

## Appendix

This appendix was part of the submitted manuscript and has been peer reviewed. It is posted as supplied by the authors.

### *Supplementary Material for:*

#### **Priorities for Pediatric Critical Care Research – a Modified Delphi Study by the Australian and New Zealand Intensive Care Society Paediatric Study Group**

Sainath Raman<sup>1,2\*</sup>, MRCPCH, PhD, FCICM, Georgia Brown<sup>3,4\*</sup>, MD, FCICM, Debbie Long<sup>1,2,5</sup>, RN, PhD, Ben Gelbart<sup>3,4</sup>, MD, FCICM, Carmel Delzoppo<sup>3,4</sup>, Johnny Millar<sup>3,4</sup>, MD, PhD, FCICM, Simon Erickson<sup>6</sup>, MD, FCICM, Marino Festa<sup>7,8</sup>, MD, FCICM, Luregn J Schlapbach<sup>1,2,9</sup>, MD, PhD, FCICM on behalf of the Australian and New Zealand Intensive Care Society Paediatric Study Group (ANZICS PSG)

### **Supplementary Content:**

- 1. Supplemental Methods**
- 2. Supplemental Table 1. Eligible participants at each participating site**
- 3. Supplemental Table 2. Complete list of research questions.**
- 4. Supplemental Table 3. All Outcomes.**
- 5. Supplemental Table 4. Top 20 research priorities with sub-scores.**
- 6. Supplemental Table 5. Top 20 outcomes with sub-scores.**
- 7. Supplemental Table 6. Top 40 Priorities stated by Nurses**
- 8. Supplemental Table 7. Top 40 Priorities stated by Doctors**
- 9. Supplemental Figure 1: Comparison of the mean classification of research priorities by Hanlon Score versus Delphi Score for each question.**
- 10. Supplemental Figure 2: Comparison of the mean classification of research outcomes by Hanlon Score versus Delphi Score for each outcome.**

## Supplemental Methods

Modified Delphi survey of research priorities and clinical outcome priorities for paediatric critical care in Australia and New Zealand. In stage 1 and 2, surveys were performed with senior medical and nursing staff working in the 9 PICUs in Australia and New Zealand. In stage 3, the responses were further prioritised by the ANZICS PSG committee using the Hanlon Process of Prioritisation in a closed face-to-face meeting on March 5th, 2020.

### *Stage 1:*

Stage 1 survey was open from September to November 2019. Specifically, the eligibility criteria included i) consultants working in paediatric intensive care in ANZ; ii) senior ANZ College of Intensive Care Medicine (CICM) trainees, with at least 2 years experience following either the CICM Primary, ANZ College of Anaesthetists, Primary or the Royal Australasian College of Physicians exam or iii) specialist level critical care nurses with a minimum of 2 years experience working in PICU.

The ANZICS PSG medical representative and research coordinators at each site distributed the survey. The response rate was calculated from the number of eligible respondents at each site (**Supplementary Table 1**). Submissions that were more general or observational and did not conform to the PICO model were retained (**Supplementary Table 2**). The proposed clinical outcomes were reviewed using a similar approach by the same expert panel (**Supplementary Table 3**).

The survey provided 267 individual research questions and 234 individual outcomes. This list was reduced to 89 research questions and 65 outcomes for Stage 2 survey by the expert panel.

### *Stage 2:*

Stage 2 survey was open from November 2019 to January 2020. Medical and nursing staff working in PICUs across ANZ who responded to Stage 1 were invited to participate in the Stage 2 online survey. Respondents were requested to score the importance of each research question and clinical outcome on a 7-point Likert scale (1=not a priority, 2=low priority, 3=somewhat priority, 4=neutral, 5=moderate priority, 6=high priority, 7=essential priority). Reminders were sent weekly by individual email over a 2 month period until the desired (>60%) response rate was achieved. Ranking by mean was done for all respondents, and separately for nursing and medical respondents.

### *Stage 3:*

All ANZICS PSG Committee members (n=26) participated at the stage 3 face-to-face HPP meeting. We opted to restrict Stage 3 to the ANZICS PSG committee because Stage 3 required sound knowledge and understanding of paediatric critical care research. In preparation for the The Hanlon Prioritisation Process (HPP), the expert panel (GB, SR, LJS, DL, SE, MF) grouped the research questions selected in Stage 2 into themes. The results and ranking of Stage 2 were then sent to each participant with instructions on the HPP. A full-day face-to-face meeting with

videoconference option for participants unable to attend was organized as part of the ANZICS Clinical Trials Group Meeting in Noosa, Australia, March 5th 2020.

The participants at the HPP consultation day were then sent a final survey that included all the top questions discussed at the face-to-face session. They were asked to score each question under the four domains outlined above. The outcomes were scored for seriousness and feasibility only. The survey remained open for 6 weeks after the stage 3 meeting, aiming at >80% response rates.

The top 20 research questions and outcomes ordered according to Hanlon Score are reported. The mean score for the likelihood to participate domain on the final survey was reported separately for each question. No inferential statistical testing was performed.

**Supplemental Table 1. Eligible participants at each participating site**

<b>Site</b>	<b>Consultants</b>	<b>Registrars</b>	<b>Nurses</b>
A	8	4	55
B	10	15	90
C	5	8	66
D	21	28	138
E	16	6	140
F	6	7	0
G	7	2	70
H	8	0	13
I	81	70	572

**Supplemental Table 2. Complete list of research questions.**

<b>Research Question</b>	<b>Priority Mean (SD)</b>
What is the health-related quality of life for children following PICU discharge? P: Critically ill children admitted to PICU I/C: N/A O: Health related quality of life assessment at baseline (parent/patient interviews) and at 6 months (telephone interviews) to determine health related quality of life following paediatric critical illness.	5.6 (1.1)
What strategies will improve nursing staff work-place satisfaction and retention? P: PICU Nursing staff I/C: N/A O: Survey of workplace practices to determine factors that contribute to poor satisfaction and retention of nursing staff.	5.5 (1.3)
What matters to families when their child is in PICU? P: Families of critically ill children I/C: N/A O: Survey of what matters to families/family experience	5.4 (1.2)
Does early inotrope use improve outcomes in paediatric sepsis?P: Critically ill children with septic shock I: Early inotrope infusion C: Standard (SSC) treatment algorithm (40-60ml/kg fluid) O: Organ Failure/ventilation/ICU stay/mortality	5.4 (1.3)
Do fluid boluses increase mortality in paediatric sepsis? P: Patients with Sepsis I: Restrictive fluid bolus strategy C: Standard/liberal fluid bolus strategy O: mortality, PICU LOS, duration of organ dysfunction	5.4 (1.1)
Does early mobilisation improve outcomes in critically ill children? P: Critically ill children in PICU I: Early mobilisation C: Standard care O: ICU/Hospital stay, ventilation time, incidence of delirium	5.3 (1.2)
What is the long-term neurological outcomes of ECMO survivors? P: ECMO Survivors I/C: N/A O: Longitudinal neurodevelopmental follow-up	5.3 (1.4)
Does early psychological intervention improve family well-being during/after a PICU admission? P: Families of critically ill children I: early psychological support intervention C: standard family care O: family wellbeing and stress during PICU and post discharge	5.2 (1.3)
What is the prevalence and factors contributing to moral distress, burn-out and PTSD amongst PICU staff? P: PICU Staff I: Survey C:N/A O: Prevalence and factors contributing to moral distress, burn-out and PTSD.	5.2 (1.5)
What factors predict adverse events and long-term outcomes following PICU admission? P: Critically ill children admitted to PICU I/C: N/A O: Longitudinal follow-up following PICU discharge to determine long term functional status, neurodevelopmental outcomes, predictors of adverse outcomes.	5.2 (1.5)
Following critical events, does psychological first aid training and debriefing reduce the incidence of moral distress and burn-out? P: PICU Staff I: Provision of psychology training/services C: Current practice O: incidence/prevalence of moral distress/ burnout.	5.2 (1.5)
What are the factors that influence organ donation consent rate? P: Family of potential organ donors in PICU I/C: N/A O: Survey to determine patient, family, medical and institutional factors that determine conversion to an informed consent and donation process.	5.1 (1.3)
Does fluid restrictive resuscitation improve outcomes in children with sepsis? P: Critically ill children with suspected infection I: Algorithm to guide decisions to start and stop antibiotics C: Standard care O: Reduction in antibiotic usage,	5.1 (1.3)

reduction of microbial resistance, safety: survival, PICU LOS, costs.	
Can we use ANZPIC data to create metrics for the benchmarking of quality and safety in PICU? P: ANZPIC registry data on critically ill children admitted to PICU I/C: N/A O: Development of predictive models for the likelihood of various metrics (Duration of mechanical ventilation, cardiac arrest, acute kidney injury)	5.1 (1.2)
Does targeting high serum sodium improve neurological outcome in children following traumatic brain injury? P: Patients with traumatic brain injury. I: Maintain serum Na > 149. C: Serum Na > 135. O: ICP, neuro outcome	5.1 (1.1)
Does invasive neuromonitoring improve outcome following severe traumatic brain injury? P: Children with severe TBI. I: ICP monitoring. C: No ICP monitoring. O: Mortality/neuro outcome at 6 & 12 months	5.1 (1.2)
Can haemodynamic or echocardiographic parameters improve effectiveness of fluid resuscitation in critically ill children? P: Critically ill children requiring fluid resuscitation I: Fluid administration guided by haemodynamic or echocardiographic parameters C: Current practice O: Mortality, Ventilation time, inotrope use, cumulative fluid balance	5.1 (1.2)
Do standardised antibiotic algorithms improve antibiotic usage/resistance and outcomes for patients with suspected infection? P: Critically ill children with suspected infection I: Algorithm to guide decisions to start and stop antibiotics C: standard care O: reduction in antibiotic usage, reduction of microbial resistance, safety: survival, PICU LOS, costs	5.1 (1.2)
Does a restrictive fluid strategy improve outcomes in critically ill children? P: Critically ill children requiring fluid resuscitation and maintenance I: Restrictive fluid strategy C: Liberal strategy O: duration of organ dysfunction, PICU LOS, mortality	5.1 (1.1)
What is optimal sedative regimen for critically ill children requiring mechanical ventilation? P: Critically ill children requiring mechanical ventilation I: Protocolised combination therapy of analgesia (morphine, fentanyl, ketamine) and sedation (dexmedetomidine, midazolam, propofol), C: standard care or specific sedative agent O: short term outcomes (PICU length of stay, ventilator-free days, delirium) long-term cognitive/behavioural/functional/quality of life outcomes	5.1 (1.5)
Does enteral feeding of newborns treated with alprostadil for duct-dependant cardiac lesions increase the risk of NEC? P: Neonates on prostin with duct dependant cardiac lesion I: Enteral feeding C: Parenteral feeding O: Incidence of Necrotising Enterocolitis.	5.1 (1.4)
Do care pathways for specific post-operative cardiac lesions shorten ICU or hospital stay? P: Patients undergoing surgical repair for specific congenital heart lesion I: Protocolised care pathway C: Current management O: Mortality, PICU/hospital stay	5.1 (1.2)
Does ECMO improve outcomes in critically ill children with septic shock? P: Critically ill children with septic shock I - ECMO C - standard treatment O - survival, organ failures, long-term outcomes.	5.0 (1.4)
Does a Delirium bundle reduce the incidence of delirium in critically ill children? P: Critically ill children I: Delirium prevention bundle C: Standard Care O: Incidence of delirium	5.0 (1.2)
Do non-pharmacological interventions reduce exposure to sedative agents? P: Critically ill children requiring mechanical ventilation I: Non-pharmacologic interventions for sedation C: Standard care sedative agents O: Cumulative exposure to sedation agents	5.0 (1.1)

Does integration of nurse-led management improve work-place satisfaction and retention? P: PICU nursing staff I: Increased nursing responsibility (For example: Nurse led ventilation/ sedation weaning) C: Current model of care O: Patient outcomes and nursing staff workplace satisfaction and retention	5.0 (1.6)
Does a restrictive fluid strategy improve outcomes following paediatric surgery? P: Children admitted to PICU post surgery I: Restrictive fluid strategy C: Standard maintenance fluid O: Mortality, ventilation time, length of stay	5.0 (1.1)
Which neuromonitoring method best predicts neurological outcome? P: Patients with traumatic brain injury I: Invasive neuromonitoring C: Non-invasive neuromonitoring (EEG/NIRS/SSEP/Serum markers/Neuroimaging) O: Mortality, neurological outcome, long-term neurological outcome	5.0 (1.3)
What is the best anticoagulant in paediatric ECMO? P: Paediatric ECMO I: Bivalirudin as primary anticoagulation strategy C: Heparin anticoagulation O: Haemorrhagic, thrombotic, circuit complications	5.0 (1.4)
Does a structured patient hand-over tool decrease the incidence of adverse events? P: Medical and nursing staff I: Structured handover tool C: Current practice O: Incidence of reported adverse events	4.9 (1.5)
Does Venovenous ECMO improve outcomes in critically ill children with ARDS? P: Critically ill children with ARDS I: VV ECMO C: Standard ventilation protocol O: ventilator free days/Oxygen-free days	4.9 (1.3)
What is the best ventilation strategy for patients on ECMO? P: Patients on ECMO I: Open-lung strategy conventional ventilation algorithm C: 'Rest settings' O: Duration of ECMO/duration of mechanical support.	4.9 (1.3)
Does Simulation Team Training improve outcomes for paediatric cardiac arrest? P: Critical care staff I: Simulation training C: Technical skills training O: Outcomes post paediatric cardiac arrest, time to ECMO initiation.	4.9 (1.6)
Do pain assessment tools/algorithms reduce exposure to sedative agents? P: Critically ill children requiring mechanical ventilation I: different tools/algorithms for pain assessment, C: standard care pain management O: cumulative exposure to analgesic agents, duration of ventilation, duration of PICU stay	4.9 (1.3)
What is the optimal timing of tracheostomy in children requiring prolonged ventilation? P: Paediatric patients requiring prolonged ventilation I: Tracheostomy at 2 weeks C: Standard care O: Mortality, ventilation time, adverse events	4.9 (1.4)
Does early institution of renal replacement therapy improve outcomes in patients with acute kidney injury? P: Critically ill children requiring renal replacement therapy I: Early/ prophylactic RRT C: Standard Care O: PICU mortality, Length of ventilation, PICU/Hospital stay	4.9 (1.2)
What is the optimal weaning plan for analgesia and sedation cessation? P: Critically ill children requiring mechanical ventilation on analgesic and sedative agents for >48hrs I: Rapid weaning strategy, C: standard weaning strategy O: short term outcomes (PICU length of stay, ventilator-free days, delirium, early mobilisation acquired weakness	4.9 (1.4)
Do balanced crystalloid solutions reduce the incidence of metabolic acidosis and renal dysfunction in critically ill children? P: Critically ill children requiring maintenance fluid I: Balanced crystalloid solutions C: Saline O: Incidence of metabolic acidosis and renal dysfunction	4.9 (1.1)
Does early enteral nutrition improve outcomes in critically ill children? P: Critically ill children I: early enteral feeding C: standard care (or late enteral feeding) O: caloric intake, NEC, PICU length of stay, mortality	4.9 (1.4)

What is the safety profile and long-term effect of sedative agents? P: Critically ill children requiring mechanical ventilation I: Specific agent, dose or protocol of sedative agents C: Standard care or specific sedative agent O: Long-term cognitive/behavioural/functional/quality of life outcomes	4.8 (1.4)
What is the best test for heparin anticoagulation during ECLS? P: Patients on ECLS anticoagulated with heparin I: APTT algorithm for heparin management C: ACT management of heparin O: Thrombotic, haemorrhagic, circuit complications.	4.8 (1.4)
Does high frequency ventilation improve outcomes in children with acute lung injury? P: Children with acute respiratory failure. I: High frequency Oscillation C-Conventional ventilation O-Survival, ventilator free days	4.8 (1.3)
Does pharmacological therapy reduce the incidence of delirium and improve outcomes in critically ill children? P: Critically ill children I: Pharmacological therapy (Anti-psychotic) C: Standard care or placebo O: Incidence of delirium, ICU LOS, duration of mechanical ventilation	4.8 (1.3)
Does 100% Caloric (or protein) intake improve outcomes in critically ill children? P: Critically ill children I: Enteral feeding targeting at least 100% caloric (or protein) intake C: Standard care (or reduced caloric/protein intake) O: caloric intake, NEC, PICU length of stay, mortality	4.8 (1.3)
Do transfusion thresholds influence neurodevelopmental outcomes following paediatric cardiac surgery? P: Newborns having cardiac surgery (stratified by uni/bi-ventricular lesions) I: Restrictive Hb target C: Usual Hb target O Primary - neurodevelopment outcome at 6mo, 6yrs	4.8 (1.2)
Who should clear a C-Spine for paediatric trauma patients admitted to PICU? P: Children with C-spine precautions post-trauma. I: C-spine clearance by PICU medical staff using MRI, CT & clinical assessment. C: Clearance by orthopaedics/neurosurgery O: Efficient clearance of C-spine, time in C-spine precautions, safety	4.8 (1.7)
What neuromonitoring methods best predict neurological outcome on ECMO? P: Children requiring ECMO I: Neuromonitoring (NIRS/ EEG) C: Standard care O: Neurological outcome	4.8 (1.3)
Is there a 'best' drug regime for patients in PICU with cardiomyopathy? P: Children with cardiomyopathy needing inotropes in PICU I&C: Two alternative inotrope/dilator regimens O: Duration of intravenous therapy	4.8 (1.3)
Can Thromboelastography be used to guide heparin anticoagulation during ECLS? P: Patients on ECLS anticoagulated with heparin I: TEG-based algorithm for heparin management C: Standard management of heparin O: Circuit longevity, blood product exposure, bleeding or thrombotic complications.	4.8 (1.2)
Is a restrictive sedation and analgesic bolus strategy safe and does it reduce duration of mechanical ventilation in children ventilated for greater than 48 hours? P: Critically ill children requiring mechanical ventilation I: sedation/analgesia bolus protocol (dosing and weaning), C: standard care without specific bolus protocol O: short term outcomes (PICU length of stay, ventilator-free days, delirium, early mobilisation acquired weakness long-term cognitive/behavioural/functional/quality of life outcomes	4.7 (1.3)
Does heparin concentration influence the incidence of central line occlusion and infection? P: PICU patients with central line with unused lumen I: strong heparin C: weak heparin O: Rate of line occlusions and CLABSI	4.7 (1.6)
Does administration of "high flow" high flow oxygen decrease rate of intubation in patients with bronchiolitis. P: Children in PICU with acute bronchiolitis. I: 3L/m HHFO2. C: 2L/m HHFO2. O: Rate of intubation	4.7 (1.6)

Does early BiPap administration reduce the need for invasive ventilation in children with respiratory failure? P: Children with acute respiratory failure. I: Early BiPAP. C: No BiPAP, no HHFNC O: Need for invasive ventilation	4.7 (1.5)
Does systemic steroid administration improve outcomes in paediatric ARDS? P: Children with ARDS. I: Systemic steroids. C: No steroids. O: Mortality, Ventilation time, Oxygenation	4.7 (1.5)
Does the use of delayed consent within the acute intensive care setting reduce parental stress? P: Families of critically ill children considered for interventional research I: delayed (deferred, consent-to-continue) consent C: prospective consent O: family stress level during admission	4.7 (1.6)
Is a conservative versus liberal oxygenation target safe? P: Children in ICU. I: Conservative oxygen targets C: Liberal oxygen target O: mortality/organ dysfunction/ adverse events	4.7 (1.3)
Does prophylactic line heparin reduce the risk of line related thrombosis? P: All children with central lines I: Prophylactic heparin infusion (10units/kg/hr) C: Saline flush O: Line related thrombosis, CLABSI	4.6 (1.5)
Does nurse-led physiotherapy reduce adverse events in mechanically ventilated children? P: Children requiring mechanical ventilation I: Nurse led chest physiotherapy C: Standard VAP bundle O: Reduced Incidence of VAP/ mechanical ventilation time	4.6 (1.5)
Does Sibling support reduce the psychological impact of PICU admission upon patient and families? P: Siblings of critically ill children I: psychological sibling intervention C: standard family care O: stress, anxiety, PTSD, depression of sibling and family during and post PICU stay	4.6 (1.4)
Can a structured training package for ETT strapping reduce adverse events? P: Children with an endotracheal tube I: Structured training package for endotracheal tube strapping C: Standard care O: Reduction in accidental extubation and the incidence of pressure areas	4.5 (1.6)
Does observation during resuscitation improve adherence to resuscitation guidelines and patient outcomes? P: In-hospital paediatric cardiac arrest I: Real time observation/monitoring of resuscitation practices with education and feedback C: Current practice O: Adherence to current resuscitation guidelines and improved patient outcomes	4.5 (1.5)
Does 20% albumin administration improve haemodynamic parameters in post-operative cardiac patients? P: Post-operative cardiac patients I: 20% Albumin bolus C: Fluid bolus or 4% Albumin bolus O: Haemodynamic parameters.	4.5 (1.3)
Does plasmfiltration improve outcome in septic shock? P: Critically ill children with sepsis I: Plasmfiltration C: Standard care O: Mortality, ICU LOS, Ventilation time	4.5 (1.4)
Q36: Does implementation of an early warning tool in the emergency department help to identify critically ill children? P: Children in the Emergency Department/Ward I: Specific Early Warning Tool C: Standard care O: PICU admission, PICU length of stay, mortality, health care costs	4.5 (1.5)
Q66: Is point of care testing for suspected infection safe and effective? P: Critically ill children with suspected infection I: Point of care testing for infection C: Current practice O: Sensitivity/specificity of POC testing, time to appropriate antibiotic therapy	4.5 (1.2)
Q47: Does rescue craniotomy improve outcome following severe traumatic brain injury? P: Children with severe TBI. I: Rescue craniotomy. C: No rescue craniotomy. O: Neuro outcome at 6 and 12 months	4.5 (1.6)



Q85: What is the safety profile of high-dose diuretics? P: Critically ill children receiving diuretics I: High dose diuretics C: Low dose diuretics O: Net diuresis and adverse effects (mortality, renal dysfunction, ventilation time).	4.5 (1.2)
Q55: Does the use of chlorhexidine mouthwash reduce the incidence of VAP in mechanically ventilated children? P: Children requiring mechanical ventilation I: Chlorhexidine mouth wash C: Standard oral care and suctioning O: Incidence of VAP	4.4 (1.4)
Q83: What is the safe platelet transfusion threshold for patients on ECMO? P: Children on ECMO I: Restrictive platelet transfusion thresholds C: Liberal Platelet transfusion threshold O: thrombotic, haemorrhagic, and circuit complications	4.4 (1.4)
Q5: Can machine learning aid us in anticipating adverse events and improve outcomes? P: Critically ill children I/C: N/A O: Utilisation of artificial intelligence/ machine learning to guide prediction of adverse events/ mortality/ long-term outcomes	4.4 (1.3)
Q68: Is vasopressin effective in treating pulmonary hypertension following cardiac surgery? P: Patients post cardiac surgery at risk of pulmonary hypertension I: Vasopressin infusion C: No Vasopressin O: Primary - duration of ventilation/ventilator free days.	4.4 (1.2)
Q41: Does no/single-dose adrenaline improve outcomes in children post in-hospital cardiac arrest? P: In-hospital paediatric cardiac arrest I: No adrenaline (or single dose adrenaline) C: Current ILCOR adrenaline guidelines O: ICU/ hospital mortality, Neurodevelopmental outcome	4.4 (1.3)
Q18: Does a rapid ultrasound and Echo teaching package lead to reliable identification of clinically relevant abnormalities in ICU trainees? P: Intensive Care trainees I: Online ultrasound/ echo training module based training (with small volume logbook) C: ultrasonographer/ cardiology fellow performed ultrasound/echo O: Able to reliably identify clinically relevant ultrasound signs (e.g. LV dysfunction, RV dysfunction, pericardial effusion, pleural effusion, absent "lung slide"/pneumothorax, lung consolidation)	4.4 (1.5)
Q48: Does saline lavage with ETT suctioning reduce length of ventilation for patients with respiratory illnesses P: Intubated PICU patients. I: Saline lavage suctioning. C: Standard suctioning. O: Duration of ventilation, incidence of VAP	4.4 (1.6)
Q58: Does viscoelastic testing reduce blood product administration and incidence of bleeding/clotting events? P: Paediatric patients with major haemorrhage I: Viscoelastic testing (TEG or ROTEM) C: Current coagulation tests and Major haemorrhage protocols O: Blood product administration and incidence of bleeding/adverse outcomes	4.4 (1.3)
Q54: Does the speed of fluid administration affect patient outcomes? P: Critically ill children requiring maintenance fluids I: Balanced crystalloid solutions (Plasmalyte, Hartman`s) C: 0.9% Saline O: Incidence of metabolic acidosis, renal dysfunction	4.4 (1.4)
Q65: Is levetiracetam effective in preventing seizures following severe traumatic brain injury in children? P: Severe traumatic brain injury. I: Levetiracetam. C: Phenytoin. O: Incidence of seizures post-TBI	4.4 (1.3)
Q57: Does treating hypoalbuminemia improve outcome? P: Critically ill children with hypoalbuminemia I: liberal albumin replacement C: restrictive albumin replacement O: duration of ventilation, PICU length of stay	4.4 (1.3)
Q23: Does Chloral Hydrate improve tolerance of respiratory support in children with bronchiolitis? P: Critically ill infants with bronchiolitis I: Chloral hydrate, C: no chloral hydrate, O: PICU length of stay, toleration of non-invasive and invasive	4.3 (1.7)

therapy, long-term outcome	
Q2: Are bolus enteral feeds safe compared to continuous enteral feeds? P: Critically ill children which are enterally fed I: Bolus feeding C: Continuous feeding O: Caloric intake, NEC, aspiration, PICU length of stay	4.2 (1.4)
Q77: What is the incidence/mechanism of immune dysfunction in PICU patients? P: Critically ill children I/C: N/A O: Incidence/ mechanism of immune dysfunction	4.2 (1.3)
Q53: Does the mode of renal replacement therapy effect filter life and treatment efficacy? P: Critically ill children requiring renal replacement therapy I: Haemodialysis C: Haemofiltration O: Filter life and treatment efficacy.	4.2 (1.4)
Q39: Does measuring gastric residual volume reduce the incidence of adverse effects? P: Critically ill children which are enterally fed I: measuring gastric residual volumes C: not measuring gastric residual volumes O: VAP, caloric intake, NEC, PICU length of stay	4.2 (1.6)
Q61: How does gene activation/deactivation impact on clinical outcomes in critical illness in infants and older children? P: Critically ill children I/C: N/A O: Gene activation/deactivation during critical illness	4.1 (1.5)
Q40: Does monitoring/ treatment of immune dysfunction, improve outcome in children with acute encephalopathy? P: Children with acute encephalopathy I: Monitoring immune function/ administration of steroids/ plasma exchange C: Standard care O: Neurological outcome	4.1 (1.3)
Q82: What is the role of measured fraction of expired oxygen (FeO <sub>2</sub> ) for assessment of adequacy of preoxygenation? P: Children requiring intubation I: Measurement of FeO <sub>2</sub> C: Standard care O: Incidence of hypoxia/adverse events during intubation	4.0 (1.5)
Q64: Is Electrical impedance Tomography useful to determine lung volume/ventilation distribution and guide ventilation strategy? P: Children requiring mechanical ventilation I: Lung Electrical Impedance Tomography C: Standard care /Standard imaging modalities (computed tomography) O: Length of ventilation	3.9 (1.3)
Q34: Does high frequency JET ventilation improve outcomes in children with acute lung injury? P: Children with acute respiratory failure. I: Jet ventilation C: Conventional ventilation. O: Survival, ventilator free days	3.9 (1.5)
Q78: What is the incidence/mechanism of mitochondrial dysfunction in PICU patients? P: Critically ill children I/C: N/A O: Incidence of mitochondrial dysfunction	3.9 (1.4)

**Supplemental Table 3. All Outcomes.**

<b>Outcome</b>	<b>Priority Mean (SD)</b>
PICU staff wellbeing	5.7 (1.2)
Staff burnout	5.6 (1.2)
PICU staff retention	5.5 (1.2)
Mortality long-term $\geq$ 12 months post PICU discharge	5.5 (1.1)
Survival $\geq$ 12 months post PICU discharge with good neurodevelopment (functional, cognitive, motor, behavioural, adaptive)	5.5 (1.3)
Neurodevelopment assessed $\geq$ 12 months post discharge (functional, cognitive, motor, behavioural, adaptive)	5.4 (1.2)
Mortality in PICU	5.4 (1.2)
New disability after PICU stay	5.4 (1.1)
Quality of Life assessed $>$ 12 months post PICU discharge	5.4 (1.2)
Unexpected adverse events during PICU stay (such as complications of treatment)	5.4 (1.1)
Post-Traumatic Stress Disorder in PICU staff	5.4 (1.3)
Mortality in hospital	5.3 (1.2)
Physical morbidities assessed $\geq$ 12 months post PICU discharge (including dependences such as ventilator dependence)	5.3 (1.3)
Physical morbidities acquired during PICU stay	5.3 (1.1)
Organ donation	5.3 (1.3)
Post-Traumatic Stress Disorder in patients	5.3 (1.2)
Central Line Associated Bloodstream Infection	5.3 (1.3)
Patient comfort	5.2 (1.1)
Duration of ventilation	5.1 (1.1)
Multi-organ dysfunction	5.1 (1.1)
Ventilator-associated complications (including pneumonia)	5.1 (1.1)
Pain	5.1 (1.2)
Family function and wellbeing post discharge (including separation/unity)	5.0 (1.4)

Acute Kidney Injury	5.0 (1.1)
Mental health in patients assessed $\geq$ 12 months after PICU discharge	5.0 (1.3)
PICU readmission	5.0 (1.1)
Delirium during PICU	5.0 (1.3)
Survival free of organ dysfunction (days alive and free of organ dysfunction)	5.0 (1.3)
Family satisfaction with care provided, assessed $\geq$ 12 months post PICU discharge	5.0 (1.3)
Post-Traumatic Stress Disorder in family members	5.0 (1.3)
Ventilator-free days (defined as days alive and free of mechanical ventilation)	5.0 (1.1)
Family satisfaction with care provided, assessed at time of hospital discharge	4.9 (1.3)
PICU Length of Stay	4.9 (1.2)
Parental distress assessed during PICU stay	4.9 (1.2)
Survival free of ECMO (alive and free of ECMO)	4.9 (1.4)
Treatment with Extracorporeal Membrane Oxygenation	4.9 (1.4)
Paediatric Overall Performance Category	4.9 (1.2)
PICU resource consumption	4.9 (1.3)
Hospital Length of Stay	4.9 (1.1)
Failed extubation	4.9 (1.2)
Duration of organ support	4.9 (1.2)
Escalation of respiratory support in PICU	4.9 (1.2)
Low Cardiac Output Syndrome	4.9 (1.3)
Pressure injuries	4.8 (1.3)
Quality of Life assessed at time of discharge from hospital	4.8 (1.2)
School-age educational outcomes	4.8 (1.6)
Equity of healthcare provided	4.8 (1.4)
Dependence on medical technology at discharge	4.7 (1.5)
Lung recruitment (measures such as Oxygenation index)	4.7 (1.3)
Duration of inotrope support	4.7 (1.3)
Survival free of sedation (days alive and free of sedation)	4.7 (1.3)
Direct health-care related costs	4.7 (1.6)
Glasgow Outcome Scale	4.6 (1.4)

PICU admission	4.6 (1.2)
Accidental extubation	4.6 (1.6)
Duration of ECMO	4.6 (1.3)
Consent rates	4.5 (1.4)
Re-admission to hospital	4.5 (1.4)
Respiratory function post hospital discharge	4.4 (1.4)
Post-operative arrhythmia	4.4 (1.3)
Physical growth	4.4 (1.2)
Respiratory function at hospital discharge	4.3 (1.3)
Reduction in oxygen support	4.3 (1.3)
Weight loss	4.2 (1.5)
Economic productivity in adulthood (such as paying taxes)	4.0 (1.6)

**Supplemental Table 4. Top 20 research priorities with sub-scores.** The Hanlon score refers to the product of prevalence times seriousness times feasibility scores.

<b>Number</b>	<b>Hanlon Score (PxSXF)</b>	<b>Research Questions</b>	<b>Participation Mean (SD)</b>	<b>Prevalence Mean (SD)</b>	<b>Seriousness Mean (SD)</b>	<b>Feasibility Mean (SD)</b>
1	505.0	Does a restrictive fluid strategy improve outcomes in critically ill children? P: Critically ill children requiring fluid resuscitation and maintenance I: Restrictive fluid strategy C: Liberal strategy O: duration of organ dysfunction, PICU LOS, mortality	7.8 (1.5)	8.2 (1.5)	8.3 (1.2)	7.5 (1.4)
2	494.4	What matters to families when their child is in PICU? P: Families of critically ill children I/C: N/A O: Survey of what matters to critically ill children I/C: N/A O: Survey of what matters to families/family experience	7.8 (1.9)	8.3 (2.1)	7.4 (2.3)	8 (1.7)
3	435.0	What is the health-related quality of life for children following PICU discharge? P: Critically ill children admitted to PICU I/C: N/A O: Health related quality of life assessment at baseline (parent/patient interviews) and at 6 months (telephone interviews) to determine health related quality of life following paediatric critical illness.	7.9 (1.2)	7.9 (1.8)	7.7 (1.4)	7.2 (1.6)
4	427.0	Does early inotrope use improve outcomes in paediatric sepsis? P: Critically ill children with septic shock I: Early inotrope infusion C: Standard (SSC) treatment algorithm (40-60ml/kg	7.5 (1.8)	7.0 (1.9)	8.0 (1.4)	7.5 (1.4)
5	425.7	Is a conservative versus liberal oxygenation target safe? P: Children in ICU. I: Conservative oxygen targets C: Liberal oxygen target O: mortality/organ dysfunction/ adverse events	7.1 (2.0)	8.3 (1.3)	7.4 (1.9)	7.0 (2.0)
6	409.5	Do fluid boluses increase mortality in paediatric sepsis? P: descriptive Patients with Sepsis I: Restrictive fluid bolus strategy C: Standard/liberal fluid bolus strategy O: duration of organ dysfunction mortality, PICU LOS,	7.9 (1.7)	7.2 (2.3)	7.8 (1.7)	7.3 (1.6)
7	389.3	Does the use of delayed consent within the acute intensive care setting reduce parental stress? P: Families of critically ill	6.7 (2.7)	7.2 (1.4)	7.6 (1.8)	7.1 (2.4)

		children considered for interventional research I: delayed (deferred, consent-to-continue) consent C: prospective consent O: family stress level during admission				
8	363.0	Does early psychological intervention improve family well-being descriptive during/after a PICU admission? P: Families of critically ill children I: early psychological support intervention C: standard family care O: family wellbeing and stress during PICU and post discharge	6.9 (1.9)	7.7 (1.9)	7.3 (1.6)	6.5 (1.6)
9	354.3	What factors predict adverse events and long-term outcomes following PICU admission? P: Critically ill children admitted to PICU I/C: N/A O: Longitudinal follow-up following PICU discharge to determine long term functional status, neurodevelopmental outcomes, predictors of adverse outcomes.	7.1 (2.3)	7.4 (2.3)	7.8 (2.0)	6.2 (2.3)
10	354.0	Does early mobilisation improve outcomes in critically ill children? P: Critically ill children in PICU I: Early mobilisation C: Standard care O: ICU/Hospital stay, ventilation time, incidence of delirium	6.5 (1.9)	7.6 (1.7)	6.9 (1.7)	6.8 (1.6)
11	348.6	Can we use ANZPIC data to create metrics for the benchmarking of quality and safety in PICU? P: ANZPIC registry data on critically ill children admitted to PICU I/C: N/A O: Development of predictive models for the likelihood of various metrics (Duration of mechanical ventilation, cardiac arrest, acute kidney injury)	6.3 (2.8)	7.7 (1.9)	7.0 (2.1)	6.5 (2.4)
12	344.1	What strategies will improve nursing staff work-place satisfaction and retention? P: PICU Nursing staff I/C: N/A O: Survey of workplace practices to determine factors that contribute to poor satisfaction and retention of nursing staff.	6.0 (2.5)	7.5 (2.0)	7.3 (1.8)	6.3 (2.2)
13	338.5	What is the long-term neurological outcomes of ECMO survivors? P: ECMO Survivors I/C: N/A O: Longitudinal neurodevelopmental follow-up	7.1 (2.3)	5.9 (2.4)	8.1 (2.0)	7.0 (2.2)
14	327.7	What is the prevalence and factors contributing to moral descriptive distress, burn-out and PTSD amongst PICU staff? P: PICU Staff I: Survey C: N/A O: Prevalence and factors contributing to moral distress, burn-out and PTSD.	6.0 (2.3)	7.0 (1.9)	7.3 (2.0)	6.5 (1.9)

15	313.6	Do standardised antibiotic algorithms improve antibiotic usage/resistance and outcomes for patients with suspected infection? P: Critically ill children with suspected infection I: Algorithm to guide decisions to start and stop antibiotics C: standard care O: reduction in antibiotic usage, reduction of microbial resistance, safety: survival, PICU LOS, costs	6.0 (2.3)	7.2 (1.5)	6.9 (1.6)	6.3 (2.2)
16	298.6	Do balanced crystalloid solutions reduce the incidence of descriptive metabolic acidosis and renal dysfunction in critically ill children? P: Critically ill children requiring maintenance fluid I: Balanced crystalloid solutions C: Saline O: Incidence of metabolic acidosis and renal dysfunction	6.4 (2.2)	7.1 (2.1)	6.2 (2)	6.8 (1.6)
17	277.8	Do pain assessment tools/algorithms reduce exposure to descriptive sedative agents? P: Critically ill children requiring mechanical ventilation I: different tools/algorithms for pain assessment, C: standard care pain management O: cumulative exposure to analgesic agents, duration of ventilation, duration of PICU stay	5.4 (1.9)	7.1 (1.7)	6.5 (1.8)	6 (1.4)
18	268.0	Can haemodynamic or echocardiographic parameters improve effectiveness of fluid resuscitation in critically ill children? P: Critically ill children requiring fluid resuscitation I: Fluid administration guided by haemodynamic or echocardiographic parameters C: Current practice O: Mortality, Ventilation time, inotrope use, cumulative fluid balance	5.9 (1.4)	7 (1.2)	7.1 (1.3)	5.4 (1.4)
19	265.1	Is point of care testing for suspected infection safe and descriptive effective? P: Critically ill children with suspected infection I: Point of care testing for infection C: Current practice O: Sensitivity/specificity of POC testing, time to appropriate antibiotic therapy	6.2 (2.1)	6.6 (1.8)	6.7 (1.3)	6 (1.5)
20	261.9	Does a Delirium bundle reduce the incidence of delirium in descriptive critically ill children? P: Critically ill children I: Delirium prevention bundle C: Standard Care O: Incidence of delirium	5.7 (1.9)	6.8 (1.9)	6.7 (1.9)	5.8 (1.8)



**Supplemental Table 5. Top 20 outcomes with sub-scores.** The Hanlon score refers to the product of seriousness times feasibility scores.

<b>Number</b>	<b>Hanlon Score</b>	<b>Outcome</b>	<b>Seriousness Mean (SD)</b>	<b>Feasibility Mean (SD)</b>
1	81.6	Mortality	8.8 (1.8)	9.3 (1.3)
2	80.9	Mortality in PICU	8.7 (1.8)	9.3 (1.3)
3	75.6	PICU length of stay	8.3 (1.8)	9.2 (1.7)
4	74.1	Duration of ventilation	8.2 (1.3)	9.1 (1.3)
5	73.8	Hospital Length of Stay	8.2 (1.9)	9 (1.8)
6	71.1	Mortality long-term $\geq$ 12 months post PICU discharge	8.5 (2)	8.3 (1.7)
7	71.0	Ventilator-free days	8.1 (1.8)	8.8 (1.6)
8	66.3	Multi-organ dysfunction	8.3 (1.4)	8 (1.5)
9	65.3	Central Line Associated Bloodstream Infection	8.0 (1.0)	8.1 (1.4)
10	63.9	Survival free of organ dysfunction (days alive and free of organ dysfunction)	8.3 (1.4)	7.7 (1.7)
11	63.8	Failed extubation	7.3 (1.9)	8.8 (1.4)
12	63.6	Duration of organ support	7.9 (1.6)	8 (1.7)
13	62.9	Treatment with ECMO	7.3 (2.1)	8.6 (2.1)
14	61.2	Quality of Life assessed $>$ 12 months post PICU discharge	8.5 (1.4)	7.2 (2.0)
15	59.6	Survival free of ECMO (alive and free of ECMO)	6.9 (2.3)	8.6 (2.1)
16	58.7	Quality of Life assessed at time of discharge from hospital	7.7 (1.5)	7.6 (1.8)
17	58.3	Survival $\geq$ 12 months post PICU discharge with good neurodevelopment	8.8 (1.8)	6.7 (2.1)
18	58.1	PICU readmission	6.9 (2.1)	8.5 (1.8)
19	55.8	Dependence on medical technology at discharge	7.3 (1.9)	7.7 (1.9)

20	55.5	Organ Donation	7.2 (1.9)	7.7 (2.4)
----	------	----------------	-----------	-----------

**Supplemental Table 6. Top 40 Priorities stated by Nurses**

Number	Research Question	Mean	SD
1	What strategies will improve nursing staff work-place satisfaction and retention? P: PICU Nursing staff I/C: N/A O: Survey of workplace practices to determine factors that contribute to poor satisfaction and retention of nursing staff.	5.9	1.0
2	What is the prevalence and factors contributing to moral distress, burn-out and PTSD amongst PICU staff? P: PICU Staff I: Survey C: N/A O: Prevalence and factors contributing to moral distress, burn-out and PTSD.	5.8	1.1
3	Following critical events, does psychological first aid training and debriefing reduce the incidence of moral distress and burn-out? P: PICU Staff I: Provision of psychology training/services C: Current practice O: incidence/prevalence of moral distress/ burnout.	5.7	1.1
4	Does integration of nurse-led management improve work-place satisfaction and retention? P: PICU nursing staff I: Increased nursing responsibility (For example: Nurse led ventilation/ sedation weaning) C: Current model of care O: Patient outcomes and nursing staff workplace satisfaction and retention	5.5	1.3
5	What is the health-related quality of life for children following PICU discharge? P: Critically ill children admitted to PICU I/C: N/A O: Health related quality of life assessment at baseline (parent/patient interviews) and at 6 months (telephone interviews) to determine health related quality of life following paediatric critical illness.	5.5	1.1
6	Does early inotrope use improve outcomes in paediatric sepsis? P: Critically ill children with septic shock I: Early inotrope infusion C: Standard (SSC) treatment algorithm (40-60ml/kg fluid) O: Organ Failure/ventilation/ICU stay/mortality	5.5	1.0
7	Does early psychological intervention improve family well-being during/after a PICU admission? P: Families of critically ill children I: early psychological support intervention C: standard family care O: family wellbeing and stress during PICU and post discharge	5.5	1.2
8	Does Simulation Team Training improve outcomes for paediatric cardiac arrest? P: Critical care staff I: Simulation training C: Technical skills training O: Outcomes post paediatric cardiac arrest, time to ECMO initiation.	5.5	1.2
9	What matters to families when their child is in PICU? P: Families of critically ill children I/C: N/A O: Survey of what matters to families/family experience	5.5	1.2
10	What factors predict adverse events and long-term outcomes following PICU admission? P: Critically ill children admitted to PICU I/C: N/A O: Longitudinal follow-up following PICU discharge to determine long term functional status, neurodevelopmental outcomes, predictors of adverse outcomes.	5.4	1.3
11	Do fluid boluses increase mortality in paediatric sepsis? P: Patients with Sepsis I: Restrictive fluid bolus strategy C: Standard/liberal fluid bolus strategy O: mortality, PICU LOS, duration of organ dysfunction	5.4	1.1
12	What is optimal sedative regimen for critically ill children requiring mechanical ventilation? P: Critically ill children requiring mechanical ventilation I: Protocolised combination therapy of analgesia (morphine, fentanyl, ketamine) and sedation (dexmedetomidine, midazolam, Propofol), C: standard care or specific sedative agent O: short term outcomes (PICU length of stay, ventilator-free days, delirium) long-term cognitive/behavioural/functional/quality of life outcomes	5.4	1.3
13	Does early mobilisation improve outcomes in critically ill children? P: Critically ill children in PICU I: Early mobilisation C: Standard care O: ICU/Hospital stay, ventilation time, incidence of delirium	5.4	1.1

14	What are the factors that influence organ donation consent rate? P: Family of potential organ donors in PICU I/C: N/A O: Survey to determine patient, family, medical and institutional factors that determine conversion to an informed consent and donation process.	5.3	1.2
15	What is the long-term neurological outcomes of ECMO survivors? P: ECMO Survivors I/C: N/A O: Longitudinal neurodevelopmental follow-up	5.3	1.2
16	Does a structured patient hand-over tool decrease the incidence of adverse events? P: Medical and nursing staff I: Structured handover tool C: Current practice O: Incidence of reported adverse events	5.3	1.3
17	What is the optimal weaning plan for analgesia and sedation cessation? P: Critically ill children requiring mechanical ventilation on analgesic and sedative agents for >48hrs I: Rapid weaning strategy, C: standard weaning strategy O: short term outcomes (PICU length of stay, ventilator-free days, delirium, early mobilisation acquired weakness	5.3	1.2
18	Does targeting high serum sodium improve neurological outcome in children following traumatic brain injury? P: Patients with traumatic brain injury. I: Maintain serum Na > 149. C: Serum Na > 135. O: ICP, neuro outcome	5.3	0.9
19	Do care pathways for specific post-operative cardiac lesions shorten ICU or hospital stay? P: Patients undergoing surgical repair for specific congenital heart lesion I: Protocolised care pathway C: Current management O: Mortality, PICU/hospital stay	5.2	1.1
20	Does ECMO improve outcomes in critically ill children with septic shock? P: Critically ill children with septic shock I - ECMO C - standard treatment O - survival, organ failures, long-term outcomes.	5.2	1.2
21	Does invasive neuromonitoring improve outcome following severe traumatic brain injury? P: Children with severe TBI. I: ICP monitoring. C: No ICP monitoring. O: Mortality/neuro outcome at 6 & 12 months	5.2	0.9
22	What is the optimal timing of tracheostomy in children requiring prolonged ventilation? P: Paediatric patients requiring prolonged ventilation I: Tracheostomy at 2 weeks C: Standard care O: Mortality, ventilation time, adverse events	5.2	1.3
23	Does fluid restrictive resuscitation improve outcomes in children with sepsis? P: Critically ill children with suspected infection I: Algorithm to guide decisions to start and stop antibiotics C: Standard care O: Reduction in antibiotic usage, reduction of microbial resistance, safety: survival, PICU LOS, costs.	5.2	1.0
24	Who should clear a C-Spine for paediatric trauma patients admitted to PICU? P: Children with C-spine precautions post-trauma. I: C-spine clearance by PICU medical staff using MRI, CT & clinical assessment. C: Clearance by orthopaedics/neurosurgery O: Efficient clearance of C-spine, time in C-spine precautions, safety	5.2	1.5
25	Does enteral feeding of newborns treated with alprostadil for duct-dependant cardiac lesions increase the risk of NEC? P: Neonates on prostin with duct dependant cardiac lesion I: Enteral feeding C: Parenteral feeding O: Incidence of Necrotising Enterocolitis.	5.2	1.2
26	Does early enteral nutrition improve outcomes in critically ill children? P: Critically ill children I: early enteral feeding C: standard care (or late enteral feeding) O: caloric intake, NEC, PICU length of stay, mortality	5.2	1.2
27	Does a restrictive fluid strategy improve outcomes in critically ill children? P: Critically ill children requiring fluid resuscitation and maintenance I: Restrictive fluid strategy C: Liberal strategy O: duration of organ dysfunction, PICU LOS, mortality	5.2	0.9
28	Does administration of "high flow" high flow oxygen decrease rate of intubation in patients with bronchiolitis. P: Children in PICU with acute bronchiolitis. I: 3L/m HHFO2. C: 2L/m HHFO2. O: Rate of intubation	5.2	1.2
29	Does systemic steroid administration improve outcomes in paediatric ARDS? P: Children with ARDS. I: Systemic steroids. C: No steroids. O: Mortality, Ventilation time, Oxygenation	5.1	1.1

30	Does a restrictive fluid strategy improve outcomes following paediatric surgery? P: Children admitted to PICU post surgery I: Restrictive fluid strategy C: Standard maintenance fluid O: Mortality, ventilation time, length of stay	5.1	0.9
31	Does high frequency ventilation improve outcomes in children with acute lung injury? P: Children with acute respiratory failure. I: High frequency Oscillation C-Conventional ventilation O-Survival, ventilator free days	5.1	1.0
32	What is the safety profile and long -term effect of sedative agents? P: Critically ill children requiring mechanical ventilation I: Specific agent, dose or protocol of sedative agents C: Standard care or specific sedative agent O: Long-term cognitive/behavioural/functional/quality of life outcomes	5.1	1.2
33	Do standardised antibiotic algorithms improve antibiotic usage/resistance and outcomes for patients with suspected infection? P: Critically ill children with suspected infection I: Algorithm to guide decisions to start and stop antibiotics C: standard care O: reduction in antibiotic usage, reduction of microbial resistance, safety: survival, PICU LOS, costs	5.1	1.0
34	Can haemodynamic or echocardiographic parameters improve effectiveness of fluid resuscitation in critically ill children? P: Critically ill children requiring fluid resuscitation I: Fluid administration guided by haemodynamic or echocardiographic parameters C: Current practice O: Mortality, Ventilation time, inotrope use, cumulative fluid balance	5.1	1.1
35	Does early institution of renal replacement therapy improve outcomes in patients with acute kidney injury? P: Critically ill children requiring renal replacement therapy I: Early/ prophylactic RRT C: Standard Care O: PICU mortality, Length of ventilation, PICU/Hospital stay	5.1	1.0
36	Do pain assessment tools/algorithms reduce exposure to sedative agents? P: Critically ill children requiring mechanical ventilation I: different tools/algorithms for pain assessment, C: standard care pain management O: cumulative exposure to analgesic agents, duration of ventilation, duration of PICU stay	5.1	1.2
37	Can we use ANZPIC data to create metrics for the bench-marking of quality and safety in PICU? P: ANZPIC registry data on critically ill children admitted to PICU I/C: N/A O: Development of predictive models for the likelihood of various metrics (Duration of mechanical ventilation, cardiac arrest, acute kidney injury)	5.1	1.2
38	Does Chloral Hydrate improve tolerance of respiratory support in children with bronchiolitis? P: Critically ill infants with bronchiolitis I: Chloral hydrate, C: no chloral hydrate, O: PICU length of stay, toleration of non-invasive and invasive therapy, long-term outcome	5.1	1.2
39	Does 100% Caloric (or protein) intake improve outcomes in critically ill children? P: Critically ill children I: Enteral feeding targeting at least 100% caloric (or protein) intake C: Standard care (or reduced caloric/protein intake) O: caloric intake, NEC, PICU length of stay, mortality	5.0	1.0
40	Does a Delirium bundle reduce the incidence of delirium in critically ill children? P: Critically ill children I: Delirium prevention bundle C: Standard Care O: Incidence of delirium	5.0	1.2

**Supplemental Table 7 – Top 40 Priorities stated by Doctors**

Number	Research Questions	Mean	SD
1	What is the health-related quality of life for children following PICU discharge? P: Critically ill children admitted to PICU I/C: N/A O: Health related quality of life assessment at baseline (parent/patient interviews) and at 6 months (telephone interviews) to determine health related quality of life following paediatric critical illness.	5.4	1.1
2	What matters to families when their child is in PICU? P: Families of critically ill children I/C: N/A O: Survey of what matters to families/family experience	5.3	1.1
3	Do fluid boluses increase mortality in paediatric sepsis? P: Patients with Sepsis I: Restrictive fluid bolus strategy C: Standard/liberal fluid bolus strategy O: mortality, PICU LOS, duration of organ dysfunction	5.2	1.1
4	Does early mobilisation improve outcomes in critically ill children? P: Critically ill children in PICU I: Early mobilisation C: Standard care O: ICU/Hospital stay, ventilation time, incidence of delirium	5.1	1.2
5	What is the long-term neurological outcomes of ECMO survivors? P: ECMO Survivors I/C: N/A O: Longitudinal neurodevelopmental follow-up	5.1	1.4
6	Can we use ANZPIC data to create metrics for the bench-marking of quality and safety in PICU? P: ANZPIC registry data on critically ill children admitted to PICU I/C: N/A O: Development of predictive models for the likelihood of various metrics (Duration of mechanical ventilation, cardiac arrest, acute kidney injury)	5.1	1.1
7	Does early inotrope use improve outcomes in paediatric sepsis? P: Critically ill children with septic shock I: Early inotrope infusion C: Standard (SSC) treatment algorithm (40-60ml/kg fluid) O: Organ Failure/ventilation/ICU stay/mortality	5.1	1.5
8	Does a Delirium bundle reduce the incidence of delirium in critically ill children? P: Critically ill children I: Delirium prevention bundle C: Standard Care O: Incidence of delirium	5.0	1.1
9	Does the use of delayed consent within the acute intensive care setting reduce parental stress? P: Families of critically ill children considered for interventional research I: delayed (deferred, consent-to-continue) consent C: prospective consent O: family stress level during admission	5.0	1.5
10	What is the best anticoagulant in paediatric ECMO? P: Paediatric ECMO I: Bivalirudin as primary anticoagulation strategy C: Heparin anticoagulation O: Haemorrhagic, thrombotic, circuit complications	4.9	1.2
11	Do non-pharmacological interventions reduce exposure to sedative agents? P: Critically ill children requiring mechanical ventilation I: Non-pharmacologic interventions for sedation C: Standard care sedative agents O: Cumulative exposure to sedation agents	4.9	0.9
12	Can haemodynamic or echocardiographic parameters improve effectiveness of fluid resuscitation in critically ill children? P: Critically ill children requiring fluid resuscitation I: Fluid administration guided by haemodynamic or echocardiographic parameters C: Current practice O: Mortality, Ventilation time, inotrope use, cumulative fluid balance	4.8	1.2
13	Do balanced crystalloid solutions reduce the incidence of metabolic acidosis and renal dysfunction in critically ill children? P: Critically ill children requiring maintenance fluid I: Balanced crystalloid solutions C: Saline O: Incidence of metabolic acidosis	4.8	1.2

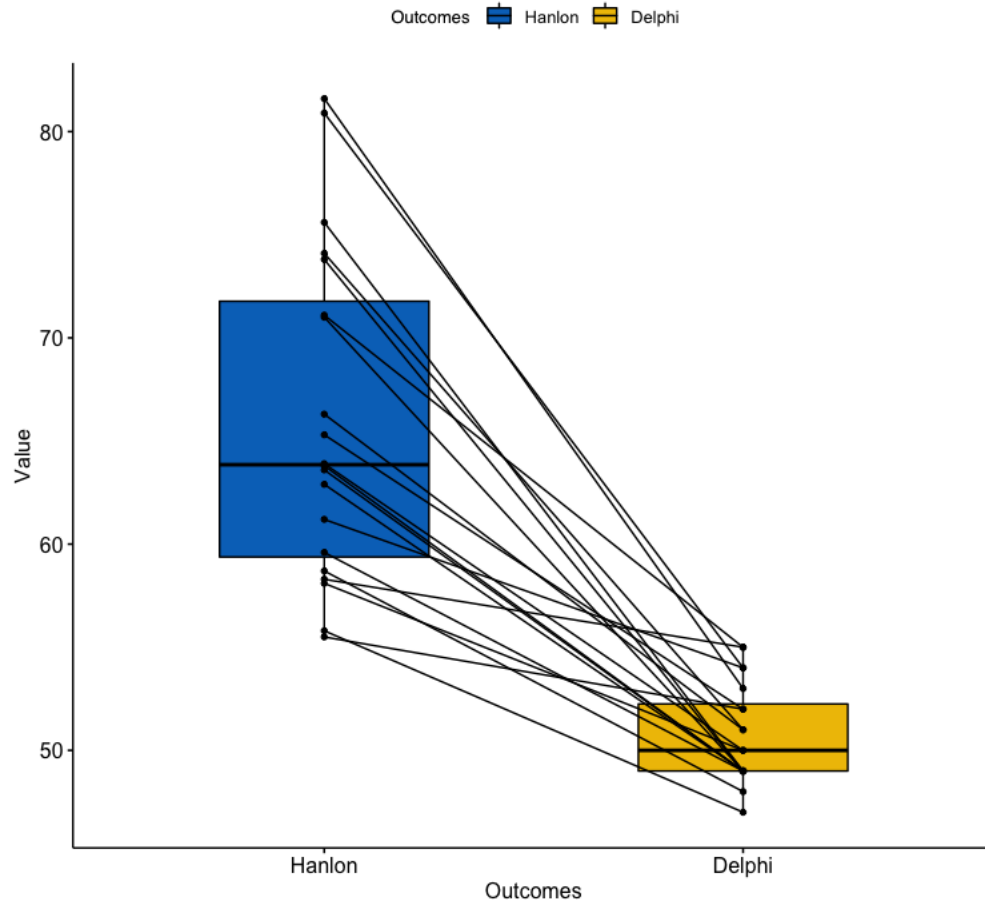
	and renal dysfunction		
14	Do standardised antibiotic algorithms improve antibiotic usage/resistance and outcomes for patients with suspected infection? P: Critically ill children with suspected infection I: Algorithm to guide decisions to start and stop antibiotics C: standard care O: reduction in antibiotic usage, reduction of microbial resistance, safety: survival, PICU LOS, costs	4.8	1.2
15	Does fluid restrictive resuscitation improve outcomes in children with sepsis? P: Critically ill children with suspected infection I: Algorithm to guide decisions to start and stop antibiotics C: Standard care O: Reduction in antibiotic usage, reduction of microbial resistance, safety: survival, PICU LOS, costs.	4.8	1.5
16	What is the best ventilation strategy for patients on ECMO? P: Patients on ECMO I: Open-lung strategy conventional ventilation algorithm C: 'Rest settings' O: Duration of ECMO/duration of mechanical support.	4.8	1.3
17	What strategies will improve nursing staff work-place satisfaction and retention? P: PICU Nursing staff I/C: N/A O: Survey of workplace practices to determine factors that contribute to poor satisfaction and retention of nursing staff.	4.8	1.2
18	Which neuromonitoring method best predicts neurological outcome? P: Patients with traumatic brain injury I: Invasive neuromonitoring C: Non-invasive neuromonitoring (EEG/NIRS/SSEP/Serum markers/Neuroimaging) O: Mortality, neurological outcome, long-term neurological outcome	4.8	1.3
19	Does enteral feeding of newborns treated with alprostadil for duct-dependant cardiac lesions increase the risk of NEC? P: Neonates on prostin with duct dependant cardiac lesion I: Enteral feeding C: Parenteral feeding O: Incidence of Necrotising Enterocolitis.	4.8	1.3
20	What factors predict adverse events and long-term outcomes following PICU admission? P: Critically ill children admitted to PICU I/C: N/A O: Longitudinal follow-up following PICU discharge to determine long term functional status, neurodevelopmental outcomes, predictors of adverse outcomes.	4.8	1.6
21	What is the best test for heparin anticoagulation during ECLS? P: Patients on ECLS anticoagulated with heparin I: APTT algorithm for heparin management C: ACT management of heparin O: Thrombotic, haemorrhagic, circuit complications.	4.8	1.3
22	Does invasive neuromonitoring improve outcome following severe traumatic brain injury? P: Children with severe TBI. I: ICP monitoring. C: No ICP monitoring. O: Mortality/neuro outcome at 6 & 12 months	4.7	1.5
23	Does Venovenous ECMO improve outcomes in critically ill children with ARDS? P: Critically ill children with ARDS I: VV ECMO C: Standard ventilation protocol O: ventilator free days/Oxygen-free days	4.7	1.4
24	What are the factors that influence organ donation consent rate? P: Family of potential organ donors in PICU I/C: N/A O: Survey to determine patient, family, medical and institutional factors that determine conversion to an informed consent and donation process.	4.7	1.3
25	Can Thromboelastography be used to guide heparin anticoagulation during ECLS? P: Patients on ECLS anticoagulated with heparin I: TEG-based algorithm for heparin management C: Standard management of heparin O: Circuit longevity, blood product exposure, bleeding or thrombotic complications.	4.7	1.1
26	Does a restrictive fluid strategy improve outcomes in critically ill children? P: Critically ill children requiring fluid resuscitation and maintenance I: Restrictive fluid strategy C: Liberal strategy O: duration of organ dysfunction, PICU LOS, mortality	4.7	1.3
27	Does targeting high serum sodium improve neurological outcome in children following traumatic brain injury? P: Patients with	4.6	1.2

	traumatic brain injury. I: Maintain serum Na > 149. C: Serum Na > 135. O: ICP, neuro outcome		
28	Is a conservative versus liberal oxygenation target safe? P: Children in ICU. I: Conservative oxygen targets C: Liberal oxygen target O: mortality/organ dysfunction/ adverse events	4.6	1.5
29	Does ECMO improve outcomes in critically ill children with septic shock? P: Critically ill children with septic shock I - ECMO C - standard treatment O - survival, organ failures, long-term outcomes.	4.6	1.5
30	Can machine learning aid us in anticipating adverse events and improve outcomes? P: Critically ill children I/C: N/A O: Utilisation of artificial intelligence/ machine learning to guide prediction of adverse events/ mortality/ long-term outcomes	4.6	1.2
31	Does early psychological intervention improve family well-being during/after a PICU admission? P: Families of critically ill children I: early psychological support intervention C: standard family care O: family wellbeing and stress during PICU and post discharge	4.6	1.2
32	Does a restrictive fluid strategy improve outcomes following paediatric surgery? P: Children admitted to PICU post-surgery I: Restrictive fluid strategy C: Standard maintenance fluid O: Mortality, ventilation time, length of stay	4.5	1.2
33	Is point of care testing for suspected infection safe and effective? P: Critically ill children with suspected infection I: Point of care testing for infection C: Current practice O: Sensitivity/specificity of POC testing, time to appropriate antibiotic therapy	4.5	1.3
34	Do care pathways for specific post-operative cardiac lesions shorten ICU or hospital stay? P: Patients undergoing surgical repair for specific congenital heart lesion I: Protocolised care pathway C: Current management O: Mortality, PICU/hospital stay	4.5	1.2
35	Do pain assessment tools/algorithms reduce exposure to sedative agents? P: Critically ill children requiring mechanical ventilation I: different tools/algorithms for pain assessment, C: standard care pain management O: cumulative exposure to analgesic agents, duration of ventilation, duration of PICU stay	4.5	1.1
36	Do transfusion thresholds influence neurodevelopmental outcomes following paediatric cardiac surgery? P: Newborns having cardiac surgery (stratified by uni/bi-ventricular lesions) I: Restrictive Hb target C: Usual Hb target O Primary - neurodevelopment outcome at 6mo, 6yrs	4.5	1.3
37	What neuromonitoring methods best predict neurological outcome on ECMO? P: Children requiring ECMO I: Neuromonitoring (NIRS/ EEG) C: Standard care O: Neurological outcome	4.5	1.4
38	Is a restrictive sedation and analgesic bolus strategy safe and does it reduce duration of mechanical ventilation in children ventilated for greater than 48 hours? P: Critically ill children requiring mechanical ventilation I: sedation/analgesia bolus protocol (dosing and weaning), C: standard care without specific bolus protocol O: short term outcomes (PICU length of stay, ventilator-free days, delirium, early mobilisation acquired weakness long-term cognitive/behavioural/functional/quality of life outcomes	4.5	1.1
39	Does early institution of renal replacement therapy improve outcomes in patients with acute kidney injury? P: Critically ill children requiring renal replacement therapy I: Early/ prophylactic RRT C: Standard Care O: PICU mortality, Length of ventilation, PICU/Hospital stay	4.4	1.4
40	Does viscoelastic testing reduce blood product administration and incidence of bleeding/clotting events? P: Paediatric patients with major haemorrhage I: Viscoelastic testing (TEG or ROTEM) C: Current coagulation tests and Major haemorrhage protocols O: Blood product administration and incidence of bleeding/adverse outcomes	4.4	1.2





**Supplemental Figure 1: Comparison of the mean classification of research priorities by Hanlon Score versus Delphi Score for each question.** Box-Whisker plots indicating mean and SD are shown for each of the 20 prioritized research questions.



**Supplemental Figure 2: Comparison of the mean classification of research outcomes by Hanlon Score versus Delphi Score for each outcome.** Box-Whisker plots indicating mean and SD are shown for each of the 20 prioritized research outcomes.

