

Factors Associated with Quality of Care Delivered to Children in US EDs

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Abstract

Purpose: The goal of this project is to further validate a quality of care instrument to measure and improve the quality of care delivered to children in emergency departments (ED).

Scope: The quality of care instrument, based on expert physician review, was applied to a sample of 600 children treated in 12 heterogeneous hospital EDs in the Pediatric Emergency Care Applied Research Network (PECARN). We used the instrument to identify differences in quality of care across different ED settings and patient characteristics. These data will help determine best practices in pediatric emergency care across the country.

Methods: This was a retrospective cross-sectional study of 600 children presenting to 12 EDs in PECARN. Eight physician experts reviewed the de-identified medical records; each chart was reviewed by four experts. We compared our results to objective measures developed from evidence-based guidelines and expert consensus for patients treated for asthma, febrile seizure, gastroenteritis, and head trauma. We compared groups based on appropriateness of disposition and cross-validation with other reviewers. We used standard multivariable regression methods and multi-level modeling.

Results: This study is in analysis phase now.

Key words: Quality of care, emergency care, pediatrics

Purpose

The overall objective of this proposal is to validate a structured implicit review instrument that measures the quality of care provided to children presenting to EDs and to identify factors associated with differences in quality of care provided to these children among a diverse cohort of EDs and patients across the United States. We expect that, by applying the structured implicit review instrument to the national PECARN collaborative, we will demonstrate that the instrument is reliable, valid, and can be used to measure quality of care for any cohort of children in any ED setting (given its successful prior application in rural EDs). We also expect that we will identify factors related to quality of care that will assist health policy makers to generate specific policy recommendations with regard to training, staffing, and practice guidelines. Furthermore, the validated instrument and results of this study, in combination with other national quality efforts, could be used by healthcare academicians, researchers, providers, and policy makers in developing recommendations for quality benchmarks, standards, and policies aimed at improving the quality of care delivered to children presenting to EDs across the country.

Our specific objectives are as follows:

Objective 1: To reassess the consistency, reliability, and validity of the structured implicit review instrument in a diverse group of EDs. We hypothesize that the instrument will be a reliable and valid method to assess quality of care in the ED, with high internal consistency and inter-rater reliability and validity across all standard measures of instrument performance.

Objective 2: To identify hospital-, ED-, and physician-level factors associated with quality of care. We hypothesize that hospital factors, such as type of ED, freestanding children's hospital status, and ED volume, and physician factors, such as training, board certification, and years of experience, will be associated with differences in the quality of care provided to children in the ED.

Objective 3: To identify patient- and presentation-level factors associated with quality of care. Our null hypothesis is that patient factors, such as age, gender, race/ethnicity, and payment source, and presentation factors, such as day and time of admission, will *not* be associated with differences in the quality of care provided to children in the ED.

Scope

Background:

One of the main challenges in measuring the quality of care delivered to children in the emergency department (ED) is that children present with a wide variety of illnesses that require age-specific, specialized care. Because of this, only a few process measures exist for a handful of specific diseases. Furthermore, whether differences in structure and processes of care result in differences in outcomes is not well understood. Therefore, there is a need to develop quality measures that can evaluate structure and processes of care for a broad spectrum of diseases across the wide age range of the pediatric population.

Previously considered outcomes in pediatric emergency care include mortality, changes in health-related quality of life, and recidivism to the emergency department or hospital. Some of these measures are difficult to measure in children, unreliable, and susceptible to confounding due to congenital anomalies and other unusual risk factors. Similarly, other factors in the healthcare system, such as access to post-ED primary care, likely confound other ED outcomes, including recidivism and 30-day mortality. Therefore, more useful, valid, and reliable instruments are needed to assess processes of care delivered to a broad spectrum of ill and injured children receiving treatment in different EDs.

Peer review plays an important role in the ascertainment of quality of care, both at the individual provider level and at the system level. Implicit review is a type of peer review in which assessments of quality are based on expert reviewers' judgment of care provided. This peer-review process is referred to as structured implicit review when it is conducted by experts and applied in a systematic and rigorous manner. Structured implicit review has been shown to have high face validity and excellent inter-rater reliability. Furthermore, structured implicit review has been shown to correlate well with explicit measures of processes of care as well as with healthcare outcomes. The critical advantage of this approach is that it is applicable to all children presenting to emergency departments, regardless of their underlying diagnoses and prognoses. Therefore, it provides comprehensive composite measurement of quality in pediatric EDs, which simply cannot be achieved using individual measures focused on specific conditions, such as asthma.

Investigators at UC Davis have developed and published a structured implicit review instrument to measure the quality of care provided to children in EDs. This instrument, entitled the "Pediatric Emergency Department Quality Assessment Tool," was developed according to the implicit review guidelines published by Rubin, et al. Our instrument was developed by modifying instruments previously published and validated by the RAND Corporation, including the RAND PRO Quality Review Validation Study (PQRVS) form and the DRG/QC Study Implicit Review form. The implicit review instrument we developed and will use in the proposed study has been shown to be reliable and valid and has also been used to identify modifiable factors associated with quality of care in a small cohort of rural EDs caring for pediatric patients.

Setting:

The Pediatric Emergency Care Applied Research Network (PECARN) is the first federally funded pediatric emergency medicine research network in the United States; it works with diverse demographic populations across varied geographical regions and is organized into six

“research nodes,” each overseen by a Research Nodal Center (RNC). Since its inception in 2001, PECARN has carefully developed an infrastructure capable of overcoming inherent barriers to pediatric emergency medicine research. These barriers include low incidence rates of serious pediatric emergency events, the need for large numbers of children from varied backgrounds to achieve broadly representative study samples, and the lack of a networked infrastructure to test the efficacy of pediatric emergency care. In PECARN, each node works collaboratively with the others as well as with the Data Coordinating Center (DCC) at the University of Utah, which is independently funded by MCHB/HRSA. PECARN has a substantial track record of federally funded studies and completed research, and it has published many important abstracts and publications on emergency medical services for children. Since 2001, PECARN has obtained extramural research funding for 21 projects, leading to 70 published peer-reviewed manuscripts and 100 abstract presentations.

Participants:

The research coordinator at each of the participating sites applied the following inclusion and exclusion criteria.

Inclusion criteria:

- a. Children younger than 17 years of age at the time of their ED visit.
- b. Children presenting to the ED for healthcare, including psychiatric emergencies.

Exclusion criteria:

- a. Children evaluated at the ED for nonmedical reasons, such as elective surgeries, psychiatric evaluations, and social problems (i.e., cases of possible neglect or abandonment, and endangerment).
- b. Children transiently evaluated at the ED in the process of direct admission to the hospital.
- c. Children who left the ED without being seen by the attending physician.

Methods

Study Design

The study was a retrospective review of the medical records of children presenting to 12 geographically and organizationally diverse EDs in the PECARN. Approximately 600 records were randomly selected from a 1-year period (2013). Each medical record was reviewed by four expert physicians for quality of care using the validated implicit review instrument. The records were also abstracted for other clinical and research data by a trained research nurse and research coordinators. Records were identified, photocopied, blinded, and abstracted by research coordinators at the participating sites; the distribution of records for physician review was managed by the PECARN Data Coordinating Center.

Data Sources/Collection

The research coordinators at each of the participating sites identified eligible patients from ED logbooks using identical sampling methods. The research coordinators then randomly selected patients for the study, oversampling patients presenting with each of the four validation diagnoses: asthma, febrile seizure, gastroenteritis, and head trauma. Oversampling was necessary for validation to ensure an adequate sample for each diagnosis. Each identified patient's record was then copied by the research coordinator after the patient's discharge from the ED and was de-identified of specific patient and hospital information.

De-identified records were uploaded electronically to a database at the PECARN Data Coordinating Center in Utah. The entire medical record for the specific ED visit was uploaded,

including all associated laboratory work, reports of radiology examinations and other procedures, consultations, ED treatment sheets, and discharge instructions. Each medical record was assigned a unique identification number. This made it possible for the site research team to securely store the hard copy of the medical record at the corresponding institution while the electronic copy of the de-identified medical records was used for abstraction. Access to the medical records was available only through the secure eRoom™ for expert reviewers to apply the quality instruments as well as for abstraction of quality scores.

Interventions

There are no interventions associated with this study.

Measures

Primary outcome measure: The primary outcome measure is the quality of care assessed using the five-item implicit review instrument. The sum of the five-item score is the summary quality of care score. The summary quality of care score from the four expert reviewers will be averaged to get a mean quality of care score for each study patient.

Validation measures: The subset of records from patients who were treated for asthma, febrile seizure, gastroenteritis, and head trauma were used for validation. The explicit quality instruments developed by Gausche-Hill, et al. for these four diagnoses were created from evidence-based guidelines and expert consensus. These explicit, diagnosis-specific quality of care instruments were applied by a nurse practitioner to all eligible children according to a standardized procedure (described below), and explicit quality of care scores were generated. These explicit quality scores were compared with implicit quality of care scores. In addition, an independent physician expert investigator reviewed all sampled medical records and answered the following question: “What is the likelihood that you would want this physician taking care of your child in the ED?” This “validation question” will be measured on a 7-point ordered adjectival scale, from extremely unlikely to extremely likely. This measure will be used to assess the construct validity of this and other implicit review instruments.

Variables that will be evaluated as correlates of quality of care include:

Hospital-level variables: These will include hospital factors that could be related to quality of care, such as the type of hospital and the volume of patients seen annually in the ED. Hospitals in the PECARN were deliberately selected to provide a diverse sample of EDs. Hospitals will be categorized into general hospitals with pediatric EDs versus freestanding pediatric hospitals and academic versus nonacademic hospitals.

Physician-level variables: These will include physician factors that could be related to quality of care, such as physician specialty training, board certification status, and years of experience since completion of medical school and residency. Physician training was categorized as Pediatric Emergency Medicine (PEM), General Emergency Medicine (GEM), and other (Internal Medicine, Family Medicine, Surgery, and Obstetrics and Gynecology) based on the type of residency and (if applicable) fellowship training. Physician board certification status was categorized as board certified versus nonboard certified. In addition, we recorded each physician’s total years of experience working in the ED since graduation from medical school and residency training.

Patient-level variables: These include patient and presentation factors, such as age, gender, race/ethnicity, payment source, and clinical variables. Patient race/ethnicity is categorized as Caucasian, Hispanic, African-American, and Other. Patient payment source is categorized as none (uninsured, paying out of pocket, or medically indigent); Medicaid; or private coverage,

which is further categorized as fee-for-service or capitated (through an HMO or other prepaid plan). Patient presentation factors include day of week, dichotomized as weekday or weekend (7 pm Friday to 7 am Monday) and time of patient presentation, dichotomized as night-time (7pm to 7am) and daytime. We also collected all variables required to calculate the Pediatric Risk of Admission (PRISA II score) and Pediatric Emergency Assessment Tool (re-PEAT score) in addition to other clinical variables (e.g., chief complaint), quality variables (e.g., length of stay), and the type of medical record used (electronic medical record versus paper medical record). We collected information regarding documentation in the medical record.

Quality Expert Reviewers: We enlisted the collaboration of eight expert physician reviewers within PECARN to review the 600 medical records for this study, with each record reviewed by four reviewers. Of the eight reviewers, there are four Pediatric Emergency Medicine and four General Emergency Medicine physicians. The physician reviewers reviewed 300 medical records each. Physicians *did not* review records from their own node of PECARN. Each medical record was randomly assigned at the PECARN Data Center to four reviewers from the pool of six physician reviewers (excluding the two physician reviewers from the corresponding node). To ensure that each reviewer was assigned to an equal number of records from each institution outside her/his node, we stratified assignment of medical records by site.

Chart Review and Implicit Review Quality of Care Determination: Quality of care will be measured with our 5-item implicit review instrument. This instrument encompasses four aspects of process of care in the ED along with a fifth item assessing the overall quality of care provided to the patient. Each item in the instrument is scored on a scale of 1 to 7 as “extremely inappropriate,” “very inappropriate,” “somewhat inappropriate,” “intermediate,” “somewhat appropriate,” “very appropriate,” or “extremely appropriate.” For this study, we will use the sum of the 5 item-specific scores from each reviewer to obtain a summary quality of care score for each medical record review by each reviewer (ranging from 5 to 35).

Each de-identified medical record will be evaluated by four physician reviewers who are board-certified in either Pediatric Emergency Medicine (PEM) or General Emergency Medicine (GEM). These physicians will independently review the medical records from the ED masked to hospital and clinician identifiers and use the implicit review instrument to assign quality of care scores. Of note, clinician documentation of clinical assessments, orders, and disposition plan may be inconsistently recorded on the medical records. Because of this, missing data (or lack of documentation) will be considered equivalent to data that are not collected or care that was not delivered. This approach is consistent with the assessment by quality experts who review medical records, including those from The Joint Commission, who consider lack of documentation as an indicator of poor quality of care.

The implicit review quality of care instrument will be applied as members of our investigative team have done previously. According to the protocol, the expert physician will review each medical record and score each of the domains of care independently. If the assessment on the overall quality of care item in the instrument differs by more than two units between any of the reviewers, the reviewers will be asked to re-review the record. If the scores remain different by more than two levels, the reviewers will be asked again to discuss the evaluation with each other in order to achieve a better consensus. The mean of the four reviewers’ summary scores (including consensus reviews, if necessary) will be recorded as the final quality of care score.

Because some limitations have been noted in the use of implicit review to measure quality, we sought to maximize reliability by averaging item-specific scores from all the reviewers.

Limitations

The results of this study will have far-reaching implications in creating a validated quality of care instrument and evaluating factors associated with quality of care delivered to children in emergency departments. However, because this study focused on medical records obtained from the charts of children receiving care and large tertiary children's hospitals, the applicability and validity of our findings may not be relevant to smaller community hospitals or rural hospitals. To address this, we are hoping to evaluate this instrument with further studies. In addition, we expect that other academic researchers will also use this instrument to identify factors associated with quality of care in other hospital settings and in a broader variety of emergency departments.

Results (Principal Findings, Outcomes, Discussion, Conclusions, Significance, Implications)

We reviewed 620 medical records for quality of care using the described implicit review instrument. Final results of this study are not currently available. The PI and co-investigators are collaborating with the PECARN Data Coordinating Center (DCC) on the analyses for the main paper. We would be happy to provide a results section at a later date and/or to provide a copy of the manuscript upon completion.

List of Publications and Products

We are still in the data analysis phase. The main manuscript is in draft format but has not been submitted for consideration to a peer-review journal.