PICU

Current Awareness Newsletter

February 2016
Outreach

Your Outreach Librarian can help facilitate evidence-based practice for all PICU staff, as well as assisting with academic study and research. We can help with literature searching, obtaining journal articles and books, and setting up individual current awareness alerts.

Literature Searching

We provide a literature searching service for any library member. For those embarking on their own research it is advisable to book some time with one of the librarians for a 1 to 1 session where we can guide you through the process of creating a well-focused literature research and introduce you to the health databases access via NHS Evidence.

Critical Appraisal Training

We also offer one-to-one or small group training in literature searching, accessing electronic journals, and critical appraisal/Statistics. These are essential courses that teach how to interpret clinical papers.

For more information, email: katie.barnard@uhbristol.nhs.uk

Books

Books can be searched for using SWIMS our online catalogue at www.swims.nhs.uk. Books and journals that are not available on site or electronically may be requested from other locations. Please email requests to: library@uhbristol.nhs.uk
Contents

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3: Latest relevant Systematic Reviews from the Cochrane Library

4: New activity in Uptodate

5: Quick Exercise

6: Current Awareness database articles
Tables of Contents from Paediatric & Critical Care journals

If you require full articles please email: library@uhbristol.nhs.uk

Paediatric Critical Care Medicine
February 2016, Volume 17, Issue 2

Alveolar Dead Space Fraction Discriminates Mortality in Pediatric Acute Respiratory Distress Syndrome*
Yehya, Nadir; Bhalla, Anoopindar K.; Thomas, Neal J.; Khemani, Robinder G.

Limiting and Withdrawing Life Support in the PICU: For Whom Are These Options Discussed?*
Keele, Linda; Meert, Kathleen L.; Berg, Robert A.; Dalton, Heidi; Newth, Christopher J. L.; Harrison, Rick; Wessel, David L.; Shanley, Thomas; Carcillo, Joseph; Morrison, Wynne; Funai, Tomohiko; Holubkov, Richard; Dean, J. Michael; Pollack, Murray

The Effect of Methylprednisolone on Plasma Concentrations of Neutrophil Gelatinase–Associated Lipocalin in Pediatric Heart Surgery*
Pesonen, Eero J.; Suominen, Pertti K.; Keski-Nisula, Juho; Mattila, Ilkka P.; Rautiainen, Paula; Jahnukainen, Timo

Dexmedetomidine Is Associated With Lower Incidence of Acute Kidney Injury After Congenital Heart Surgery
Kwiatkowski, David M.; Axelrod, David M.; Sutherland, Scott M.; Tesoro, Tiffany M.; Krawczeski, Catherine D.

A Double-Blinded, Randomized, Placebo-Controlled Clinical Trial of Aminophylline to Prevent Acute Kidney Injury in Children Following Congenital Heart Surgery With Cardiopulmonary Bypass*
Axelrod, David M.; Sutherland, Scott M.; Anglemyer, Andrew; Grimm, Paul C.; Roth, Stephen J.

Transvesical Intra-Abdominal Pressure Measurement in Newborn: What Is the Optimal Saline Volume Instillation?*
Defontaine, Anne; Tirel, Olivier; Costet, Nathalie; Beuchée, Alain; Ozanne, Bruno; Gaillot, Théophile; Arnaud, Alexis Pierre; Wodey, Eric

Prevalence of Early Posttraumatic Seizures in Children With Moderate to Severe Traumatic Brain Injury Despite Levetiracetam Prophylaxis*
Chung, Melissa G.; O’Brien, Nicole F.

Comparison of the New Adult Ventilator-Associated Event Criteria to the Centers for Disease Control and Prevention Pediatric Ventilator-Associated Pneumonia Definition (PNU2) in a Population of Pediatric Traumatic Brain Injury Patients*
Cirulis, Meghan M.; Hamele, Mitchell T.; Stockmann, Chris R.; Bennett, Tellen D.; Bratton, Susan L.
Pediatric Acute Respiratory Distress Syndrome: Which Child Is Destined to Die?*
Anas, Nick G.

Measuring and Improving, Not Just Describing—The Next Imperative for End-of-Life Care*
vander Velden, Meredith; Burns, Jeffrey P.

Predicting Acute Kidney Injury After Pediatric Cardiac Surgery: Are Steroids Muddying the Water?*
Buckley, Jason R.; Graham, Eric M.

Aminophylline for Acute Kidney Injury After Pediatric Cardiac Surgery: Finally Entering the Next Phase in Child Acute Kidney Injury Research*
McMahon, Kelly; Zappitelli, Michael

Intra-Abdominal Pressure Monitoring in Neonates*
Prodhan, Parthak; Mathur, Mudit

Comparing Apples and Oranges: Seizure Prophylaxis in Pediatric Traumatic Brain Injury*
Friess, Stuart H.

Unanswered Questions and Consternation: The Ventilator-Associated Pneumonia Diagnostic Challenge Continues*
Lutmer, Jeffrey E.; Brilli, Richard J.

High-Dose Magnesium Infusions for Acute Severe Asthma in Children: If a Little Is Good, Is More Even Better?*
Baker, Alyson K.; Carroll, Christopher L.

Children Are Not Just Little Adults...*
Czaja, Angela S.

Admission Hypoalbuminemia: Ready for Including It in the Pediatric Prognostic Scores?*
Vázquez Martínez, José Luis

Evidence-Based Use of α-2 Agonists for Sedation in the PICU: From Fiction to Facts?*
vanden Anker, John N.; Allegaert, Karel

Still a Way to Go: The Substitution of the x-Ray as the Gold Standard to Locate the Right Placement of Central Venous Catheter
Colletti Junior, José; de Carvalho, Werther Brunow

The authors reply
Alonso-Quintela, Paula; Oulego-Erroz, Ignacio; Rodríguez-Nuñez, Antonio

Noninvasive Ventilation in Pediatric Acute Respiratory Distress Syndrome. Where Is the Limit?
Medina-Villanueva, Alberto; i Alapont, Vicent Modesto; Pons-Òdena, Martí

The authors reply
Essouri, Sandrine; Carroll, Christopher; on behalf of the Pediatric Acute Lung Injury Consensus Conference Group
High-Dose Magnesium Sulfate Infusion for Severe Asthma in the Emergency Department: Efficacy Study*
Irazuzta, Jose E.; Paredes, Fatima; Pavlicich, Viviana; Domínguez, Sara L.
Pediatric Critical Care Medicine, February 2016,17(2):e29-e33
Online Clinical Investigations

Impact of Retrieval, Distance Traveled, and Referral Center on Outcomes in Unplanned Admissions to a National PICU
Moynihan, Katie; McSharry, Brent; Reed, Peter; Buckley, David

Pediatric Intensive Care in PICUs and Adult ICUs: A 2-Year Cohort Study in Finland*
Peltoniemi, Outi M.; Rautiainen, Paula; Kataja, Janne; Ala-Kokko, Tero

Serum Albumin Is an Independent Predictor of Clinical Outcomes in Critically Ill Children*
Leite, Heitor Pons; Rodrigues da Silva, Alessandra Vaso; de Oliveira Iglesias, Simone Brasil; Koch Nogueira, Paulo Cesar

Search of Unknown Fever Focus Using PET in Critically Ill Children With Complicated Underlying Diseases
Chang, Lung; Cheng, Mei-Fang; Jou, Shiann-Tarng; Ko, Chi-Lun; Huang, Jei-Yie; Tzen, Kai-Yuan; Yen, Rouh-Fang

Efficacy of α2-Agonists for Sedation in Pediatric Critical Care: A Systematic Review*
Hayden, John C.; Breatnach, Cormac; Doherty, Dermot R.; Healy, Martina; Howlett, Moninne M.; Gallagher, Paul J.; Cousins, Gráinne

Evaluation of Endotoxemia After Pediatric Cardiac Surgery With the Endotoxin Activity Assay: An Exploratory Prospective Cohort Study
Ricci, Zaccaria; Haiberger, Roberta; Pezzella, Chiara; Favia, Isabella; Cogo, Paola

Pediatrics
February 2016, Volume 137, Issue 2

Changes in Efficiency and Safety Culture After Integration of an I-PASS–Supported Handoff Process
Shreya Sheth, Elisa McCarthy, Alaina K. Kipps, Matthew Wood, Stephen J. Roth, Paul J.Sharek, Andrew Y. Shin

Pediatric Anesthesia
March 2016, Volume 26, Issue 3

Colloid fluids in adult anesthesia and ICU (pages 230–231)
David A. Story

Outcomes of dexmedetomidine treatment in pediatric patients undergoing congenital heart disease surgery: a meta-analysis (pages 239–248)
Wanying Pan, Yueting Wang, Lin Lin, Ge Zhou, Xiaoxiao Hua and Liqiu Mo
Impact of high doses of 6% hydroxyethyl starch 130/0.42 and 4% gelatin on renal function in a pediatric animal model (pages 259–265)
Lars Witt, Silke Glage, Ralf Lichtinghagen, Lars Pape, Dietmar Boethig, Nils Dennhardt, Sebastian Heiderich, Andreas Leffler and Robert Sümpelmann

Comparison of dexmedetomidine and chloral hydrate sedation for transthoracic echocardiography in infants and toddlers: a randomized clinical trial (pages 266–272)
Jeff Miller, Bin Xue, Md Hossain, Ma-Zhong Zhang, Andreas Loepke and Dean Kurth

Validity of sidestream endtidal carbon dioxide measurement in critically ill, mechanically ventilated children (pages 294–299)
Hylke H. A. C. M. van der Heijden, Gerben J. Truin, Joyce Verhaeg, Peggy van der Pol and Joris Lemson

Inadvertent insertion of central venous catheter into a Blalock-Taussig shunt—a rare complication (pages 322–324)
Melody Long, Poh Sun Goh and Lian Kah Ti

Journal of Pediatrics
February 2016, Volume 169

Hospital Costs for Neonates and Children Supported with Extracorporeal Membrane Oxygenation
David Faraoni, Viviane G. Nasr, James A. DiNardo, Ravi R. Thiagarajan

Management and Outcomes of Patients with Occlusive Thrombosis after Pediatric Cardiac Surgery
Cedric Manlhiot, Leonardo R. Brandão, Steven M. Schwartz, V. Ben Sivarajan, Suzan Williams, Tanveer H. Collins, Brian W. McCrindle

The Association among Feeding Mode, Growth, and Developmental Outcomes in Infants with Complex Congenital Heart Disease at 6 and 12 Months of Age
Barbara Medoff-Cooper, Sharon Y. Irving, Alexandra L. Hanlon, Nadya Golfenshtein, Jerilynn Radcliffe, Virginia A. Stallings, Bradley S. Marino, Chitra Ravishankar

Gastrostomy Tube Feeding after Neonatal Complex Cardiac Surgery Identifies the Need for Early Developmental Intervention

Parental Sources of Support and Guidance When Making Difficult Decisions in the Pediatric Intensive Care Unit
Vanessa N. Madrigal, Karen W. Carroll, Jennifer A. Faerber, Jennifer K. Walter, Wynne E. Morrison, Chris Feudtner

Pulse Oximetry Waveform: Important Bedside Tool to Assess Cardiac Tamponade
Lindsay Mills, Sharmila Udupa, Robert Gow
The Challenge of Addressing Family Needs at the End of Life
Nancy Kentish-Barnes, Elie Azoulay

Randomized Trial of Communication Facilitators to Reduce Family Distress and Intensity of End-of-Life Care
J. Randall Curtis, Patsy D. Treece, Elizabeth L. Nielsen, Julia Gold, Paul S. Ciechanowski, Sarah E. Shannon, Nita Khandelwal, Jessica P. Young, Ruth A. Engelberg

Evaluating Risk Factors for Pediatric Post-extubation Upper Airway Obstruction Using a Physiology-based Tool
Robinder G. Khemani, Justin Hotz, Rica Morzov, Rutger Flink, Asavari Kamerkar, Patrick A. Ross, Christopher J. L. Newth

Erratum: Global Epidemiology of Pediatric Severe Sepsis: The Sepsis Prevalence, Outcomes, and Therapies Study

Critical Care
February 2016, Volume 20

Treatment of Gram-negative pneumonia in the critical care setting: is the beta-lactam antibiotic backbone broken beyond repair?
Matteo Bassetti, Tobias Welte and Richard G. Wunderink

The critical care management of poor-grade subarachnoid haemorrhage
Airton Leonardo de Oliveira Manoel, Alberto Goffi, Tom R. Marotta, Tom A. Schweizer, Simon Abrahamson and R. Loch Macdonald

The struggle to differentiate inflammation from infection in severely burned patients: time to send better biomarkers into the arena?
Patrick M. Honore and Herbert D. Spapen

Impact of prolonged assisted ventilation on diaphragmatic efficiency: NAVAversus PSV
Rosa Di mussi, Savino Spadaro, Lucia Mirabella, Carlo Alberto Volta, Gabriella Serio, Francesco Staffieri, Michele Dambrosio, Gilda Cinnella, Francesco Bruno and Salvatore Grasso

Acta Paediatrica
February 2016, Volume 105, Issue 2

Association of house staff training with mortality in children with critical illness
Punkaj Gupta, Xinyu Tang, Mallikarjuna Rettiganti, Casey Lauer, Robert M. Kacmarek, Tom B. Rice, Barry P. Markovitz and Randall C. Wetzel
European Journal of Pediatrics
February 2016, Volume 175, Issue 2

Evaluation and management of bradycardia in neonates and children
Alban-Eloren Baruteau, James C. Perry, Shubhayan Sanatani

Ultrasound detection of pneumonia in febrile children with respiratory distress: a prospective study
Mattia Guerra, Giovanni Crichiutti, Paolo Pecile

Validity of non-invasive point-of-care hemoglobin estimation in healthy and sick children—a method comparison study
Aditya Bhat, Amit Upadhyay, Vijay Jaiswal, Deepak Chawla

Cardiology in the Young
February 2016, Volume 26, Issue 2

Routine intra-operative trans-oesophageal echocardiography yields better outcomes in surgical repair of CHD
Erin J. Madriago, Rajesh Punn, Natalie Geeter and Norman H. Silverman

Current outcomes of the bi-directional cavopulmonary anastomosis in single ventricle patients: analysis of risk factors for morbidity and mortality, and suitability for Fontan completion
Katrien François, Kristof Vandekerckhove, Katya De Groote, Joseph Panzer, Daniel De Wolf, Hans De Wilde and Thierry Bové

Other Journals

Current Opinion in Pediatrics
February 2016, Volume 28, Issue 1

Current Opinion in Critical Care
February 2016, Volume 22, Issue 1

Critical Care Medicine
February 2016, Volume 44, Issue 2
New Nice Guidance

<table>
<thead>
<tr>
<th>QS112</th>
<th>Gastro-oesophageal reflux in children and young people</th>
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</thead>
<tbody>
<tr>
<td>QS107</td>
<td>Preventing unintentional injury in under 15s</td>
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Latest relevant Systematic Reviews from the Cochrane Library

- Antibody therapies for lymphoma in children
- Intranasal or transdermal nicotine for the treatment of postoperative pain
- Antifungal agents for preventing fungal infections in non-neutropenic critically ill patients
- Inhaled non-steroid anti-inflammatories for children and adults with bronchiectasis
New activity in Uptodate

Timing of appendectomy (January 2016)

Whether emergent appendectomy is required in all patients with early appendicitis has been debated. In many institutions, children with early appendicitis receive antibiotics and undergo appendectomy based upon operative and professional resources with a preference for performance of the procedure during daytime or evening hours. In a prospective, observational study that evaluated 230 children who underwent appendectomy, patients with symptoms greater than 48 hours had a significantly higher rate of perforation when compared with patients with symptoms ≤48 hours (46 versus 12 to 18 percent) [41]. When evaluated according to time from diagnosis, the perforation rate, length of stay, and operating time were not significantly different. Thus, limiting the total time from symptom onset to surgery rather than from diagnosis to surgery appears to be of greatest importance in preventing adverse outcomes of appendicitis. (See “Acute appendicitis in children: Management”, section on ’Timing of operation’.)

Epinephrine for the treatment of fluid-refractory, cold septic shock in infants and children (January 2016)

The 2009 American College of Critical Care Medicine (ACCM) pediatric sepsis guidelines recommended dopamine as the first-line agent for the treatment of fluid-refractory septic shock in patients with signs of vasoconstriction or "cold" shock (eg, cold extremities and diminished peripheral pulses). However, in a single-center randomized trial of 120 infants and children (1 month to 15 years of age) undergoing treatment for fluid-refractory septic shock in a pediatric intensive care unit (88 percent with cold shock), patients who received infusions of dopamine rather than epinephrine had significantly higher mortality (21 versus 7 percent) and more healthcare-associated infections (29 versus 2 percent) [17]. Based on these findings, we now suggest that infants and children with fluid-refractory, hypotensive, cold septic shock receive infusions of epinephrine rather than dopamine. Epinephrine infusions are initiated at a dose of 0.05 to 0.1 mcg/kg/minute and titrated to response up to 1.5 mcg/kg/minute. The 2009 ACCM pediatric sepsis guidelines are undergoing review. (See ”Septic shock: Rapid recognition and initial resuscitation in children”, section on ’Cold shock’.)
Quick Exercise

Creating a search strategy

Scenario: A 64 year old obese male who has tried many ways to lose weight presents with a newspaper article about ‘fat-blazer’ (chitosan). He asks for your advice.

1. What would your PICO format be?

<table>
<thead>
<tr>
<th>Population/problem</th>
<th>Intervention/indicator</th>
<th>Comparator</th>
<th>Outcome</th>
</tr>
</thead>
</table>

2. What would your research question be?

Research question: In obese patients, does chitosan compared to a placebo, decrease weight?

PICO: P = obese patients; I = chitosan; C = placebo; O = decrease weight

Taken from the Centre for Evidence Based Medicine

Find out more about constructing an effective search strategy in one of our Literature searching training sessions.
For more details, email library@uhbristol.nhs.uk.

Upcoming Lunchtime Drop-in Sessions

The Library and Information Service provides free specialist information skills training for all UHBristol staff and students.

To book a place, email: library@uhbristol.nhs.uk

If you’re unable to attend we also provide one-to-one or small group sessions. Contact library@uhbristol.nhs.uk or katie.barnard@uhbristol.nhs.uk to arrange a session.

February (12pm)

- Fri 5th: Literature Searching
- Mon 8th: Understanding articles
- Tues 16th: Statistics
- Wed 24th: Information resources

March (1pm)

- Thurs 3rd: Literature Searching
- Fri 11th: Understanding articles
- Mon 14th: Statistics
- Tues 22nd: Information resources
- Weds 30th: Literature Searching
Title: The Effect of an Electronic SBAR Communication Tool on Documentation of Acute Events in the Pediatric Intensive Care Unit.

Citation: American journal of medical quality : the official journal of the American College of Medical Quality, Jan 2016, vol. 31, no. 1, p. 64-68 (January 2016)

Author(s): Panesar, Rahul S, Albert, Ben, Messina, Catherine, Parker, Margaret

Abstract: The Situation, Background, Assessment, Recommendation (SBAR) handoff tool is designed to improve communication. The effects of integrating an electronic medical record (EMR) with a SBAR template are unclear. The research team hypothesizes that an electronic SBAR template improves documentation and communication between nurses and physicians. In all, 84 patient events were recorded from 542 admissions to the pediatric intensive care unit. Three time periods were studied: (a) paper documentation only, (b) electronic documentation, and (c) electronic documentation with an SBAR template. Documentation quality was assessed using a 4-point scoring system. The frequency of event notes increased progressively during the 3 study periods. Mean quality scores improved significantly from paper documentation to EMR free-text notes and to electronic SBAR-template notes, as did nurse and attending physician notification. The implementation of an electronic SBAR note is associated with more complete documentation and increased frequency of documentation of communication among nurses and physicians. © The Author(s) 2014.

Title: Research in Pediatric Intensive Care.

Citation: Pediatric critical care medicine : a journal of the Society of Critical Care Medicine and the World Federation of Pediatric Intensive and Critical Care Societies, Jan 2016, vol. 17, no. 1, p. 97., 1529-7535 (January 2016)

Author(s): Hutchison, Jamie

Title: Usefulness of radiographic imaging of percutaneously inserted central venous catheters in critically ill infants and children.

Citation: Intensive care medicine, Jan 2016, vol. 42, no. 1, p. 130-131 (January 2016)

Author(s): Brouwer, Carole N M, van Halsema, Emo E, Reiber, Beata M M, Mioduszewska, Katarzyna, van Woensel, Job B M

Title: Rapid Response Team Calls and Unplanned Transfers to the Pediatric Intensive Care Unit in a Pediatric Hospital.
Variability in disposition of children according to the time of rapid response calls is unknown. To evaluate times and disposition of rapid response alerts and outcomes for children transferred from acute care to intensive care. Deidentified data on demographics, time and disposition of the child after activation of a rapid response, time of transfer to intensive care, and patient outcomes were reviewed retrospectively. Data for rapid-response patients on time of activation of the response and unplanned transfers to the intensive care unit were compared with data on other patients admitted to the unit. Of 542 rapid responses activated, 321 (59.2%) were called during the daytime. Out of all rapid response activations, 323 children (59.6%) were transferred to intensive care, 164 (30.3%) remained on the general unit, and 19 (3.5%) required resuscitation. More children were transferred to intensive care after rapid response alerts (P = .048) during the daytime (66%) than at night (59%). During the same period, 1313 patients were transferred to intensive care from acute care units. Age, sex, risk of mortality, length of stay, and mortality rate did not differ according to the time of transfer. Mortality among unplanned transfers (3.8%) was significantly higher (P < .001) than among other intensive care patients (1.4%). Only 25% of transfers from acute care units to the intensive care unit occurred after activation of a rapid response team. Most rapid responses were called during daytime hours. Mortality was significantly higher among unplanned transfers from acute care than among other intensive care admissions.

Standard instruction versus simulation: Educating registered nurses in the early recognition of patient deterioration in paediatric critical care.

Identifying and stabilising deterioration in a child with significant clinical compromise is both a challenging and necessary role of the paediatric critical care nurse. Within adult critical care research, high fidelity patient simulation (HFPS) has been shown to positively impact learner outcomes regarding identification and management of a deteriorating patient; however, there is a paucity of evidence examining the use of HFPS in paediatric nursing education. The aim of this study was to investigate the effect of HFPS on nurses' self-efficacy and knowledge for recognising and managing paediatric deterioration. Further, participants' perceptions of the learning experiences specific to the identification and management of a deteriorating child were also explored. Registered nurses working in a tertiary-referral paediatric critical care unit were recruited for this quasi-experimental study. Using a pre-test/post-test control-group design, participants were assigned to one of two learning experiences: HFPS or standard instruction. Following the learning experience, nurses were also invited to participate in semi-structured interviews. 30 nurses participated in the study (control n=15, experiment n=15). Participants in the HFPS intervention were most likely to demonstrate an increase in both perceived self-efficacy (p<0.01) and knowledge (p<0.01). No statistically significant change was observed in control group scores. The mean difference in self-efficacy gain score between the two groups was 5.67 score units higher for the experiment group compared to the control. HFPS also yielded higher follow-up knowledge scores (p=0.01) compared to standard instruction. Ten nurses participated in semi-structured interviews. Thematic analysis of the interview data identified four themes: self-awareness, hands-on learning, teamwork, and maximising
learning. The results of this study suggest that HFPS can positively influence nurses' self-efficacy and knowledge test scores specific to the recognition and management of paediatric deterioration. Copyright © 2015 Elsevier Ltd. All rights reserved.

**Title:** Training Pathways in Pediatric Cardiac Intensive Care: Proceedings From the 10th International Conference of the Pediatric Cardiac Intensive Care Society.

**Citation:** World journal for pediatric & congenital heart surgery, Jan 2016, vol. 7, no. 1, p. 81-88 (January 2016)

**Author(s):** Anand, Vijay, Kwiatkowski, David M, Ghanayem, Nancy S, Axelrod, David M, DiNardo, James, Klugman, Darren, Krishnamurthy, Ganga, Siehr, Stephanie, Stromberg, Daniel, Yates, Andrew R, Roth, Stephen J, Cooper, David S

**Abstract:** The increase in pediatric cardiac surgical procedures and establishment of the practice of pediatric cardiac intensive care has created the need for physicians with advanced and specialized knowledge and training. Current training pathways to become a pediatric cardiac intensivist have a great deal of variability and have unique strengths and weaknesses with influences from critical care, cardiology, neonatology, anesthesiology, and cardiac surgery. Such variability has created much confusion among trainees looking to pursue a career in our specialized field. This is a report with perspectives from the most common advanced fellowship training pathways taken to become a pediatric cardiac intensivist as well as various related topics including scholarship, qualifications, and credentialing. © The Author(s) 2015.

**Title:** Pharmacokinetics of sufentanil during long-term infusion in critically ill pediatric patients.

**Citation:** Journal of clinical pharmacology, Jan 2016, vol. 56, no. 1, p. 109-115 (January 2016)

**Author(s):** Bartkowska-Śniatkowska, Alicja, Bienert, Agnieszka, Wiczling, Paweł, Rosada-Kurasińska, Jowita, Zielińska, Marzenna, Warzybok, Justyna, Borsuk, Agnieszka, Tibboel, Dick, Kalisz, Roman, Grześkowiak, Edmund

**Abstract:** The aim of this study was to develop a population pharmacokinetic model of sufentanil and to assess the influence of covariates in critically ill children admitted to a pediatric intensive care unit. After institutional approval, 41 children were enrolled in the study. Blood samples for pharmacokinetic (PK) assessment were collected from routinely placed arterial catheters during and after discontinuation of infusion. Population nonlinear mixed-effects modeling was performed using NONMEM. A 2-compartment model described sufentanil PK sufficiently. Typical values of the central and peripheral volume of distribution and the metabolic and intercompartmental clearance for a theoretical patient weighing 70 kg were VC = 7.90 l, VT = 481 L, Cl = 45.3 L/h, and Q = 38.3 L/h, respectively. High interindividual variability of all PK parameters was noted. Allometric/isometric principles to scale sufentanil PK revealed that to achieve the same steady-state sufentanil concentrations in plasma for pediatric patients of different body weights, the infusion rate should follow the formula (infusion rate for a 70-kg adult patient, μg/h) × (body weight/70 kg)(0.75) . Severity of illness described by PRISM score, the monitored physiological and laboratory parameters, and coadministered drugs such as vasopressors were not found to be significant covariates. © 2015, The American College of Clinical Pharmacology.
Title: ICU-Acquired Weakness Is Associated With Differences in Clinical Outcomes in Critically Ill Children.

Citation: Pediatric critical care medicine : a journal of the Society of Critical Care Medicine and the World Federation of Pediatric Intensive and Critical Care Societies, Jan 2016, vol. 17, no. 1, p. 53-57, 1529-7535 (January 2016)

Author(s): Field-Ridley, Aida, Dharmar, Madan, Steinhorn, David, McDonald, Craig, Marcin, James P

Abstract: ICU-acquired weakness, comprised critical illness myopathy and critical illness neuropathy, occurs in a significant proportion of critically ill adults and is associated with high morbidity and mortality. Little is known about ICU-acquired weakness among critically ill children. We investigated the incidence of ICU-acquired weakness among PICUs participating in the Virtual PICU Systems database. We also sought to identify associated risk factors for ICU-acquired weakness and evaluate the hypothesis that ICU-acquired weakness is associated with poor clinical outcomes. Retrospective cohort study. PICU. Virtual PICU System was queried for critical illness myopathy and critical illness neuropathy between January 2009 and November 2013. Demographic, admission, and clinical outcome variables including mechanical ventilation days, PICU length of stay, and discharge disposition were analyzed. The Pediatric Index of Mortality-2 was used to evaluate and control for illness severity and risk of mortality. Among 203,875 admissions, there were 55 cases of critical illness myopathy reported and no cases of critical illness neuropathy, resulting in an incidence of 0.02%. Mechanical ventilation days were higher among patients with ICU-acquired weakness versus those who did not develop ICU-acquired weakness (31.6 ± 28.9 vs 9.3 ± 20.6; p < 0.001). In our multivariable analysis, when controlling for Pediatric Index of Mortality-2, ICU-acquired weakness was more frequently reported in those with admission diagnoses of respiratory illness and infection and the need for mechanical ventilation, renal replacement therapy, extracorporeal life support, and tracheostomy. ICU-acquired weakness was associated with a longer PICU length of stay, episodes requiring mechanical ventilation, and discharge to an intermediate, chronic care, and rehabilitation care unit. ICU-acquired weakness was not independently associated with mortality. ICU-acquired weakness is uncommonly diagnosed among PICU patients reported in Virtual PICU System. ICU-acquired weakness is associated with critical care therapies, invasive procedures, and resource utilization. Limitations of our retrospective study include underrecognition of ICU-acquired weakness and lack of standardized diagnostic criteria within Virtual PICU System. Prospective studies are needed to better understand the true incidence, risk factors, and clinical course for patients who develop ICU-acquired weakness.

Title: Procalcitonin to Detect Suspected Bacterial Infections in the PICU.

Citation: Pediatric critical care medicine : a journal of the Society of Critical Care Medicine and the World Federation of Pediatric Intensive and Critical Care Societies, Jan 2016, vol. 17, no. 1, p. e4., 1529-7535 (January 2016)

Author(s): Mandell, Iris M, Aghamohammadi, Sara, Deakers, Timothy, Khemani, Robinder G

Abstract: Nonspecific clinical symptoms frequently lead to suspicion of bacterial infection in critically ill children. Clinicians send bacterial cultures for suspected infection and begin an empiric course of antibiotics while microbiology results are pending. We investigated whether the biomarker procalcitonin could be useful to predict confirmed bacterial infection in critically ill children in the PICU, before culture results are available. Prospective, blinded single-center study. Tertiary PICU and cardiothoracic ICU. There were one hundred forty-four patients with suspected bacterial infections
that had bacterial cultures sent by clinicians. Procalcitonin samples were obtained at three time intervals: as close to the time of the initial culture as possible (up to 12 hr after) and 24 and 72 hours after the initial culture. Patients were stratified into clinical outcome groups based on microbiology results and clinical symptoms using Centers for Disease Control and Prevention criteria. These assignments were blinded to procalcitonin levels. Primary outcome was the presence of culture-proven bacterial infection. There was a statistically significant difference in initial and subsequent median procalcitonin values between patients with confirmed bacterial infections and patients with low suspicion of bacterial infection (p < 0.02). However, there was extremely high variability in procalcitonin values among all groups. Procalcitonin had only a fair ability to predict bacterial infection, with area under the curve of receiver operating characteristic plots ranging between 0.63 and 0.71. When using serial procalcitonin values to predict bacterial infection, positive likelihood ratios were near 1 and negative likelihood ratios were between 0.3 and 0.4. Procalcitonin levels were higher in children with documented confirmed bacterial infection as compared with those with low suspicion of infection. However, neither single nor serial procalcitonin measurements were able to predict the presence or absence of confirmed bacterial infection with enough certainty to be clinically useful as to recommend initiating or withholding antibiotics.

Title: A cross-over study of continuous tracheal cuff pressure monitoring in critically-ill children.

Citation: Intensive care medicine, Jan 2016, vol. 42, no. 1, p. 132-133 (January 2016)

Author(s): Vottier, Gaëlle, Matrot, Boris, Jones, Peter, Dauger, Stéphane

Title: The Morbidity and Mortality Conference in Pediatric Intensive Care as a Means for Improving Patient Safety.

Citation: Pediatric critical care medicine : a journal of the Society of Critical Care Medicine and the World Federation of Pediatric Intensive and Critical Care Societies, Jan 2016, vol. 17, no. 1, p. 67-72, 1529-7535 (January 2016)

Author(s): Frey, Bernhard, Doell, Carsten, Klauwer, Dietrich, Cannizzaro, Vincenzo, Bernet, Vera, Maguire, Christine, Brotschi, Barbara

Abstract: To present our experience in an interdisciplinary and interprofessional morbidity and mortality conference, with special emphasis on its usefulness in improving patient safety. Retrospective analysis. Tertiary interdisciplinary neonatal PICU. Morbidity and mortality conference minutes on 48 patients (newborns to 17 yr), January 2009 to June 2014. None. The authors' PICU implemented a morbidity and mortality conference guideline in 2009 using a system-based approach to identify medical errors, their contributing factors, and possible solutions. In the subsequent 5.5 years, there were 44 mortality conferences (of 181 deaths [27%] over the same period) and four morbidity conferences. The median death/morbidity event-morbidity and mortality conference interval was 90 days (range, 7 d to 1.5 yr). The median age of patients was 4 months (range, newborn to 17 years). In six cases, the primary reason for PICU admission was a treatment complication. Unsafe processes/medical errors were identified and discussed in 37 morbidity and mortality conferences (77%). In seven cases, new autopsy findings prompted the discussion of a possible error. The 48 morbidity and mortality conferences identified 50 errors, including 30 in which an interface problem was a contributing factor. Fifty-four improvements were identified in 34 morbidity and mortality conferences. Four morbidity and mortality conferences discussed specific ethical issues. From our experience, we have found that the interdisciplinary and interprofessional
morbidity and mortality conference has the potential to reveal unsafe processes/medical errors, in particular, diagnostic and communication errors and interface problems. When formatted as a nonhierarchical tool inviting contributions from all staff levels, the morbidity and mortality conference plays a key role in the system approach to medical errors.

Title: Drugs as risk factors of acute kidney injury in critically ill children.

Citation: Pediatric nephrology (Berlin, Germany), Jan 2016, vol. 31, no. 1, p. 145-151 (January 2016)

Author(s): Glanzmann, Corina, Frey, Bernhard, Vonbach, Priska, Meier, Christoph R

Abstract: Acute kidney injury (AKI) is a serious condition in critically ill children. Nephrotoxic medication exposure is a common contributing factor to AKI, but little literature is available in pediatrics. The aim of the present study was to assess potential associations between drugs and the risk of developing AKI. We performed a retrospective case-control study in a pediatric intensive care unit (PICU). Cases were patients who developed AKI during PICU stay. Patients without AKI served as controls and were matched to cases by age and gender in a one-to-one ratio. One hundred case-control pairs were included. Cases were not statistically different from controls with regard to median weight and main diagnoses, but differed with regard to the need for mechanical ventilation, severity of illness, and median length of PICU stay. Multivariate models revealed a statistically significant higher risk of developing AKI for patients treated with metamizole, morphine, paracetamol, and tropisetron. A similar risk could be shown for medication groups, namely glucocorticoids, betalactam antibiotics, opioids, and non-steroidal anti-inflammatory drugs. The results suggest that drugs are associated with acute renal dysfunction in critically ill children, but the multifactorial causes of AKI should be kept in mind.

Title: Single Center Outcomes of Status Epilepticus at a Paediatric Intensive Care Unit.

Citation: The Canadian journal of neurological sciences. Le journal canadien des sciences neurologiques, Jan 2016, vol. 43, no. 1, p. 105-112, 0317-1671 (January 2016)

Author(s): Shah, Samir, Shah, Namrata, Johnson, Robert, West, Alina Nico, Prasad, Narayan

Abstract: Status epilepticus (SE) is a frequent admission diagnosis to paediatric intensive care units (PICUs) and is associated with variable outcomes. We have audited our experience of patients presenting in SE at a Canadian PICU to determine unfavorable outcome variables. Charts of patients <18 years of age presenting in SE to a tertiary care PICU over a 10-year period were audited. Data were analyzed at three care-points: transport, the emergency department (ED) and the PICU. Patient outcome before PICU discharge was categorized as "favorable" for return to pre-status functioning level or "unfavorable" for new deficit/death. Student’s t-test and the Kruskal-Wallis test were used for analysis of normal and skewed continuous variables, respectively, and either Chi-square test or Fisher's exact test for categorical variables. 189 patients (54% males) were identified with a median age of 1.9 years. Idiopathic SE had the highest incidence; infectious/vascular etiologies were associated with more unfavorable outcomes. Progression to refractory SE in the ED had a higher incidence of death (p<0.05). Patients with an unfavorable outcome had a higher incidence of apnea during transport (p=0.01), longer hospital stays (p<0.05), need for therapeutic coma (p=0.01), longer duration of therapeutic coma (p<0.05), need for mechanical ventilation (p<0.05), and recurrent or refractory seizures during inpatient stay (p<0.05). Multivariate analysis of unfavorable outcomes of patients in SE presenting to the PICU included renal failure, cerebral edema, apnea during transport,
refractory seizures, and recurrent seizures. Refractory seizures in children presenting with SE are associated with worsened outcomes in the PICU.

**Title:** Drug dosage in continuous venovenous hemofiltration in critically ill children.

**Citation:** Frontiers in bioscience (Scholar edition), Jan 2016, vol. 8, p. 56-66 (2016)

**Author(s):** Assadi, Farahnak, Shahrbaf, Fatemeh Ghane

**Abstract:** The dosage of drugs in patients requiring continuous renal replacement therapy need to be adjusted based on a number of variables that affect pharmacokinetics (PK) including patient weight, CRRT modality (convention, vs. diffusion), blood and/or effluent flow, hemofilter characteristics, physiochemical drug properties, volume of distribution, protein binding and half-life as well as residual renal function. There is a paucity of data on PK studies in children with acute kidney injury requiring CRRT. When possible, therapeutic drug monitoring should be utilized for those medications where serum drug concentrations can be obtained in a clinically relevant time frame. Also, a patient-centered team approach that includes an intensive care unit pharmacist is recommended to prevent medication-related errors and enhance safe and effective medication use is highly recommended. The aim of this article is to review the current guidelines for drug dosing in critically ill children who require continuous venovenous hemofiltration.

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**Title:** Severity-of-Illness Scoring in Pediatric Critical Care: Quo Vadis?

**Citation:** Pediatric critical care medicine : a journal of the Society of Critical Care Medicine and the World Federation of Pediatric Intensive and Critical Care Societies, Jan 2016, vol. 17, no. 1, p. 83-85, 1529-7535 (January 2016)

**Author(s):** Tasker, Robert C, Randolph, Adrienne G

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**Title:** Vasoactive Drugs and Hemodynamic Monitoring in Pediatric Cardiac Intensive Care: An Italian Survey.

**Citation:** World journal for pediatric & congenital heart surgery, Jan 2016, vol. 7, no. 1, p. 25-31 (January 2016)

**Author(s):** Rizza, Alessandra, Bignami, Elena, Belletti, Alessandro, Polito, Angelo, Ricci, Zaccaria, Isgrò, Giuseppe, Locatelli, Alessandro, Cogo, Paola

**Abstract:** Little is known about practitioner preference, the availability of technology, and variability in practice with respect to hemodynamic monitoring and vasoactive drug use after congenital heart surgery. The aim of this study was to characterize current hospital practices related to the management of low cardiac output syndrome (LCOS) across Italy. We issued a 22-item questionnaire to 14 Italian hospitals performing pediatric cardiac surgery. Electrocardiogram, invasive blood pressure, central venous pressure, pulse oximetry, diuresis, body temperature, arterial lactate, and blood gas analysis were identified as routine in hemodynamic monitoring. With regard to advanced hemodynamic monitoring, pulmonary arterial catheter and transpulmonary thermodilution were available in 43% of the centers, uncalibrated pulse contour methods in 29% of the centers, and transesophageal/transthoracic echocardiograms in all of the centers. Dopamine added to milrinone
was the most frequent drug regimen for LCOS prevention after cardiopulmonary bypass. Overall, 86% of centers used milrinone alone as the initial treatment for LCOS with elevated systemic vascular resistances and levosimendan, the second preferred choice. In cases of LCOS with low vascular resistance, epinephrine was the first choice (10 centers), dopamine was the second choice (4 centers), followed by vasopressin and norepinephrine (3 centers). For treatment of LCOS with elevated pulmonary resistances, milrinone was the first choice (eight centers), followed by inhaled nitric oxide (five centers). The survey shows that advanced hemodynamic monitoring is rarely performed. The most commonly used vasoactive drugs are milrinone, levosimendan, dopamine, epinephrine, vasopressin, and norepinephrine. Guidelines on the topic are warranted. © The Author(s) 2015.

**Title:** Pediatric Critical Care Medicine 2016: Growth and Further Specialization.

**Citation:** Pediatric critical care medicine : a journal of the Society of Critical Care Medicine and the World Federation of Pediatric Intensive and Critical Care Societies, Jan 2016, vol. 17, no. 1, p. 1., 1529-7535 (January 2016)

**Author(s):** Kochanek, Patrick M

**Title:** Pediatric Critical Care Telemedicine Program: A Single Institution Review.

**Citation:** Telemedicine journal and e-health : the official journal of the American Telemedicine Association, Jan 2016, vol. 22, no. 1, p. 51-55 (January 2016)

**Author(s):** Hernandez, Maria, Hojman, Nayla, Sadorra, Candace, Dharmar, Madan, Nesbitt, Thomas S, Litman, Rebecca, Marcin, James P

**Abstract:** Rural and community emergency departments (EDs) often receive and treat critically ill children despite limited access to pediatric expertise. Increasingly, pediatric critical care programs at children's hospitals are using telemedicine to provide consultations to these EDs with the goal of increasing the quality of care. We conducted a retrospective review of a pediatric critical care telemedicine program at a single university children's hospital. Between the years 2000 and 2014, we reviewed all telemedicine consultations provided to children in rural and community EDs, classified the visits using a comprehensive evidence-based set of chief complaints, and reported the consultations' impact on patient disposition. We also reviewed the total number of pediatric ED visits to calculate the relative frequency with which telemedicine consultations were provided. During the study period, there were 308 consultations provided to acutely ill and/or injured children for a variety of chief complaints, most commonly for respiratory illnesses, acute injury, and neurological conditions. Since inception, the number of consultations has been increasing, as has the number of participating EDs (n=18). Telemedicine consultations were conducted on 8.6% of seriously ill children, the majority of which resulted in admission to the receiving hospital (n=150, 49%), with a minority of patients requiring transport to the university children's hospital (n=103, 33%). This single institutional, university children's hospital-based review demonstrates that a pediatric critical care telemedicine program used to provide consultations to seriously ill children in rural and community EDs is feasible, sustainable, and used relatively infrequently, most typically for the sickest pediatric patients.

**Title:** Establishment of Pediatric Cardiac Intensive Care Advanced Practice Provider Services.
Abstract: The addition of advanced practice providers (APPs; nurse practitioners and physician assistants) to a pediatric cardiac intensive care unit (PCICU) team is a health care innovation that addresses medical provider shortages while allowing PCICUs to deliver high-quality, cost-effective patient care. APPs, through their consistent clinical presence, effective communication, and facilitation of interdisciplinary collaboration, provide a sustainable solution for the highly specialized needs of PCICU patients. In addition, APPs provide leadership, patient and staff education, facilitate implementation of evidence-based practice and quality improvement initiatives, and the performance of clinical research in the PCICU. This article reviews mechanisms for developing, implementing, and sustaining advance practice services in PCICUs. © The Author(s) 2015.

Title: Transforming the Morbidity and Mortality Conference to Promote Safety and Quality in a PICU.

Abstract: Determine the effectiveness of a structured systems-oriented morbidity and mortality conference in improving the process of reviewing and responding to adverse events in a PICU. Prospective time series analysis before and after implementation of a systems-oriented morbidity and mortality conference. Single tertiary referral PICU in Baltimore, MD. Thirty-three patients discussed before and 31 patients after implementation of a systems-oriented morbidity and mortality conference over a total of 20 morbidity and mortality conferences, from April 2013 to March 2014. Systems-oriented morbidity and mortality conference incorporating elements of medical incident analysis. There was a significant increase in meeting attendance (mean, 12 vs 31 attendees per morbidity and mortality conference; p < 0.001) after the systems-oriented morbidity and mortality conference was instituted. There was no significant difference in the mean number of cases suggested (4.2 vs 4.6) or discussed (3.3 vs 3.1) per morbidity and mortality conference. There was also no significant difference in the mean number of adverse events identified per morbidity and mortality conference (3.4 vs 4.3). However, there was an increase in the proportion of cases discussed using a standard case review tool, but this did not reach statistical significance (27% vs 45%; p = 0.231). Nevertheless, we observed a significant increase in the mean number of quality improvement interventions suggested (2.4 vs 5.6; p < 0.001) and implemented (1.7 vs 4.4; p < 0.001) per morbidity and mortality conference. All adverse event categories identified had corresponding interventions suggested after the systems-oriented morbidity and mortality conference was instituted compared with before (80% vs 100%). Intervention-to-adverse event ratios per category were also higher (mean, 0.6 vs 1.5). A structured systems-oriented PICU morbidity and mortality conference incorporating elements of medical incident analysis improves the process of reviewing and responding to adverse events by significantly increasing quality improvement interventions suggested and implemented. Future work would involve testing locally adapted versions of the systems-oriented morbidity and mortality conference in multiple inpatient settings.
Title: An Evaluation of Various Ventilator-Associated Infection Criteria in a PICU.

Citation: Pediatric critical care medicine : a journal of the Society of Critical Care Medicine and the World Federation of Pediatric Intensive and Critical Care Societies, Jan 2016, vol. 17, no. 1, p. 73-80, 1529-7535 (January 2016)

Author(s): Beardsley, Andrew L, Nitu, Mara E, Cox, Elaine G, Benneyworth, Brian D

Abstract: To describe characteristics and overlap associated with various ventilator-associated infection criteria in the PICU. Retrospective observational study. A quaternary care children’s hospital PICU. Children ventilated more than 48 hours, excluding patients with tracheostomy. None. Ventilator-associated infection, including pneumonia, infection-related ventilator-associated condition, tracheobronchitis, and lower respiratory tract infection were defined according to criteria from the Centers for Disease Control and Prevention or medical literature. Clinical data were abstracted to assign diagnoses of each ventilator-associated infection. In 300 episodes of mechanical ventilation, there were 30 individual episodes of ventilator-associated infection. Nine episodes met more than one definition. Rates per 1,000 ventilator days were 2.60 for ventilator-associated pneumonia, 2.16 for infection-related ventilator-associated condition, 5.19 for ventilator-associated tracheobronchitis, and 6.92 for lower respiratory tract infection. The rate of any ventilator-associated infection was 12.98 per 1,000 ventilator days. Individual criteria had similar risk factors and outcomes. Risk factors for development of any ventilator-associated infection included older age (p = 0.003) and trauma (p = 0.007), while less cardiac surgery patients developed ventilator-associated infection (p = 0.015). On multivariate analysis, trauma was the only independent risk factor (adjusted odds ratio, 3.10; 95% CI, 1.15-8.38). Developing any ventilator-associated infection was associated with longer duration of mechanical ventilation (p < 0.001) and longer PICU length of stay (p < 0.001) but not PICU mortality (p = 0.523). There is little overlap in diagnosis of various ventilator-associated infection. However, the risk factors and outcomes associated with individual criteria are similar, indicating that they may have validity in identifying true pathology. Ventilator-associated infection in general is likely a larger problem than indicated by low hospital-reported rates of ventilator-associated pneumonia. There is clinical confusion due to the presence of several diagnostic criteria for ventilator-associated infection. Developing a more inclusive and clinically relevant criterion for diagnosing ventilator-associated infection is warranted to accurately assess their impact and improve guidance for clinicians in evaluating and treating ventilator-associated infection.

Title: Identifying Barriers to Delirium Screening and Prevention in the Pediatric ICU: Evaluation of PICU Staff Knowledge.

Citation: Journal of Pediatric Nursing, 2016, vol./is. 31/1(81-84), 08825963

Language: English

Publication Type: Academic Journal

Title: Parental Sources of Support and Guidance When Making Difficult Decisions in the Pediatric Intensive Care Unit.
Abstract: Objective: To assess sources of support and guidance on which parents rely when making difficult decisions in the pediatric intensive care unit and to evaluate associations of sources of support and guidance to anxiety, depression, and positive and negative affect. Study Design: This was a prospective cohort study of 86 English-speaking parents of 75 children in the pediatric intensive care unit at The Children's Hospital of Philadelphia who were hospitalized greater than 72 hours. Parents completed standardized instruments and a novel sources of support and guidance assessment. Results: Most parents chose physicians, nurses, friends, and extended family as their main sources of support and guidance when making a difficult decision. Descriptive analysis revealed a broad distribution for the sources of support and guidance items related to spirituality. Parents tended to fall into 1 of 2 groups when we used latent class analysis: the more-spiritual group (n = 47; 55%) highly ranked "what my child wants" (P = .023), spouses (P = .002), support groups (P = .003), church community (P < .001), spiritual leader (P < .001), higher power (P < .001), and prayer (P < .001) compared with the less-spiritual group (n = 39; 45%). The more-spiritual parents had greater positive affect scores (P = .005). Less-spiritual parents had greater depression scores (P = .043). Conclusions: Parents rely most on physicians, nurses, and friends and extended family when making difficult decisions for their critically ill child. Respondents tended to fall into 1 of 2 groups where the more-spiritual respondents were associated with greater positive affect and may be more resistant to depression.
on MV pre-tracheostomy was longer among those who required MV at discharge (median 18.3 vs. 13.8 days, P < 0.0001); however, number of failed extubations was similar (median 1 for both groups, P = 0.97). On mixed-effects multivariable regression analysis, the age categories of neonate (OR 2.9, 95%CI 1.1-7.6, P = 0.03), and infant (OR 1.7, 95%CI 1.1-2.8, P = 0.03), and ventilator days prior to tracheostomy (OR 1.01, 95%CI 1.0-1.02, P = 0.01) were significantly associated with increased odds of MV upon PICU discharge, while being a trauma admission was associated with decreased odds (OR 0.45, 95%CI 0.28-0.73, P = 0.001). Younger patients and those with prolonged courses of MV prior to tracheostomy are more likely to continue to need MV upon PICU discharge. Pediatr Pulmonol. 2016;51:53-59. © 2015 Wiley Periodicals, Inc. © 2015 Wiley Periodicals, Inc.

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**Title:** Patterns of Sedation Weaning in Critically Ill Children Recovering From Acute Respiratory Failure.

**Citation:** Pediatric critical care medicine : a journal of the Society of Critical Care Medicine and the World Federation of Pediatric Intensive and Critical Care Societies, Jan 2016, vol. 17, no. 1, p. 19-29, 1529-7535 (January 2016)

**Author(s):** Best, Kaitlin M, Asaro, Lisa A, Franck, Linda S, Wypij, David, Curley, Martha A Q, Randomized Evaluation of Sedation Titration for Respiratory Failure Baseline Study Investigators

**Abstract:** To characterize sedation weaning patterns in typical practice settings among children recovering from critical illness. A descriptive secondary analysis of data that were prospectively collected during the prerandomization phase (January to July 2009) of a clinical trial of sedation management. Twenty-two PICUs across the United States. The sample included 145 patients, aged 2 weeks to 17 years, mechanically ventilated for acute respiratory failure who received at least five consecutive days of opioid exposure. None. Group comparisons were made between patients with an intermittent weaning pattern, defined as a 20% or greater increase in daily opioid dose after the start of weaning, and the remaining patients defined as having a steady weaning pattern. Demographic and clinical characteristics, tolerance to sedatives, and iatrogenic withdrawal symptoms were evaluated. Sixty-six patients (46%) were intermittently weaned; 79 patients were steadily weaned. Prior to weaning, intermittently weaned patients received higher peak and cumulative doses and longer exposures to opioids and benzodiazepines, demonstrated more sedative tolerance (58% vs 41%), and received more chloral hydrate and barbiturates compared with steadily weaned patients. During weaning, intermittently weaned patients assessed for withdrawal had a higher incidence of Withdrawal Assessment Tool-version 1 scores of greater than or equal to 3 (85% vs 46%) and received more sedative classes compared with steadily weaned patients. This study characterizes sedative administration practices for pediatric patients prior to and during weaning from sedation after critical illness. It provides a novel methodology for describing weaning in an at-risk pediatric population that may be helpful in future research on weaning strategies to prevent iatrogenic withdrawal syndrome.

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**Title:** Research as a Standard of Care in the PICU.

**Citation:** Pediatric critical care medicine : a journal of the Society of Critical Care Medicine and the World Federation of Pediatric Intensive and Critical Care Societies, Jan 2016, vol. 17, no. 1, p. e13., 1529-7535 (January 2016)

**Author(s):** Zimmerman, Jerry J, Anand, Kanwaljeet J S, Meert, Kathleen L, Willson, Douglas F, Newth, Christopher J L, Harrison, Rick, Carcillo, Joseph A, Berger, John, Jenkins, Tammara L, Nicholson, Carol,
Abstract: Excellence in clinical care coupled with basic and applied research reflects the maturation of a medical subspecialty, advances that field, and provides objective data for identifying best practices. PICUs are uniquely suited for conducting translational and clinical research. In addition, multiple investigations have reported that a majority of parents are interested in their children’s participation in clinical research, even when the research offers no direct benefit to their child. However, such activity may generate ethical conflict with bedside care providers trying to acutely identify the best approach for an individual critically ill child. Ultimately, this conflict may diminish enthusiasm for the generation of scientific evidence that supports the application of evidence-based medicine into PICU clinical standard work. Accordingly this review endeavors to provide an overview of current state PICU clinical research strengths, liabilities, opportunities, and barriers and contrast this with an established pediatric hematology-oncology iterative research model that constitutes a learning healthcare system. Narrative review of medical literature published in English. Currently, most PICU therapy is not evidence based. Developing a learning healthcare system in the PICU integrates clinical research into usual practice and fosters a culture of evidence-based learning and continual care improvement. As PICU mortality has significantly decreased, identification and validation of patient-centered, clinically relevant research outcome measures other than mortality is essential for future clinical trial design. Because most pediatric critical illness may be classified as rare diseases, participation in research networks will facilitate iterative, collaborative, multiinstitutional investigations that over time identify the best practices to improve PICU outcomes. Despite real ethical challenges, critically ill children and their families should have the opportunity to participate in translational/clinical research whenever feasible.

Title: Early fluid overload is associated with acute kidney injury and PICU mortality in critically ill children.

Citation: European journal of pediatrics, Jan 2016, vol. 175, no. 1, p. 39-48 (January 2016)

Author(s): Li, Yanhong, Wang, Jian, Bai, Zhenjiang, Chen, Jiao, Wang, Xueqin, Pan, Jian, Li, Xiaozhong, Feng, Xing

Abstract: Fluid overload (FO) has been associated with an increased risk for adverse outcomes in critically ill patients. Information on the impact of FO on mortality in a general population of pediatric intensive care unit (PICU) is limited. We aimed to determine the association of early FO with the development of acute kidney injury (AKI) and mortality during PICU stay and evaluate whether early FO predicts mortality, even after adjustment for illness severity assessed by pediatric risk of mortality (PRISM) III. This prospective study enrolled 370 critically ill children. The early FO was calculated based on the first 24-h total of fluid intake and output after admission and defined as cumulative fluid accumulation ≥5 % of admission body weight. Of the patients, 64 (17.3 %) developed early FO during the first 24 h after admission. The PICU mortality rate of the whole cohort was 18 of 370 (4.9 %). The independent factors significantly associated with early FO were PRISM III, age, AKI, and blood bicarbonate level. The early FO was associated with AKI (odds ratio [OR] = 1.34, p < 0.001) and mortality (OR = 1.36, p < 0.001). The association of early FO with mortality remained significant after adjustment for potential confounders including AKI and illness severity. The area under the receiver operating characteristic curve (AUC) of early FO for predicting mortality was 0.78 (p < 0.001). This result, however, was not better than PRISM III (AUC = 0.85, p < 0.001). Early FO was associated with increased risk for AKI and mortality in critically ill children. • Fluid overload is associated with an increased risk for adverse outcomes in specific clinical settings of pediatric
population. What is New: • Early fluid overload during the first 24 h after PICU admission is independently associated with increased risk for acute kidney injury and mortality in critically ill children.

Title: Red cell transfusions as an independent risk for mortality in critically ill children.

Citation: Journal of intensive care, Jan 2016, vol. 4, p. 2. (2016)

Author(s): Rajasekaran, Surender, Kort, Eric, Hackbath, Richard, Davis, Alan T, Sanfilippo, Dominic, Fitzgerald, Robert, Zuiderveen, Sandra, Ndika, Akunne N, Beauchamp, Hilary, Olivero, Anthony, Hassan, Nabil

Abstract: Severity of illness is an important consideration in making the decision to transfuse as it is the sicker patient that often needs a red cell transfusion. Red blood cell (RBC) transfusions could potentially have direct effects and interact with presenting illness by contributing to pathologies such as multi-organ dysfunction and acute lung injury thus exerting a considerable impact on overall morbidity and mortality. In this study, we examine if transfusion is an independent predictor of mortality, or if outcomes are merely a result of the initial severity as predicted by Pediatric Risk of Mortality (PRISM) III, Pediatric Index of Mortality (PIM2), and day 1 Pediatric Logistic Organ Dysfunction (PELOD) scores. A single center retrospective study was conducted using data from a prospectively maintained transfusion database and center-specific data at our pediatric ICU between January 2009 and December 2012. Multivariate regression was used to control for the effects of clinical findings, therapy, and severity scores, with mortality as the dependent variable. Likelihood ratios and area under the curve were used to test the fidelity of severity scores by comparing transfused vs. non-transfused patients. There were 4975 admissions that met entry criteria. In multivariate analysis, PRISM III scores and serum hemoglobin were significant predictors of transfusion (p < 0.05). Transfused and non-transfused subjects were distinctly disparate, so multivariate regression was used to control for differences. Severity scores, age, volume transfused, and vasoactive agents were significantly associated with mortality whereas hemoglobin was not. A substantial number of transfusions (45%) occurred in the first 24 h, and patients transfused later (24-48 h) were more likely to die compared to this earlier time point. Likelihood ratio testing revealed statistically significant differences in severity scoring systems to predict mortality in transfused vs. non-transfused patients. This study suggests that RBC transfusion is an important risk factor that is statistically independent of severity. The timing of transfusions that related strongest to mortality remained outside the purview of severity scoring, as these happened beyond the timing of data collection for most scoring systems.

Title: Pathways to Care for Critically Ill or Injured Children: A Cohort Study from First Presentation to Healthcare Services through to Admission to Intensive Care or Death.

Citation: PloS one, Jan 2016, vol. 11, no. 1, p. e0145473. (2016)

Author(s): Hodkinson, Peter, Argent, Andrew, Wallis, Lee, Reid, Steve, Perera, Rafael, Harrison, Sian, Thompson, Matthew, English, Mike, Maconochie, Ian, Ward, Alison

Abstract: Critically ill or injured children require prompt identification, rapid referral and quality emergency management. We undertook a study to evaluate the care pathway of critically ill or injured children to identify preventable failures in the care provided. A year-long cohort study of critically ill and injured children was performed in Cape Town, South Africa, from first presentation
to healthcare services until paediatric intensive care unit (PICU) admission or emergency department death, using expert panel review of medical records and caregiver interview. Main outcomes were expert assessment of overall quality of care; avoidability of severity of illness and PICU admission or death and the identification of modifiable factors. The study enrolled 282 children, 252 emergency PICU admissions, and 30 deaths. Global quality of care was graded good in 10% of cases, with half having at least one major impact modifiable factor. Key modifiable factors related to access to care and identification of the critically ill, assessment of severity, inadequate resuscitation, and delays in decision making and referral. Children were transferred with median time from first presentation to PICU admission of 12.3 hours. There was potentially avoidable severity of illness in 185 (74%) of children, and death prior to PICU admission was avoidable in 17/30 (56.7%) of children. The study presents a novel methodology, examining quality of care across an entire system, and highlighting the complexity of the pathway and the modifiable events amenable to interventions, that could reduce mortality and morbidity, and optimize utilization of scarce critical care resources; as well as demonstrating the importance of continuity and quality of care.

Full Text:
Available from ProQuest in PLoS One

ClinicalSkills.net contains over 220 guidelines for procedures in both graphic and text format, including for Paediatrics. It is evidence based, double-blind peer reviewed, and is quick and easy to use.

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Contact the PICU Outreach librarian:
katie.barnard@uhbristol.nhs.uk

www.uhbristol.nhs.uk/for-clinicians/library-and-information-service