

Codman Awards

Decreasing Mortality for Patients Undergoing Hip Fracture Repair Surgery

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Staten Island University Hospital (SIUH; Staten Island, New York) undertook an initiative to reduce the incidence of mortality in a high-risk population—patients undergoing hip fracture repair. Hip fracture is the largest portion of injury-related hospitalizations nationally, accounting for more than 300,000 admissions annually,¹ with a cost of more than \$7 billion. Yet, as Hannan et al. note, “the quality improvement agenda of most organizations has not addressed preventing the mortality and morbidity that results once a patient has fractured a hip.”^{2(p. 2741)}

At SIUH, the mortality rate for 2000, the baseline year of this initiative, was 4.9%, well within our statewide benchmark of 5.1%. A literature search revealed mortality rates that vary from 3% to 5% in similar studies from national sources.

Our initiative arose from findings from a root cause analysis (RCA) conducted following a mortality review. Although Joint Commission on Accreditation of Healthcare Organization standards require RCAs only for sentinel events,³ SIUH’s performance improvement (PI) philosophy is to use the RCA as often as possible when analyzing adverse occurrences.

A timeline (Table 1, page 305) illustrates the steps in the initiative’s implementation. SIUH’s quality improvement (QI) program, through its internal surveillance mechanism, communicates reportable incidents to the Medical Staff Performance Improvement Committee (MSPIC). Primary surveillance is based on each clinical

* Element of Performance 3, “Conducting thorough and credible root cause analyses that focus on process and system factors,” for Standard PI.2.30.

Article-at-a-Glance

Background: Staten Island University Hospital (Staten Island, New York) undertook an initiative to reduce mortality in a high-risk population on the basis of findings from a root cause analysis (RCA).

Methods: A 78-year-old woman admitted following a fall was diagnosed with a femur fracture. The medical history was significant for chronic obstructive pulmonary disease, hypothyroidism, and laryngeal cancer. A medical consultant classified the patient as grade II (American Society of Anaesthesiologists-Physical Status [ASA] scale), no contra-indication for operating room (OR). An anesthesiologist evaluated the patient as an ASA grade III/IV. The patient went to the OR and died after anesthesia induction. The RCA revealed inadequate communication between providers and preoperative assessment and no framework to privilege providers for high risk preoperative evaluations. Proposed corrective actions included use of a preoperative assessment tool.

Results: During the baseline year, 2000, the preimplementation mortality rate for 185 patients undergoing hip fracture repair surgery was 4.9%. For the 644 postimplementation patients, the mortality rate decreased to 2.7% for both 2001 and 2002 and to 1% for 2003. Comparison of the 2000 baseline and 2003 mortalities indicated a statistically significant mortality reduction of 79% ($p = .0245$).

Discussion: Mortality rates can be reduced by systematic application of comprehensive preoperative assessment when implemented by specially trained and privileged staff.

Table 1. Timeline of Steps in the Initiative's Implementation*

2000	
February	■ Incident: OR mortality
April/May	■ RCA conducted; corrective actions developed
August	■ Medical Executive Committee approval
August	■ Implemented assessment P and P
September	■ Board of Trustees passed privilege mandate
September	■ Staff training initiated
December	■ Implementation of protocol
2001–2002	■ Monitored progress, fine-tuned assessment, trained additional staff
	■ Mortality rate reduced 45% in each year
January 2004	■ Mortality rate for full-year 2003 fell to 1%, a 79.5% decline from baseline

* OR, operating room; RCA, root cause analysis; P and P, policy and procedure.

service's morbidity and mortality (M&M) review process. Each department defines peer review tools to be used for individual case review. The results of incident analysis are analyzed in the quality management department and evaluated for state regulatory reporting requirements.

RCAs are developed by the Sentinel Event Task Force (SETF)—an extension of the MSPIC. Final analysis and recommendations are forwarded for comment to the chief medical officer, PI medical director, chief nurse executive, and vice president quality/risk management. Chairpersons and directors of service are integrally involved in all deliberations, corrective action development, and monitoring protocols. The full MSPIC reviews the work product and must approve the RCA findings, corrective action plan, and subsequent monitoring. The initiative reported in this article illustrates how RCA and leadership commitment to its implementation and follow-up can reduce error and improve patient outcomes.

Methods

RCA

Case. The RCA was conducted on a case referred to MSPIC. A 78-year-old woman was admitted on Feb. 15,

2000 following a fall in a nursing home. She was diagnosed with a femur fracture. The patient's past medical history was significant for chronic obstructive pulmonary disease, hypothyroidism, and laryngeal cancer. The patient was evaluated preoperatively by a medical consultant, who classified the patient as grade II (no contraindication for surgery) on the American Society of Anaesthesiologists-Physical Status (ASA-PS) scale (which grades the patients according to their general health and fitness for anesthesia and surgery). An anesthesiologist evaluated the patient as an ASA III/IV, signifying elevated risk. The patient went to the operating room (OR) on Feb. 16 and died after anesthesia induction.

The RCA revealed an inadequate preoperative assessment, inadequate communication between providers, and lack of a framework to privilege providers for high-risk preoperative evaluations. Specifically, no defined privileges or training were required to assess high-risk surgical patients.

Corrective Actions. Corrective actions proposed by the medical staff PI committee are shown in Table 2 (page 306). The preoperative assessment tool that was implemented has evolved over time but includes important evidence-based medicine guidelines for management of hypertension, use of beta blockers, deep vein thrombosis prophylaxis, and so on.

The voluntary and full-time medical staff were critical to the implementation of this project. To qualify for the privilege to conduct medical assessment involving high-risk patients undergoing hip fracture repair surgery, the voluntary and faculty staff had to participate in continuing medication education (CME) level programs. In addition, they agreed to conduct the initial review of the patient within 12 hours of notification.

Early notification of a patient with a hip fracture is essential to the process being carried out effectively. At SIUH, the emergency department's notification of a properly privileged provider to initiate the process of medical clearance has been instrumental. When variances occurred in notification, it was generally associated with a miscommunication at this level.

The full MSPIC reviewed the work product and approved the RCA findings, corrective action plan, and subsequent monitoring. The corrective action plan and outcomes were monitored and reported on a 3-, 6-, and

Table 2. Proposed Corrective Actions

- Develop privilege criteria defining minimum education and training requirements for staff desiring to perform preoperative evaluation on hip fracture patients
- Mandatory preoperative consults prior to surgery for patients with fractured hips by appropriately privileged staff
- Define minimum assessment criteria combining risk stratification model
- Develop methodology to identify high-risk patients (hip fracture) in emergency department and promptly notify member of preop team to initiate preoperative evaluation
- Select appropriate disciplines to participate as a team in the evaluation and preparation of high-risk patients prior to surgery
- Develop methodology to monitor process for improvement purposes

9-month basis. Following completion of the original monitoring phase, the project entered a phase of annual oversight.

Data Analysis

The 829 patients, all ≥ 65 years of age and undergoing hip fracture repair surgery, included in this four-year study consisted of the following two cohorts:

- Cohort A included 185 patients (9 deaths, 176 survivors of surgery and hospitalization) seen in 2000, the base year, when the index case and RCA occurred.
- Cohort B included 644 patients (14 deaths, 630 survivors of surgery and hospitalization) seen in 2001–2003, the postprotocol years.

In cohort A, women represented 72.4% of the population, with patients aged ≥ 75 years accounting for 82% of the group. In cohort B, women represented 77% of the population, with patients ≥ 75 years accounting for 79.5% of that group.

The outcome of interest was the mortality rate of patients undergoing hip fracture repair surgery within 30 days from admission for the treatment of the fracture. Mortality data were easily captured via information management data runs and M&M reviews. M&M conference, the New York Patient Occurrence and Tracking System

data, physician profile information, and the New York Quality Improvement Organization (IPRO) reports were cross-referenced to identify mortalities. In addition, because all abstracted data elements come directly from the patient's medical record there are no issues of information recall or historical bias.

Results

As illustrated in Figure 1 (page 307), during the baseline year, 2000, the preimplementation mortality rate was 4.9%. Following the implementation of the protocol in 2001, the mortality rate decreased to 2.7% for both 2001 and 2002 and to 1% for 2003. Comparison of the 2000 baseline and 2003 mortalities indicated a statistically significant mortality reduction of 79% ($p = .0245$) with Fisher's exact test. There was a relative risk (RR) for death of 0.58 ($.043 < RR < .78$), indicating that this population had a risk reduction of 42%. The odds ratio (OR) was .20 ($0.03 < OR < 1.01$), suggesting that a patient from cohort A had a 4.98 times higher odds of in-hospital mortality than a case from the 2003 postinitiative patients.

Discussion

Key to the initiative's success was the medical staff's acceptance of the privileging structure. With the change in patient preoperative assessment practice, each patient of ≥ 65 years of age who presented with a hip fracture was to be evaluated by a specially trained and privileged provider in the postintervention period. A 30-day observation period indicated that the protocol did not lengthen the time to the surgical intervention because of early notification from the emergency department to the cadre of privileged physicians. Consultants were likewise cooperative and timely in their response. The plan for monitoring after three full years of the protocol consists of monthly M&M review and continuous monitoring of any variances in the timing of evaluations.

The optimization of patients' cardiac and pulmonary status was presumed to be a major contributing factor to the reduction in the mortality rate. The cardiac function was primarily affected by an increase in appropriate use of beta blockers. In examining risk factors for acute inpatient mortality, Bhattacharyya, Iorio, and Healy noted that hypertension, as comorbidity, showed a protective effect "with a three fold decrease in mortality"^{4(p. 568)}

Mortality Rate, 2002–2003

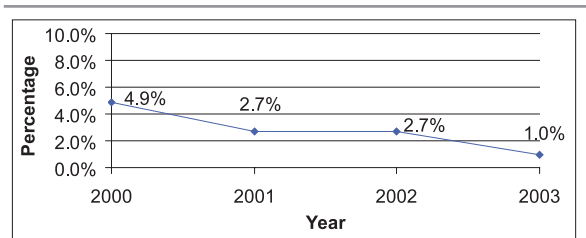


Figure 1. Following the implementation of the protocol in 2001, the mortality rate decreased to 2.7% for both 2001 and 2002 and to 1% for 2003.

presumed to be associated with the beta-blocker treatment. The appropriate preoperative management for patients with congestive heart failure also contributed to reduced mortality rate because this has been associated with a significantly increased mortality rate of 5.75% in this population.

In a related research project we are now expanding this initiative to address functional status measures following hip fracture repair surgery and mortality rates at 12 months following hospital discharge. In an expansion of the credentialing aspect of the initiative, the medical leadership is developing a protocol to expand the risk-stratification approach to preoperative assessments for all invasive procedures based upon complexity of patient and procedure. This process

will be implemented for high-risk procedures in June 2005.

The reason that many PI process changes fail is that they rely merely on policy changes and the introduction of forms, check-off sheets, new devices, or additional steps in a process. This initiative relied on changes in education, training, and privileging. The outcomes were so dramatic that they could not be reasonably ascribed to change in acuity of patients or chance. The states' health code requirements for hospitals, governing bodies, and medical staff to self-administer guidelines for credentialing further provides statutory legitimacy for the concept of severity-adjusted preoperative privileging.

The primary lesson learned from this initiative was that mortality rates can be reduced by systematic application of comprehensive preoperative assessment when implemented by specially trained and privileged staff for high-risk patients undergoing hip fracture surgery. **1**

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