The Prevalence of Patient Safety Indicators and Hospital Acquired Conditions in Patients With Ruptured Cerebral Aneurysms: Establishing Standard Performance Measures Using the Nationwide Inpatient Sample Database

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Introduction

The Agency for Healthcare Research and Quality (AHRQ) patient safety indicators (PSIs) and the Centers for Medicare and Medicaid Services (CMS) hospital acquired conditions (HACs) are publically reported metrics used to gauge the quality of healthcare provided by healthcare institutions. To better understand the prevalence of these events in hospitalized patients treated for ruptured cerebral aneurysms, we determined the incidence rates of PSIs and HACs among patients with a diagnosis of subarachnoid hemorrhage and procedure codes for either coiling or clipping in the Nationwide Inpatient Sample (NIS) database.

Methods

We queried the NIS, part of the AHRQ's Healthcare Cost and Utilization Project (Rockville, MD), for all hospitalizations between 2002 and 2010 involving coiling or clipping of ruptured cerebral aneurysms. The incidence rate of each PSI and HAC was determined by searching the hospital records for ICD-9 codes. We used the SAS statistical software package (Cary, NC, Version 9.3) to calculate incidence rates and perform multivariate analyses to determine the effects of patient variables on the probability of developing each indicator.

Examples of the most commonly reported PSIs: Pressure ulcer; Iatrogenic pneumothorax; Central venous line infection; Post-operative hemorrhage; Post -operative respiratory failure; DVT; PE; Sepsis; Accidental puncture or laceration.

Examples of the most commonly reported HACs: Foreign object retained after surgery; Pressure ulcer stages III & IV; Falls and trauma – fracture; Falls and trauma – intracranial injury; Catheter-associated uninary tract infection; Vascular catheter-associated infection.

Results

There were 62,972 patient admissions with a diagnosis code of subarachnoid hemorrhage between the years of 2002 and 2010; 10,274 (16.3%) underwent clipping and 8,248 (13.1%) underwent endovascular coiling. A total of 6,547 PSI/HAC occurred within the 10,274 patients treated with clipping; at least one PSI/HAC occurred in 47.9% of these patients. There were 5,623 total PSI/HAC events among the 8,248 coiled patients; at least one PSI/HAC occurred in 51.0% of coiled patients. Age, gender, comorbidities, hospital size and hospital type had statistically significant associations with indicator occurrence.

Compared to clipped patients without PSIs during their hospitalization, those patients who underwent clipping for a ruptured aneurysm and had 1 or more PSIs had significantly longer mean lengths of stay (24.7 vs. 15.0 days, p<0.001), higher mean hospital charges ($279,587 vs. $157,461, p<0.001), and higher in-hospital mortality rates (22.8% vs. 3.0%, p<0.001). Compared to clipped patients without a reported HAC during their hospitalization, those clipped patients with 1 or more HACs had significantly longer mean lengths of stay (29.3 vs. 19.5 days, p<0.001), higher mean hospital charges ($327,123 vs. $214,053, p<0.001), but were not more likely to die while in the hospital (12.9% vs. 12.4%, p=0.88).

Compared to coiled patients without PSIs during their hospitalization, those who underwent coiling for a ruptured aneurysm and had 1 or more PSIs had significantly longer mean lengths of stay (22.3 vs. 13.2 days, p<0.001), higher mean hospital charges ($298,277 vs. $160,351, p<0.001), and higher hospital mortality rates (25.9% vs. 2.9%, p<0.001). Compared to coiled patients without a reported HAC during their hospitalization, coiled patients with 1 or more HACs similarly had significantly longer mean lengths of stay (24.3 vs. 17.7 days, p<0.001), higher mean hospital charges ($342,575 vs. $228,889, p<0.001), but were not more likely to die in the hospital (16.8% vs. 14.6%, p=0.49).

Those patients undergoing clipping had higher odds of having 3 of the PSIs compared to those who underwent coiling: iatrogenic pneumothorax (p = 0.022), central venous line infection (p = 0.024), and DVT (p=0.012). Compared to coiled patients, clipping treatment was protective for postoperative intracranial hemorrhage (p=0.002) and postoperative respiratory failure (p=0.011). Patients who received clipping had significantly longer mean lengths of stay (19.6 vs. 17.8 days, p < 0.001) and significantly higher hospital mortality (14.6% vs. 12.4%, p<0.001). However, mean hospital charges were significantly less for patients who underwent clipping compared to coiling ($215,481 vs. $230,584, p<0.001).

Conclusions

These results estimate baseline national rates of PSIs and HACs in patients treated for ruptured cerebral aneurysms. These data may be used to gauge individual institutional quality of care and patient safety metrics in comparison to national data.

Learning Objectives

By the conclusion of this sessions, participants should be able to: 1) Describe the driving forces for pay-for-performance reimbursement; 2) Discuss the prevalence of PSI/HACs within patients with aneurysmal subarachnoid hemorrhage; 3) Identify the effects of PSI/HACs on hospital cost, patient mortality, and length of stay.

References

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