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THE IMPACT OF A PEDIATRIC EMERGENCY DEPARTMENT FACILITY VERIFICATION SYSTEM ON PEDIATRIC MORTALITY RATES IN ARIZONA

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☐ **Abstract—Background: The Emergency Medical Services for Children State Partnership Program, as well as the Institute of Medicine report on pediatric emergency care, encourages recognition of emergency departments (EDs) through categorization and verification systems. Although pediatric verification programs are associated with greater pediatric readiness, clinical outcome data have been lacking to track the effects and patient-centered outcomes by implementing such programs. Objective: To describe pediatric mortality rates prior to and after implementation of a pediatric emergency facility verification system in Arizona. Methods: This was a cross-sectional study conducted using data from ED visits between 2011 and 2014 recorded in the Arizona Hospital Discharge Database. The primary outcome measure was the mortality rate for ED visits by patients under 18 years old. Rates were compared prior to and after facility certification by the Arizona Pediatric Prepared Emergency Care program. Results: The total number of ED visits by children during the study period was 1,928,409. Of these, 1,127,294 were at facilities undergoing certification. For hospitals becoming certified, overall ED mortality rates were 35.2 deaths/100,000 ED visits (95% confidence interval [CI] 29.5–41.7) in the precertification analysis and 34.4 deaths/100,000 ED visits (95% CI 30.4–38.9) in the postcertification analysis. The injury-related ED visit mortality rate for certified hospitals showed a decrease from 40.0 injury-related deaths/100,000 ED visits (95% CI 28.6–54.4) in the precertification analysis to 25.8 injury-related deaths/100,000 ED visits (95% CI 18.7–34.8) in the postcertification analysis. Conclusion: The implementation of the Arizona pediatric ED verification system was associated with a trend toward lower mortality. These results offer a platform for further research on pediatric ED preparedness efforts and their effects on improved patient outcomes.** © 2017 Elsevier Inc. All rights reserved.

☐ **Keywords—pediatric emergency care; mortality rates; Institute of Medicine; facility verification; Pediatric Prepared Emergency Care; injury mortality; trauma systems**

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INTRODUCTION

Background

Since the creation of the federal Emergency Medical Services (EMS) for Children program in 1984, there has been a national focus on improving emergency care for children. Early reports on the emergency care of children emphasized a concern that many facilities were poorly equipped to adequately care for ill or injured children. Additional findings showed that plans for medical staffing, prehospital protocols, and disaster protocols also failed to include the special needs of children (1).

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In 1993, the Institute of Medicine (IOM) delivered its first independent review of EMS for children, creating a report outlining deficiencies and providing recommendations for improving the state of pediatric emergency care (2). Since that report, numerous studies have continued to illuminate a general lack of readiness to care for pediatric patients at emergency departments (EDs) across the country (1,3–6). The American Academy of Pediatrics and the American College of Emergency Physicians defined the baseline of pediatric readiness in EDs in a joint policy statement published in 2001, and updated with the Emergency Nurses Association in 2009 (7,8).

In a 2002–2003 survey, only 5.5% of EDs had all recommended pediatric supplies in stock. Of these, only one-half had more than 85% of recommended supplies (9). In a follow-up study of 2006 data, there had been little progress, with similar numbers of hospitals carrying the recommended supplies needed to deliver appropriate care for children (10). The presence of a nurse or physician pediatric emergency care coordinator has been shown to lead to greater readiness (6,11). Despite evidence and strong recommendations for designating a pediatric emergency care coordinator, compliance with this recommendation was shown to be extremely low (6,12). Although many studies have suggested that the needs of pediatric patients are not being met, there are few definitive data to establish a link between pediatric readiness and clinical outcomes (10,13).

The EMS for Children State Partnership Program, as well as the IOM report on pediatric emergency care, encourages recognition of EDs through categorization and verification systems. At least 14 states have developed a regional or statewide verification system for EDs that provide pediatric emergency services. These programs aim to provide well-defined standards (as outlined in the IOM report) mandating critical resources required to provide effective care. A report on the California pilot program, where EDs must meet specific standards to be an approved pediatric center, indicated that pediatric readiness scores are improved when a region uses a pediatric facility verification process. The California data also noted that trauma center verification was not independently associated with pediatric readiness scores, indicating that the pediatric verification program in and of itself has the ability to drive improved pediatric emergency care (14). In a national analysis, states achieving the highest readiness scores were those whose processes included a physical verification with a site visit to the institution (11,14,15).

Importance

In the United States, it is estimated that only 18% of all pediatric visits are to pediatric EDs (16). Therefore, the majority of ED visits by children are to general hospital EDs, which in turn have variable pediatric volume and resources and are less likely to have health care providers that have focused training in pediatric emergency medicine (3–6,11,12,14,17). Children's hospitals with advanced capabilities are well prepared to take care of sick and injured children, but these facilities represent only 2.6% of all hospitals with an ED (17). The majority of EDs in the United States see a relatively low pediatric volume, hence, the recommendations to regionalize pediatric emergency services (6,18). Because children comprise only 5–10% of EMS calls, many pediatric patients are brought to EDs by a parent, which may be based upon the most geographically convenient location. This underscores the importance of compliance with well-established guidelines for all EDs that care for children. Although pediatric verification programs have been associated with greater pediatric readiness, clinical outcome data have been lacking to track the effects and patient-centered outcomes by implementing such programs (14).

Goals of This Investigation

The aim of this study was to describe pediatric health outcomes by measuring ED visit mortality rates prior to and after implementation of a voluntary statewide pediatric emergency facility verification program. The hypothesis was that lower pediatric mortality rates would be associated with facilities undergoing certification by the program.

MATERIALS AND METHODS

Study Design and Setting

This was a cross-sectional study conducted using data from ED visits and inpatient hospitalizations between 2011 and 2014, using the Arizona Hospital Discharge Database (AHDD). This study was deemed exempt by The University of Arizona Human Subjects Protection Program (Institutional Review Board approval #1607750645).

The Arizona Pediatric Prepared Emergency Care (PPEC) program is a three-tiered voluntary verification system that was officially launched in Arizona in 2012 (19). Its goal, following the tenets of the IOM report on pediatric emergency care, is to improve the delivery of medical care to children in EDs throughout Arizona. Since its inception, it has expanded to include 36 hospitals with EDs in the state. This constitutes nearly half of all Arizona EDs, including rural and tribal facilities. The program's levels are designated as: Pediatric Prepared, Pediatric Prepared Plus, and Pediatric Prepared Advanced. The higher levels of care include, among other