Articles Reviewed
1. Cardiac Resuscitation Events: One Eyewitness Is Not Enough.

Objective
To determine the accuracy of paper cardiopulmonary resuscitation records.

Setting
Twenty-six-bed video-monitored pediatric cardiac ICU. Patients: All patients who had a resuscitation event with available video and electronically stored vital sign and waveform data from May 2012 to February 2013.

Measurements and Main Results
There were 41 cardiopulmonary resuscitation events during the study period. Fifteen had complete and valid data from the paper cardiopulmonary resuscitation forms, the retrieved monitor data, and the continuous bedside video monitoring. These 15 events occurred in 12 individual patients, and there was 100% agreement of data in the documentation of interventions in place (ventilation, arterial catheter, pulse oximetry, and vascular access) and in the presence of a witness at the onset of the arrest. All events were witnessed. Of the 15 events, video and monitor review revealed that 14 used waveform and numeric capnometry to confirm endotracheal tube/tracheostomy placement, but this section was only completed on the paper cardiopulmonary resuscitation record in three of the 14 cases. All records showed discrepancies in the time of return of spontaneous circulation. The video and monitor review revealed delay in initiating cardiopulmonary resuscitation (mode: 2 min; two cases ≥ 7 min) and shockable rhythms (ventricular arrhythmia) in two cases. A sign of pulseless state was discovered in seven cases classified on the paper record as “always with a pulse.” Those include sudden loss of consciousness, flat arterial line tracing, and abrupt drop in the partial pressure of exhaled carbon dioxide tracing (< 10 mm Hg).

Conclusions
Eyewitness accounts of cardiopulmonary resuscitation are often inaccurate and incomplete. Review of information from video and electronically stored vital sign and waveform data provides more accurate information than review of paper-based cardiopulmonary resuscitation records and may provide the insight necessary to improving cardiopulmonary resuscitation.

Reviewer’s Comments
Many centers, including our own, use a paper cardiopulmonary resuscitation (CPR) record to capture data. Thus, essentially we depend on retrospective analysis and participant memory to reconstruct events and identify missed opportunities. Park HS et al (Emerg Med J. 2012 Apr;29(4):287-9) in their study compared CCTV based assessment of CPR versus the registry by an observer and found that the level of CPR registry accuracy was 54% (81/150).

Memories are reconstructions that can be influenced by stress, previous experiences, and even manipulation. In some sense, the inaccurate documentation should not be surprising. Cardiac arrests create a very chaotic environment, and the focus is on the resuscitation and not documentation. In our center, as is common in many others, one person is assigned to be the recorder. (S)he must not only record many simultaneous events but also the time and sequence in which they occur. Attempts to verify the record with resuscitation team members is time consuming and may not be accurate.
The authors have expressed certain limitations in their study; for example, during the initial 6 months, only sudden and unexpected events were reviewed. This might have introduced a selection bias toward more severe cases with suboptimal quality of care and outcomes.

Despite few limitations and its small sample size (15 patients), video review provides us with insight into human behavior patterns of medical personnel reacting to an acute crisis. Documenting and categorizing human behaviors in events in medicine such as in CPR has been advocated in previous studies (e.g., N Engl J Med 2013; 368:2445–2448) and may help improve CPR outcomes.


Objectives

Although there are similarities in the pathophysiology of acute respiratory distress syndrome in adults and children, pediatric-specific practice patterns, comorbidities, and differences in outcome necessitate a pediatric-specific definition. We sought to create such a definition.

Measurements and Main Results

Several aspects of the proposed pediatric acute respiratory distress syndrome definition align with the Berlin Definition of acute respiratory distress syndrome in adults: timing of acute respiratory distress syndrome after a known risk factor, the potential for acute respiratory distress syndrome to coexist with left ventricular dysfunction, and the importance of identifying a group of patients at risk to develop acute respiratory distress syndrome. There are insufficient data to support any specific age for “adult” acute respiratory distress syndrome compared with “pediatric” acute respiratory distress syndrome. However, children with perinatal-related respiratory failure should be excluded from the definition of pediatric acute respiratory distress syndrome. Larger departures from the Berlin Definition surround 1) simplification of chest imaging criteria to eliminate bilateral infiltrates; 2) use of pulse oximetry–based criteria when PaO2 is unavailable; 3) inclusion of oxygination index and oxygen saturation index instead of PaO2/FIO2 ratio with a minimum positive end-expiratory pressure level for invasively ventilated patients; 4) and specific inclusion of children with preexisting chronic lung disease or cyanotic congenital heart disease.

Conclusions

This pediatric-specific definition for acute respiratory distress syndrome builds on the adult-based Berlin Definition, but has been modified to account for differences between adults and children with acute respiratory distress syndrome. We propose using this definition for future investigations and clinical care of children with pediatric acute respiratory distress syndrome and encourage external validation with the hope for continued iterative refinement of the definition.

Reviewer’s Comments

This study is an attempt to create a pediatric-specific definition for ARDS that builds on the adult-based Berlin definition, but has been modified to account for the unique epidemiology, practice patterns, comorbidities, and differences in outcome between adults and Pediatric ARDS (PARDS). Important Highlights are using Pulse Oximeter based criteria when PaO2 is not available, using Oxygen Index and Oxygen saturation Index instead of PF Ratio.

The new definition for the patients on Non Invasive ventilation (CPAP,BiLevel etc) at CPAP ≥ 5 cm H2O PF Ratio ≤ 300, SpO2:FiO2 ratio ≤ 264. For those on Invasive Ventilation there are three disease stratifications as:

1. Mild (4 ≤ O.I. < 8 OR 5 ≤ Oxygen Saturation Index (OSI) < 7.5)
2. Moderate (8 ≤ O.I. < 16 OR 7.5 ≤ OSI < 12.3)
3. Severe (O.I. ≥ 16 OR OSI ≥ 12.3)

The other highlights of the recommendations are that patients with chronic lung disease and patients with congenital cyanotic heart disease are also included in the process of defining Pediatric ARDS (PARDS).
The recommendations with “weak” agreement:
• Prone positioning not be recommended as routine therapy in PARDS. However, it should be considered an option in cases of severe PARDS. (Weak agreement 92%). Similarly, recommendation to use HFOV in severe PARDS was weak.
• Corticosteroids and Inhaled nitric oxide (iNO) is not recommended for routine use in PARDS. However, use of iNO may be considered in patients with documented pulmonary hypertension or severe right ventricular dysfunction or as a rescue from or bridge to extracorporeal life support.
• There is insufficient evidence to recommend

In many ways, this is a very interesting publication which needs close evaluation.

One important question in children with Cyanotic Heart Disease or chronic lung disease will be as to how to stratify the risk categories as Oxygen Index or Oxygen Saturation Index will obviously not very helpful. Future studies are necessary to determine PARDS risk stratification of patients with acute-on-chronic hypoxemic respiratory failure.

3. Patient Mortality Is Associated With Staff Resources and Workload in the ICU: A Multicenter Observational Study. Crit Care Med 2015; XX:00–00

Objective
Matching healthcare staff resources to patient needs in the ICU is a key factor for quality of care. We aimed to assess the impact of the staffing-to-patient ratio and workload on ICU mortality.

Design
A multicenter longitudinal study using routinely collected hospital data.

Setting
Information pertaining to every patient in eight ICUs from four university hospitals from January to December 2013 was analyzed. Patients: A total of 5,718 inpatient stays were included.

Measurements and Main Results
The study used a shift-by-shift varying measure of the patient-to-caregiver ratio in combination with workload to establish their relationships with ICU mortality over time, excluding patients with decision to forego life-sustaining therapy. Using a multilevel Poisson regression, we quantified ICU mortality-relative risk, adjusted for patient turnover, severity, and staffing levels. The risk of death was increased by 3.5 (95% CI, 1.3–9.1) when the patient-to-nurse ratio was greater than 2.5, and it was increased by 2.0 (95% CI, 1.3–3.2) when the patient-to-physician ratio exceeded 14. The highest ratios occurred more frequently during the weekend for nurse staffing and during the night for physicians (p < 0.001). High patient turnover (adjusted relative risk, 5.6 [2.0–15.0]) and the volume of life-sustaining procedures performed by staff (adjusted relative risk, 5.9 [4.3–7.9]) were also associated with increased mortality.

Conclusions
This study proposes evidence-based thresholds for patient-to-caregiver ratios, above which patient safety may be endangered in the ICU. Real-time monitoring of staffing levels and workload is feasible for adjusting caregivers’ resources to patients’ needs.

Reviewer’s Comments
This is a multicenter longitudinal study in eight adult ICUs located in four university hospitals in Lyon, France.
This study proposes evidence based ratios of patients per nurse and physician in the context of ICUs. Insufficient staffing above the observed maximum thresholds showed an increased risk of mortality. Particular attention should be paid to critical periods identified to be at risk of high patient-to-caregiver ratios (ie, on weekends for nurses and at night for physicians). Moreover, identification of patient turnover as an independent risk factor of mortality should lead to a thoughtful management of patient influx during a single shift. Delaying admissions during periods when teams are experiencing a heavy workload with unbalanced patients-to-caregivers ratios could prevent ICU disorganization.
A study published by Xu R et al (Annals of Surgery: December 2013 - Volume 258 - Issue 6 - p 953–957), had demonstrated that In addition to individual person’s experience, team familiarity contributed to reductions in operative time, suggesting potential benefits to maintaining continuity of team membership over time. Thus a more accurate evaluation of the capability of a team to properly handle difficult situations is also an important aspect to be considered. Analysis of individual characteristics and interactions among team members should be considered because team composition and familiarity might influence its resilience to intense workload variations. This study raises further unresolved questions. What are the exact conditions of excessive workload and insufficient staffing that lead to avoidable deaths in the ICU?


Pediatr Emer Care 2015;31: 395–398

Objective
To use Lean methodologies and the Model for Improvement to rapidly redesign and pilot test a new pediatric emergency department (ED) front-end model that reduces time to a licensed independent provider to 30 minutes or less.

Methods
Lean improvement methodologies were applied during a 5-day multidisciplinary model of care redesign event. The new ED front-end model of care included: (1) placement of a registered nurse in the lobby; (2) direct patient rooming with elimination of traditional triage; (3) early documentation of home medications; (4) Team-based immediate assessment; (5) “early Initiation” providers to place orders when a team was not available. An observational, cohort controlled before-and-after study de- sign was used. The new model was tested over 2 pilot periods and compared to a similar period of control days, defined as the “current state.”

Results: The ED census and patient acuity were similar during both pilot periods. Eighteen patients were included in pilot 1, and 80 patients were included in the expanded second pilot. Patients seen within 30 minutes improved from a baseline of 33% to 93% in pilot 2. Time to a licensed independent provider, to a room, and to visual assessment by a nurse all de-creased. The largest decrease was in median time to provider, from 43 minutes in the current state to 7 minutes during pilot 2.

Conclusions
Rapid process improvement methodology was used to de-sign and test a front-end model that reduced patient waiting time. Our experience demonstrates the feasibility of employing Lean principles and the Model for Improvement in actual practice environments to rapidly improve care delivery processes in pediatric emergency departments.

Reviewer’s Comments
This pilot project describes a focused, rapid, and successful effort to use Lean methodologies and the Model for Improvement to design and test a front-end model to reduce patient waiting time in Emergency Department (ED).

Lean thinking is a bundle of concepts, methods, and tools derived from the Toyota Production System, the production philosophy of Toyota Motor Corporation. Lean was first implemented in US auto manufacturing in an attempt to replicate Toyota’s success and has subsequently spread to other manufacturers (e.g., Boeing), to service industry (e.g., Tesco), and to the public sector (e.g., UK National Health Service). The success of Lean in NHS resulted in a strong push for introducing Lean to health care and more particularly to the Emergency Department.

In a review article (Ann Emerg Med. 2011; 57:265-278.) of Eighteen articles describing Lean initiatives in 15 EDs concluded that Lean appears to offer significant improvement opportunities in the ED. The EDs implementing Lean in this review reported generally favorable effects

Understanding how Lean transforms work structure and process is important because those transformations will determine patient care quality and safety indicators such as length of stay, medication errors, and patient satisfaction.

Each institution will require to develop different,
but equally successful methods for developing and implementing changes to their systems of care based upon their unique needs and circumstances.

5. Excess Mortality Associated With Colistin-Tigecycline Compared With Colistin-Carbapenem Combination Therapy for Extensively Drug-Resistant Acinetobacter baumannii Bacteremia: A Multicenter Prospective Observational Study.
Crit Care Med 2015; 43:1194–1204

Objectives
Since few therapeutic options exist for extensively drug resistant Acinetobacter baumannii, an emerging threat in ICUs worldwide, and comparative prospective studies of colistin-based combination therapies are lacking, our objective was to compare the outcomes of patients with extensively drug-resistant A. baumannii bacteremia, treated with colistin-carbapenem and colistin-tigecycline combinations.

Setting, Patients, and Interventions
Adults with extensively drug-resistant A. baumannii bacteremia were prospectively followed from 2010 to 2013 at three hospitals in Taiwan. Extensively drug-resistant A. baumannii was defined as A. baumannii (genospecies 2) non-susceptible to all drug classes except for colistin and tigecycline, and standard combination therapy as use of parenteral colistin-carbapenem or colistin-tigecycline for at least 48 hours after onset of bacteremia.

Measurements and Main Results
Primary outcome measure was 14-day mortality. Of the 176 episodes of extensively drug resistant A. baumannii bacteremia evaluated, 55 patients with a median (interquartile range) age of 62 years (44–79 yr) and Sequential Organ Failure Assessment score of 9 (5–13) points received standard combination therapy: colistin-tigecycline in 29 patients and colistin-carbapenem in 26. Crude 14-day and in-hospital mortality rates for patients receiving colistin-tigecycline versus patients receiving colistin-carbapenem were 35% versus 15% (p = 0.105) and 69% versus 50% (p = 0.152), respectively. Breakthrough extensively drug-resistant A. baumannii bacteremia under steady state concentrations of combination therapy for colistin-tigecycline group was 18% and for colistin-carbapenem group was 0% (p = 0.059). Eleven patients (20.0%) developed nephrotoxicity. After adjusting for age, sex, comorbidity, initial disease severity, loading colistin dose, poly microbial infection, and primary infection site, excess 14-day mortality was associated with the use of colistin-tigecycline in the subgroup with tigecycline minimum inhibitory concentration greater than 2 mg/L compared with the use of colistin-carbapenem (hazard ratio, 6.93; 95% CI, 1.61–29.78; p = 0.009).

Conclusions
Increased 14-day mortality was associated with colistin-tigecycline therapy given tigecycline minimum inhibitory concentration greater than 2 mg/L compared with colistin-carbapenem therapy for extensively drug-resistant A. baumannii bacteremia.

Reviewer’s Comments
This is a very important study as it ignites the all important discussion of approach to Extensively resistant A. Baumannii infection. There are several studies describing role of Carbapenems and Colistin in the situations of Extensively resistant Gram Negative infections. Spyrose and colleagues in their study (International Journal of Antimicrobial Agents. March 2011 Volume 37, Issue 3, Pages 244–247) concluded that at most drug concentrations, tigecycline, colistin and meropenem as single agents do not exhibit efficient bactericidal activity against most of the Klebsiella pneumoniae carbapenemase (KPC)-producing strains. In another study by Luis and colleagues (Antimicrob Agents Chemother. 2009 Mar; 53(3): 1295–1296.) the Colistin + Tigecycline combination was found to be synergistic, however could not be confirmed by Time-Kill kinetics. And now, this study under consideration concludes that the combination of colistin-carbapenem to be more effective than colistin-tigecycline for treating XDRAB bacteremia. In this study, Tigecycline-based treatment resulted in poorer bacteriological clearance and increased short-term mortality.
The most important limitation of this study we feel is that the univariate analysis showed a trend toward more patients receiving a loading dose of colistin in the colistin-carbapenem than in the colistin-tigecycline group. However, in the subgroup analysis of the patients who received colistin loading (13 in the colistin-carbapenem group and eight in the colistin-tigecycline group), the differences in 14-day mortality remained significant in favor of colistin-carbapenem (0 of 13 vs 5 of 8; \( p = 0.003 \)), and this could well be due to more patients receiving the loading dose of Colistin.

This study is also limited due to its design, being a nonrandomized observational study. More reliable randomized are warranted to confirm these findings. Till then it is advisable to be cautious while using Colistin-Tigecycline combination therapy.