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Article type : Consensus Conference

ABSTRACT

Emergency care providers share a compelling interest in developing an effective patient-centered, outcomes-based research agenda that can decrease variability in pediatric outcomes. The 2018 *Academic Emergency Medicine* Consensus Conference, "Aligning the Pediatric Emergency Medicine Research Agenda to Reduce Health Outcome Gaps (AEMCC)," aimed to fulfill this role. This conference convened major thought leaders and stakeholders to introduce a research, scholarship, and innovation agenda for pediatric emergency care specifically to reduce health outcome gaps. Planning committee and conference participants included emergency physicians, pediatric emergency physicians, pediatricians, and researchers with expertise in research dissemination and translation, as well as comparative effectiveness, in collaboration with patients, patient and family advocates from national advocacy organizations, and trainees. Topics that were explored and deliberated through subcommittee breakout sessions led by content experts included: 1) pediatric emergency medical services (EMS) research, 2) pediatric emergency medicine (PEM) research network collaboration, 3) PEM education for emergency medicine providers, 4) workforce development for PEM, and 5) enhancing collaboration across emergency departments (PEM practice in non-children's hospitals). The work product of this conference is a research agenda that aims to identify areas of future research, innovation, and scholarship in pediatric emergency medicine.

Key Words: pediatrics, emergency medicine, pediatric emergency medicine, research networks, education, emergency medicine services, workforce

CASE VIGNETTE

A 22-month-old girl with cerebral palsy, development delay, and epilepsy develops status epilepticus in a rural part of the state. Her parents call 911, and the paramedics note that she has intermittent seizure activity and shallow, irregular respirations. The paramedics check a blood glucose level and initiate bag-valve-mask ventilation, but they are unable to obtain intravenous access, and the child continues to seize. A small emergency department (ED) is 20 minutes away by ground. The ED is staffed by physicians residency-trained in emergency medicine, the staff undergoes ongoing pediatric education, and the hospital is loosely affiliated with the regional children's hospital. However, this ED rarely sees seriously ill children. The regional childrens hospital, which serves as the child's medical home, is 60 minutes away by helicopter. The paramedics contact the base hospital for management and transport orders.

Case Discussion

This illustrative case raises numerous questions about how to assure that the highest possible quality care is available for all acutely ill and injured children. What are the most effective interventions for children in the prehospital setting? How does the core training, experience, and continuing education of emergency providers affect patient care? What are the respective roles of general and pediatric EDs, and how can these effectively collaborate within the pediatric emergency care system? Are these and other questions answerable through high-quality, multicenter studies? The 2018 *Academic Emergency Medicine* Consensus Conference: "Aligning the Pediatric Emergency Medicine Research Agenda to Reduce Health Outcome Gaps" aims to identify and address areas of focus for future pediatric emergency medicine research and scholarship that can propel actionable change.

CURRENT STATE OF PEDIATRIC EMERGENCY MEDICINE

The health care system in the United States fails to provide consistent, high-quality care to all people,[1] leading to clear inequalities in health outcomes. Disparities in health outcomes are driven by many determinants. Many of the factors associated with these differences are socio-demographic, such as race and ethnicity, poverty, education, and geographic location[2] and are associated with clinically relevant differences in outcomes for many of the conditions seen in the ED: rates of appendicitis with perforation;[3] time to surgery in patients with appendicitis;[4] analgesia for painful conditions[5,6] use of antibiotic in presumed viral illnesses;[7] and rates of ED aftercare compliance.[8]

Clinical factors and differential access to care also contribute to health disparities.[9-11] In 1993, the National Academies of Science, Engineering and Medicine (NASEM), previously known as the Institute of Medicine, conducted a study of pediatric emergency medical care in the United States, *Emergency Medical Services for Children*. This report described the evolving state of emergency care for children and identified factors contributing to the challenges of delivering consistent, high-quality emergency care. These factors include "complexities of the organization, delivery, and financing of health care; financial, insurance, and other barriers to access to appropriate care; inadequate numbers of health care personnel and perverse patterns of specialization and geographic location; and great variations in use of services and questions about the appropriateness and quality of health care." This report contained specific personnel and equipment recommendations and also recommended areas for future research.[12]

A subsequent report in 2006 from the NASEM, *Emergency Care for Children: Growing Pains*, evaluated interim progress. The authors described successes in the overall state of pediatric emergency care since the NASEM report published 13 years earlier. Yet they also noted that the overall state of pediatric emergency care was "uneven," outlining continued disparities in access to care, pediatric expertise among emergency care providers, and resource availability.[13] The report focused extensively on research and described a widening information gap in basic, translational, and health systems research in pediatric emergency care. However, the report also noted the early

successes of the Pediatric Emergency Medicine Collaborative Research Committee of the American Academy of Pediatrics and the promise of the nascent Pediatric Emergency Care Applied Research Network. Overall, it reiterated the call to address the uneven landscape of pediatric emergency care and promoted research that advanced sound, evidence-based practices.

To date, there has been inconsistent progress in the delivery of consistent high-quality emergency care for infants and children. Substantial gains have been achieved in emergency department (ED) pediatric preparedness through guidelines published in 2001[14,15] and revised in 2009.[16,17] In the time between these guidelines, a study reported that 17% of EDs did not have access to emergency physicians, PEM, or pediatric attending physicians, and only 6% of EDs had all of the pediatric equipment recommended in the 2001 guidelines.[18] Concerted efforts by stakeholders led to the National Pediatric Readiness Project, with marked improvements in the overall pediatric readiness of EDs.[19,20] Other recent initiatives by PEM stakeholders resulted in the development of Pediatric Emergency Medicine Milestones by the American Board of Emergency Medicine, the American Board of Pediatrics, and the Accreditation Council for Graduate Medical Education; the launch of the Advanced Pediatric Emergency Medicine Assembly by the American College of Emergency Physicians and the American Academy of Pediatrics; and the ongoing successes of the federal Emergency Medical Services for Children (EMSC) Program.

Despite important gains on a national level, progress has unfortunately been tempered by ongoing geographic and provider-based gaps in pediatric emergency care. These gaps constitute a vital impediment to assuring consistent, high quality pediatric emergency care. There is data to suggest an association between hospital type and pediatric mortality for critically ill children, even though this outcome measure is confounded by overall low pediatric mortality rates.[21,22] The evidence for substantial variability among emergency departments in the rates of computed tomographic imaging in pediatric trauma[23-27] and children with abdominal pain[28] is more robust. While the clinical outcomes are comparable between general and pediatric EDs, the rates of

unnecessary exposure to ionizing radiation are different and constitute a higher risk to children in the general ED setting.

There is variability in access to emergency departments in general,[10,11,29] and access to "pediatric-ready" EDs remains a challenge in many regions of the U.S.[30] Substantial variability exists in adherence to pediatric cardiac arrest [31] and sepsis[32] guidelines across emergency departments. The distribution of fellowship-trained pediatric emergency physicians continues to be uneven, with a relative abundance of board-certified pediatric emergency physicians in some urban areas, many regions with far fewer pediatric emergency physicians and five states with none at all.[33] Viewed in this context, "progress on improving the quality of care for children in emergencies has remained slow at best."[34]

CONFERENCE PLANNING

The *Academic Emergency Medicine* Consensus Conference (AEMCC) is an annual research conference that has been held since 2000 in conjunction with the Society for Academic Emergency Medicine Annual Meeting. The AEMCC is intended to generate a research agenda that fosters progress in evolving disciplines of emergency medicine. An array of thought leaders in pediatrics, emergency medicine, and PEM joined together as a core group to form the initial AEMCC Executive Committee to create a proposal for a conference that focuses on pediatric emergency medicine. (Table 1).

The AEMCC Executive Committee created a survey to identify specific thematic content and to generate additional multi-organization interest in the conference. This survey was distributed to multiple organizations, including the American Academy of Pediatrics Section on Emergency Medicine, the American College of Emergency Physicians PEM Committee and PEM Section, the Academic Pediatric Association Pediatric Emergency Medicine Special Interest Group, the National Association of EMS Physicians, the EMSC Program, the Society for Pediatric Research, and the Emergency Medicine Resident Association.

Over 250 respondents completed the survey, which helped to identify possible topic domains warranting additional focus at the AEMCC. Five specific areas of research interest were identified based on the results of this questionnaire: pediatric EMS research; PEM research network collaboration; PEM education for EM providers; workforce development for PEM; and enhancing collaboration across EDs (PEM practice in non-children's hospitals). These became the five themes for the breakout sessions at the AEMCC. Incorporating input from this survey, the Executive Committee wrote and submitted an AEMCC proposal. The proposed conference, "Addressing the Pediatric Emergency Medicine Research Agenda to Reduce Health Outcomes Gaps," underwent a competitive review process and was selected by the *Academic Emergency Medicine (*AEM) editorial board as the topic for the 2018 AEMCC.

The initial AEMCC survey also helped to identify further stakeholders who wanted to participate in the conference planning process. These additional volunteers joined with the members of the Executive Committee to form the Planning Committee for the conference. Subcommittees were created to address each of the five themes, and chairs were appointed to lead each of these subcommittees (Table 2). All of the Planning Committee members were subsequently assigned to one of the five subcommittees to collaborate on subcommittee planning (Table 3).

The co-chairs and Executive Committee oversaw all aspects of conference development throughout the planning year for the AEMCC, which included formulating the conference agenda, identifying and inviting keynote speakers, and subcommittee oversight. The Planning Committee also worked on grant writing, fundraising and marketing for the conference, primarily via electronic mail and monthly conference calls. Members of the Planning Committee met in person at both the 2017 AEMCC in Orlando, Florida, and the 2017 American College of Emergency Physicians Scientific

Assembly in Washington, DC. The entire Planning Committee held a final meeting on the evening prior to the conference.

Much of the conference planning was conducted at the subcommittee level. Each subcommittee generated a list of research topics, informed by the expertise of the panelists and outside experts, literature review, electronic discussions, and conference calls. The subcommittees then distributed a preliminary list of prioritized research topics. In the weeks before the conference date, a survey was distributed to both confirmed attendees and other pediatric emergency medicine stakeholders to help further identify and prioritize the research topics within these five domains; thus 178 respondents helped to further refine the topic areas of focus for subcommittees. The combined input from subcommittee members and survey respondents was used to finalize the subcommittee agendas for the AEMCC breakout sessions.

Role of patient advocates

The conference organizers recognized that the perspective of both pediatric patients and caretakers was crucial to the AEMCC given the unique patient/caretaker/clinician relationship that underpins the emergency care of all infants and children. Thus patient and parent advocates were recruited to participate in the conference planning process. (Table 4). An advocate was assigned to each of the five subcommittees, and they participated in the monthly teleconferences and subcommittee planning. On the day of the conference, each advocate participated in their subcommittee breakout sessions, and all of the advocates served on a patient-focused lunchtime panel. The advocates also contributed to manuscript preparation and were included as authors on these proceedings.

CONFERENCE AIMS

The overarching goal of the 2018 *AEMCC* was to develop a research agenda for the future to reduce health outcome gaps in ill and injured children. To achieve this goal, the consensus conference had five specific aims:

1) to align PEM leaders across organizations and foster new leadership
2) to develop a research agenda for PEM across all access points to the emergency care system
3) to identify pathways to achieve core pediatric emergency knowledge and skills among all care providers to children
4) to launch networks for research and innovation in PEM education and workforce development; and
5) to integrate PEM research networks to foster high-quality research of high-risk and/or low-frequency clinical conditions.

While the 2018 conference is the first AEMCC to focus exclusively on pediatric emergencies, it also aims to build on the past efforts of the previous AEMCCs and to incorporate relevant works into current research recommendations. Themes of several previous AEMCCs have been broadly applicable to PEM and have included health care disparities,[35] educational research,[36] knowledge translation,[37] (this conference included one pediatric-specific topic[38]), and the regionalization of emergency care.[39]

CONFERENCE AGENDA (Table 5)

The AEMCC was held on May 15, 2018 in Indianapolis, Indiana in conjunction with the Society for Academic Emergency Medicine Annual Meeting. 119 stakeholders, including physicians, nurses, advanced practice providers, prehospital providers, trainees, researchers, patient representatives, and representatives from funding agencies attended this conference.

After an introduction by Jeffrey Kline, MD, the editor-in-chief of Academic Emergency Medicine, conference co-chairs Drs. Ishimine and Denninghoff discussed the current state of pediatric emergency medicine and the background leading up to this conference, the goals of the conference, and the conference plan. The conference included a morning keynote presentation by Nate Kuppermann, MD, MPH, highlighting the power of research network collaboration.[40,41] This was followed by three morning subcommittee breakout sessions on pediatric EMS research, PEM research networks, and PEM education. Each attendee participated in one of these three morning sessions. Each session was led by the subcommittee chairs, which facilitated discussions among breakout session participants to build consensus around and prioritize the proposed research topics that had been identified in the preconference planning process.

The conference attendees reconvened at lunch, where a panel of four of the patient advocates described their experiences in the pediatric emergency care system and participated in a moderated question-and-answer session. After this lunchtime panel session, all conference participants then attended either the workforce development for PEM breakout session or the enhancing collaboration across EDs (PEM practice in non-children's hospitals) breakout session, working in the same fashion as the morning sessions. Terry Klassen, MD, MSc, then gave the closing address, describing opportunities in translational research to decrease the gaps between evidence-based knowledge and clinical practice.[42-45] The consensus ideas, challenges, and conclusions from all of the five breakout sessions were then summarized and presented by the subcommittee chairs, followed by adjournment after concluding remarks by the Consensus Conference chairs.

After the conclusion of the conference, the subcommittees began writing manuscripts summarizing the discussions that had occurred during their breakout sessions and

detailing the prioritized research, innovation, and scholarship agendas as a consensus for each theme. These proceedings are published in this issue of *Academic Emergency Medicine.* Additionally, the Society for Academic Emergency Medicine has free on-line access to most of the conference presentations.[46]

LIMITATIONS

A major limitation of any consensus conference is that the results are influenced significantly by attendees and their active participation. Combining the AEMCC with a major emergency medicine conference helped to leverage conference support infrastructure in an efficient manner. However, attendance is often limited by competing interests and obligations. One such conflict was a national pediatric research conference held nearly simultaneously with this conference in a different North American city. Though the dilemma was unavoidable, this understandably made it very challenging for some of the PEM stakeholders to attend the AEMCC in person. To mitigate this impact, the Planning Committee sought pre-conference input by attendees and non-attendee stakeholders alike via two pre-conference surveys, and disseminated background materials prior to the conference to help attendees prepare for the breakout session discussions.

SUMMARY

The 2018 *Academic Emergency Medicine* Consensus Conference: "Aligning the Pediatric Emergency Medicine Research Agenda to Reduce Health Outcomes Gaps" brought together a wide array of stakeholders with a vested interest in the emergency care of children, which led to the development of a consensus-driven research agenda in five domains of pediatric emergency care. We hope that these conference proceedings will drive essential research and scholarship that promotes innovation, advances clinical practice, and broadens collaboration across institutions and

organizations to improve the emergency care of children. The future for acutely ill and injured children nationwide depends on it.

ACKNOWLEDGEMENTS

The authors gratefully acknowledge the assistance of Melissa McMillian, CNP, who provided invaluable guidance throughout the entirety of the 2018 AEMCC planning process. The authors acknowledge Jennifer Walthall, MD, MPH, who conceived the idea for this conference, brought together the original planning committee, and submitted the initial AEMCC proposal. The authors would also like to thank the scribes for the AEMCC: Isabelle Chea; Ryan Hartman, MD; Seth Linakis, MD; Teresa Liu, MD; and Nadira Ramkhelawan, MD.

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Table 1: 2018 Academic Emergency Medicine Consensus Conference Executive Committee

Name	Institution	Role
Kurt Denninghoff, MD	University of Arizona	Co-Chair
Paul Ishimine, MD	University of California, San Diego	Co-Chair
Kathleen Adelgais, MD, MPH	University of Colorado	Subcommittee Chair
Isabel Barata, MS, MD, MBA	Donald and Barbara Zucker School of Medicine at Hofstra/Northwell	Subcommittee Chair
Jean Klig, MD	Massachusetts General Hospital	Subcommittee Co-Chair

Maybelle Kou, MD	Inova Fairfax Hospital	Subcommittee Co-Chair
Prashant Mahajan, MD, MPH, MBA	University of Michigan	Subcommittee Co-Chair
Chris Merritt, MD, MPH	Brown University	Subcommittee Chair
Michael J. Stoner, MD	Nationwide Children's Hospital & The Ohio State University	Subcommittee Co-Chair
Jeffrey Kline, MD	Indiana University	*Academic Emergency Medicine* Editor-in-Chief
Robert Cloutier, MD, MCR	Oregon Health & Science University	*Academic Emergency Medicine* Guest Editor
Rakesh Mistry, MD, MS	University of Colorado	*Academic Emergency Medicine* Guest Editor
Melissa McMillian, CNP	Society for Academic Emergency Medicine	Director, Foundation and Business Development

Subcommittees	Chair(s)	Goals and Objectives
Pediatric Emergency Medical Services Research	**Kathleen Adelgais, MD, MPH**	**Goal:** • To create a research agenda for the pediatric EMS research community that will advance the science of EMS for children and ultimately improve patient outcomes **Objectives:** • To explore research opportunities to determine whether established best practice for pediatric EMS care improves patient-oriented outcomes • To discuss the best methods to study challenging but high impact clinical conditions such as out-of-hospital cardiac arrest, drowning, severe trauma, and respiratory failure • To identify opportunities to translate knowledge and evidence into the prehospital setting
Pediatric Emergency Medicine Education	**Jean Klig, MD** **Maybelle Kou, MD**	**Goal:** • To introduce a research agenda that can unify and advance pediatric emergency medicine education, promote a network for ongoing progress, and improve outcomes for acutely ill and injured children **Objectives:** • Identify fundamental research priorities to close the many education gaps that underlie non-uniform care for children across emergency departments and urgent care centers in the US. • Propose key steps to launch a PEM education research network • Discuss how information from the patient experience may be integrated into PEM education research.
Enhancing collaboration across EDs (PEM in non-children's hospitals)	**Isabel Barata, MS, MD, MBA**	**Goal:** • To include general EDs based in non-children's hospitals in creating a research agenda to advance the quality and safety of pediatric emergency care across all EDs, understand the challenges, and enhance the collaboration with children's hospitals to achieve optimal health outcomes **Objectives:** • Create best practices for developing a system of care for general EDs and those in children's hospitals to collaborate and focus on solutions to close the gap on safety, quality, and evidence-based practice in a patient/family-centered setting. This system should meet the needs of both groups to provide the best clinical care for pediatric patients. • Develop pediatric specific outcome measures and implementation processes to ensure continuous quality improvement. • Evaluate the National Pediatric Readiness Project (NPRP) initiative, a quality improvement project
Research Networks	**Michael J. Stoner, MD** **Prashant Mahajan, MD, MPH, MBA**	**Goals:** • To increase attendee understanding of, participation in, and prioritization of pediatric emergency medicine network research • To demonstrate how pediatric emergency medicine network research results can improve care of acutely ill and injured children **Objectives:** • To identify priorities for future pediatric emergency medicine network research • To provide conference participants a forum to brainstorm and discuss potential future network research studies

Workforce Development for Pediatric Emergency Medicine	**Chris Merritt, MD, MPH**	**Goals:** • To delineate and prioritize a research agenda to advance our understanding of the unique workforce needs in the emergency care of children in the interest of ensuring excellence in pediatric care and improve patient outcomes across emergency care settings **Objectives:** • To define highest-priority areas of research and workforce needs in pediatric emergency care • To engage a group of stakeholders in a discussion of means and targets for workforce research in pediatric emergency care • To identify opportunities to translate workforce knowledge and evidence into the array of pediatric care environments

Table 2: Subcommittees

Table 3: Planning Committee Members by Subcommittee

Education Subcommittee

Jean Klig, MD & Maybelle Kou, MD (Chairs)
Rahul Bhat, MD
Troy Denslow (Patient Advocate)
Andrea Fang, MD
Sean Fox, MD
Jeffrey Hom, MD
Ashley Strobel, DO
Sonny Tat, MD
Jessica Wall, MD
Eric Weinberg, MD

Emergency Medical Services Subcommittee

Kathleen Adelgais, MD MPH (Chair)
Kathleen Brown, MD
Paula Denslow (Patient Advocate)
J. Joelle Donofrio, DO
Matt Hansen, MD MSCR
Kabir Yadav, MDCM MS MSHS
E. Brooke Lerner, PhD
Lenora Olson, PhD (Moderator)

Enhancing Collaboration Across EDs (PEM in Non-Children's Hospitals) Subcommittee

Isabel Barata, MS, MD, MBA (Chair)
Marc Auerbach, MD
Oluwakemi Badaki-Makun, MD
Lee Benjamin, MD
Madeline Joseph, MD
Moon Lee, MD
Kim Mears (Patient Advocate)
Emory Petrack, MD
Dina Wallin, MD

Research Networks Subcommittee

Michael J. Stoner, MD (Chair)
Prashant Mahajan, MD, MPH, MBA (Co-chair)
Jill Baren, MD, MBE
Silvia Bressan, MD, PhD
Corrie E. Chumpitazi, MD, MS
Stephen B. Freedman, MDCM, MSc

Parris Keane (Patient Advocate)
Aaron E. Kornblith, MD
Nate Kuppermann, MD, MPH
Sam H. F. Lam, MD, MPH
Lise E. Nigrovic, MD MPH
Damian Roland, BMedSci BMBS, MRCPCH, PhD

Workforce Subcommittee,

Chris Merritt, MD, MPH (Chair)
Christopher Amato, MD
Mary Kay Ballasiotes (Patient Advocate)
Amanda Bogie, MD
Ann Dietrich, MD
Michael Gerardi, MD
Kajal Khanna, MD, JD
Mohsen Saidinejad, MD, MPH, MBA
Fred Wu, MHS, PA-C

Table 4: Patient Advocates

Name	Organization
Mary Kay Ballasiotes	Founder/President, International Alliance for Pediatric Stroke
Paula Denslow	Patient Advocate, Tennessee Disability Coalition
Troy Denslow	Patient Advocate
Kim Mears	Patient Advocate, Children's Hospital Volunteer
Parris Shelley	Patient Advocate

Table 5: Conference Agenda

7:30 am - 8:00 am	•**Registration/Continental Breakfast/Networking**
8:00 am - 8:15 am	•**Opening Remarks** Jeffrey Kline, MD Editor-in-Chief, *Academic Emergency Medicine*
8:15 am - 8:45 am	•**Welcome, Setting the Agenda, and Conference Plan** Paul Ishimine, MD and Kurt Denninghoff, MD AEM Consensus Conference Co-Chairs
8:45 am - 9:30 am	•**Keynote Address: "Generating Evidence that is Ripe for Translation: Not All Evidence is Created Equal"** Nate Kuppermann, MD, MPH Bo Tomas Brofeldt Endowed Chair, Department of Emergency Medicine Distinguished Professor, Departments of Emergency Medicine and Pediatrics University of California, Davis School of Medicine
9:30 am - 9:45 am	•**Break**
9:45 am - 11:20 am	•**Breakout Session/Morning** • Pediatric EMS Research • Pediatric Emergency Medicine Research Networks • Pediatric Emergency Medicine Education
11:20 am - 11:35 am	•**Break**
11:35 am -12:35 pm	•**Lunchtime Panel: "The Power of Collaboration"** Patient Advocacy Panel: Rakesh Mistry, MD, MS (Moderator) • Paula Denslow, Tennessee Disability Coalition, Patient Advocate • Troy Denslow, Patient Advocate • Kim Mears, Children's Hospital Volunteer, Patient Advocate • Mary Kay Ballasiotes, Founder/President, International Alliance for Pediatric Stroke
12: 35 pm - 12:50 pm	•**Break**
12:50 pm - 2:30 pm	•**Breakout Session/Afternoon** • Workforce Development for Pediatric Emergency Medicine • Enhancing Collaboration Across EDs (PEM in Non-Childrens Hospitals)
2:30 pm - 2:45 pm	•**Break**
2:45 pm - 3:30 pm	•**Closing Address: "Reducing the Gap: Getting Evidence to the Point of Care"** Terry Klassen, MD, MSc Professor and Head, Department of Pediatrics & Child Health Max Rady College of Medicine, Rady Faculty of Health Sciences University of Manitoba
3:30 pm - 4:45pm	•**Breakout Session Reports** Subcommittee Chairs
4:45 pm - 5:00 pm	•**Future Directions and Closing Remarks** Kurt Denninghoff, MD and Paul Ishimine, MD AEM Consensus Conference Co-Chairs