Preventable medical injuries are a major public health problem, estimated by the Institute of Medicine to cause 44,000 to 98,000 deaths per year and to cost $29 billion dollars. To reduce the toll from such injuries among Medicare beneficiaries, the Centers for Medicare & Medicaid Services (CMS) is exploring the use of patient safety indicators (PSIs) as a way to measure safety in hospitals. PSIs are adverse events in hospital care that can be identified through ICD-9 diagnosis and procedure codes in computerized hospital administrative data.1

This report presents rates of PSIs in 2000 and 2001. We used all Medicare claims for hospital discharges in 2000 and 2001 among Medicare fee-for-service (FFS) beneficiaries. We calculated age-sex standardized rates of PSI events. From the results of Zhan and Miller,2 we also calculated relative ratios for excess length of stay (LOS), hospital charges, and mortality for each PSI. The PSI of anesthesia reactions and complications was used as the reference value.

**RESULTS**

A few PSIs stand out in frequency, number, and impact. Although rankings of the PSIs by occurrence rates, absolute numbers, and excess LOS, charges, and mortality are not closely correlated, decubitus ulcers and postoperative sepsis were among the top ranking PSIs across all measures (Table 1).

Some beneficiaries have higher rates of PSIs. With increasing patient age, rates of decubitus ulcers went up, and rates of selected infections due to medical care went down. Rates of postoperative sepsis were highest in the youngest and oldest age groups and lowest in the middle age groups (Figure 1). Men had higher rates of postoperative sepsis, respiratory failure, and wound dehiscence. Rates of decubitus ulcers and postoperative sepsis among African American beneficiaries were nearly twice that of white beneficiaries (Figure 2). Beneficiaries dually eligible for Medicaid and Medicare also had much higher rates of several PSIs than did non-dual eligibles (data not shown).

**Table 1. Rates, numbers of events, and relative ratios for excess LOS, charge, and mortality, for selected PSIs, 2000 and 2001**

<table>
<thead>
<tr>
<th>PSI</th>
<th>Rate per 1,000 eligible discharges</th>
<th>Number of events</th>
<th>Excess LOS Relative Ratio</th>
<th>Excess Charge Relative Ratio</th>
<th>Excess Mortality Relative Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decubitus ulcer</td>
<td>27.3</td>
<td>270,515</td>
<td>23.4</td>
<td>8.4</td>
<td>30.1</td>
</tr>
<tr>
<td>Foreign body left in during procedure</td>
<td>0.1</td>
<td>1,625</td>
<td>12.2</td>
<td>6.8</td>
<td>8.9</td>
</tr>
<tr>
<td>Postoperative hemorrhage or hematoma</td>
<td>2.3</td>
<td>14,891</td>
<td>23.2</td>
<td>8.3</td>
<td>12.5</td>
</tr>
<tr>
<td>Postoperative hip fracture</td>
<td>1.8</td>
<td>7,417</td>
<td>30.8</td>
<td>13.4</td>
<td>18.8</td>
</tr>
<tr>
<td>Postoperative respiratory failure</td>
<td>7.9</td>
<td>18,087</td>
<td>53.4</td>
<td>25.2</td>
<td>91.0</td>
</tr>
<tr>
<td>Postoperative sepsis</td>
<td>13.4</td>
<td>14,069</td>
<td>64.1</td>
<td>36.1</td>
<td>91.3</td>
</tr>
<tr>
<td>Postoperative wound dehiscence</td>
<td>3.7</td>
<td>4,201</td>
<td>55.4</td>
<td>33.5</td>
<td>40.1</td>
</tr>
<tr>
<td>Selected infections due to medical care</td>
<td>3.2</td>
<td>53,099</td>
<td>56.4</td>
<td>34.3</td>
<td>18.0</td>
</tr>
</tbody>
</table>

**Note:** Rates are adjusted for differences in age and sex. Relative ratios are calculated from the results of Zhan and Miller, using the PSI for anesthesia reactions and complications as the denominator or reference value.

PSIs vary with principal procedure and DRG. Discharges with diagnostic related groups (DRGs) or principal procedures for limb amputations, vascular procedures, and cardiovascular procedures accounted for 19 percent of discharges with postoperative sepsis. Major small and large bowel surgeries accounted for 7 percent of such discharges. Fifteen percent of cases with postoperative respiratory failure were accounted for by discharges for major intestinal, stomach, and esophageal procedures. Major orthopedic limb procedures made up 6 percent of such cases.
Among discharges in the liver transplant and kidney transplant DRGs, rates of postoperative hemorrhage or hematoma were 36 per 1,000 and 15 per 1,000, respectively—both higher than among other DRGs. Rates of postoperative sepsis were also high among the DRGs for knee procedures performed for treatment of infection (78 per 1,000) and for certain circulatory system procedures (69 per 1,000).

**Implications**

These results may help to more precisely focus quality improvement efforts for Medicare beneficiaries, and provide a benchmark for measuring changes in quality. Postoperative sepsis and postoperative wound dehiscence may be potential candidates for such efforts because of their high rates; numbers; and excess mortality, LOS, and charge ratios.

Certain subgroups of beneficiaries may warrant attention. Rates of decubitus ulcers are higher among older, African American, and dual-eligible beneficiaries. Postoperative sepsis is also associated with age, gender, ethnicity, and dual eligibility.

Finally, it may also be fruitful to examine specific DRGs and procedures. Among cases with postoperative sepsis or postoperative respiratory failure, discharges with certain DRGs and principal procedures were more common. Among discharges in some DRGs, rates of specific PSIs were very high.

**NOTES**


**ABOUT MQMS**

The Medicare Quality Monitoring System (MQMS) is a data collection, analysis, and dissemination system through which the Centers for Medicare & Medicaid Services (CMS) monitors the quality of care delivered to Medicare fee-for-service (FFS) beneficiaries. Launched by CMS in 2003 in response to growing public concern about patient safety, patient choice, and provider accountability, MQMS provides national- and state-level statistics on the trends and variations in FFS beneficiaries’ use of health care, outcomes of that care, preventable hospitalizations, and patient safety. These MQMS measures of quality act as input for high-level policy making and program planning within CMS.

Specifically, MQMS quality measures include the following:

- Preventable hospitalizations
- Patient safety indicators
- Mortality and readmission rates, length of stay, and cost of hospitalizations for acute myocardial infarction, heart failure, and stroke
- Preventive services and rates of complications for diabetes
- Mortality and readmission rates following cancer- and cardiac-related high-risk surgical procedures

Most of the measures are based on 100 percent of hospital discharge data for FFS beneficiaries from 1992 through 2001. The diabetes measures are based on the 5% Standard Analytic File, and the patient safety measures are limited to 2000 and 2001. We adjusted the measures to a common distribution of age and sex but did not risk-adjust them beyond age and sex. MQMS statistics are descriptive. Results do not indicate the causes of the observed trends and cross-sectional variation.

CMS disseminates MQMS results on its website, www.cms.hhs.gov, in the form of a summary of key findings for each clinical area (MQMS Highlights), full-length reports (MQMS Reports), detailed tables, and technical documentation.

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