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Application title: Training Leaders to Improve Healthcare Quality in Emergency Settings for Children

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Abstract

Purpose: The overall objective of this proposal was to host a conference to maximize knowledge and skills of the Pediatric Emergency Medicine (PEM) workforce in order to deliver the highest quality of emergency care to children.

Scope: The conference partnered with the American Academy of Pediatrics (AAP). Healthcare providers and health professionals who are in positions to effect improvements in infrastructures that deliver care to children in emergent-care settings were invited to participate.

Methods: The conference was held in San Antonio, Texas (April 2010). Quality improvement themes were specifically addressed within the domains of quality and safety, translating research into practice and policy, and PEM workforce development and administration. Abstracts were encouraged (in competition) for moderated workshops in the following categories: ED throughput, H1N1 throughput, respiratory illnesses, safety and medication errors, and pain and sedation. Pre- and post-conference evaluations measured knowledge, attitudes, intentions, and behaviors.

Results: There were 194 participants. Twenty-eight abstracts were presented. The course received high evaluation scores (mean satisfaction score=4.4, 1-5 scale). Participants demonstrated improvements in knowledge and in several domains rating attitudes and confidence. Although no difference in intentions was seen, this was primarily due to an already high rate of intent among participants. Behaviors improved, with an increase in participation in quality improvement initiatives demonstrated among subgroups of participants 3 months post conference. Dissemination/products include web-based associated materials, quality improvement issues/articles for PEM journals, and a permanent infrastructure change in the AAP (Committee for Quality Transformation).

Key words: quality, pediatric emergency medicine, leadership, conference

PURPOSE

The overall objective of this project was to host a conference that would maximize knowledge and skills of the pediatric emergency medicine (PEM) workforce in order to deliver the highest quality of emergency care to children. Knowledge transferred during these conferences would result in direct improvements in the quality of pediatric emergency care. Quality improvement/improvement science themes addressed research, best practices, and current knowledge in the domains of quality and safety, translating research into practice and policy (TRIPP), and PEM workforce development and administration.

This conference was intended to partner with, and utilize the services of, the American Academy of Pediatrics (AAP), a professional organization of over 60,000 members that has supported the planning and implementation of prior *general* leadership training PEM conferences. However, the prior general leadership training PEM conferences had never focused on quality; this project would integrate prior conference implementation strategies with the talents of national thought leaders to bring state-of-the-art quality improvement science to PEM.

Objective 1 was to interact with established leaders in quality improvement and train emerging leaders in the subspecialty of PEM to define, evaluate, utilize, and implement agendas for improving quality of care delivery in their respective institutions. This aim was implemented through a national conference that applied a conference curriculum defined by the American Academy of Pediatrics' Section on Emergency Medicine Agenda Meeting of 2008, which addressed new technical issues or methods to improve quality within quality and safety, translating research into policy and practice, and workforce issues directed specifically at PEM specialists.

Objective 2 was to develop best practices workshops that would allow mentored conference participants to submit abstract concepts and to present those concepts in sessions (either in podium or storyboard form) moderated by national thought leaders in quality as well as leaders in PEM.

Objective 3 was to provide moderator reviews of best practices to describe issues or problems in the delivery of health services within specific domains: pain/sedation, throughput, respiratory illness management, medication errors, safety/safety culture, and improvement through health information technology.

SCOPE

Background. On June 15, 2006, after the release of the Institute of Medicine (IOM) report on the state of emergency medicine in the US, the Washington Post reported, "Emergency medical care in the United States is on the verge of collapse…As a system…it provides care of variable and often unknown quality…."[1] In the IOM's report titled "*Growing Pains,*" the threats to high-quality pediatric emergency medicine (PEM) are described, and the need to address quality PEM is a theme for improving outcomes.[2]

Improving the quality of healthcare is critical to improving outcomes for children. Healthy People 2010 emphasizes the need to improve healthcare quality, with a goal to improve access to comprehensive, high-quality healthcare services while improving effectiveness of that care.[3] Unfortunately, health services research has documented wide variations in the delivery of quality, evidence-based healthcare,[4] which can have a negative impact on children. The ED is a clinical microsystem, where improvements in healthcare delivery can result in direct improvement in patient outcomes. Yet, providing high-quality healthcare can be profoundly more difficult in the ED setting, where resources must be appropriately apportioned to patients and families. The ED setting is crisis oriented, overcrowded, and marked by transient doctor-patient relationships.

The National Center for Health Statistics has described an increase in the number of ED visits from over 96 million in 1995 to nearly 114 million in 2003. Concurrently, children younger than 18 years of age comprise at least 25% of ED visits.[5] Populations of children presenting to EDs will ultimately reap the benefit of quality improvement in pediatric emergency care settings. They represent priority populations for AHRQ and include low-income groups, minority groups, young children, children with special healthcare needs, and children who need chronic care.[6-9]

Changing paradigms or motivating improvement often takes great leadership. Most physicians never receive formal leadership training; even fewer receive leadership training in improving quality of care or using advanced improvement techniques from other industries. Many policymakers believe that educating and developing physician leaders could play a role in resolving the nature and causes of today's healthcare crises because of their unique experience-based perspective regarding the health delivery system.[10,11] Leadership training in medicine is often limited, despite qualitative data suggesting that general leadership competencies transcend the specific context of healthcare and physicians.[12] The need for leadership among physicians is also critical to an academic health center's service lines in order to meet quality, service, and business performance goals.[13] If PEM as a subspecialty is to hope for improvement in global quality initiatives and research, it is imperative to train its leaders and develop members for future leadership roles, specifically in areas of research in quality of healthcare and methods to improve delivery of safe, effective, efficient, and patient-oriented care in diverse settings.

Context and settings. The Section of Emergency Medicine (SOEM) of the AAP has held four previous general leadership conferences: 1987 Eagle Lodge, PA (120 attendees, 20 faculty), 1995 Snowbird, Utah (200 attendees, 25 faculty), 1997 Kansas City, MO (168 attendees, 28 faculty), and 2003 Albuquerque/Santa Fe, NM (148 attendees, 27 faculty). Prior attendance has been by section members, usually in leadership positions at their respective institutions/hospitals. These conferences have been staffed by successful speakers and workshop leaders with expertise in teaching strategies, managed care issues, clinical pathways, outcomes research, leadership skills, fellowship accreditation strategies, publication strategies, and other administrative issues. A survey of the AAP membership was conducted prior to the 2003 PEM Leadership Conference that indicated a need for a recurrent conference that addressed leadership development strategies. Evaluation of the 2003 conference indicated a significant impact of the program on the self-perceived development of leadership skills, with a "likely" to "definite" change noted in over 96% of the attendees. The overriding rationale for the AAP to host or co-host a leadership skills development conference is the need to refine the role of PEM as a subspecialty, given its growth in numbers (a 25% increase over 10 years in the number of board-certified PEM physicians and a 67% increase in fellowship trainees over the same period). In addition, the program and meeting provide a unique forum for networking, common problem solving, and long-term goal setting.

The AAP Leadership Conference Planning Committee was created after the AAP SOEM Executive Committee (the leadership board for the AAP's activities on PEM) met in its biannual meetings on six separate occasions to include discussions on leadership development. The purpose of the planning committee was to re-examine the leadership needs of the subspecialty as well as to focus on quality of care initiatives. The committee designated for the 2010 Leadership Conference was composed of individuals who are key thought leaders in PEM and who represent backgrounds and talents essential to assessing the needs of the subspecialty. Consideration of agendas for existing quality healthcare improvement conferences led to the support for a conference specifically dedicated to agendas addressing the challenging role of improving quality in the often chaotic delivery

systems surrounding emergency care and, even more specifically, emergency care for children. The planning committee's proposal for a National Leadership Conference for 2010 was approved by the AAP's Committee on Continuing Medical Education (COCME).

In January of 2008, the AAP hosted a 2-day Leadership Conference Planning Committee Meeting in Chicago, IL, to review the needs assessments and plans for the 2010 National Leadership Conference. The planning committee developed strategies to introduce a broad-based quality improvement agenda to the SOEM membership (a relatively small pediatric emergency medicine provider base with a short history of existence as a subspecialty). Based on prior leadership conference survey results, the venue selected was to appease the needs of potential participants in western and eastern ends of the country to travel to a venue near the geographic center. Thus, the San Antonio site was selected.

Participants. The conference target audience was expanded to include more mid-career PEM specialists, administrators, nurses, advanced fellowship trainees, and community practitioners. The conference was intended to leverage the **AAP**'s support and expertise in conference planning, marketing, evaluation and implementation; **AHRQ**'s branding for healthcare quality initiatives; the **AAP Leadership Conference Planning Committee**'s goals for quality improvement agendas within defined domains recognized as subspecialty needs; and **Co-directors** with research skills and experience as well as support from their respective academic institutions, which are known for their strengths in PEM quality care initiatives, research, and education.

METHODS

Marketing. Prior PEM Leadership Conferences hosted by the AAP had been directed and marketed to PEM physicians and general emergency medicine physicians who care for a great majority of children seeking emergency care. The audience distribution was as follows: 92% subspecialty pediatricians; 6% nonpediatric physicians (emergency medicine), <1% nurses, and <1% allied health professionals. This conference was targeted at administrators, nurses, and physicians who are in positions to effect health infrastructure changes for children in emergent-care settings. Marketing was accomplished through two mass mailings, list-serv postings to professional societies (AAP and Emergency Nurses Association), and notifications and electronic brochures to key quality organizations.

Site selection and dates. The conference took place at the Westin Riverwalk in San Antonio, Texas, on April 15-18, 2010. The dates and venue were selected by the AAP based upon evaluation feedback for a venue midway between the East and West Coasts and for dates that do not conflict with other large national conferences that might impede attendance.

Program. A 2.5-day conference in the spring of 2010 (3-4 lectures/day [1 hour] and 1-2 breakout sessions/half-day [1 to 1½ hours]). The first half-day was directed at fellowship directors of PEM trainee programs (standard for AAP PEM leadership conferences) to develop enhanced curriculum and implementation for quality improvement in PEM. Topics were divided into the three domains of TRIPP, workforce development, and quality and safety. Written, electronic, and telephone invitations to participate were coordinated by the lead project coordinator in conjunction with the AAP's CME and conference offices. Speakers incorporated the most related health services research in quality care improvement applicable to PEM. When that evidence was incomplete, general didactic concepts were presented with best practices/evidence for supporting general quality improvement initiatives in the emergency care settings for children. A special half-day of programming was targeted at fellowship directors for PEM subspecialty training programs. This special program was intended to address the

unique needs of integrating educational curricula for quality improvement into existing education programs.

Participatory programming. Best practices abstracts for workshop podium presentation or storyboard (poster) presentation were solicited through both general requests and targeted requests for projects (identified by members of the planning committee and quality organization partners). Letters for targeted projects were sent out concurrently with notification of competition for the best practices workshops and poster sessions by AAP staff working in conjunction with the project coordinator. Moderators were selected to represent key organizations and included a PEM leader identified by the planning committee. Twenty-nine abstracts were selected for presentation in storyboard form in the following topics: ED throughput, H1N1 throughput, respiratory illnesses, safety and medication errors, and pain and sedation. Moderators determined the number and format of platform presentation, as the number of abstracts submitted varied by topic, with ED throughput having the largest number of submissions. Concurrently, room size was appropriated based upon the number of expected audience members in order to allow participants to select the workshops they believed would give them the greatest opportunity to learn strategies they could implement in their own institutions. The largest ballrooms were appropriated for ED throughput workshops.

Publication plans. Moderator teams reviewed abstract presentations, and planning committee members attended best practices workshops to determine the likelihood of publication from workshop proceedings based on cohesiveness of content. Agreements with the editors of *Pediatric Emergency Care* allowed for special consideration of these manuscripts. Dissemination of conference materials through two websites with the most widespread utilization among pediatric emergency care providers was undertaken (www.aap.org and www.pemnetwork.org). See lists of publications and products below in the results section.

RESULTS

Principal findings from conference activities. The conference was marketed through two postal mailings of brochures and four list-serv announcements (Section of Emergency Medicine, American College of Emergency Physicians, Pediatric Emergency Medicine Fellowship Directors, Pediatric Emergency Medicine Division Directors). Website announcements were placed on www.pemfellows.org and www.aap.org. Additionally, letters to disseminate announcements were forwarded to the National Association of Children's Hospitals and Related Institutions, Pediatric Emergency Care Applied Research Network, National Initiative for Children's Healthcare Quality, Emergency Nurses Association, American Board of Pediatrics, Child Health Corporation of America, Emergency Services for Children, and the Society for Academic Emergency Medicine.

Objective 1 was to interact with established leaders in quality improvement and train emerging leaders in the subspecialty of PEM to define, evaluate, utilize, and implement agendas for improving quality of care delivery in their respective institutions. Measures for this objective were as follows:

Process measures: Confirmation of plenary and workshop speakers by November 2009. Additional speakers were added to accommodate the larger audience; thus, a total of 35 faculty members were included (exceeding the targeted minimum of 20).

Outcome measures: Participation of a minimum of 175 participants in a 2010 PEM Leadership Conference was exceeded, with 194 participants noted. Representation had a minimum of 10 administrative nurses, 10 mid-level career PEM specialists, 10 hospital administrators, 10 community hospital-based physicians, and 10

upper-level fellowship trainees. Ten administrative nurses participated (at target of 10), 46 mid-career PEM specialists participated (exceeding the target of 10), 11 hospital administrators participated (exceeding the target of 10), 35 community-based physicians participated (exceeding the target of 10), and six upper-level fellowship trainees participated (under the target of 10).

Faculty members were evaluated on a Likert-like scale of 1-5 in the categories of communication, organization, interaction, audio visual, handouts, appropriate amount of content, and clinical relevance. Aggregated means are demonstrated below for each speaker, demonstrating a range from 3.33 to 4.73, with 72% of the faculty who were evaluated receiving mean scores greater than 4.0.

Best practices workshops. *Objective 2* was to develop best practices workshops that would allow mentored conference participants to submit abstract concepts and present those concepts in sessions (either in podium or storyboard form) moderated by national thought leaders in quality as well as leaders in PEM. According to Ajzen and Fishbein, "attitude toward a behavior" means a person's evaluation that the behavior is good or bad, favorable or unfavorable. Furthermore, in the subjective norms component of this theoretical framework (the Theory of Reasoned Action), the influence of the social environment drives a person's perception of what people who are important to them think they should or should not do with respect to a given behavior. Believing that one "should" conduct quality interventions would be associated with intentions to do so, because beliefs about behaviors and the consequences of those behaviors influence attitudes that in turn influence intentions and subsequent behaviors.[14,15] Thus, the importance of bringing thought leaders in quality improvement and leaders in PEM as speakers/moderators not only provided a framework for change but also allowed queries into the evaluation components that facilitate or enable change, by assessing which organizations and their representatives should be the motivational drivers for quality improvement in PEM agendas.

Process measures: Development of abstract program, submission forms, and judging forms by June 2009 was accomplished. Dissemination of the project presentation process description during marketing of the 2010 PEM Leadership Conference to a minimum of 55 institutions that provide pediatric emergency care was exceeded, with over 100 institutions and organizations targeted (all US children's hospitals or related institutions, select institutions in Canada, and professional societies and organizations with emergency medicine or quality affiliations). Identification of a minimum of 18 presenters (approximately three per domain) was targeted; however, secondary to the tremendous response, 29 abstracts were selected by the review team for quality improvement workshop presentations.

Outcome measures: A minimum of five manuscripts/editorial papers were to be generated as descriptions of the workshops. However, the wide variation in topics and content required a change in the originally planned categories for the workshops to add H1N1 throughput issues; join the safety and medication errors topics; and eliminate the health information technology topic, as it represented a cross-cutting vehicle to achieve improvement in other topics. All workshops were attended by conference planning committee members, and only the ED throughput topic provided sufficient cohesiveness in content of projects to be able to formulate a manuscript of proceedings. The remaining topics had too much variability in content of projects to provide for a uniform strategy for publication after discussion with the involved journal editors. Thus, the plan for five was minimized to one general manuscript, one educationally based manuscript, and one describing ED throughput best practices.

	NAME	INSTITUTION	TITLE OF ABSTRACT
	ED Throughput	Gorelick and Mahajan (moderators)	
platform	Chaulk, D	University of Calgary/Alberta Children's Hospital	Decreasing time to be seen for moderately ill children
platform	Codispoti, C	Texas Children's Hospital	Utilizing Kaizen in the ED
platform	Werner, D	Children's Healthcare of Atlanta	Decreasing LOS with Lean methodology
platform	Johns, C	Children's National Medical Ctr/The George Washington University School of Medicine	The Charge MD: Day-to-day leadership in a pediatric ED
poster	Li, J	Children's Hospital Boston/Harvard Medical School	Comparing high- and low-ED-utilizing PCPs
poster	Nag, P	Texas Children's Hospital/Baylor College of Medicine	Reducing LOS for patients with acute gastroenteritis
poster	Ramirez, D	Children's Hospital of the King's Daughters/Eastern Virginia Medical School	Reducing Emergency Department Throughput of Pediatric Migraine Patients Utilizing a Clinical Pathway
poster	Schroeder, L	The Children's Mercy Hospital, Kansas City, MO	Reducing microscopic urine exams in the ED
	H1N1 Throughput	Adirim and Knapp (moderators)	
platform	Fagbuyi, D	Children's National Medical Ctr/The George Washington University School of Medicine	A Rapid Medical Screening Process Improves ED Patient Flow during Surge Associated with Novel H1N1 Influenza Virus
platform	Patel, B	Texas Children's Hospital/Baylor College of Medicine	Implementation of an Exterior Mobile Pediatric Response Team (MPERT) for H1N1
platform	Pershad	Le Bonheur Children's Medical Ctr/University of Tennessee Health Sciences Center	Cost Analysis of Construction of a Temporary Establishment for Medical Screening during an Influenza Pandemic
poster	Melzer-Lange, M	Children's Hospital of Wisconsin/Medical College of Wisconsin	An H1N1 Pediatric ED Surge Plan
poster	Laos, C	Texas Children's Hospital/Baylor College of Medicine	Mobile Pediatric Emergency Response Team (MPERT): Patient Satisfaction during the Novel H1N1 Influenza Outbreak
	Respiratory Illnesses	Zorc and Ruddy (moderators)	
platform	Dexheimer, J	Vanderbilt University Medical Center	Computerized asthma management guidelines
platform	Iyer, S	Dell Children's Medical Center of Central Texas	Improving timeliness of care for patients with asthma exacerbations
platform	Sahouria, J	Texas Children's Hospital/Baylor College of Medicine	Triage-based protocols for steroid administration in patients with asthma
platform	Shah, M	Vanderbilt University/Monroe Carell Jr Children's Hospital	Performance and Improvement Program (PM&I) for Utilization of Noninvasive Ventilation in the Pediatric Emergency Dept
	Safety/ Medication Errors	Frush and Shaw (moderators)	
platform	Godambe, S	University of Tennessee Health Sciences Center/LeBonheur Children's Hospital	The Effects of a Resident-Focused Educational Intervention on Patient Satisfaction Scores and Medication Errors
platform	Madhok, Manu	Children's Hospitals and Clinics of Minnesota	Reducing medication errors through ED pharmacist
platform	Patterson, M	Cincinnati Children's	Use of Shared Mental Models to Improve Safety during Pediatric Resuscitations
platform	Chamberlain, J	Children's National and PECARN	Identifying Themes from Network Incident Reports to Improve Patient Safety
poster	Messina, A	Children's Memorial Hospital-Chicago, IL	Reducing false-positive blood culture rates

poster	Tuuri, R	Children's Memorial Hospital	Traumatic versus nontraumatic lumbar punctures
poster	Kerrey, B	Cincinnati Children's	Video-based case review and high-fidelity ED simulation to identify latent safety threats and knowledge deficits of care providers
	Pain and Sedation	Gausche-Hill and Fuchs (moderators)	
platform	Bajaj, L	Denver Children's	IV ondansetron to decrease vomiting after ketamine sedation
poster	Cross, K	Kosair Children's Hospital	Introducing Ultrasound-Guided Nerve Blocks for Femur Fracture Pain to a Pediatric Emergency Division
platform	Reeves, S/ Iyer, S	Cincinnati Children's	Improving pain management of long bone fractures
platform	Mallory, M	Children's Healthcare of Atlanta	Development and Use of an Electronic Quality Database for Pediatric Sedation

Objective 3 was to collate abstracts and provide moderator reviews of best practices workshops within specific domains (pain/sedation, throughput, respiratory illness management, safety and medication errors, and H1N1 throughput).

Process measures: 100% of moderator teams submit final reports from the moderated abstract/storyboard sessions within 2 months of the sessions. This was discussed via teleconference secondary to the disparate nature of abstracts presented, and the decision to move forward with a different publication strategy was made. Manuscripts for the pre-conference fellowship directors' session, for the ED throughput best practices workshop, and for the overall conference outcomes would be generated.

Outcome measures: Editorial summaries from the abstract/storyboard session to be published in one national pediatric emergency medicine journal within 12 months of the conference is planned as targeted. Follow-up discussions with the editor of *Pediatric Emergency Care* have reaffirmed a commitment for special consideration of the resultant manuscripts to be completed by April 2011. Additionally, the engagement of the editor of *Clinical Pediatric Emergency Medicine* at this conference has led to the dedication of one issue in 2011 to quality improvement. Both guest editors for this issue were on the planning committee for this conference.

At least one national website will post conference-related activities from best practices/storyboard sessions within 12 months of the workshop. Currently, the activities from the conference are posted on the www.aap.org website. Within the next 2 months, materials will be posted on www.pemnetwork.org, which has a targeted PEM base.

Outcomes. Two levels of evaluation of the conference were undertaken.

1. Overall course evaluation: Evaluation describing demographics, venue, and overall content was conducted in partnership with the AAP. Ninety participants evaluated the conference at exit from the course. On a Likert-like scale of 1-5, with 5 as the highest, the mean score for overall satisfaction with the course was 4.44. The mean score for the conference's ability to meet the participants' educational needs was 4.16.

2. Evaluation was consistent with recommendations of the *Future of Pediatric Education II,*[16] in which the continuing medical education experience should be evaluated on 1) attendance and perception of the course; 2) changes in physician competence (knowledge, attitude, and skills); and 3) assessments of healthcare or patient outcomes.[16] Changing behavior is a process that requires change in knowledge, attitudes, and other behaviors.[17] In a conceptual framework previously described by Ajzen and Fishbein, the performance of a specific behavior cannot be predicted from a person's knowledge of or attitudes toward a behavior, but a person's intention to perform is a better predictor of engaging in a behavior. Thus, attitudes become predictors of intentions to perform the behavior. The measures of attitude and intention to perform a

behavior, such as conducting a quality improvement project, must correspond to each other. Therefore, our evaluative efforts focused on improvement in knowledge, attitudes, and intention to perform specific behaviors.

Objective 1 (a priori defined, see actual outcomes below): Pre- and post-conference evaluations will demonstrate a 20% increase in the intention to create a quality initiative project among participants; a 20% increase in knowledge from pre- to post-test evaluations of specific topics addressed in the conference; and a 5% increase in mean scores for attitude and/or confidence to undertake a quality improvement project.

A pre-conference survey was created to assess these domains. It was distributed to registrants of the conference. Additionally, late registrants (at the event) were provided written copies of the survey and asked to complete the survey on site, prior to the first lecture. One hundred thirty-three surveys were returned via an electronic survey tool (paper copies completed on site were converted to electronic survey entries by data quality specialists). As part of the overall course evaluation, qualitative and quantitative outcomes were collected by paper survey. Ninety surveys were collected at exit. Three months after the conference, a post-conference survey was generated electronically. Identifiers were limited to email addresses of participants. Seventy-three surveys were returned.

Analyses were performed using SAS (v9.2). Ordinal variables were compared utilizing the McNemar test of change. Sign test was used to evaluate ordinal variables for paired samples. Medians were compared utilizing Wilcoxon two-sample tests. Continuous variables were compared utilizing Student t test. Categorical variable were compared utilizing Chi square or Fisher exact tests. Significance was defined with an alpha of 0.05.

Knowledge (greater than 20% improvement in most knowledge-based questions):
Self-reported knowledge questions reveal significant improvement in understanding the relationship between cost and quality as well as general components of patient safety and the science of improvement (p<0.01) but not in the rationale behind a multidisciplinary approach of team work in achieving quality improvement (although there was a trend to improvement in this domain).

Pre-test and post-test questions were submitted by faculty testing knowledge content for each of the topics addressed. Pre-test aggregated scores improved from a 28% correct answer rate to a 68% correct answer rate (p<0.01).

Attitudes and confidence (greater than a 5% improvement in most attitude and knowledge-based questions):
Confidence in the use of the model for improvement showed an increase (p<0.01), as did confidence to apply knowledge of patient safety/medication error strategies. Moreover, participants also demonstrated an improvement in confidence to apply analytical techniques to quality improvement data (p<0.01).

Intentions (less than a 20% improvement in most intented actions):
Although the intent to participate in a national or regional collaborative, to participate in a quality improvement initiative, or to establish national professional mentoring relationships improved in the pre- versus post-conference period, this difference was not statistically significant. Interestingly, participants reported high rates of intent to participate in a quality improvement project within 3 months (93% of participants reported intent in the pre-conference evaluation, whereas 99% reported intent in the post-evaluation survey).

Perceptions that participants have support from medical administrators in their institutions and that conducting quality improvement work in one's own institution is difficult did not change over time. There was no difference in the belief that it was

important to conduct quality improvement work in emergency settings, as the response rating of very much was almost uniform before and after the conference.

Skills and behaviors:

Pre- and post-conference evaluations demonstrated a statistically significant (p=0.02) increase in the use of multidisciplinary teams to conduct quality improvement projects (despite no significant difference in knowledge of the rationale behind this approach). Additionally, there was an improvement in self-reported behaviors for the utilization of the model for improvement (p<0.01), evidence-based clinical tools and guidelines (p=0.04), financial measures for quality improvement projects (p=0.03), and statistical process control methods (p<0.01). There was no significant improvement in personal collection of data or application of safety principles in daily patient care delivery (despite a trend to significance in the latter).

A subgroup of participants had both pre- and post-survey data available (n=59). There was no statistically significant difference in the median number of projects in which the pre-conference versus post-conference participants were engaged. Overall, among the subgroup who reported both before and after the conference, 35% (95% CI 21,48%) of the group (n=49) reported an increase in the number of quality improvement projects in which they were engaged. Additionally, 27% (95% CI 14,39%) reported an increase in the number of projects they led (n=49). Of eight participants who reported not having been engaged in any quality improvement projects over the prior 3 months, 75% (n=6 of 8) reported participating in one or more quality improvement projects. Among those who reported not having led any quality improvement projects in the prior 3 months, 30% (n=8 of 27) reported leading one or more project in the 3 months following the conference.

Additionally, it is important to note that, upon exit, of the participants reporting a time frame in which they would engage in their qualitatively described quality improvement initiative, only 15% reported that change to occur in less than 3 months.

Discussion. This conference was intended to improve the knowledge, attitudes, confidence, intentions, and behaviors of participants engaged in caring for children in emergent settings. Overall, the conference was successful in meeting those goals. Objectives for improving the diversity of prior leadership conferences to impact a wide range of participants were met, with overall attendance and overall faculty participant numbers exceeding the targets. Faculty members, as evidenced by evaluation scores, received very positive evaluations. Best practices workshops were modified in scope from the spectrum of topics originally described secondary to the nature of abstracts received. More abstracts were received than originally anticipated, as the partnership with the AAP resulted in very effective marketing. Plans for independent manuscripts for each of the five domains in best practices workshops were revised to accommodate the variation in abstracts submitted. However, a focus on the outcomes and a focus on the education pre-conference shifted the total number anticipated from five to three.

Although the conference was successful in meeting all of its goals, as defined by the individual process and outcome measures defined a priori, some specific exceptions were noted. The post-conference evaluations demonstrated an improvement in knowledge (both self-reported and tested) of 13 topics pertinent to quality improvement. Similar improvements in attitudes and confidence were noted when participants were queried pre and post conference. There were particularly high levels of confidence with the use of plan-do-study-act cycles for quality improvement initiatives and with understanding and applying principles of patient safety and medication safety in clinical practice. However, intent to participate in a quality improvement study in the following 3 months did not increase significantly, likely secondary to the already high rate of participants intending to engage in such activities prior to the conference (93%).

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It is possible that the conference self-selected PEM participants who were already interested in such quality improvement work and thus opted to attend this conference to improve their performance. Most important are the behaviors that resulted from these changes in knowledge, attitudes, and intentions. The pre- and post-conference surveys demonstrated an increase in the number of projects in which respondents of both surveys reported (13% increase). Additionally, there was a subgroup of participants who had not been engaged in a project in the prior 3 months or had not led a project in the prior 3 months who reported engaging in or leading such activities (75% and 30%, respectively). This is important for engaging new champions and changing institutional cultures to ones of quality and safety.

As only 15% of respondents at the exit from the conference reported change in less than a 3-month period, this survey will be expanded to conduct a 1-year survey to allow ample opportunity to assess the impact of the conference on the parameters described, given the need for longer time frames for designing and implementing quality improvement initiatives. Dissemination of the findings of this conference will proceed as planned with manuscripts describing impact after the added 12-month surveys are complete. Additionally, the invitation for participation extended to the key editors of PEM journals has resulted in the commitment of *Clinical Pediatric Emergency Medicine* to a journal edition devoted to quality improvement in PEM. It will focus on the following:

1. Preface: P. Mahajan, MD, MPH
2. Defining Quality in Emergency Medicine: A New Framework – E. Alessandrini, MD, MSCE
3. Quality Terminology – A User's Guide to Common Terms – P. Mahajan MD, MBA
4. Measuring Quality in PEM – E. Alessandrini MD, MSCE, and J. Knapp, MD
5. Ensuring Therapeutic Reliability in PEM – C. Macias, MD, MPH
6. Ensuring Diagnostic Accuracy in PEM – G. Thompson, MD
7. Improving Operational Efficiency in the ED – S. Knazik, MD, and T. Woodward, MD
8. Workforce and its Impact on Quality – R. Ruddy, MD

Additional activities added to the impact of this conference: Web-based conference materials with key messages and tools are hosted on the AAP website for Section of Emergency Medicine members (>1500). With an anticipated date of February 2011, additional materials describing critical messages from the conference will be hosted on a PEM website (www.pemnetwork.org) that does not require section membership and thus is open to participation by anyone interested in PEM activities. Conference planners coordinated with Emergency Medical Services for children to facilitate quality improvement-associated podcasts. These focused on medication errors/patient safety issues. The overwhelmingly positive feedback from this conference to the AAP regarding the importance of quality improvement in PEM has resulted in the adoption of a permanent infrastructure to address quality improvement in PEM: the Committee for Quality Transformation.

Conclusion and significance. The implementation of a conference dedicated to leadership development in quality improvement in emergent-care settings for children resulted in high acceptance of the value of the conference and of the faculty as rated by evaluation of both. Additionally, pre- and post-conference assessments resulted in demonstrations of improvement in knowledge, attitudes, and behaviors. Although there was limited impact on intention to act, this was thought to be secondary to a ceiling effect of already high levels of intent by conference participants. Actual changes in behaviors were demonstrated among those with limited engagement as prior participants or as leaders of a quality improvement initiative within the 3 months prior to query. The 12-month effect (given the plan-do-study-act cycle time for implementation) is yet to be determined. The unit of study was participants in a pediatric

emergency medicine subspecialty, so this project was not intended to prove generalizable to all subspecialties, but it does warrant further investigation of a subspecialty-specific leadership training conference in quality improvement.

LIST OF PUBLICATIONS AND PRODUCTS

Outputs and products of dissemination include:

Manuscripts currently in draft form:
Directly associated with this conference:
Macias CG, Alessandrini EA. Improving pediatric emergency care provider engagement in quality improvement through a national leadership conference. *In draft.*
Hsu D, Mull C, Nypaver M, et al. Quality improvement in pediatric emergency care fellowship training: 2010 Leadership Conference outcomes. *In draft.*
Macias CG, Alessandrini EA, Goreclick M, et al. Improving ED throughput: best practice strategies from 2010 Leadership Conference. *In draft.*

Partially as a result of this conference:
Mahajan P and Alessandrini EA, editors. *Clinical Pediatric Emergency Medicine*. Issue dedicated to quality improvement. 2011.

Web-based materials:
Directly associated with this conference:
www.aap.org
www.pemnetwork.org (available February of 2011)
http://www.childrensnational.org/EMSC/EducationTraining/VideoAudioPodcasts.aspx

Created in affiliation with this conference:
http://www.childrensnational.org/EMSC/EducationTraining/VideoAudioPodcasts.aspx
http://www.youtube.com/emscnrc

Infrastructure change:
The creation of the Committee for Quality Transformation of the Section of Emergency Medicine/American Academy of Pediatrics. Announced October 2010.

REFERENCES:
[1] Remedying the Crisis in Emergency Care. Washington Post, 22 June 2006: A.28.
[2] Institute of Medicine. The Future of Emergency Care in the United States Health System. Washington, DC: National Academy Press, 2006.
[3] Agency for Healthcare Research and Quality. Healthy People 2010. www.health.gov/healthypeople/document/. Accessed March 2008.
[4] Kerr EA, McGlynn EA, Adams J, Keesey J, and Asch SM. Profiling the quality of care in twelve communities: results from the CQI study. Health Affairs, 2004;(23)3:247-256.
[5] National Center for Health Statistics. Health, United States, 2005, with Chartbook on trends in the Health of Americans. Hyattsville, Maryland. 2005. 311.
[6] Weiss HB, Mathers LJ, Forjuoh SN, Kinnane JM, Coben JH. Child and Adolescent Emergency Department Visit Databook: Center for Violence and Injury Control. Pittsburgh, PA: Allegheny University of Health Sciences. 1997.
[7] Sutton D, Stanley P, Babl FE, Phillips F. Preventing or accelerating emergency care for children with complex healthcare needs. Arch Dis Child. 2008;93(1):17-22.
[8] Simpson L, Owens PL, Zodet MW, Chevarley FM, Dougherty D, Elixhauser A, McCormick MC. Health care for children and youth in the United States: annual report on patterns of coverage, utilization, quality, and expenditures by income. Ambulatory Pediatrics. 2005;5(1):6-44.

[9] Luo X, Liu G, Frush K, Hey LA. Children's health insurance status and emergency department utilization in the United States. Pediatrics. 2003;112(2):314-9.

[10] Olson DA, Scott EF. And a doctor shall lead them. Health Syst Rev.1997;30:33-35.

[11] Romano M. Ready. Or not. Talented, high-achieving physicians often come up short on the skills and other attributes needed to excel as CEO. Modern Health. 2004;34:26-28.

[12] Taylor CA, Taylor JC, Stoller JK. Exploring leadership competencies in established and aspiring physician leaders: an interview-based study. J Gen Intern Med. 2008.

[13] Epstein AL, Bard MA. Selecting physician leaders for clinical service lines: critical success factors. Academic Medicine. 2008;83(3):226-234.

[14] Kyriacou DN, Ricketts V, Dyne PL, McCollough MD, Talan DA. A 5-year time study analysis of emergency department patient care efficiency [comment]. Ann Emerg Med. 1999;34(3):326-335.

[15] Pender NJ, Pender AR. Attitudes, subjective norms, and intentions to engage in health behaviors. Nurs Res. 1986;35(1):15-18.

[16] Future of Pediatric Education II (FOPE II) Task Force. The future of pediatric education II: organizing pediatric education to meet the needs of infants, children, adolescents, and young adults in the 21st century. Pediatrics. 2000;105(1 Suppl):163-212.

[17] Prochaska JO, Redding CA, Harlow LL, Velicer WF, Rossi JS. The transtheoretical model of change and HIV prevention: a review. Health Educ Q. 1994;21(4):471-486.

Appendix A: Scientific Program Schedule

Pediatric Emergency Medicine Leadership Conference
Scientific Program Schedule
April 16-18, 2010
San Antonio, Texas

Pre-Conference Session for Fellowship Directors Only (limited to 60 participants)
(Separate registration required)

<u>**Thursday, April 15, 2010**</u>

Noon   Registration-***Navarro Pre-Function***

1:00 pm   Welcome Address-***Navarro B* (All sessions for Thursday are in
                    Navarro B)**
                    Colette Mull, MD, and Michelle Nypaver, MD

1:15 pm   Perspectives on Quality in Emergency Medicine/Pediatric Emergency
                    Medicine Training
                    Susan Swing, PhD

2:15 pm   Workshop I: Quality Improvement in the ED:
                    Current Knowledge and Implications for Fellowship Training
                    Evaline Alessandrini, MD, MSCE

2:45 pm   Break-***Navarro Pre-Function***

3:00 pm   Workshop II: Practice-Based Learning and Systems-Based Practice
                    Competencies in PEM: Practical Methods and Measurement
                    Evaline Alessandrini, MD, MSCE, and Charles G. Macias MD, MPH

3:45 pm   Models That Work: Best Educational Quality Initiatives in Pediatric
                    Emergency Medicine
                    Carole Lannon, MD, MPH

4:45 pm   Closing Remarks by PEM Fellowship Committee Chairpersons
                    Colette Mull, MD, and Michelle Nypaver, MD

6:00 pm   Dinner

Total Pre-Conference CME Credits: maximum of 3.75
<u>**Friday, April 16, 2010**</u>

7:00 am   Registration and Continental Breakfast-***Navarro Pre-Function***

8:15 am   Training Leaders to Improve Healthcare Quality in Emergency
                    Settings for Children-***Navarro Ballroom***
                    Charles G. Macias, MD, MPH, and Evaline Alessandrini, MD, MPH

8:30 am   Leadership in a Time of Crisis-***Navarro Ballroom***
             James G. Adams, MD

9:45 am   Break (Visit the Exhibits)-***Navarro Pre-Function***

10:15 am   Breakout Sessions (Choose one)

     A1.   Performance Measurement in Pediatric Emergency Care-***Encino Room***
             Evaline Alessandrini, MD, MSCE

     A2.   Simulation as a Strategy to Improve Patient Safety-***Villa Room***
             Mary Patterson, MD

     A3.   The Problem Physician: Strategies for Improving Performance
             -***Sabino Room***
             Javier Gonzalez del Rey, MD, MEd

     A4.   Safety Culture and Paradigm Shift-***Zapata Room***
             Karen Frush, MD, and Robert Wears, MD

11:15 am   Break

11:30 am   Breakout Sessions (Choose one)

     B5.   Human Factors-***Zapata Room***
             Karen Frush, MD, and Kathy Shaw, MD

     B6.   Faculty Development Strategies That Work-***Sabino Room***
             Joan Shook, MD, MBA

     B7.   Understanding ED Performance and Outcomes:
             The Role of Dashboards-***Encino Room***
             Richard Ruddy, MD

     B8.   Collaborative Innovation Networks and Improving Quality of Care
             -***Villa Room***
             Peter Margolis, PhD

12:30 pm   Lunch-***Navarro Pre-Function***

1:30 pm   Building a Financial Case for Quality Improvement-***Navarro Ballroom***
             Ramesh Sachdeva, MD, PhD, MBA

2:30 pm   Breakout Sessions (Choose one)

     C2.   Simulation as a Strategy to Improve Safety-***Zapata Room***
             Mary Patterson, MD

     C6.   Care Quality, Patient Engagement, and Smart Phones-***Sabino Room***

Doug Evans, MD, MPH
(Presidiohealth and Polka)

C8. Collaborative Innovation Networks and Improving Quality of Care
-*Villa Room*
Peter Margolis, PhD

C10. Community Outreach to Improve the Quality of Care for All
Children-*Encino Room*
Marianne Gausche-Hill, MD, and Joseph Wright, MD, MPH

3:30 pm   Break (Visit the Exhibits)-*Navarro Pre-Function*

4:00 pm   <u>Breakout Sessions</u> (Choose one)

D7. Understanding ED Performance and Outcomes:
The Role of Dashboards-*Villa Room*
Richard Ruddy, MD

D14. Evidence-Based Guidelines as a Driver for Quality-*Encino Room*
Scott Reeves, MD, and Charles G. Macias, MD, MPH

D15. Patient-Centered Care as a Strategy to Improve Quality-*Zapata Room*
Jane Knapp, MD, and Terri Byczkowski, PhD

D16. Methodologies to Improve Workforce Productivity and Life
Balance Across Generations-*Sabino Room*
Joan Shook, MD, MBA

5:00 pm-7:00 pm   Reception/Exhibits-*Navarro Pre-Function*

Total CME Credits for Friday: maximum of 6

<u>**Saturday, April 17, 2010**</u>

7:45 am   Continental Breakfast-*Navarro Pre-Function*
and Plenary Session-Imperative of Why we Have to Change-*Navarro Ballroom*
Virginia Moyer, MD, MPH

8:30 am   Break

8:45 am   <u>Breakout Sessions</u> (Choose one)

E3. The Problem Physician: Strategies for Improving Performance
-*Zapata Room*
Javier Gonzalez del Rey, MD, Med

E4. Safety Culture and Paradigm Shift-*Villa Room*

Karen Frush, MD, and Robert Wears, MD

E18. Applying Business Strategies in Quality Improvement To
Healthcare
-***Sabino Room***
Joe Duhig, MBA

E19. Publishing Your Quality Improvement Work: SQUIRE Guidelines
-***Encino Room***
Virginia Moyer MD, MPH

9:45 am   Break (Visit the Exhibits)-***Navarro Pre-Function***

10:00 am   <u>Breakout Sessions</u> (Choose one)

F10. Community Outreach to Improve the Quality of Care for All
Children
-***Zapata Room***
Marianne Gausche-Hill, MD, and Joe Wright, MD

F15. Patient-Centered Care as a Strategy to Improve Quality-***Encino Room***
Jane Knapp, MD, and Terri Byczkowski, PhD

F18. Applying Business Strategies in Quality Improvement
to Healthcare-***Villa Room***
Joe Duhig, MBA

F21. Care Quality, Patient Engagement, and Smart Phones-***Sabino Room***
Doug Evans, MD, MPH

11:00 am   Break

11:15 am   <u>Breakout Best Practices Workshops</u> (Choose one)

G22. Pain and Sedation-***Encino Room***
Moderators: Marianne Gausche-Hill, MD, and Susan Fuchs, MD

G23. Throughput-***Navarro Ballroom***
Moderators: Marc Gorelick, MD, MSCE,
and Prashant Mahajan, MD

G24.   Respiratory Illnesses-***Villa Room***
Moderators: Joe Zorc, MD, and Terry Adirim, MD, MPH

G25. Medication Errors-***Zapata Room***
Moderators: Karen Frush, MD, and Jane Knapp, MD

G26. Patient Safety & the Creation of a Safety Culture-***Sabino Room***

Moderators: Richard Ruddy, MD, and Kathy Shaw, MD, MSCE

12:45 pm   Plenary Session (with lunch)
Airline Safety and Application to Patient Safety-***Navarro Ballroom***
John Nance

1:30 pm   Adjourn for the Day

1:30 -3:30 pm Advanced Pediatric Media Training: From Media Disaster to Media Master
-***Navarro Ballroom*** **(Optional Workshop)**

Total CME Credits for Saturday: maximum of 4.5

Sunday, April 18, 2010

7:30 am   Continental Breakfast-***Navarro Pre-Function*** and
Meet the Organization Leaders-***Navarro Ballroom***

8:00 am   Breakout Sessions (Choose one)

      H5.   Human Factors-***Zapata Room***
      Karen Frush, MD, and Kathy Shaw, MD

      H15.   Understanding Statistical Process Control in Quality Improvement
-***Villa Room***
      Terri Byczkowski, PhD

      H27.   Implementing ED Electronic Records and Their Relationship to
Quality
-***Sabino Room***
      Lalit Bajaj, MD, and Joe Zorc, MD

      H28.   The Model for Improvement vs. Six Sigma: Applying the Best

      Model for Quality Improvement-***Encino Room***
      Ramesh Sachdeva, MD, PhD, MBA

9:00 am   Break

9:15 am   Breakout Sessions (Choose one)

      I11.   Evidence-Based Guidelines as a Driver of Quality-***Villa Room***
      Scott Reeves, MD, and Charles G. Macias, MD, MPH

      I13.   Methodologies to Improve Workforce Productivity and Life
Balance Across Generations-***Sabino Room***
      Joan Shook, MD, MBA

I28.   The Model for Improvement vs. Six Sigma: Applying the Best
       Model for Quality Improvement-***Zapata Room***
       Ramesh Sachdeva, MD, PhD, MBA

I29.   Performance Measurement in Pediatric Emergency Care-***Encino Room***
       Evaline Alessandrini, MD, MSCE

10:15 am   Break (Visit the Exhibits)-***Navarro Pre-Function***

10:30 am   Traditional Research vs. Quality Research-***Navarro Ballroom***
           Mary Ann Baily, PhD

11:30 am   Setting a Quality Agenda-***Navarro Ballroom***
           Karen Cox, RN, PhD, FAAN

12:30 pm   Closing Remarks and Adjourn

Total CME Credits for Sunday: maximum of 4

Total CME Credits for PEM: maximum of 18.25 (including pre-conference total of 3.75)