working is poor, conditions are poor. It needs to be shown improving these improves patient care and doctor welfare		Anaesthesia/ICU
50.1	Drug dosing in critical care - should/ can we use more TDM (therapeutic drug monitoring) for antibiotic dosing- is treatment failure because we aren't using big enough doses. Can we tailor sedation to patient needs better with TDM	All patients, test drug levels, can compare treatment success	Patients overly sedated take time to extubate		
51.1	Given our aging and increasingly multimorbid population, how can we predict which patients benefit from unrestricted / prolonged admission to critical care?	Population: All patients with a Canadian Study of Health and Ageing (CSHA) clinical frailty scale of 4 or more referred to critical care services. Intervention and comparators: no admission to critical care; admission to critical care with various treatment limitations; maximal critical care intervention. Outcomes: mortality; physical and cognitive function at 12 months post beginning of acute episode; patient and primary carer rating of health and well being at 12 months post beginning of acute episode (and where possible) compared to the patient's state 3-6 months before the beginning of the acute episode.	Important to patients because some are probably receiving burdensome interventions which merely protract their death, whilst other might be being denied interventions from which they are likely to benefit. The general public and healthcare professionals need better information on which to base important decisions about access to and the extent of, interventions in critical care. Unrealistic expectations and unfounded nihilism are both common. From an NHS perspective Critical Care is extremely costly and struggling to meet the increasing demands being placed upon it. Innovations, especially in extracorporeal organ support, are creating ever increasing challenges in terms of decision making.		Critical Care
51.2	How can we differentiate, in an individual, what constitutes beneficial physiological / cellular adaptation to an acute insult and what constitutes maladaptive / detrimental physiological / cellular adaptation to an acute insult?	Patient population: the critically ill Develop better methods than currently exist that characterise and follow the evolution of physiological / cellular response to an acute insult perhaps using techniques such as genomics, proteomics and metabolomics. Comparators: those that recover and those that do not. Outcomes: practical techniques that can be widely used and reliably identify failing organ systems that still have the capacity to recover, if supported for an acute period.	This is the holy grail of critical care. Currently, we use a combination of unreliable tools and clinical experience. We need to improve our understanding of the basic science of critical illness and recovery potential.		Critical Care
51.3	What are the long term consequences of surviving a critical illness? What interventions maximise the recovery potential and what interventions have harmful effects?	Critically ill patients A detailed national registry of interventions and a standardised detailed follow up assessment in survivors at 12 months? Outcomes: physical and cognitive function at 12 months post beginning of acute episode; patient and primary carer rating of health and well being at 12 months post beginning of acute episode (and where possible) compared to the patient's state 3-6 months before the beginning of the acute episode.	We have only a rudimentary understanding of real world, patient centred outcomes we achieve and little idea of what the effects of specific interventions really are. Given the complexities the only viable way forwards is using "big data" techniques.		Critical Care
52.1	How to detect and treat immunoparesis (and consequent susceptibility to secondary sepsis/nosocomial infection) in critically ill patients.	Critically ill patients with established immunoparesis as identified by biomarkers or direct functional testing. This could include both patients with primary sepsis and those following sterile insults such as major trauma. Intervention - immunomodulatory therapy (e.g. recombinant cytokines such as GM-CSF or IL-7, blockade of negative co-stimulatory molecules such as PD1). Comparator would be standard care and placebo. Important outcomes would be - rates of secondary infection, duration of organ support and length of stay in ICU. For patients with primary sepsis, rate of resolution/clinical cure would also be important. Important safety outcomes would be new organ failures and evidence of immune hyperstimulation.	Primary and secondary sepsis are major causes of morbidity and mortality amongst critically ill patients - despite decades of research and therapy trials we have found little which is effective beyond organ support and antibiotics. The relatively recent understanding of the presence and role of immune failure despite evidence of concomitant immune-mediated organ damage suggests that these failures may have resulted from an incomplete understanding of the disease process. Immunophenotyping and immunomodulation presents the possibility of personalised therapy for critically ill patients and may have a major impact on both patient outcomes and resource utilisation.	A research focus on critical illness is commendable, and long overdue, however it is vital that it focuses on the wider patient journey (from community -ED-ICU-ward/rehab) and not simply on the ICU itself.	Intensive Care, immunology/neutrophil biology, nosocomial infection
52.2	How can we effectively diagnose infections	Population: Patients with suspected infections. Intervention: Rapid, multiplex molecular diagnostics for pathogens, near-patient microbial sequencing in combination with host signatures of infection. Comparator: conventional microbiological testing. Outcomes: Use of antibiotics (appropriateness, narrowest safe spectrum), rates of clinical cure, impact of test on clinical decision making about antibiotic prescription.	Infection remains a challenge to diagnose, especially amongst critically ill patients who often have manifestations of systemic inflammation even in the absence of infection. This leads to frequent, empiric use of antibiotics - as conventional microbiology often takes 48-72 hours to come back and is frequently false-negative the empiric antibiotic use is often broad spectrum and prolonged. This leads to patients being exposed to unnecessary antibiotics, with risk of toxicity as well as the selection of highly resistant and hard to treat organisms. Effective, rapid diagnostics for infection would be a major step forward in improving antibiotic stewardship.		Intensive Care, immunology/neutrophil biology, nosocomial infection
52.3	How should we manage fluids in septic shock	Population: patients with septic shock Intervention: restrictive fluid strategy, avoiding fluid boluses and using vasopressors to maintain perfusion. Comparator: liberal fluid strategy Outcomes: resolution of shock, length of stay in ICU/hospital, mortality, adverse events	Fluid, often administered by bolus, has been the mainstay of shock management for decades - however fluid therapy in adult shock has never been subjected to rigorous clinical trials. The FEAST trial in sub-saharan African children with shock suggested that fluid boluses may be harmful, although we do not know if this is applicable to adults in rich-world healthcare settings. There is epidemiological evidence to suggest that fluid overload is associated with worse outcomes in sepsis, although this cannot distinguish between cause and effect.		Intensive Care, immunology/neutrophil biology, nosocomial infection
53.1	Determinants of rehabilitation outcomes and long term functional state after ICU. To inform decision making and consent	Collect prospective long term data up to 12 months post ICU discharge via icnarc or similar data base. Use this data to generate hypotheses for rcts	True measure of health and social care burden post ICU. Identify potential benefits of dedicated ICU therapy and rehab services. Identify effects of delays ICU discharge on rehab outcome.		Consultant intensivist
54.1	Is critical care beneficial to patients?	Development of follow up routinely and use of core data sets	Improve morbidity and mortality, prevent hospital readmission and reduce burden on community services		Critical Care
54.2	Whole blood for major trauma patients	Development of clinical trials	Improve morbidity and mortality		Critical Care
55.1	use of biomarkers for coha patients	outcomes	to try and plan care post arrest		ICU (general)
55.2	Is there some pre arrest information that can determine a arrest risk that is not already highlighted	patient population	to try and reduce coha		ICU (general)
56.1	Which elective/emergency patients benefit from ICU care	Unwell ward/ED patients or ICU (level 2/3) care v ward care (level 0, 1) hospital discharge, LOS	ICU admissions increasing and not clear which patients benefit e.g. after major surgery		ICU
56.2	Prognostication in the critically-ill	Patients with prolonged ICU stay (e.g. 1 week) what factors, predict unlikely to leave hospital, poor functional status	Ensuring we can give patients and relatives information, and not offer prolonged ICU care that is not beneficial		ICU
57.1	Does the fluid regime used in critical care alter patient outcomes in terms of organ dysfunction, length of stay or mortality. Does volumes of fluids, types of fluids, fluid balance, total daily electrolytes such as Na, Cl etc effect outcome?	All critical care patients, block randomised cross over study of different critical units to different regimes. "standard care", controlled fluid balance, controlled maintenance fluids in terms of volume and electrolytes delivered. Controls would be "standard care" within and across units. Outcomes would be complications, length of stay, organ dysfunction, mortality.	Fluid usage within patients is a basic aspect of care, with little clear high quality evidence of what is best for patients. Growing areas of evidence that what fluids used do make a difference to outcomes such as, Yunos et al 2012, McCluskey et al 2013, SPLIT trial 2015		Critical care/ Anaesthetic Consultant
57.2	Should frail patients be admitted to intensive care, is a frailty score a better indicator of likely benefit of whether a patient should or should not receive intensive care than traditional co-morbidity scores?	Emergency admissions/ referrals to intensive care. Comparison in outcomes of patients with high frailty score for those who do or do not get admitted to intensive care. Is a high frailty score universally associated with a poor outcome irrespective of whether a patient receives intensive care. Long term mortality outcomes, 30, 90 six months or year mortalities.	The NHS is faced with a rapidly aging population with increasing co-morbidities and frailty with complex needs. Understanding whether admission to critical care has any benefit beyond the very short term is important in guiding clinicians as to whether admission is worth while. The population trends have significant implications for critical care and hospital resources and understand whether frail patients truly benefit from a critical care admission will aid in the planning of those resources.		Critical care/ Anaesthetic Consultant

Respondent/ Question number	Question	PICO	Why is this important?	Additional comments	Area(s) of expertise?
57.3	Does intubation and ventilation for airway protection in the elderly with a low GCS and CT scanning the head alter outcome or treatment pathway in these patients?	Elderly (>85) patients with GCS less than 5/15? Intubation, ventilation and CT scan head vs CT scan alone or no imaging, reversal of any anticoagulants and supportive care?	Rapidly growing population of elderly patients with an increasing number of patients anticoagulated. Elderly patients with a low GCS on admission to hospital have a uniformly poor outcome (metabolic causes excluded). The intervention of intubation/ventilation CT scanning is highly resource intensive and if given age, low GCS are not a neurosurgical candidate irrespective of CT findings and given low GCS would not be a candidate for stroke thrombolysis etc. Are these interventions appropriate and would conservative palliative approach be less invasive for the patients and result in better and rapid delivery of end of life care in this group of patients?		Critical care/ Anaesthetic Consultant
58.1	should critical care units use electronic prescribing, is the transcribing process from ward based electronic prescribing to paper drug kardex on it creating unnecessary risk, and like wise transcribing back to electronic prescribing on discharge from ICU to the ward	review of transcribing errors nationally. did any patients come to harm as a result of process adopted by many ICU units	effects length of stay, missed doses, patients may not get critical medications or updated/reviewed medications due to duplicate processes	great exercise	Perioperative medicine/ pain management
58.2	why most trusts don't adopt the pharmacist level of cover as requested within GPICS.		level of cover based on its bed risk level. potentially affecting capacity of critical care pharmacists to make good interventions clinically and audit		Perioperative medicine/ pain management
58.3	role of prescribing pharmacists with it, looking at diversity and possibly creating a consistent stream / training programme	intervention / outcomes	get it right first time		Perioperative medicine/ pain management
59.1	Who should we admit to Critical care?				ICU registrar
59.2	Does the patient require more fluid?				ICU registrar
59.3	The process of consenting patients for long ICU stays? Do we do it? Do they understand what a respiratory wean is like? Do they really appreciate how grim 4 weeks on ICU is?				ICU registrar
60.1	Who does not benefit and who benefits from prolonged level 3 care	Age, co-morbidities, aerobic fitness, frailty	Best use of resources. Avoiding harm.		Perioperative medicine, shared decision making, HDU
60.2	Can better pre ICU care reduce ICU demand	High risk surgical patients and high risk medical patients	Best use of resources. Avoiding harm		Perioperative medicine, shared decision making, HDU care
60.3	Consent or shared decision making on ICU care before a patient is admitted to hospital or has an acute illness	Age, co-morbidities, aerobic fitness, frailty	Best use of resources. Avoiding harm		Perioperative medicine, shared decision making, HDU
61.1	Will my individual patient benefit from Critical Care?	Need to analyse morbidity and mortality outcomes for all Critical Care patients in order to predict more accurately the outcome for future individual patients.	Targeting costly Critical Care resources to patients who will actually benefit is ideal, avoiding unnecessary costs and suffering for those who will not benefit.6		Critical Care
61.2	How can we treat ICU delirium effectively?	Population: patients suffering from ICU delirium. Intervention: Pharmacological treatments such as Haloperidol, Olanzapine, Quetiapine etc. Control: Placebo. Outcomes: Duration and intensity of delirium, other complications such as arrhythmias, etc, longer term outcomes such as cognitive decline.	ICU delirium is common and distressing for patients, relatives and staff. Optimising the treatment would be extremely beneficial.		Critical Care
61.3	Does APRV improve outcomes in ARDS?	Population: Patients with ARDS. Intervention: Protocolised APRV Ventilation. Control: Protocolised conventional Ventilation (high PEEP, ARDSnet). Outcomes: P/F ratio over time, tidal volume, duration of Ventilation, duration of Critical Care, complications eg Barotrauma, Pneumothorax, Haemodynamic instability, ECMO referral.	APRV is a more recent mode of Ventilation that anecdotally appears to improve gas exchange but has very little evidence base.		Critical Care
62.1	who should be admitted to intensive care? is intensive care the right way to use limited resources in healthcare?	All ICU and hospital patients. Intensive care and other interventions other uses of resources Overall benefit to population	To give best use of resources		intensive care medicine
63.1	1 Clinical - how the functioning of mitochondria can be supported and the functional deterioration associated with critical illness prevented.	1 Basic research by screening patients that are not critically ill and comparing those who become critically ill with those who do not. Particular attention to levels of intracellular redox states, substrate transport across the mitochondrial membrane. outcome measures death and duration of organ support.	1 Massive resource implications (the "80/20 rule) 2 Massive impact upon those most vulnerable. 3 Significant risk of causing the death or disadvantage of those who would otherwise have been expected to survive	Good luck.	
63.2	2 Service: How the ethical difficulties of deciding when intervention is inappropriate in a resource limited health service are managed.	2 Collect a group of appropriately ethically trained individuals, map out the issues involved, develop an ethical framework to base the discussion with the relevant stakeholders. These will include, Religious leaders, the judiciary, the clinicians (not restricted to just physicians but all who are involved in the care of the critically ill with life limiting conditions), the families of those with life limiting conditions, and most importantly, individuals with life limiting conditions who are cognitively able to participate in the debate.	1 Massive resource implications (the "80/20 rule) 2 Massive impact upon those most vulnerable. 3 Significant risk of causing the death or disadvantage of those who would otherwise have been expected to survive		
63.3	How to remove politicians from the decision making process of the workings of the NHS and its funding				
63.4	How to educate the public in the difference between delivering healthcare to the individual, and delivering healthcare to the nation, in order to foster support for truly equitable access for all to the highest quality care.				
64.1	Cost effectiveness of Level 3 care for frail medical patients and emergency surgical patients	Patient population: Frail, Age >65, Comparator: appropriate elective surgical population	Cost for NHS and clinical benefit / suffering for patient and their family		
65.1	How is safe swallowing best determined in critical care patient to reduce potential complications?	Post extubation patients. Fibre optic endoscopic evaluation of swallowing (FEES) or cough reflex testing versus bedside testing. Outcomes - absence of signs of aspiration such as wet voice/chest infection/time to oral intake. May be secondary outcomes related to respiratory function, nutrition and QoL	Systematic reviews and studies in USA have demonstrated high rates of aspiration and dysphagia in non-neurological patients which increases length of stay, interventions and risk to morbidity and mortality. This increase the complexity, whereas early identification permits a focussed intervention to be developed preventing symptoms.	More multidisciplinary research needed in addition to qualitative data for small patient groups such as small spinal cord injury which cannot attract large numbers to studies. There needs to be standards of care, allowing for flexibility dependent on patient need.	Weaning, swallowing problems, communication in critical care patients, specifically spinal cord injury
65.2	What swallow interventions are most effective in improving swallow function?	Heterogenous critical care patients, Interventions for improving strength of swallow and range of hyolaryngeal movement (like musculoskeletal exercises), use of surface EMG, compare to nothing or food modifications, outcomes need to include markers on instrumental evaluation (FEES or videofluoroscopy)	We really do not know what is effective and what is not, there are few studies in the critical care group but evidence of increasing complexity suggests a need to better understand efficacy of swallow interventions		Weaning, swallowing problems, communication in critical care patients, specifically spinal cord injury
65.3	The value of a collaborative multi-disciplinary team to facilitate ventilator weaning	P - Heterogenous critical care patients with tracheostomy and ventilation who are being weaned, I - tracheostomy team decision making to involve dr, nurse, physiotherapist, speech and language therapist, dietitian, pharmacist (may also include Occupational therapist and psychologist) C- intensivist/physiotherapy led wean O-time to complete wean, addition of speaking and swallowing, PROM	Despite national recommendations (NCEPOD, GPICS) weaning is often led by one professional. When complications occur this means having to stop and start again. By employing a team, multiple avenues will be investigated as part of the team decision and better monitoring to detect issues and achieve successful outcomes, especially for patients who find the lack of speech and being unable to eat and drink as key issues to adjustment		Weaning, swallowing problems, communication in critical care patients, specifically spinal cord injury
66.1	Cytokine adsorption - using external filter attached to haemofilter	Regional study looking at reduction in vasopressor therapy and consequent digital ischaemia reduction in survivors.	For sepsis very few therapies have been shown to help, patients can be unresponsive to vasopressor therapy and we use high levels with little benefit and lots of side effects in terms of limb and digital ischaemia as well as organ malperfusion.		ICU consultant, research
66.2	Biomarkers in renal injury	regional study looking at non-inferiority,	Traditional markers are poor and late with no prognostic value. If we identify problems early and prognosticate, this will allow us to anticipate and design services as well as design treatments for pts		ICU consultant, research
66.3	Nutrition - hypocaloric feeding	regional looking at non-inferiority	nobody knows when to feed what to feed or whether or not to avoid tpm.		ICU consultant, research
67.1	Delirium in ICU	All ICU patients Medical/non-medical Interventions Compare to usual practice Reduction in delirium	Reduction in associated worse outcomes with delirium. Unpleasant for patients, relatives and staff.		
67.2	Which elective post-op patients benefit from ICU	All elective post-op patients Screening tools for correct patient identification Standard practice Multiple outcome measures- mortality, hospital stay, complications, patient satisfaction	To avoid unnecessary cancellation of elective operations and mis-use of ICU resource		
68.1	As patients are awake and weaning what can the team do around their communication to support the patient more when they have a tracheostomy?	Intervention make every effort to understand what the patient asks. Give clear and consistent information to the patient. Ask closed questions either or and yes/ no questions. Randomise patients to this style of communication vs normal care delivery Length of time to wean VAS scale of fatigue/mood Health utilities LOS on units in hosp Well being post discharge.	Manage recovery of people who are vulnerable Enable them to participate effectively in their care around weaning Manage anxiety Limit LOS on critical care with limited communication.		Acute care in a teaching trust.

Respondent/ Question number	Question	PICO	Why is this important?	Additional comments	Area(s) of expertise?
68.2	If teams follow a decannulation trachy policy does this limit /reduce complications of decannulation.	A unit follows a protocol vs a unit does not Time to decannulation Lack of complications Time to oral intake of fluid and diet.	Decisions are made based on assurances rather than being overlooked. Patients progress with decannulation as able.		Acute care in a teaching trust.
68.3	In which patient groups are speech and language therapists of benefit or is it according to symptom presentation?	Delphi study in which SLT and units discuss this question.	The resource is small is it appropriate to focus at particular points or with particular symptom constellations with particular patient groups.		Acute care in a teaching trust.
69.1	How should we manage fluid status following the resuscitation period in critical illness.	Population: all critically ill patients Intervention: fluid restriction and use of diuretics or renal replacement therapy to remove accumulated fluid Comparator: usual care Outcomes: mortality, long term quality of life and specifically cognitive function	Fluid overload is potentially a major iatrogenic source of morbidity i.e. avoidable harm, contributing to increased resource use (longer duration of mechanical ventilation and ICU stay) and perhaps mortality. Intensive Care Med 2017;43:155-70		Fluid management in critical illness
69.2	How do we reduce the risk of complications for high risk post-operative patients?	Population: high-risk elective major surgical patients Intervention: high-dependency care Comparator: extended recovery / PACU / ward care with outreach Outcomes: morbidity - surgical complications, cardio-respiratory complications, length of stay, long-term functional status	Huge volume of patients, increasingly high risk population, post-op complications are hugely expensive and associated with worse long-term outcomes.		Fluid management in critical illness
70.1	The end point at which we should stop active resuscitation and commence de-resuscitation during a patient's critical illness. This can be in the form of diuretic therapy with or without Renal Replacement Therapy	Patients requiring admission to ICU Over 16 years old On Invasive ventilation for greater than 24 hours Multicentre RCT Investigative de-resuscitation as defined by the use of furosemide or Renal replacement therapy with greater than 2000ml fluid removal Compare conservative measures (standard practice in critical illness) with de-resuscitation Fluid balance and mortality ICU free days Duration of mechanical ventilation	Fluid resuscitation in the Emergency department, ward, and critical care environment is a very important factor for survival in many different pathologies. At a point fluid resuscitation will however tip the balance and increase mortality of these patients. Being able to identify a point at which removing this excess fluid will improve mortality will be a simple, cost effective and safe practice that will have a significant impact.		Anaesthetics and Intensive Care Medicine
71.1	Clinical role and health economics of acute non-invasive ventilation (NIV) in paediatric respiratory failure	P: Children admitted with acute respiratory failure I: Early initiation of non-invasive ventilation C: Current practice (initial high flow nasal cannula in mild-moderate patients and intubation and mechanical ventilation in severe patients) O: LOS, PICU bed days, intubation rates, mortality, patient-family satisfaction	NIV is a much more user patient and family mode to deliver respiratory support in critically ill patient and has the potential to be delivered in Level 2 Critical care units with the adequate support. It has been shown to improve outcomes in certain pathologies in comparison with other techniques.		Paediatric Critical Care
71.2	Use of telemedicine to support remote critical care (level 1 and 2 paediatric critical care units outside tertiary hospitals).	P: Children admitted to Level 1 and Level 2 critical care units I: To provide telemedicine support to local clinicians C: Current practice (phone advice via transport services) O: LOS, rate of transfer to level 3 PCCU, rate of intubation, mortality, patient-family satisfaction	In the current plans to decentralise critical care, a gap of training might compromise care. Telemedicine support by paediatric intensivists, anaesthetists and HDU trained paediatricians might improve care delivered remotely, leading to a better patient care (closer to home).		Paediatric Critical Care
71.3	Complex needs population needs for admission to critical care	P: Children with complex needs and shortened life expectancy I: Enhance the capacities of local hospitals and hospital at home to provide intensified care locally C: Current practice, referral to tertiary centre. O: Quality of life, LOS in tertiary hospitals, PICU bed days, mortality	Children with a limited life expectancy spend a lot of their lives in hospital, losing quality time with their families. A more local approach to intensified treatment can help them and their families, as well as allowing patient flow in tertiary hospitals.		Paediatric Critical Care
72.1	What are the most important clinical outcomes following interventions in Intensive Care.	Adult and Paediatric (ICNARC & PICANET) Systematic literature review for previous outcomes used in clinical trials. Identify where there is significant variation between centres/ patient level for all outcome measures without any intervention. Or running a mock trial with no intervention at the Patient/ unit level over 3 years - would be there be significant different outcomes? Which outcomes appear robust enough to use in future clinical trials.	RCTs in ICU aren't delivering evidence to change practice. This is likely because we need to understand the populations better and the appropriate outcomes.	Happy to discuss further.	PICU, Early Warning
72.2	What are the bottom up NHS costs (for an average patient) of the top 10 reasons for admission to ICU/ PICU across centres. Where there is variation there is an opportunity to create efficiencies by sharing ways of working/ patient pathways/ procurement.	P: Adult and Paediatric ICU Systematic literature review for previous cost studies in ICU. I: What are the bottom up NHS costs (for an average patient) of the top 10 reasons for admission to ICU/ PICU across centres. C: all ICU/ PICU. O: Where there is variation there is an opportunity to create efficiencies by sharing ways of working/ patient pathways/ procurement. 2nd intervention: reduce waste 2nd outcome: savings	We need to reduce waste in our care and national comparison is a way to identify and manage out waste in the system.		PICU, Early Warning
72.3	PICU currently does not limit access to admissions based on background disease and likelihood to survive. The majority of resources are used by complex long-stay patients. Despite increased beds no more patients are being offered treatment. We need to have a study on societal, policy maker and clinician views as to the trade-offs that are acceptable under the situation of limited resources.	PIC patients parents, clinicians, public, policymakers opinions. Qualitative & economic trade-off study. QOL measures and survival vs cost of care. no comparator Recommendations as to whom we should offer PICU and who we should not.	Limited resources. Chronic patients are receiving PIC, elective patients are being compromised. We need help to determine who should receive these precious resources to maximise the ethical criteria of providing care with the most benefit to the most patients. We're not able to decide on this at present.		PICU, Early Warning
73.1	Reducing antibiotic resistance in the PICU by improving diagnosis of bacterial infection	Patients - Critically ill children admitted to PICU and requiring at least 48 hours of mechanical ventilation. Intervention - a stratification tool to aid diagnosis of bacterial infection and guide antibiotic therapy. Control - standard care Outcomes - 1. levels of antibiotic resistance in bacterial isolates grown on cultures taken in PICU 2. days free of antibiotic therapy in children admitted to PICU 3. prevalence of multi-drug resistant organism related infections in the PICU	Antimicrobials are commonly administered in patients with critical illness with >70% of patients receiving them. Whilst antimicrobials are often used to treat the infections that precipitated admission to intensive care, critically ill patients are also at increased risk of healthcare-associated infections (HAI). In the United Kingdom an estimated 10-23% of all critically ill patients develop an HAI, resulting in 320,000 HAIs, 5000 deaths and an additional £1 billion healthcare costs per year High antimicrobial usage is recognised to contribute to the development of antimicrobial resistance (AMR) through selection pressure. Up to 70% of organisms associated with HAI are resistant to at least one antimicrobial. The majority of HAIs are caused by commensal bacteria colonising the patients oropharyngeal or gastrointestinal tracts (the intestinal microbiome). In adults, faecal transplantation has been used to treat Clostridium difficile infections, by restoring normal intestinal flora. The burden of AMR infections in the critically ill paediatric population is less well defined. Whilst it may not be possible to reduce the initial antibiotics administered at the time of onset of illness, subsequent antibiotic episodes are often given without clear indications of infection, and often discontinued after 48 hours when cultures are returned. Improved diagnostic techniques and stratification tools could support a safe reduction in the inappropriate use of antibiotics and could reduce levels of antibiotic resistance in the PICU setting.		Paediatric Intensive Care, Paediatric Infectious Disease, Paediatric Research
74.1	How should survivors of PICU that currently receive no additional neurodevelopmental surveillance over that offered to healthy kids, be followed up in terms of functional outcome/ subsequent post PICU neurodevelopmental needs?	P children who have an admission to paediatric intensive care unit (PICU) before the age of four years / preschool age and would not be in normal circumstances be under any additional or enhanced developmental surveillance in the UK. i.e. previously healthy children with non neurological conditions and children with cardiac disease. Intervention1 - ND surveillance according to the NICE Guideline for premature baby/ ND surveillance by specialists using conventional gold standard measures at set time intervals. Intervention2 - ND surveillance using the Brief Developmental Assessment see https://www.journalslibrary.nihr.ac.uk/programmes/hsdr/12500506/#/ Comparator - Usual care (no additional ND surveillance) Outcomes Primary outcome clinical effectiveness - The proportion of children at preschool stage (have turned four years) who have developmental delay or a behaviour disorder who are under child development services and receiving multi-disciplinary input for their problem. This is an inferiority design, is intervention 2) inferior to intervention 1) Secondary outcomes: Cost to the NHS, is intervention 2) cheaper? Parent satisfaction Parental anxiety Is anxiety reduced / satisfaction increased with ND surveillance?	The proportion of children surviving PICU is at a record high and it has become more important to consider function and quality of life in survivors. Children who were healthy and then experience a critical illness and children with heart disease who need to have an intervention (heart surgery or cardiac catheter) and PICU admission are at much increased risk of neurodevelopmental delay (ND) and behaviour problems compared to other children who do not have these health events. The rate of developmental delay is not known in the UK PICU population. In a mixed cohort of survivors of children's heart surgery from Australia (which was otherwise similar to the UK population) the rate of severe developmental impairment was 9% (GUNN ADC 2016). In the UK these children get no additional surveillance over and above healthy kids. Furthermore the standard surveillance for ND in UK kids is not consistently undertaken with reports of ASQ being done in <25% in some regions at the age of two years. Our study https://www.journalslibrary.nihr.ac.uk/programmes/hsdr/12500506/#/ suggests that children with heart defects and with significant developmental delay are not always identified in a timely way and are not under services they need. Our research https://www.ncbi.nlm.nih.gov/pubmed/28554921 shows that for the cardiac children at least, this type of clinical problem for children undergoing such treatments is the number one concern amongst lay people and clinicians consulted. A relatively large number of children per year are affected - 5000 children per year are transported to PICU as an emergency, 3000 children per year have cardiac surgery under the age of one year this being a high risk group.		PICU and health services research
75.1	What is the safest level of mechanical ventilation	P: All patients expected to be ventilated > 24h I: Reduced tidal volumes at 3x levels (4/5/6 ml/kg PBW) C: Standard care O: 90-day mortality, 6-month mortality, long-term respiratory status, rate of ECMO	It is unknown what the safest level of mechanical ventilation is for the >100,000 mechanically ventilated UK ICU patients annually. Identifying this safety issue may improve outcomes from ICU and reduce costs to the NHS.		Respiratory failure
75.2	Optimal management of raised ICP				Respiratory failure
76.1	How can all the data we collect in our Clinical Information System be used to support direct patient care?	- Any critical care with electronic data collection (including data from monitor, electronic patient records, electronic charts) etc.... - Need a different scientific approach seeking expertise in other fields such as sociology, anthropology and for sure computer sciences - No comparator required - To be defined	the electronic memory is gathering a lot of data but little is turned into information useful to clinically direct patient care. The digital memory is not used.		Critical Care
76.2	What is the impact of checklists and regulated practice on outcome? or how much therapeutic freedom (i.e. clinicians apply what they believe in) impact on patient outcomes?	- Any ICU patient - freews regulated care - long term outcome including QoL	Direct impact on outcome - direct impact on cost		Critical Care
76.3	The impact of remote ward rounds on ICU outcomes.	- Any ICU - Remote (telemedicine) ward rounds allowing one team (doctor, pharmacist, senior nurse) to advise on actions to influence patient trajectory. This means remote access to information stored in real time at bedside in Clinical Informations Systems - remote vs bed-based ward rounds - Outcome - duration of stay - QoL - satisfaction	Would ensure expert input./direction available to all 24/7 - cost		Critical Care
77.1	What pressure ulcer risk assessment tool is reliable and valid in critical care?	multi-center 20 units 3 tools: CALCULATE, BRADEN, WATERLOW, thresholds to implement prevention interventions	No tool has been shown to be reliable and valid in critical care. How to best target expensive interventions to prevent. Pressure ulcers are a major problem: patient suffering, cost, increased LOS.		Adult critical care nursing

Respondent/ Question number	Question	PICO	Why is this important?	Additional comments	Area(s) of expertise?
78.1	What is the optimum blood pressure to aim at in Paediatric Critical Care? 5th or 50th centile?	Children in PICU 5th centile systolic or mean BP 50th centile systolic or mean BP Survival (primary) Organ failure free days at 28 days (secondary) Long - medium term neurological morbidity (secondary)	Currently it is unclear what blood pressure target is optimal in PICU, both in terms of survival but also in terms of time to recovery and long term morbidity.		Paediatric Intensive Care
79.1	Can delivery of a structured rehabilitation pathway including daily input (not just chest physio) by physiotherapist or therapy assistants and access to counselling reduce the burden of surviving ICU? Can this in turn reduce length of hospital stay and ongoing health problems and promote better funding of staff to deliver rehabilitation.	ICU/HDU patients Delivery of structured rehabilitation by physiotherapist/therapy assistants Patients given daily rehabilitation by dedicated physiotherapy/therapy assistants compared with patients given rehabilitation by bedside nurse according to standard care (as and when time allows). Offer of referral to counselling service during hospital stay compared with patient self referring to GP when home and waiting for service to be available. Outcomes measured by survival to discharge home, length of hospital stay, readmissions, patient reported experience for example of mobility and mental health.	To reduce the burden of ongoing health problems following critical illness in human and financial terms. For the patient and the NHS		Ex ICU Sister recently joined Research Dept
80.1	How are medicines optimisations best delivered in intensive care units?	Population: Intensive care patients requiring L3 support and expected survival >24 hours Intervention: Structured medication review process adapted for Intensive Care Unit use and focused on the patient's critical care pathway Control: Usual care Outcome: Patient risk adjusted mortality at 60 days	The ICU literature is inundated with large multicentre RCTs that largely show no effect of the intervention on patient outcomes. This shouldn't be unexpected as ICUs are clearly complex areas treating complex patients using multiple inter-related interventions. As such it is important that we look at processes that impact on patient morbidity and mortality and how the efficiency of these processes or complex interventions can be improved and then routinely delivered. Medicines are an excellent example of a complex intervention in ICUs where there are significant variations in the resources available to and employed by ICUs to deliver medicines optimisation (MO). So, whilst the importance of MO processes are recognised by the NHS and wider (NICE medicines optimisation (NGS); Lord Carter NHS productivity & performance review, GIRFT; WHO 3rd patient safety initiative), there is a lack of knowledge of effective intervention components and then structured delivery of MO interventions. Medicines are the most frequent intervention ICU patient receive, present the most common medical error patients are at risk of and require the most individualisation during the progress of their acute illness and resolution (optimisation). MO is central to NHS efficiency/improvement drives and intensive care as a patient and NHS resource would benefit from learning more about how best to deliver and the potential positive patient and resource outcomes.		Critical Care Pharmacy
80.2	How best to deliver medication review processes on ICU patient discharge?	Population: Intensive care patients requiring L3 support and expected survival >24 hours Intervention: Structured medication review process adapted for Intensive Care Unit use and focused on the patient's critical care pathway Control: Usual care Outcome: Patient risk adjusted mortality at 60 days	The ICU literature is inundated with large multicentre RCTs that largely show no effect of the intervention on patient outcomes. This shouldn't be unexpected as ICUs are clearly complex areas treating complex patients using multiple inter-related interventions. As such it is important that we look at processes that impact on patient morbidity and mortality and how the efficiency of these processes or complex interventions can be improved and then routinely delivered. Medicines are an excellent example of a complex intervention in ICUs where there are significant variations in the resources available to and employed by ICUs to deliver medicines optimisation (MO). So, whilst the importance of MO processes are recognised by the NHS and wider (NICE medicines optimisation (NGS); Lord Carter NHS productivity & performance review, GIRFT; WHO 3rd patient safety initiative), there is a lack of knowledge of effective intervention components and then structured delivery of MO interventions. Medicines are the most frequent intervention ICU patient receive, present the most common medical error patients are at risk of and require the most individualisation during the progress of their acute illness and resolution (optimisation). MO is central to NHS efficiency/improvement drives and intensive care as a patient and NHS resource would benefit from learning more about how best to deliver and the potential positive patient and resource outcomes. The nature of intensive care practice is focused on the intense treatment required for the recent ICU admission. Increasingly to enable care for this new admission a lower level acuity patient is discharged to the ward. Whilst the focus remains on stabilising and directing care for these new ICU patient admissions; there is proportionally much less focus on planning, documenting and communicating ongoing care for the patient being discharged. Furthermore, the NHS recognises the importance of ICUs as a resource and is encouraging prompt recognition and then discharge of patients to a ward when medically fit for transfer now within a 4 hour window. Whilst this is a sensible use of resources it requires more refined and developed processes to be in place to ensure continuity and communication of treatment plans (such as medication) across the ward interface and ongoing care periods. The complexity of patient care during the ICU stay makes this a complex task and medication review on discharge may be limited i.e. within the critical care pathway the discharge period may present the greatest medication review vulnerability. The net result is important chronic medication potentially not restarted, potentially inappropriate medication continued into the ward care period and ultimately patient discharge. These medication inadequacies may contribute to patient morbidity including higher re-admission rates.		Critical Care Pharmacy
80.3	How best to deliver medicines optimisation of antimicrobial therapy in critically ill patients?	Population: Intensive care patients requiring L3 support and expected survival >24 hours Intervention: Structured antimicrobial review process adapted for Intensive Care Unit use and focused on delivery of individualised PK/PD parameters incl. TDM Control: Usual care Outcome: Patient risk adjusted mortality at 60 days	Appropriate antimicrobial therapy is the cornerstone of management of sepsis and septic shock patients. Delivery depends on using the right antimicrobial(s) at the right time and right dose. Many hospitals and ICUs have invested in systems to include prompt recognition and appropriate management of sepsis, with Microbiology input, review and antimicrobial stewardship principles. The complexity of critically ill patients, many of whom are immunosuppressed, means that optimisation of antimicrobial therapy to deliver the best cure rates and patient outcomes whilst minimising risk of resistance, needs more patient individualisation/optimisation of therapy. PK/PD studies of septic shock patients highlight the large degree of variation of antimicrobial dosing and resulting plasma levels patients experience. Increasingly, the importance of PK/PD optimisation of antimicrobials is recognised to positively impact on patient outcomes (e.g. 2 recent SIs of prolonged infusions of beta-lactams in septic shock patients). Investigating routine delivery of optimised antimicrobial PK/PD supported by appropriate TDM (incl. beta-lactams) compared to usual care would test whether resources required to deliver this intervention would improve patient outcomes and NHS resource utilisation. This research is in keeping with the Sepsis Action Plan and Start Smart - Then Focus initiatives to improve antimicrobial therapy and stewardship.		Critical Care Pharmacy
81.1	The best way to manage delirium, anxiety, depression and agitation acutely in the ICU and in hospital in order to reduce long term psychological sequelae of critical illness.	Departments all have a specialist clinical psychologist in critical care to work with patients on the ICU with these problems and to educate, train and support multi-professional staff in the ICU in management of these problems. A clinical psychologist within a multi-professional team would be able to monitor and evaluate intervention, progress and outcomes before and after for patients.	This will prevent long term psychological morbidity and allow people to successfully rehabilitate reaching their full potential more rapidly. This will save on need to access services in the future for these patients and improve return to maximum possible function and return to work or able to do meaningful activities for example.	I would be very happy to assist in any of these areas.	Critical Care Rehabilitation and Follow Up and Standardised Major Elective Surgery Post-Operative Pathways
81.2	Should major elective high risk surgical post-operative patients really be mixed into general ICUs as they are in so many units?	Evaluate differences in patient outcomes and experience in centres where the pathway is separate from the ICU compared to those where patients are cared for with a mix of general ICU patients.	There is a potential to have a cheaper cost of delivery of this standardised pathway care compared to the cost of a critical care bed as well as a better outcome and improved patient experience and satisfaction.		Critical Care Rehabilitation and Follow Up and Standardised Major Elective Surgery Post-Operative Pathways
81.3	How do we establish effective continued critical illness rehabilitation uniformly across all hospitals in order that patient rehabilitation remains focused and coordinated when they leave the ICU and go to the ward.	Assessment of what exists in current practice for this service across NHS trusts and pilot various methods for education, coordination delivery of joined up rehabilitation once patients leave the ICU.	To ensure the fastest return to maximum possible function cognitively, psychologically and physically.		Critical Care Rehabilitation and Follow Up and Standardised Major Elective Surgery Post-Operative Pathways
82.1	Clinical identification and early management of sepsis in hospital : a system wide approach to improve service and sustain it for spread in other areas. There have been many criteria for the identification of sepsis in adults and children, predominantly for use in research to justify the inclusion of the right cases in research. The Sepsis 6 tool developed initially in adults uses more wider criteria with emphasis on use of criteria available at point of care or bedside. It is well known that use of such sensitive tools, even though taken up well initially, there is gradual attrition with cycles of reduced 'actions' or 'setbacks' in practice sometimes influenced by institutionally led measures to reduce 'indiscriminate antibiotic use'. There are so examples where the thresholds for trigger to treat as sepsis are raised. One of the important reasons is the concern that there may be low specificity for the tool with consequent exposure to large number of patients to antibiotics. This is in times of concerns about a rise in incidence of antibiotic resistance. However a rational practice with focus on review and early decision making in 48 hours, on the duration and type of antibiotic may limit the collateral effects such as antibiotic resistance and put less stress on resources. A study which	Patient population: Adults and children admitted to hospital / intensive care for clinical care - unscheduled or scheduled care who showed some deterioration. Intervention/service to test: Use of Sepsis 6 tool to identify and manage sepsis with emphasis on use of the appropriate antibiotic and care bundle incorporated with focus on appropriate antibiotic use, control / removal of focus and changing to narrow spectrum antibiotic based on culture results in the following 48 hours. Comparator/control: other centres who manage without the use of the tool or use a different method. Or use of a cluster randomized trial for implementation with step wedge randomization of centers to change in practice Outcomes: Mortality/Length of stay, incidence of multi-drug resistance, overall incidence of sepsis in the research participating center and economic evaluation.	Even though there has been an incredible improvement in the awareness of identification of sepsis, identification and management of sepsis is variable in different centers. Various measures have been used in the past to identify and manage sepsis but some of the non technical aspects/human factors involved in adopting a change in behaviours. This is in view of the various other factors which may influence front line staff and institutional policies. A sensitive tool to identify sepsis incorporated in to a package which focuses on good after care including measures to rationalize antibiotics would convince staff and institutions to adopt the tool.		Paediatric Intensive Care Medicine
82.2	Use of steroids in ex premature babies with Bronchiolitis. An observational study.	Patient: Infants who were born premature and subsequently discharged but re-admitted to PICU with respiratory illnesses related to viral infections. Intervention/service test: Observational evaluation of use of steroids for ventilator dependence Comparator: none Outcomes: Assessment of the prevalence of steroid use in these babies, mortality, duration on ventilator, adverse effects of steroids. This is with a view to understand the magnitude of the problem and also to identify patient specific clinical features which lead to steroid use.	With improvement in health care and technology, there have been significant improvements in babies admitted to Neonatal Intensive Care Units born prematurely. However even the survival to discharge home has improved, these babies have significant respiratory problems related to a combination of immature lungs at birth and side effects of respiratory support. There babies develop what is called chronic lung disease which is a combination of inflammatory and physical injury to lungs. During winter, a significant proportion of these babies with chronic lung disease become unwell with respiratory infections and require intensive care. Some babies recover quickly but a proportion end on ventilators for respiratory support. The practice is to start these babies who remain dependent on the ventilator on steroids to reduce lung inflammation. An understanding of the clinical features of babies with ventilator dependence and the outcomes following steroid use may help to evaluate use of steroids early in this cohort of patients and outcomes. This may need a Randomized Controlled Trial in the future.		Paediatric Intensive Care Medicine
83.1	How can we identify patients most likely to respond to treatment	P: Sepsis patients I: New therapies C: What we do now O: long term survival and quality of life	Sepsis still results in significant mortality and morbidity. Previous novel treatment strategies have failed so we need smarter ways to identify who will benefit and who won't.		ICU doctor
83.2	Can we identify patients too frail to benefit from ICU	P: Frail patients I: ICU admission C: ward care only O: survival, quality of life and cost-effectiveness	The patient population is getting older and more frail. More and more of these patients are now referred to ICU and it is unclear if ICU offers any real benefit.		ICU doctor

Respondent/ Question number	Question	PICO	Why is this important?	Additional comments	Area(s) of expertise?
83.3	Can we use new diagnostic tools to guide antibiotic treatment in sepsis	P: patients with sepsis I: new rapid pathogen detection devices to guide antibiotic prescribing C: Standard micro testing O: antibiotic use and patient outcomes	The important drive to treat sepsis better has led to a possible overuse of antibiotics. Can we safely use novel diagnostics to better guide and limit antibiotic use		ICU doctor
84.1	what dose of antibiotics should be used in critically ill patients on haemodialysis	measure blood levels of antibiotics where critically ill and HDF in operation. compare different centres using different doses and capture data on culture or signs of sepsis	Data on HD available. small studies on HF but very few on HDF - are treatment failures linked to low doses? changing antibiotics a sign of treatment failure?	A poison is a drug at the wrong dose. ITU studies often look at whether a drug is of benefit in ITU but few question the dose - eg phenytoin, ciprofloxacin, penicillin in endocarditis, anticoagulation in HF - no funding means no research	clinical pharmacy
84.2	Acute liver failure how much nitrogen can be tolerated in parenteral nutrition. Is ammonia level a useful guide?	How many ITUs in UK regularly measure NH3? how many measure NH3 in patients on PN with a ALT > 300	BN data in chronic liver failure implies give extra protein. However patients with acute liver failure and hepatic encephalopathy probably form a different cohort		clinical pharmacy
84.3	On admission to ITU what proportion of patients have low HB and platelets and is this associated with low levels of vit B, folate, iron and thiamine	make measuring these micronutrients part of the admission process to assess if supplementation is need previous estimates of 50% below normal levels	vit C, Se, Zn low levels on ITU associated poor outcomes. Is the same true of blood components and would supplementation decrease the need for blood transfusion, or part of transfusion rescue reduce need for erythropoietin and platelets	A poison is a drug at the wrong dose. ITU studies often look at whether a drug is of benefit in ITU but few question the dose - eg phenytoin, ciprofloxacin, penicillin in endocarditis, anticoagulation in HF - no funding means no research	clinical pharmacy
85.1	what is the optimal target for systemic oxygen saturation in mechanical ventilated critically ill children	P: Emergency admissions of critically ill children requiring mechanical ventilation and supplementary oxygen. I: Conservative oxygenation strategy SpO2 88-92 C: Liberal oxygenation strategy SpO2>94% O: Organ failure duration, LOS, Length of ventilation, mortality	Approx 19-20,000 critically ill children admitted to PICU annually. Around 60-70% require intubation and mechanical ventilation No evidence of optimal strategy and evidence from adult ICU studies of possible benefit at lower SpO2 whilst in extremely premature neonates the BOOST trials suggest the opposite. Hence large numbers of children would benefit from even a smaller advantage of one strategy over another both in the UK and around the world.		Paediatric Intensive Care
85.2	what is the optimal target for systemic blood pressure in mechanical ventilated critically ill children	P: Emergency admissions of critically ill children requiring mechanical ventilation and I: Conservative blood pressure support targeting >5th centile for age (assuming 50th height centile) C: Liberal blood pressure support strategy targeting BP >50th centile for age (assuming 50th height centile) O: Days on cardiovascular support. Organ failure duration, LOS, Length of ventilation, mortality	Blood pressure is measured in all 19-20,000 admissions to paediatric intensive care - observational data suggest values in excessive of age-adjusted normal distributions are commonplace. If lower targets were shown to be equivalent or superior then this would permit a reduction in interventions, expenses and duration of ICU with an improved patient and family experience and reduced costs.	The PICS-SG group have been very successful in facilitating collaborations nationally. All of these ideas have been discussed in this group and would be enthusiastically supported if commissioned.	Paediatric Intensive Care
85.3	What are the long-term neurodevelopment consequences of the full spectrum of paediatric critical illness?	All emergency or prolonged (>5 days) elective admissions to PICU. Standardised expert neurodevelopment follow up minimum of 12 months later. Comparisons to age matched healthy controls	PICU is a very expensive intervention. Currently outcomes are described in terms of length of stay and case mix adjusted mortality, with the PICANet registry we have a better understanding of outcomes than any other national service. However despite this, outside of a few areas of more intensive study (e.g post congenital heart disease surgery) we have no robust data on the long term health impact of our interventions. Collecting these data systematically would be an important step to making better decisions for our patients and designing better trials of simple interventions		Paediatric Intensive Care
86.1	What is the optimal method of administering antimicrobial therapy to patients with sepsis?	P: Critically ill patients with sepsis and septic shock. I: Antibiotic infusions v/ combinations of multiple agents C: Single antibiotic by bolus dosing O: Mortality; clinical cure; microbiological cure; antimicrobial resistance; triggers for escalation of antibiotics	Significant Australian and Asian evidence to support use of infusions but not extrapolatable to the NHS. Studies suggest improve rates of cure and reduced mortality using infusions. Significant amount of in-vitro and in-vivo evidence to suggest infusions are more effective. Effect of emergence of antimicrobial resistance have never been studied.		Anti-infective pharmacology; critical care trials
87.1	Do the use of cardiac output monitors change the outcome of critically ill patients	P: Critically ill patients on inotropes. I: a cardiac output monitor C: no cardiac output monitor O: mortality	Use of cardiac output monitors is very variable throughout the UK. They are expensive and may not improve outcome		
87.2	Does treatment of candida identified in the airway of critically ill patients with pneumonia improve outcomes?	P: Critically ill patients treated for ventilator associated pneumonia I: fluconazole C: placebo O: microbiological cure of pneumonia, mortality. Emergence of resistance	Candida is commonly isolated from the airway of patients in ICU. It is unclear if this requires treatment?		
88.1	the benefits of critical care patient follow-up services / clinics	trial / analysis involving follow-up teams & patients	so far staff & patients report huge benefit, yet there is minimal funding. if we could demonstrate benefit (to patients' health & wellbeing plus costs) then we may be able to justify funding to improve these services		Critical Care & research
88.2	early rehab for level 3 patients	NHSR portfolio adopted trials on the benefits of implanting early rehab (ie while in critical care) in the critically ill	early improvement in physical strength improves speed of recovery - physical & mental		Critical Care & research
89.1	Insufficient training of doctors in being better clinicians rather than followers of guidelines and protocols blindly. This needs to be remedied.	Patient population - no change Stricter performance evaluation of clinical service Not just outcomes but pointers like 1) time to recording correct history 2) Time to right clinical diagnosis 3) Relevance of tests ordered 4) Amount of time, effort and MONETARY savings to NHS by NOT ordering unnecessary tests 5) AND, still not compromising patient safety, by using improvised clinical skill plus judgement more than investigations plus following nonspecific guidelines/protocols. OUTCOMES to be measured - any difference in patient outcomes whilst comparing time/effort/monetary savings to NHS.	Lack of specificity and overall protocol driven practice adds to burden of NHS. Though protocols are built to promote safety, being patient specific to every one, helps in improving efficiency of care provided and results in enormous savings for NHS. This is the essence of the practice of medicine.	Apologies, as above are my views. Not meant to hurt anyone / organisation.	CRITICAL CARE
89.2	Accepting that critical care needs involvement and dedication. Hence, provision for longer working hours with adequate compensation, will lead to better recruitment and retention of professionals in critical care.	No change to patient population Offering extra supplements to those willing to work/train in critical care Comparing before/after enrollment/retention rates Measuring gaps in a rota in a unit, amount of need for locum work, money spent on locums, ease and safety of delivery of patient care by better continuity - if adequate personnel are available in a unit - these can be measured before and after the intervention.	Rather than saying all specialities are the same, the truth has to be accepted and appropriate recognition plus remuneration needs to be offered. This will lead to better long term solutions to workforce scarcity (doctors and non-doctors) and improved patient experience as well. NHS cost savings will be surely benefited.		CRITICAL CARE
89.3	Avoiding research trials where a hypothesis is proposed to be tested, if it is without a proper patho-physiological basis. The same amount of time/effort/money should be invested in imparting better clinical training to all, to evolve as better clinicians.		Though a variety of new trials bring about new results, many times they're not relevant and they only serve to stay as additional points in the CVs of the researchers. New individuals are recruited into research and paid salaries when actual clinical staff are in shortage - this needs to be addressed first.		CRITICAL CARE
90.1	What is the appropriate oxygen saturation for children admitted to paediatric intensive care units (PICU)?	P - all children mechanically ventilated following an unplanned admissions (unless contraindication to permissive hypoxia e.g. brain injury) I - targeting oxygen saturations between 88-94% C - targeting oxygen saturations >94% O - duration of mechanical ventilation; secondary outcome - organ injury	Oxygen is vital for cells to generate energy. In children with respiratory failure, needing mechanical ventilation, oxygen delivery can be increased by increasing the amount of oxygen given through a ventilator. However, oxygen can also be toxic if given in high quantity. In children with bronchiolitis and adults with myocardial infarction, recent evidence suggests that giving oxygen to achieve high oxygen saturations provides no benefit over accepting slightly lower saturations. We propose a similar trial in all children with respiratory failure needing mechanical ventilation. We hypothesise that targeting lower oxygen saturations will reduce the duration of mechanical ventilation, reducing the need for ICU stay and associated lung injury.		Paediatric Intensive Care
90.2	What is the appropriate blood pressure target for children admitted to paediatric intensive care units (PICU)?	Population Inclusion criteria: - Children admitted to PICU - Aged between 0 (>37 week corrected gestation age) and 16 years - With a systolic blood pressure measurement <50th centile for age Exclusion criteria: - Children with neurological injury - Children with pulmonary hypertension - Children with chronic hypertension - Children where end of life is perceived imminent Intervention Use of 5th centile systolic blood pressure as a threshold to guide therapy (left to the clinician's discretion) to restore blood pressure above this value Control Use of 50th centile systolic blood pressure as a threshold to guide therapy (left to the clinician's discretion) to restore blood pressure above this value Outcome Primary outcome: survival to ICU discharge Secondary outcome: length of ventilated stay; need for renal replacement therapy; hospital acquired infection; neurological sequelae at 1 year (new onset of seizures; drop in functional outcome scores)	Shock is a key feature of critically ill children. Blood pressure is one of the indicators of shock. However, blood pressure is difficult to measure accurately, and the definition of 'normal' blood pressure in children is poorly defined. There is an inherent bias towards higher blood pressures in PICU (above population 50th centile). Although this is often not targeted specifically, low blood pressure is treated aggressively with fluid or vaso-active drugs (either vasoconstrictors to squeeze blood vessels or inotropes to make the heart beat stronger). Excessive fluid use in critical illness can have adverse effects, both increasing mortality and length of ventilation. The use of vaso-active drugs can put unnecessary strain on the heart or redirect blood to or away from organs inappropriately. Adult studies have demonstrated that maintaining a relatively high blood pressure over a low blood pressure does not offer benefit in sepsis. We hypothesise that targeting a population defined 50th centile blood pressure does not offer any benefit over targeting a 5th centile blood pressure in children admitted to PICU. Targeting a lower blood pressure target can prevent over-treatment, and may reduce PICU stay.		Paediatric Intensive Care
90.3	What long term outcomes are acceptable for children admitted to the paediatric intensive care unit?	P - all children following unplanned admissions to PICU I - definition of acceptable outcomes for families of children admitted to PICU within the last 3 months, along with healthcare professionals C - definition of acceptable outcomes for families of children admitted to PICU >1 year ago O - comparison of acute and long term acceptable outcomes for families	Unplanned admissions to PICU are rare but resource hungry. Mortality has improved over the last 30 years. However chronic morbidity in survivors, either as a consequence of disease or treatment is increasing. Efforts to provide care 'at all costs' to keep children alive is often the norm. However, the best interests of children are sometimes difficult to determine. It is important to understand the goals of treatment both acutely and in the long term. This will both a) prove valuable clinical evidence for what is acceptable to families and healthcare professionals as goals of PICU treatment, and b) inform the research agenda for future trials to improve outcomes, especially as mortality rates continue to fall.		Paediatric Intensive Care

Respondent/ Question number	Question	PICO	Why is this important?	Additional comments	Area(s) of expertise?
91.1	Cardioplegic application in congenital heart surgery has made major gains over the past 10 years. However, recovery and outcome statistics continue to show a need to improve myocardial protection in young and high risk patients. Perioperative myocardial damage with low cardiac output remains the most common cause of morbidity and death after surgical repair. Myocardial damage from inadequate protection can prolong hospital stay and result in delayed myocardial fibrosis, leading to cardiac dysfunction months to years later. As the immature heart is less responsive to inotropic agents compared to the adult heart, preservation of myocardial function in immature hearts assumes even greater importance, because a perioperative insult is both less well tolerated and more difficult to treat. Hypothermic cardioplegia solution remains the standard method of myocardial protection in paediatric patients, either in the form of cold crystalloid or cold blood cardioplegia. There is a large body of experimental and clinical evidence in the literature that shows intermittent antegrade warm blood cardioplegia (WBC) preserves aerobic myocardial metabolism and improves clinical outcomes in adults. However, very little is known	Patient population – Paediatric patients undergoing operations requiring cardiopulmonary bypass (CPB) and cardioplegic arrest to repair congenital heart defects. Intervention – warm blood cardioplegia, i.e. blood cardioplegia at the same temperature as the body (34 degrees C). Control – cold blood cardioplegia, i.e. blood cardioplegia at 4-6 degrees C. Important outcomes to measure – objective measures of clinical and biochemical effectiveness, for example markers of myocardial ischaemia/reperfusion injury (e.g. cardiac troponin T) which is almost exclusively released from damaged heart cells, measures of cardiac function; myocardial performance; systemic oxygen delivery; cerebral function; renal function; cardiac and electrical activity; vasoactive-inotrope usage; intubation time; ICU and hospital stay; chest and wound infections; all-cause mortality.	Paediatric surgery for congenital heart defects is associated with significant morbidity and mortality. Hypothermic cardioplegia is the current mainstay of myocardial protection in the paediatric population, although this may be associated with greater myocardial ischaemia and dysfunction. Recent preliminary experience suggests that warm blood cardioplegia is safe in paediatric patients and may even be associated with improved outcomes. If the results of the research support the hypothesis that WBC contributes towards clinical and biochemical benefits to the participants, it is anticipated that the standard use of cold blood cardioplegia during paediatric CPB could be reviewed. A general reduction in postoperative hospitalisation and improved clinical outcome would benefit both patients and the NHS and will allow improvements to the clinical management for this high risk group of patients. In addition, the use of WBC has more practicable and cost-effective benefits, because a simple electrically driven pump can substitute for more complex blood/crystalloid mixing devices; and because the expenses related to these delivery systems, various biochemical additives, and fluid-removing ultrafilters or cell-saving devices are eliminated.		Clinical Trials
92.1	Anaemia - the consequences and management in adults AND CHILDREN after discharge from critical care	P: Anaemia I: Iron intravenous and oral C: No iron O: Long term outcomes to include physical and quality of life (and development)	Anaemia is common, and more so as restrictive transfusion thresholds are now used. Diagnosing iron deficiency is frequently a challenge with co-existing inflammation. But we also have poor understanding of the consequences and management which may be very important for long-term rehabilitation and recovery. The consequences of failing to manage anaemia, most commonly iron deficiency, may be magnified in children because of additional concerns about neurodevelopment or pregnancy (for older girls). Arguably the uncertainty of recognising and treating iron-depletion and deficiency in children is a major national public health issue		haematology
92.2	Clotting and platelet abnormalities	P: Critical illness, patients with no bleeding I: Better diagnostic tests (Eg TG, TEG/ROTEM) C: standard tests of laboratory O: bleeding, rationale use of blood, costs	Many adults and children admitted to critical care develop low platelet counts or abnormalities of clotting tests. These patients then often receive (costly and at risk) transfusions of platelets or plasma. We need to assess the role of better tests and explore alternatives to blood components as 'cover' for these patients, for example ahead of invasive procedures.		haematology
93.1	What intervention can we offer to patients to support their recovery from PTSD due to ICU delusions & flashbacks?	All patients admitted to ICU. Psychotherapy for trauma Usual care v enhanced care pathway mixed methods- pre&post hard outcome measures of PTSD, anxiety & depression and also qualitative data to capture patient experience	PTSD suffered has affect on whole family, person's recovery, and long term their ability to return to work. Cost to NHS in GP visits, medication etc. If untreated, cost of maladaptive coping mechanisms- drugs, alcohol etc.		
93.2	How can we prevent our patients from suffering hallucinations/delusions which go on to be traumatising				
94.1	Who (if any) will benefit from fluid resuscitation? If we find who then how much fluid? What should we do with those who don't	Patients with Septic Shock Revisit an Early Goal Directed Therapy Trial Current Best Practice 30ml/kg Mortality	Promise / Arise / Process only assessed goal directed therapy AFTER initial resuscitation. Current data is basically from single centre.		Sepsis / Infection
94.2	How much renal replacement therapy should I use?	All ICU patients with pre-defined AKI Dose range of RRT from Nothing / Delayed to high exchanges Current Practise Mortality / Rate of renal recovery	Could be cost saving as we don't know whether RRT is any good at all.		Sepsis / Infection