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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
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NHS Behind the Headlines

Last line in antibiotic resistance under threat

Thursday Nov 19 2015

"The last line of antibiotic defence against some serious infections is under threat,” The Guardian reports, after researchers found that E.coli bacteria from food products in China has developed resistance to colistin, a polymixin antibiotic…
New activity in Uptodate

Updated guidelines for the diagnosis and management of primary immunodeficiency (November 2015)

A revised “Practice parameter for the diagnosis and management of primary immunodeficiency,” developed by the three national allergy and immunology societies in the United States, has been published to aid allergy/immunology specialists and other practitioners in the recognition, diagnosis, and general management of these disorders [19]. Highlights include screening and advanced laboratory tests for the different components of immune function, characteristic clinical manifestations and laboratory findings for a number of disorders, internet resources, antibiotic prophylaxis, and indications for hematopoietic cell transplantation or gene therapy. There are now more than 200 genetically distinct disorders of immune function that are classified using the system devised by the World Health Organization (WHO) and International Union of Immunological Societies (IUIS). Consultation with an immunology specialist with experience in diagnosing and managing primary immunodeficiencies is recommended. Our approach is consistent with that outlined in this practice parameter. (See “Approach to the child with recurrent infections” and “Laboratory evaluation of the immune system” and "Medical management of immunodeficiency".)

Quick exercise

Systematic Reviews

There are 7 key steps that need to be taken when carrying out a Systematic Review. Can you put them in order?

A. Quality assessment
B. Study selection
C. Synthesis
D. Data extraction
E. Define the question
F. Literature search
G. Writing up

For assistance with carrying out a systematic review search or a literature search, please email library@uhbristol.nhs.uk.
Title: The Value of Screening Parents for Their Risk of Developing Psychological Symptoms After PICU: A Feasibility Study Evaluating a Pediatric Intensive Care Follow-Up Clinic.

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, Nov 2015, vol. 16, no. 9, p. 808-813, 1529-7535 (November 2015)

Author(s): Samuel, Victoria M, Colville, Gillian A, Goodwin, Sarah, Ryninks, Kirsty, Dean, Suzanne

Abstract: This study aimed to assess whether prospectively screening parents for psychological vulnerability would enable beneficial targeting of a subsequent follow-up clinic. Parents of children consecutively admitted to a PICU were assessed for risk of developing posttraumatic stress disorder at discharge using the Posttraumatic Adjustment Scale. High-risk parents were then randomized to the intervention (follow-up clinic, 2 mo after discharge) or control condition. All parents completed Impact of Event Scale-Revised and Hospital Anxiety and Depression Scale at 6 months. Of the 209 parents of 145 children recruited to the study, 78 (37%) were identified, on the basis of their Posttraumatic Adjustment Scale score at baseline, as being at risk of developing posttraumatic stress disorder, and randomized to the control or intervention condition. Follow-up data were provided by 157 of 209 parents (75%). Logistic regression analyses controlling for parent gender and child length of stay showed that high-risk control parents (n = 32) were significantly more likely to score above the clinical cutoff for all three psychological outcomes than parents deemed low risk at baseline (n = 89) (posttraumatic stress: odds ratio = 3.39; 95% CI, 1.28-8.92; p = 0.014; anxiety: odds ratio = 6.34; 95% CI, 2.55-15.76; p < 0.001; depression: odds ratio = 4.13; 95% CI, 1.47-11.61; p = 0.007). Only 14 of 38 (37%) high-risk intervention parents attended the follow-up clinic appointment they were offered. At follow-up, there were no statistically significant differences between the intervention and control groups, but there were small effect sizes in favor of the intervention for anxiety scores (Cohen d = 0.209) and depression scores (Cohen d = 0.254) CONCLUSIONS:: Screening parents for psychological vulnerability using measures such as the Posttraumatic Adjustment Scale may enable more efficient targeting of support. However, further research is needed on how best to provide effective follow-up intervention for families.

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Title: A Novel Method to Identify the Start and End of the Winter Surge in Demand for Pediatric Intensive Care in Real Time.


Author(s): Pagel, Christina, Ramnarayan, Padmanabhan, Ray, Samiran, Peters, Mark J

Abstract: Implementation of winter surge management in intensive care is hampered by the annual variability in the start and duration of the winter surge. We aimed to develop a real-time monitoring system that could identify the start promptly and accurately predict the end of the winter surge in a pediatric intensive care setting. We adapted a method from the stock market called "Bollinger
bands" to compare current levels of demand for pediatric intensive care services to thresholds based on medium-term average demand. Algorithms to identify the start and end of the surge were developed using Bollinger bands and pragmatic considerations. The method was applied to a specific pediatric intensive care service: the North Thames Children's Acute Transport Service using eight winters of data (2005-2012) to tune the algorithms and one winter to test the final method (2013/2014). A regional specialized pediatric retrieval service based in London, United Kingdom. The optimal Bollinger band thresholds were 1.2 and 1 SDs above and below a 41-day moving average of demand, respectively. A simple linear model was found to predict the end of the surge and overall surge demand volume as soon as the start had been identified. Applying the method to the validation winter of 2013/2014 showed excellent performance, with the surge identified from November 18, 2013, to January 4, 2014. We have developed and tested a novel method to identify the start and predict the end of the winter surge in emergency demand for pediatric intensive care.

Title: Virtualization of open-source secure web services to support data exchange in a pediatric critical care research network.

Citation: Journal of the American Medical Informatics Association : JAMIA, Nov 2015, vol. 22, no. 6, p. 1271-1276 (November 2015)


Abstract: To examine the feasibility of deploying a virtual web service for sharing data within a research network, and to evaluate the impact on data consistency and quality. Virtual machines (VMs) encapsulated an open-source, semantically and syntactically interoperable secure web service infrastructure along with a shadow database. The VMs were deployed to 8 Collaborative Pediatric Critical Care Research Network Clinical Centers. Virtual web services could be deployed in hours. The interoperability of the web services reduced format misalignment from 56% to 1% and demonstrated that 99% of the data consistently transferred using the data dictionary and 1% needed human curation. Use of virtualized open-source secure web service technology could enable direct electronic abstraction of data from hospital databases for research purposes. © The Author 2015. Published by Oxford University Press on behalf of the American Medical Informatics Association. All rights reserved. For Permissions, please email: journals.permissions@oup.com.

Title: An Evaluation of Family-Centered Rounds in the PICU: Room for Improvement Suggested by Families and Providers.


Author(s): Levin, Amanda B, Fisher, Kiondra R, Cato, Krista D, Zurca, Adrian D, October, Tessie W

Abstract: To identify areas for improvement in family-centered rounds from both the family and provider perspectives. Prospective, cross-sectional mixed-methods study, including an objective measure (direct observation of family-centered rounds) and subjective measures (surveys of English-speaking families and providers) of family-centered rounds. PICU in a single, tertiary children's
hospital. Families of children admitted to the PICU, physicians, and nurses. None. Two hundred thirty-two family-centered round encounters were observed over a 10-week period. Family-centered round encounters averaged 10.5 minutes per child. Multivariable regression analysis revealed that family presence was independently associated with length of family-centered rounds (p < 0.002) despite family talk time accounting for an average of 25 seconds (4%) of the encounter. Non-English-speaking families were less likely to attend family-centered rounds compared with English-speaking families even when physically present at the patient's bedside (p < 0.001). Most commonly families and providers agreed that family-centered rounds keep the family informed and reported positive statements about family presence on family-centered rounds; however, PICU fellows did not agree that families provided pertinent information and nurses reported that family presence limited patient discussions. The primary advice families offered providers to improve family-centered rounds was to be more considerate and courteous, including accommodating family schedules, minimizing distractions, and limiting computer viewing. Family presence increased the length of family-centered rounds despite a small percentage of time spoken by families, suggesting longer rounds are due to changes in provider behavior when families are present. Also, non-English-speaking families may need more support to be able to attend and benefit from family-centered rounds. Lastly, in an era of full family-centered rounds acceptance, families and most providers, except fellows, report benefit from family presence during family-centered rounds. However, providers should be aware of the perception of their behaviors to optimize the experience for families.

Title: Gastric Dysmotility in Critically Ill Children: Pathophysiology, Diagnosis, and Management.


Author(s): Martinez, Enid E, Douglas, Katherine, Nurko, Samuel, Mehta, Nilesh M

Abstract: We aimed to review gastric dysmotility in critically ill children: 1) its pathophysiology, with a focus on critical care diseases and therapies that affect gastric motility, 2) diagnostic methodologies, and 3) current and future potential therapies. Eligible studies were identified from PubMed and MEDLINE. Literature search included the following key terms: "gastric emptying," "gastric motility/dysmotility," "gastrointestinal motility/dysmotility," "nutrition intolerance," and "gastric residual volume." Studies since 1995 were extracted and reviewed for inclusion by the authors related to the physiology, pathophysiology, diagnostic methodologies, and available therapies for gastric emptying. Delayed gastric emptying, a common presentation of gastric dysmotility, is present in up to 50% of critically ill children. It is associated with the potential for aspiration, ventilator-associated pneumonia, and inadequate delivery of enteral nutrition and may affect the efficacy of enteral medications, all of which may be result in poor patient outcomes. Gastric motility is affected by critical illness and its associated therapies. Currently available diagnostic tools to identify gastric emptying at the bedside have not been systematically studied and applied in this cohort. Gastric residual volume measurement, used as an indirect marker of delayed gastric emptying in PICUs around the world, may be inaccurate. Gastric dysmotility is common in critically ill children and impacts patient safety and outcomes. However, it is poorly understood, inadequately defined, and current therapies are limited and based on scant evidence. Understanding gastric motility and developing accurate bedside measures and novel therapies for gastric emptying are highly desirable and need to be further investigated.
**Title:** Using Time Series Analysis to Predict Cardiac Arrest 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, Nov 2015, vol. 16, no. 9, p. e332., 1529-7535 (November 2015)

**Author(s):** Kennedy, Curtis E, Aoki, Noriaki, Mariscalco, Michele, Turley, James P

**Abstract:** To build and test cardiac arrest prediction models in a PICU, using time series analysis as input, and to measure changes in prediction accuracy attributable to different classes of time series data. Retrospective cohort study. Thirty-one bed academic PICU that provides care for medical and general surgical (not congenital heart surgery) patients. Patients experiencing a cardiac arrest in the PICU and requiring external cardiac massage for at least 2 minutes. None. One hundred three cases of cardiac arrest and 109 control cases were used to prepare a baseline dataset that consisted of 1,025 variables in four data classes: multivariate, raw time series, clinical calculations, and time series trend analysis. We trained 20 arrest prediction models using a matrix of five feature sets (combinations of data classes) with four modeling algorithms: linear regression, decision tree, neural network, and support vector machine. The reference model (multivariate data with regression algorithm) had an accuracy of 78% and 87% area under the receiver operating characteristic curve. The best model (multivariate + trend analysis data with support vector machine algorithm) had an accuracy of 94% and 98% area under the receiver operating characteristic curve. Cardiac arrest predictions based on a traditional model built with multivariate data and a regression algorithm misclassified cases 3.7 times more frequently than predictions that included time series trend analysis and built with a support vector machine algorithm. Although the final model lacks the specificity necessary for clinical application, we have demonstrated how information from time series data can be used to increase the accuracy of clinical prediction models.

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**Title:** Early Differentiation of Kawasaki Disease Shock Syndrome and Toxic Shock Syndrome in a Pediatric Intensive Care Unit.

**Citation:** The Pediatric infectious disease journal, Nov 2015, vol. 34, no. 11, p. 1163-1167 (November 2015)

**Author(s):** Lin, Ying-Jui, Cheng, Ming-Chou, Lo, Mao-Hung, Chien, Shao-Ju

**Abstract:** Kawasaki disease shock syndrome (KDSS) and toxic shock syndrome (TSS) can present as shock and fever with skin rash, but the management of these 2 groups of patients is different. This report proposes to help clinicians earlier distinguish these 2 diseases and expedite institution of appropriate therapy. We retrospectively reviewed the medical records of patients admitted to the pediatric intensive care unit with the diagnosis of KDSS or TSS from January 2000 through December 2010. Clinical, laboratory and echocardiographic data were collected for analysis of differences between them. Seventeen patients met the inclusion criteria of KDSS and 16 had a confirmed diagnosis of TSS. The mean age of the KDSS group was significantly younger than that of the TSS group (36.8 ± 41.1 vs. 113.3 ± 55.6 months, P < 0.001). Significantly lower hemoglobulin and age-adjusted hemoglobulin concentrations were noted in the KDSS group [Hb, age-adjusted Z score, -1.88 (range, -3.9 to 3.9) vs. 0.89 (range, -6.4 to 10.8), P = 0.006]. The median platelet count of the KDSS group was nearly twice that of the TSS group [312 × 10 per μL (range, 116-518) vs. 184.5 × 10 per μL (range: 31-629), P = 0.021]. Echocardiographic abnormalities, such as valvulitis (mitral or tricuspid regurgitation) and coronary artery lesions, were significantly more common in the KDSS
Echocardiography, anemia and thrombocytosis are useful early differentiating features between KDSS and TSS patients.

Title: Clinical Epidemiology of Extubation Failure in the Pediatric Cardiac ICU: A Report From the Pediatric Cardiac Critical Care Consortium.

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, Nov 2015, vol. 16, no. 9, p. 837-845, 1529-7535 (November 2015)


Abstract: To describe the clinical epidemiology of extubation failure in a multicenter cohort of patients treated in pediatric cardiac ICUs. Retrospective cohort study using prospectively collected clinical registry data. Pediatric Cardiac Critical Care Consortium registry. All patients admitted to the CICU at Pediatric Cardiac Critical Care Consortium hospitals. None. Analysis of all mechanical ventilation episodes in the registry from October 1, 2013, to July 31, 2014. The primary outcome of extubation failure was reintubation less than 48 hours after planned extubation. Repeated-measures analysis using generalized estimating equations to account for within patient and center correlation was performed to identify risk factors for extubation failure. Adjusted extubation failure rates for each hospital were calculated using logistic regression controlling for patient factors. Of 1,734 mechanical ventilation episodes (1,478 patients at eight hospitals) ending in a planned extubation, there were 100 extubation failures (5.8%). In multivariable analysis, only longer duration of mechanical ventilation was significantly associated with extubation failure (p = 0.01); the failure rate was 4% when ventilated less than 24 hours, 9% after 24 hours, and 13% after 7 days. For 503 patients intubated and extubated in the cardiac operating room, 15 patients (3%) failed extubation within 48 hours (12 within 24 hr). Case-mix-adjusted extubation failure rates ranged from 1.1% to 9.8% across hospitals. Patients failing extubation had greater median cardiac ICU length of stay (15 vs 3 d; p < 0.001) and in-hospital mortality (7.9 vs 1.2%; p < 0.001). Though extubation failure is uncommon overall, there may be opportunities to improve extubation readiness assessment in patients ventilated more than 24 hours. These data suggest that extubation in the operating room after cardiac surgery can be done with a low failure rate. We observed variation in extubation failure rates across hospitals, and future investigation must elucidate the optimal strategies of high-performing centers to reduce ventilation time while limiting extubation failures.

Title: Pediatric Index of Cardiac Surgical Intensive Care Mortality Risk Score for Pediatric Cardiac Critical Care.


Author(s): Jeffries, Howard E, Soto-Campos, Gerardo, Katch, Aaron, Gall, Christine, Rice, Tom B, Wetzel, Randall

Abstract: Comparison of clinical outcomes is imperative in the evaluation of healthcare quality. Risk adjustment for children undergoing cardiac surgery poses unique challenges, due to its distinct
nature. We developed a risk-adjustment tool specifically focused on critical care mortality for the
pediatric cardiac surgical population: the Pediatric Index of Cardiac Surgical Intensive care Mortality
score. Retrospective analysis of prospectively collected pediatric critical care data. Pediatric critical
care units in the United States. Pediatric cardiac intensive care surgical patients. Prospectively
collected data from consecutive patients admitted to ICUs were obtained from The Virtual PICU
System (VPS, LLC, Los Angeles, CA), a national pediatric critical care database. Thirty-two candidate
physiologic, demographic, and diagnostic variables were analyzed for inclusion in the development
of the Pediatric Index of Cardiac Surgical Intensive care Mortality model. Multivariate logistic
regression with stepwise selection was used to develop the model. A total of 16,574 cardiac surgical
patients from the 55 PICUs across the United States were included in the analysis. Thirteen variables
remained in the final model, including the validated Society of Thoracic Surgeons-European
Association of Cardio-Thoracic Surgery Congenital Heart Surgery Mortality (STAT) score and
admission time with respect to cardiac surgery, which identifies whether the patient underwent the
index surgical procedure before or after admission to the ICU. Pediatric Index of Cardiac Surgical
Intensive Care Mortality (PICSIM) performance was compared with the performance of Pediatric Risk
of Mortality-3 and Pediatric Index of Mortality-2 risk of mortality scores, as well as the STAT score
and STAT categories by calculating the area under the curve of the receiver operating characteristic
from a validation dataset: PICSIM (area under the curve = 0.87) performed better than Pediatric
Index of Mortality-2 (area under the curve = 0.81), Pediatric Risk of Mortality-3 (area under the curve
= 0.82), STAT score (area under the curve = 0.77), STAT category (area under the curve = 0.75), and
Risk Adjustment for Congenital Heart Surgery-1 (area under the curve = 0.74). This newly developed
mortality score, PICSIM, consisting of 13 risk variables encompassing physiology, cardiovascular
condition, and time of admission to the ICU showed better discrimination than Pediatric Index of
Mortality-2, Pediatric Risk of Mortality-3, and STAT score and category for mortality in a multisite
cohort of pediatric cardiac surgical patients. The introduction of the variable "admission time with
respect to cardiac surgery" allowed prediction of mortality when patients are admitted to the ICU
either before or after the index surgical procedure.

Title: Perceived Barriers To Anthropometric Measurements In Critically Ill Children.

Citation: American journal of critical care : an official publication, American Association of Critical-

Author(s): Irving, Sharon Y, Seiple, Stephanie, Nagle, Monica, Falk, Shiela, Mascarenhas, Maria,
Srinivasan, Vijay

Abstract: Anthropometric measurements are vital for safe care in pediatric intensive care units. To
identify barriers to anthropometric measurements and determine if perceptions of barriers differ
between ordering providers and nurses. A 21-item survey to elicit perceptions of barriers to
obtaining anthropometric measurements was distributed via e-mail to societies with members who
provide care in pediatric intensive care units. Most of the 258 eligible respondents (46% ordering
providers) were from North America (90%). Although 84% agreed that anthropometric
measurements are important, only 3% knew if these measurements were obtained upon admission
to their unit. Estimates of patients' measurements by parents or caregivers were commonly used
(72%) when actual measurements were not obtained. Leading barriers were presence of medical
devices (57%), use of extracorporeal life support (54%), and unstable hemodynamic status (52%).
More ordering providers than nurses considered osteopenia/fragile bones as a barrier to weight
measurement (46% vs 29%; P = .007) and traumatic brain injury a barrier to measurement of head
circumference (42% vs 24%; P = .002). More nurses than ordering providers perceived dialysis (21%
vs 9%; P = .01) and obesity (26% vs 15%; P = .04) as barriers to measurement of stature. Ordering
providers more than nurses perceived nurses' workload (51% vs 33%; P < .001) and lack of importance (43% vs 20%; P < .001) as barriers. Barriers to obtaining anthropometric measurements exist in pediatric intensive care units; ordering providers and nurses have different perceptions of what constitutes a barrier. ©2015 American Association of Critical-Care Nurses.

Title: Critically Ill Children Have Low Vitamin D-Binding Protein, Influencing Bioavailability of Vitamin D.


Author(s): Madden, Kate, Feldman, Henry A, Chun, Rene F, Smith, Ellen M, Sullivan, Ryan M, Agan, Anna A, Keisling, Shannon M, Panoskaltsis-Mortari, Angela, Randolph, Adrienne G

Abstract: Vitamin D deficiency, often defined by total serum 25-hydroxyvitamin D (25[OH]D) <20 ng/ml, is common in critically ill patients, with associations with increased mortality and morbidity in the intensive care unit. Correction of vitamin D deficiency in critical illness has been recommended, and ongoing clinical trials are investigating the effect of repletion on patient outcome. The biologically active amount of 25(OH)D depends on the concentration and protein isoform of vitamin D-binding protein (VDBP), which is also an acute-phase reactant affected by inflammation and injury. We performed a secondary analysis of a cohort of critically ill children in which we reported a high rate of vitamin D deficiency, to examine how VDBP level and genotype would impact vitamin D status. We prospectively enrolled 511 children admitted to the pediatric intensive care unit over a 12-month period. We measured serum VDBP in 479 children. We genotyped single nucleotide polymorphisms rs7041 and rs4588 in the VDBP gene (GC) to determine haplotypes GC1F, GC1S, and GC2 in 178 subjects who consented, then calculated bioavailable 25(OH)D from serum 25(OH)D, VDBP, albumin, and GC haplotype. The median serum VDBP level was 159 μg/ml (interquartile range, 108-221), lower than has been reported in healthy children. Factors predicting lower levels in multivariate analysis included age <1 year, nonwhite race, being previously healthy, 25(OH)D <20 ng/ml and greater illness severity. In the subgroup that was genotyped, GC haplotype had the strongest association with VDBP level; carriage of one additional copy of GC1S was associated with a 37.5% higher level (95% confidence interval, 31.9-44.8; P < 0.001). Bioavailable 25(OH)D was also inversely associated with illness severity (r = -0.24, P < 0.001), and ratio to measured total 25(OH)D was variable and related to haplotype. Physiologic deficiency of 25(OH)D in critical illness may be more difficult to diagnose, given that lower VDBP levels increase bioavailability. Treatment studies conducted on the basis of total 25(OH)D level, without consideration of VDBP concentration and genotype, may increase the risk of falsely negative results.

Full Text: Available from ProQuest in Annals of the American Thoracic Society

Title: Whole blood glutathione status and ICU morbidity in critically ill children.

Citation: Acta anaesthesiologica Scandinavica, Nov 2015, vol. 59, no. 10, p. 1311-1318 (November 2015)

Author(s): Fläring, U, Ekmark, L, Wernerman, J, Rooyackers, O

Abstract: A high reduced glutathione ratio is associated with high mortality in adult ICU patients. Whole blood glutathione status in critically ill children is less well characterized. In this study, whole
blood glutathione status in pediatric intensive care (PICU) patients was determined and the relation between the redox status of whole blood glutathione and morbidity was investigated. A prospective consecutive cohort of critically ill children (n = 146) admitted to the PICU of a tertiary university hospital, and a reference group of healthy children (n = 60) and healthy adults (n = 10) were included in the study. The concentrations of total and reduced whole blood were determined at admission and patient characteristics were recorded. A high fraction of reduced glutathione in the glutathione redox status was associated with longer dependency of mechanical ventilation and length of stay in the PICU (P = 0.02 and P = 0.03 respectively). In patients with a prolonged stay in the PICU (> 5 days), a more reduced state of glutathione was seen in patients who had more than two organ failures as compared to patients with one or two failing organs (P < 0.01 and P < 0.05), respectively. A positive correlation was also seen between numbers of organ failures and redox status of glutathione (r = 0.45, P < 0.001). A high reduced glutathione ratio was associated with longer PICU stay, duration of mechanical ventilation, and multiple organ failure. © 2015 The Acta Anaesthesiologica Scandinavica Foundation. Published by John Wiley & Sons Ltd.

Title: Increasing Parental Participation During Rounds in a Pediatric Cardiac Intensive Care Unit.

Citation: American journal of critical care : an official publication, American Association of Critical-Care Nurses, Nov 2015, vol. 24, no. 6, p. 532-538 (November 2015)

Author(s): Blankenship, Angela, Harrison, Sheilah, Brandt, Sarah, Joy, Brian, Simsic, Janet M

Abstract: Inviting parents of sick children to participate during the rounding process may reduce parents’ anxiety and improve communication between the parents and the health care team. To increase the percentage of available parents invited to participate in morning rounds in a pediatric cardiothoracic intensive care unit (CTICU). Invitations to parents to participate in morning CTICU rounds were randomly audited from June 2012 to April 2014 (mean, 15 audits per month). From June 2012 to February 2013 (before intervention), 73% of parents available during morning rounds received an invitation to participate. From April 2013 to May 2013, the following interventions (family participation bundle) were implemented: (1) staff education, (2)"Invitation to Rounds" handout added to the parent welcome packet with verbal explanation, (3) bedside tool provided for parents to communicate desire to participate in rounds with the team, (4) reminder to invite parents added to nursing rounding sheet. Following interventions, family feedback was obtained by 1-on-1 (physician-parent) open-ended conversation. From April 2013 to April 2014, 94% of parents available during morning rounds received an invitation to participate. Reasons for not participating: chose not to participate (63%), sleeping-staff reluctant to wake (25%), not English speaking (7%), breastfeeding (5%). Implementation of a family participation bundle was successful in increasing invitations to parents to participate during morning rounds in the CTICU. Engagement of staff and addressing specific staff concerns was instrumental in the project's success. ©2015 American Association of Critical-Care Nurses.

Title: Augmented Renal Clearance Implies a Need for Increased Amoxicillin-Clavulanic Acid Dosing in Critically Ill Children.

Citation: Antimicrobial agents and chemotherapy, Nov 2015, vol. 59, no. 11, p. 7027-7035 (November 2015)

Author(s): De Cock, Pieter A J G, Standing, Joseph F, Barker, Charlotte I S, de Jaeger, Annick, Dhont, Evelyn, Carlier, Mieke, Verstraete, Alain G, Delanghe, Joris R, Robays, Hugo, De Paepe, Peter
Abstract: There is little data available to guide amoxicillin-clavulanic acid dosing in critically ill children. The primary objective of this study was to investigate the pharmacokinetics of both compounds in this pediatric subpopulation. Patients admitted to the pediatric intensive care unit (ICU) in whom intravenous amoxicillin-clavulanic acid was indicated (25 to 35 mg/kg of body weight every 6 h) were enrolled. Population pharmacokinetic analysis was conducted, and the clinical outcome was documented. A total of 325 and 151 blood samples were collected from 50 patients (median age, 2.58 years; age range, 1 month to 15 years) treated with amoxicillin and clavulanic acid, respectively. A three-compartment model for amoxicillin and a two-compartment model for clavulanic acid best described the data, in which allometric weight scaling and maturation functions were added a priori to scale for size and age. In addition, plasma cystatin C and concomitant treatment with vasopressors were identified to have a significant influence on amoxicillin clearance. The typical population values of clearance for amoxicillin and clavulanic acid were 17.97 liters/h/70 kg and 12.20 liters/h/70 kg, respectively. In 32% of the treated patients, amoxicillin-clavulanic acid therapy was stopped prematurely due to clinical failure, and the patient was switched to broader-spectrum antibiotic treatment. Monte Carlo simulations demonstrated that four-hourly dosing of 25 mg/kg was required to achieve the therapeutic target for both amoxicillin and clavulanic acid. For patients with augmented renal function, a 1-h infusion was preferable to bolus dosing. Current published dosing regimens result in subtherapeutic concentrations in the early period of sepsis due to augmented renal clearance, which risks clinical failure in critically ill children, and therefore need to be updated. (This study has been registered at Clinicaltrials.gov as an observational study [NCT02456974].). Copyright © 2015, American Society for Microbiology. All Rights Reserved.

Title: Evaluation of the Safety of Quetiapine in Treating Delirium in Critically Ill Children: A Retrospective Review.

Citation: Journal of child and adolescent psychopharmacology, Nov 2015, vol. 25, no. 9, p. 666-670 (November 2015)

Author(s): Joyce, Christine, Witcher, Robert, Herrup, Elizabeth, Kaur, Savneet, Mendez-Rico, Elena, Silver, Gabrielle, Greenwald, Bruce M, Traube, Chani

Abstract: Quetiapine is an atypical antipsychotic that has been used off-label for the treatment of intensive care unit (ICU) delirium in the adult population, with studies demonstrating both efficacy and a favorable safety profile. Although there is a potential role for quetiapine in the treatment of pediatric ICU delirium, there has been no systematic reporting to date of safety in this patient population. Pharmacy records were used to identify 55 consecutive pediatric ICU patients who were diagnosed with delirium and received quetiapine. A comprehensive retrospective medical chart review was performed to collect data on demographics, dosing, and side effects. Fifty patients treated between January 2013 and November 2014 were included, and five patients were excluded from the study. Subjects ranged in age from 2 months to 20 years. Median daily dose was 1.3 mg/kg/day, and median duration of treatment was 12 days. There were three episodes of QTc prolongation that were clinically nonsignificant with no associated dysrhythmia: Two resolved over time without intervention, and one resolved with decrease in quetiapine dosage. There were no episodes of extrapyramidal symptoms or neuroleptic malignant syndrome. In this population of critically ill youth, short-term use of quetiapine as treatment for delirium appears to be safe, without serious adverse events. Further research is required to assess efficacy and evaluate for long-term effects. A prospective, randomized, placebo-controlled study of quetiapine in managing pediatric delirium is necessary.
**Title:** Higher Dead Space Is Associated With Increased Mortality in Critically Ill Children.

**Citation:** Critical care medicine, Nov 2015, vol. 43, no. 11, p. 2439-2445 (November 2015)

**Author(s):** Bhalla, Anoopindar K, Belani, Sanjay, Leung, Dennis, Newth, Christopher J L, Khemani, Robinder G

**Abstract:** Elevated dead space has been consistently associated with increased mortality in adults with respiratory failure. In children, the evidence for this association is more limited. We sought to investigate the association between dead space and mortality in mechanically ventilated children. Single-center retrospective review. Tertiary care pediatric critical care unit. Seven hundred twelve mechanically ventilated children with an arterial catheter. None. The end-tidal alveolar dead space fraction ([PaCO2 - PETCO2]/PaCO2), a dead space marker, was calculated with each arterial blood gas. The initial end-tidal alveolar dead space fraction (first arterial blood gas after intubation) (per 0.1 unit increase: odds ratio, 1.59; 95% CI, 1.40-1.81) and day 1 mean end-tidal alveolar dead space fraction (odds ratio, 1.95; 95% CI, 1.66-2.30) were associated with mortality. The relationship between both initial and day 1 mean end-tidal alveolar dead space fraction and mortality held in multivariate modeling after controlling for any of the following individually: PaO2/FIO2, oxygenation index, 24-hour maximal inotrope score, and Pediatric Risk of Mortality III (all p < 0.01), although end-tidal alveolar dead space fraction was no longer significant after controlling for the combination of oxygenation index, 24-hour maximal inotrope score, and Pediatric Risk of Mortality III. In 217 children with acute hypoxemic respiratory failure, initial end-tidal alveolar dead space fraction (per 0.1 unit increase odds ratio, 1.38; 95% CI, 1.14-1.67) and day 1 mean end-tidal alveolar dead space fraction (per 0.1 unit increase odds ratio, 1.60; 95% CI, 1.27-2.0) were associated with mortality. Day 1 mean end-tidal alveolar dead space fraction remained associated with mortality after controlling individually for any of the following in multivariate models: PaO2/FIO2, oxygenation index, and 24-hour maximal inotrope score (p ≤ 0.02), although end-tidal alveolar dead space fraction was no longer significant after controlling for the combination of oxygenation index, 24-hour maximal inotrope score, and Pediatric Risk of Mortality III. Increased dead space is associated with higher mortality in critically ill children, although it is no longer independently associated with mortality after controlling for severity of oxygenation defect, inotrope use, and severity of illness. However, because end-tidal alveolar dead space fraction is easy to calculate at the bedside, it may be useful for risk stratification and severity-of-illness scores.

**Full Text:** Available from Ovid in Critical Care Medicine

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**Title:** The Centers for Disease Control and Prevention's New Definitions for Complications of Mechanical Ventilation Shift the Focus of Quality Surveillance and Predict Clinical Outcomes in a PICU.

**Citation:** Critical care medicine, Nov 2015, vol. 43, no. 11, p. 2446-2451 (November 2015)

**Author(s):** Phongjitsiri, Siriporn, Coss-Bu, Jorge, Kennedy, Curtis, Silva, Jaime, Starke, Jeffrey, Graf, Jeanine, Thammasitboon, Satid

**Abstract:** The Centers for Disease Control and Prevention shifted the focus of surveillance paradigm for adult patients receiving mechanical ventilation, moving from the current standard of ventilator-associated pneumonia to broader complications. The surveillance definitions were designed to enable objective measures and efficient processes, so as to facilitate quality improvement initiatives...
and enhance standardized benchmark comparisons. We evaluated the surveillance definitions in terms of their ability to predict clinical outcomes and ease of surveillance in a PICU. Retrospective cohort study. A PICU at a university-affiliated children’s hospital. Eight hundred thirty-six patients receiving mechanical ventilation over 1-year period. None. We applied the definition for ventilator-associated condition (i.e., a sustained increase in ventilator setting after a period of stable or decreasing support) to our database. Of total 606 patients, 14.5% had ventilator-associated condition (20.9/1,000 ventilator days) and 8.1% had an infection-related ventilator-associated condition (12.9/1,000 ventilator days). The patients with infection-related ventilator-associated condition were classified into probable pneumonia (55%), possible pneumonia (28.6%), and undetermined infection (16.3%). A large portion of patients with ventilator-associated condition (44%) had other noninfectious etiologies (e.g., atelectasis, pulmonary edema, and shock). Patients who developed ventilator-associated condition had significantly longer ventilatory, ICU, and hospital days compared with those who did not. The ventilator-associated condition group had increased hospital mortality compared with the non-ventilator-associated condition group (19.3% vs 6.9%; \( p = 0.0007 \)). Multivariate regression analysis identified ventilator-associated condition as one of the predictors of hospital mortality with an adjusted odds ratio of 2.14 (95% CI, 1.03-4.42). Risk factors for developing a ventilator-associated condition included immunocompromised status (odds ratio, 2.90; 95% CI, 1.57-5.33), tracheostomy dependence (odds ratio, 2.78; 95% CI, 1.40-5.51), and chronic respiratory disease (odds ratio, 1.85; 95% CI, 1.03-3.3). The definitions for the various ventilator-associated conditions are good predictors of outcomes in children and adults and are amenable to automated surveillance. Based on the study findings, we suggest consideration for shifting the focus of surveillance for ventilator-associated events from only pneumonia to a broader range of complications.

**Full Text:**
Available from *Ovid in Critical Care Medicine*

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**Upcoming Lunchtime Drop-in Sessions**

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- Thurs 17th: Literature Searching

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