Determining the Hospital Trauma Financial Impact in a Statewide Trauma System

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BACKGROUND: There have been no comprehensive studies across an organized statewide trauma system using a standardized method to determine cost.

STUDY DESIGN: Trauma financial impact includes the following costs: verification, response, and patient care cost (PCC). We conducted a survey of participating trauma centers (TCs) for federal fiscal year 2012, including separate accounting for verification and response costs. Patient care cost was merged with their trauma registry data. Seventy-five percent of the 2012 state trauma registry had data submitted. Each TC's reasonable cost from the Medicare Cost Report was adjusted to remove embedded costs for response and verification. Cost-to-charge ratios were used to give uniform PCC across the state.

RESULTS: Median (mean ± SD) costs per patient for TC response and verification for Level I and II centers were $1,689 ($1,492 ± $647) and $450 ($636 ± $431) for Level III and IV centers. Patient care cost—median (mean ± SD) costs for patients with a length of stay >2 days rose with increasing Injury Severity Score (ISS): ISS <9: $6,787 ($8,827 ± $8,165), ISS 9 to 15: $10,390 ($14,340 ± $18,395); ISS 16 to 25: $15,698 ($23,615 ± $21,883); and ISS 25+: $29,792 ($41,407 ± $41,621), and with higher level of TC: Level I: $13,712 ($23,241 ± $29,164); Level II: $8,555 ($13,515 ± $15,296); and Levels III and IV: $8,115 ($10,719 ± $11,827).

CONCLUSIONS: Patient care cost rose with increasing ISS, length of stay, ICU days, and ventilator days for patients with length of stay >2 days and ISS 9+. Level I centers had the highest mean ISS, length of stay, ICU days, and ventilator days, along with the highest PCC. Lesser trauma accounted for lower charges, payments, and PCC for Level II, III, and IV TCs, and the margin was variable. Verification and response costs per patient were highest for Level I and II TCs. (J Am Coll Surg 2015;220:446—458. © 2015 by the American College of Surgeons)

Both the cost and financial impact of a hospital's participation in a trauma system have remained largely a mystery in the United States. This is despite the critical nature of trauma care to the overall health care of our nation. Our study attempts to answer some essential questions about the Trauma Financial Impact (TFI) on trauma centers (TCs) by the use of an innovative system-wide methodology that allows us to view financial factors, including standardized costs alongside pertinent patient clinical factors. This article will lay out the background and methodology of our survey and will report on substantive initial findings of the survey.

Arkansas developed a statewide trauma system in 2009, with legislation that established, among other things, funding for TCs, an integrated statewide trauma call system, uniform trauma triage guidelines, implementation of the American College of Surgeons National Trauma Data Base registry in all TCs, and use of a unique Trauma Band ID number assigned to each patient, which follows them through the trauma system. The Arkansas Department of Health oversees the trauma system with the advice

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Abbreviations and Acronyms
CCR = cost-to-charge ratio
ISS = Injury Severity Score
LOS = length of stay
MCR = Medicare Cost Report
PCC = patient care costs
TC = trauma center
TFI = Trauma Financial Impact

of the Trauma Advisory Committee, composed of representatives of all of the major providers and professional organizations dealing with trauma. The Arkansas Trauma System recognizes the need to include TCs in adjacent states that care for the citizens of our state and, as of July 2014, has incorporated 5 TCs in Tennessee, Texas, and Missouri, along with 64 Arkansas hospitals into the Arkansas Trauma System. The initial funding for hospitals during the start-up phase has been by a grant mechanism, allocating a priori assigned block grants to the 4 levels of TCs, along with a portion allocated to pay-for-performance funding for achievement of certain goals and targets. As the trauma system progresses, one of the goals of our system will be to match the allocation of funding to the TFI for various levels of TCs, as well as certain types of trauma patients with resource-intensive requirements. The Trauma Financial Survey was designed to help answer questions about appropriate funding to assure the sustainability of our system. The aim of this article is to outline the background, development, learning lessons, methodology, and initial results of this survey.

METHODS

Survey purpose and design

In 2011, the Arkansas Trauma System underwent an American College of Surgeons Trauma System Consultation and, from that review, a series of recommendations were issued, with one calling for improvements in cost analysis. They explained that "routine collection of financial data from all participating health care facilities is encouraged to fully identify the costs and revenues of the trauma system, including costs and revenues pertaining to patient care, administrative, and trauma center operations."[1] The report also recommended that Arkansas: "Actively engage the Arkansas Hospital Association (and other associations as relevant) in resource and cost identification, best practice, performance improvement, cost-effectiveness and capacity-building strategies, including on a contractual basis if necessary and appropriate."[1]

Based on their recommendations, the Finance Committee of the Trauma Advisory Committee formed a workgroup consisting of members of the Finance Committee and the Arkansas Hospital Association to develop a system-wide trauma financial survey. The survey was designed to deliver a comprehensive analysis of the cost of caring for trauma patients, using a methodology that would allow for comparisons of similar patient care costs (PCC) across the hospitals participating in our trauma system. The workgroup noted that the Arkansas Trauma System had several characteristics and assets that would allow us an unprecedented opportunity to examine the cost drivers for the care of the trauma patient. These assets included the development of a trauma band ID, which is a unique number assigned to an armband that was attached to every patient at entry into the trauma system. This trauma band and ID number allowed the Arkansas Trauma System to identify and track all trauma patients from prehospital through rehabilitation, including transfers within the trauma system. Another asset was a statewide, uniform collection of patient care data in a state trauma registry. All hospitals in the trauma system were supplied and trained on the American College of Surgeons trauma registry software. These TCs submitted their data to the Arkansas Trauma Registry, allowing the Trauma System to collect a standardized set of clinical data on every patient, using a standard set of inclusion criteria and a uniform data dictionary.[2] This enabled us to then link relevant clinical data to the financial billing information for that patient, allowing us to correlate clinical factors with revenue and cost information from participating TCs.

The workgroup also determined that it would be advantageous to have a separate accounting of the costs of a hospital to become and maintain the status of an Arkansas TC (termed *verification costs*) and the costs incurred in being able and capable of responding to incoming trauma patients by activation of a trauma team (termed *response costs*). A consulting and accounting firm with specialized expertise in hospital and health care accounting, BKD LLP, was brought in as an advisor to help assist the workgroup in devising a unique methodology to accomplish these aims. BKD LLP had a long history of working closely with many of the hospitals in Arkansas and surrounding states, and had the expertise and infrastructure to ably advise the workgroup on the critical elements of such a survey. The workgroup submitted its recommendations for the Trauma Financial Survey to the Arkansas Department of Health, which authorized funding to conduct the survey under the guidance of the Arkansas Hospital Association, which in turn selected BKD LLP as the agent to conduct the survey. Due to the sensitive and competitive nature of hospital pricing and financial data, one initial concern was that few hospitals would want to share their data for such a survey. However, having the Arkansas Hospital Association involved from the start, and adding the expertise