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Mini Review

Pediatric Trauma In-Hospital Mortality: A Protocol for Conducting a Systematic Review

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Abstract

Pediatric mortality is often used as an outcome indicator when evaluating personal characteristics of trauma patients, specific injury, and patient care models. Because in-hospital mortality rates are ill-defined and often low, using this measure as a quality indicator has been questioned in the literature. Instead, recommendations for using surrogate markers have been proposed. A systematic review will be conducted, utilizing multiple search engines, to investigate the use of in-hospital mortality as a viable outcome in a pediatric trauma population. In addition, we plan to evaluate the extent to which these studies have appropriately analyzed in-hospital mortality as a rare event. The review will include study- and outcome-level assessments for risk of bias. Conduct and reporting of results of the systematic review will follow PRISMA Statement, among other guidelines.

Background

The number one leading cause of death for children in the United States is unintentional injury [1], with motor vehicle occupant the most frequently reported mechanism [2]. In-hospital mortality measures, often a rare event (e.g. 3.1% fatality in injured adolescents [2]), have been used to differentiate pediatric trauma populations on personal characteristics such as obesity [3], ethnicity and payer status [4], race [5], and socio-economic status [6]. In addition, studies targeting a specific injury, such as head injuries [7], have used in-hospital mortality as an outcome indicator. Patient care models (adult versus children's hospitals [8] and adult versus pediatric surgeons [9]) have also been evaluated using in-hospital mortality as an indicator of effectiveness. However, using in-hospital mortality as a quality indicator has been questioned in the literature [10,11]. Instead, recommendations for using surrogate markers have been proposed, such as vent-free days or quality of life in sepsis critical care trials [12]. Our newly formed research team is exploring the appropriateness of using mortality as a quality indicator of service. This protocol outlines the methodology we will use to conduct a systematic review of in-hospital mortality in a pediatric trauma population.

Objectives

A systematic review will be conducted to investigate the extent to which in-hospital mortality was used for determining efficacy of care in a pediatric trauma population. Further, we will assess the design and statistical methodology used for analyzing this rare event.

Inclusion/Exclusion Criteria for Studies in the Systematic Review

A critical appraisal of peer-viewed published studies will include research involving in-hospital mortality of pediatric trauma patients (ages 0-19). All clinical and system interventions and comparisons will be considered. Study settings will include pediatric trauma centers, adult trauma centers, and children's hospitals. Exclusion criteria are those studies older than 20 years (prior to1996), published in a language other than English, and studies not available in free full text.

Search Methods

Research studies for this review will be identified using these electronic databases: PUBMED/MEDLINE, COCHRANE and CINHAL. A preliminary search in PUBMED/MEDLINE utilized"(pediatrics OR child OR adolescent) AND (Hospital mortality AND (wounds and injuries OR trauma)) AND trauma center" as search terms, which listed 1928 articles. Adding limiting terms of English, articles published since 1996, abstract availability and free full text resulted in 259 articles. Additional search terms such as: Survival, Death, Preschool, Female, Male, Humans, Follow-Up Studies, Hospital Mortality/trends, Children's hospital, Injury Severity Score, Odds Ratio, Outcome Assessment (Health Care), Retrospective Studies, or United States/epidemiology, may also be explored. Research studies identified through the search will be reference- checked. A hand search will be conducted to uncover any additional relevant studies. Because a publication bias may exist (reporting only significant results), we plan to include unpublished articles, such as trial registry reports, in our literature search.

Methods of Review

To further reduce selection bias, two main reviewers (GB and WB) will evaluate studies meeting inclusion/exclusion criteria. A third Reviewer (RZ) will be included when necessary to resolve disagreements. RZ will also conduct a statistical review of select studies using in-hospital mortality as an outcome measure. End Note will track all selected studies, along with references. End Note data will be uploaded into REDCap (a secure web application for building and managing online surveys and databases). Extracted data from each article reporting in-hospital mortality as an outcome will include: authors, publication date, setting, total sample size (N), number of pediatric patients who did not survive (n), percent mortality, intervention, type of statistical analysis conducted, use of mortality risk adjustment, and recommendation (pro/con) for in-hospital

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mortality as a quality indicator. The review will include study-level and outcome-level assessments for risk of bias. Assessments of bias will follow methodologies recommended by Agency for Healthcare Research and Quality [13]; for example, the inclusion / exclusion criteria will be defined by PICOTS = population (s), intervention(s), comparator(s), outcome(s), timing, and setting. This framework will be utilized:1) synthesis of findings across outcomes; 2) exploration of relationships among studies; 3) synthesis of arguments for or against in-hospital mortality as an outcome in the pediatric trauma population; and 4) development of a conclusion on the appropriateness of using in-hospital mortality as an outcome in the pediatric trauma population. We anticipate that comparable evidence will be sparse (lacking similar design, population, variables of interest and analyses); therefore, a meta-analysis will not be conducted, nor will selected articles be graded.

Presentation of Results

Reporting of results for the systematic review will follow PRISMA Statement guidelines [14]. A flowchart will document the inclusion / exclusion of journal articles. To reduce the potential for bias, reasons for exclusion will be reported. Tables of the extracted data will be presented. A discussion will include a general interpretation of results with implications for future research. Upon completion of the manuscript, we may conduct a self-evaluation of the systematic review using GRADE (Grading of Recommendations Assessment, Development, and Evaluation) a formal process to rate the quality of scientific evidence [15]. Last, we plan to present findings of the systematic review nationally at the Pediatric Trauma Society Annual Conference in November 2017, and target high quality pediatric or trauma journals for manuscripts.

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