Screening for *Helicobacter pylori* and Nonsteroidal Anti-inflammatory Drug Use in Medicare Patients Hospitalized With Peptic Ulcer Disease

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**Background:** Peptic ulcer disease has well-defined causes, with most cases related to *Helicobacter pylori* infection and nonsteroidal anti-inflammatory drug use.

**Objectives:** To report performance rates on measures of care related to peptic ulcer disease in hospitalized Medicare patients and to identify improvement opportunities.

**Methods:** Retrospective study of 2267 Medicare beneficiaries hospitalized with peptic ulcer disease. Data were obtained from 2 sources: medical records (n = 1580) from 80 hospitals—16 hospitals in each of 5 states (Alabama, Florida, Louisiana, Tennessee, and Texas)—and a national random sample (n = 687). Three measures of care were evaluated: (1) rate of diagnostic screening or treatment for *H pylori* infection, (2) rate of screening for nonsteroidal anti-inflammatory drug use on admission to the hospital, and (3) rate of assessment of risk factors for recurrence.

**Results:** The rate of screening or treatment for *H pylori* infection was 52.9% to 59.8% among the 5 states and 55.6% in the national random sample. The rate of screening for nonsteroidal anti-inflammatory drug use was 64.6% to 75.4% among the states and 73.4% in the national random sample. The rate of assessment at discharge from the hospital for additional risks for ulcer recurrence was 66.1% to 73.6% among the states and 70.9% in the national random sample.

**Conclusions:** Based on hospital records, slightly more than half of the Medicare patients admitted with diagnoses studied are being considered for *H pylori* eradication. If recurrence of this disease is to be reduced, physicians must adopt current screening and treatment recommendations.

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MATERIALS AND METHODS

DESIGN

This study is a retrospective examination of baseline performance rates for 3 measures of care that was done in anticipation of implementing and evaluating the effectiveness of a specific intervention to improve rates.

SAMPLING

Patient records from 16 hospitals in each of 5 states (Alabama, Florida, Louisiana, Tennessee, and Texas) were eligible for inclusion in the study if the patient had a principal diagnosis of peptic ulcer disease during the 6 months from October 1, 1995, to March 31, 1996. Hospitals with fewer than 15 patients during the specified period were not included in the sampling frame. The percentage of hospitals included in the study ranged from 7.7% (Texas) to 24.7% (Alabama). If a hospital had fewer than 30 patients during the 6-month period, then all patients were included. For hospitals with more than 30 patients, a power calculation was done to determine a minimum sample size to detect differences between baseline and remeasurement. The assumed universe for a hospital-specific power calculation was the total number of patients with peptic ulcer disease during the 6-month sample. In addition, the calculation assumed a baseline proportion of 0.35 (a rate consistent with that in other studies), an effect size of 0.15, and \( \alpha = .05, \beta = .20 \) (80% power).

There were 329 patients from Alabama, 342 patients from Florida, 333 patients from Louisiana, 333 patients from Tennessee, and 243 patients from Texas. The percentage of Medicare recipients in the 5 states represented in the study ranged from 12.5% (Texas) to 55.8% (Louisiana). Percentage of Medicare beneficiaries impacted is derived from the total number of claims reported by selected hospitals in calendar year 1995, not from the actual number sampled.

Medical records were selected using the National Claims History File to identify Medicare Prospective Payment System hospital claims with principal diagnoses believed to possibly be caused by \( H \text{ pylori} \) infection or NSAID use. These diagnoses included duodenal and gastric ulcer. Gastritis and duodenitis codes were omitted. The top 10 International Classification of Diseases, Ninth Revision, Clinical Modification codes in the 5-state sample are noted in Table 1. (All the codes used are as follows: 531.00, 531.01, 531.10, 531.11, 531.20, 531.21, 531.30, 531.40, 531.41, 531.50, 531.51, 531.60, 531.61, 531.70, 531.71, 531.90, 531.91, 532.00, 532.01, 532.10, 532.11, 532.20, 532.21, 532.30, 532.31, 532.40, 532.41, 532.50, 532.51, 532.60, 532.61, 532.70, 532.71, 532.90, 532.91, 533.00, 533.01, 533.10, 533.11, 533.20, 533.21, 533.30, 533.40, 533.41, 533.50, 533.51, 533.60, 533.61, 533.70, 533.71, 533.90, 533.91, 534.00, 534.01, 534.02, 534.20, 534.21, 534.30, 534.40, 534.41, 534.50, 534.51, 534.60, 534.61, 534.70, 534.71, 534.90, and 534.91.)

MEASURES OF CARE

Three measures of care were used in this study: (1) percentage of patients diagnosed or treated for \( H \text{ pylori} \) infection, (2) percentage of patients assessed at admission to the hospital for NSAID use, and (3) percentage of patients assessed for risk factors (for recurrence) at discharge from the hospital.

Key variables noted in the measure of care statements require further clarification. The first measure of care...
The second measure of care statement refers to “screening for NSAID use.” Patients passed this indicator if an NSAID was listed as a hospital admission medication or if the physician documented the status of current NSAID use (whether NSAIDs were being used by the patient). The collection tool contained an NSAID medication list.

The third measure of care statement states that the patient was “assessed for additional risks for recurrence at discharge from the hospital.” Two components of this measure of care were noted: (1) if NSAID administration was continued or after discharge from the hospital, there must have been physician documentation as to the indications for use (eg, aspirin use because of transient ischemic attacks or unstable angina), and (2) if there was documentation of current alcohol or tobacco use, there must have been documentation of education about risk factors associated with gastrointestinal (GI) tract bleeding and the use of alcohol or tobacco. “Current” was defined as “at the time of admission to the hospital” or “within 3 months before admission to the hospital.”

**DATA COLLECTION**

An electronic data collection instrument was used to collect administrative and clinical information from the medical records specific to peptic ulcer disease. Abstraction services were performed by 2 clinical data abstraction centers.

**ANALYSIS METHODS**

The measure of care performance rates were calculated using a software program (Microsoft Access 2.0; Microsoft Corp, Redmond, Wash). The STATA statistical software package was used to verify the algorithmic logic.

**RELIABILITY**

Clinical data abstraction centers conducted extensive training programs and competency testing before abstraction of study records. Abstraction reliability testing was performed by dual abstraction of a subset of study records. The overall abstraction reliability rate for the data elements was 95%

Louisiana Health Care Review Inc, Baton Rouge, conducted an independent assessment of reliability using a subset of study records (n = 259) (R. Horswell, written communication, May 20, 1997). Raw agreement rates for the measures of care were reported to range from 94 to 83. Reported k values were as follows: the H pylori infection measure was 0.88, the NSAID use measure was 0.77, and the risks at hospital discharge measure was 0.56. The Health Care Financing Administration Data Quality Team has adopted reporting of k values, in addition to raw agreement rates, to assess agreement beyond that which would normally occur by chance. Using references in the literature to assist with interpretation of reported k values, the reliability of the H pylori infection measure is near perfect, the NSAID use indicator has substantial agreement, and the risks at hospital discharge measure has moderate agreement.

**COMMENT**

A popular phrase that appears in current outcomes research is “best practice.” This concept is used to define a clinical practice that results in an optimal outcome and has literature and research support. Clearly, the identification of H pylori as a causative agent for peptic ulcer disease and the eradication of the organism in preventing recurrence would be considered a best practice. Effective treatment of this infectious disease would be expected to improve quality of life, to reduce morbidity, and to eventually affect the prevalence of this disease. Despite the dollars spent and the articles written on this issue, recommendations for medical interventions are still not being followed. Physician adherence rates to best practices was a topic of a study by Krumholz et al in an observational study that showed that aspirin was not prescribed at discharge to 24% of elderly patients who had been hospitalized with acute myocardial infarction and did not have a contraindication to aspirin use. Gleason et al noted that treatment of community-acquired pneumonia in young patients was consistent with American Thoracic Society guidelines in 62% of patients. Treatment of patients older than 60 years with 1 or more comorbid conditions was consistent with American Thoracic Society guidelines in only 18% of patients. Stafford...
increase physician knowledge but fails to improve any practice guidelines to the medical community may serve to performance. Eisenberg20 surmised that dissemination of practiced indications.

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et al23 investigated national patterns of use of angiotensin-converting enzyme inhibitors for office patients screened or treated for Helicobacter pylori.

Table 2. State Rates for Peptic Ulcer Disease Measures of Care*

<table>
<thead>
<tr>
<th>State</th>
<th>Measure 1</th>
<th>Measure 2</th>
<th>Measure 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alabama</td>
<td>52.9 (n = 329)</td>
<td>69.6 (n = 329)</td>
<td>71.4 (n = 315)</td>
</tr>
<tr>
<td>Florida</td>
<td>54.4 (n = 342)</td>
<td>71.9 (n = 342)</td>
<td>71.9 (n = 320)</td>
</tr>
<tr>
<td>Louisiana</td>
<td>50.0-83.3</td>
<td>50.0-92.9</td>
<td></td>
</tr>
<tr>
<td>Tennessee</td>
<td>50.0-83.3</td>
<td>50.0-92.9</td>
<td></td>
</tr>
<tr>
<td>Texas</td>
<td>50.0-83.3</td>
<td>50.0-92.9</td>
<td></td>
</tr>
<tr>
<td>National</td>
<td>50.0-83.3</td>
<td>50.0-92.9</td>
<td></td>
</tr>
</tbody>
</table>

*ICD-9-CM indicates International Classification of Diseases, Ninth Revision, Clinical Modification.12

Table 1. Top 10 ICD-9-CM* Codes in the 5-State Study Population

<table>
<thead>
<tr>
<th>ICD-9-CM Code</th>
<th>Definition</th>
<th>Patients, No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>531.40</td>
<td>Chronic stomach ulcer with hemorrhage</td>
<td>391 (24.7)</td>
</tr>
<tr>
<td>531.00</td>
<td>Acute stomach ulcer with hemorrhage</td>
<td>248 (15.7)</td>
</tr>
<tr>
<td>532.40</td>
<td>Chronic duodenal ulcer with hemorrhage</td>
<td>238 (15.1)</td>
</tr>
<tr>
<td>532.00</td>
<td>Acute duodenal ulcer with hemorrhage</td>
<td>179 (11.3)</td>
</tr>
<tr>
<td>531.90</td>
<td>Unspecified gastric ulcer without mention of hemorrhage or perforation without mention of obstruction</td>
<td>103 (6.5)</td>
</tr>
<tr>
<td>533.40</td>
<td>Chronic peptic ulcer with hemorrhage</td>
<td>48 (3.0)</td>
</tr>
<tr>
<td>532.90</td>
<td>Unspecified duodenal ulcer without mention of hemorrhage or perforation without mention of obstruction</td>
<td>46 (2.9)</td>
</tr>
<tr>
<td>533.90</td>
<td>Peptic ulcer, unspecified acute or chronic, without mention of hemorrhage or perforation without mention of obstruction</td>
<td>36 (2.3)</td>
</tr>
<tr>
<td>531.30</td>
<td>Acute gastric ulcer without hemorrhage without perforation without mention of obstruction</td>
<td>31 (2.0)</td>
</tr>
<tr>
<td>532.50</td>
<td>Chronic duodenal ulcer with perforation without mention of obstruction</td>
<td>31 (2.0)</td>
</tr>
</tbody>
</table>

*ICD-9-CM indicates International Classification of Diseases, Ninth Revision, Clinical Modification.12

Figure 1. Top 10 physician specialties admitting patients with peptic ulcer disease in 5 states to the hospital between October 1, 1995, and March 31, 1996. A indicates internal medicine (n = 667); B, family practice (n = 238); C, gastroenterology (n = 201); D, general surgery (n = 139); E, cardiology (n = 85); F, other (n = 76); G, nephrology (n = 41); H, pulmonary disease (n = 30); I, emergency medicine (n = 22); and J, hematology and oncology (n = 16).

Figure 2. Measures of care passed per admitting specialty. A indicates internal medicine; B, family practice; C, gastroenterology; D, general surgery; E, cardiology; F, other; G, nephrology; H, pulmonary disease; I, emergency medicine; and J, hematology and oncology.

et al23 investigated national patterns of use of angiotensin-converting enzyme inhibitors for office patients with congestive heart failure from 1989 through 1994. They were able to show a limited increase in use from 20.8% to 30.6% during the study despite widely accepted indications.

Educational methods for improving adherence rates to best practices have been studied, but no clear methods have been identified that enhance physician performance. Eisenberg20 surmised that dissemination of practice guidelines to the medical community may serve to increase physician knowledge but fails to improve any outcomes measurement. However, involvement of administrative staff, physicians, and support staff in a focus group approach seems to improve outcomes that are measurable.21 In a report by Lomas et al,22 improvement in outcomes occurred only when a clinical staff opinion leader was involved in surveillance and feedback of performance data to the other practitioners in a study encouraging compliance with guidelines for the management of delivery in women with a previous cesarean section. Hirth et al23 reported that, compared with gastroenterologists, primary care physicians are more conservative in their approach to new research on H pylori and may take a “wait and see” attitude toward the treatment of peptic ulcer disease with antibiotic drugs.

Hirth et al also reported that generalists in multispecialty practice settings adopted National Institutes of Health Consensus Conference recommendations faster than those in solo practice. This suggests that practice environment may affect the flow of information about new therapies. These reports may partially explain the low percentage of hospitalized Medicare patients being screened or treated for H pylori infection in the present study. The data in the present study were abstracted from hospital discharge records dated October 1, 1995, through March 31, 1996, when H pylori infection treatment guidelines had been in the literature for longer than 1 year.
Recognition of *H pylori* infection and NSAID use as causes of peptic ulcer disease and recommendations for treatment were well established in the literature by 1993. Increased adherence to *H pylori* infection screening by medical specialists over surgeons in the present study could be predicted and explained by specific interest and the content of differing literature. Not surprising is the enhanced screening of NSAID use by cardiologists or the increased rate of risk recurrence screening by pulmonologists that included smoking cessation.

In the present study, upper GI tract endoscopy was performed in 84.6% of patients in the 5-state sample and in 92.3% of the national sample with the implication that biopsy sampling and the opportunity for diagnosis by urease testing, histological examination, or culture existed. Readmission rates for patients in the study group were not studied but would have been of interest with an expectation that treatment groups would have had a lower hospital readmission rate. Information about specific medical specialties performing endoscopic procedures was not abstracted.

Billing codes have inherent error rates in that some patients may be included in the diagnostic category of peptic ulcer disease when in fact clinical tests would fail to confirm the diagnosis. This type of error could result in an underestimate of the rates for the measures of care. Overall adherence rates for the measures of care were determined for patients with the principal diagnosis confirmed by chart abstraction and compared with principal diagnosis by claims data in the 5-state study. A discrepancy of less than 2.4% in rates was found. The diagnostic confirmation algorithm was not used because of a variable *k* value of 0.47 and poor correlation with clinical validation in a study of 30 patients.

In the present study, the scope was limited to hospitalized patients. Outpatient documentation was not available—the low rate of *H pylori* infection screening in the hospital could be partly explained by this. Measuring hospital performance rates based on chart review may not be a reflection of health care delivery because data would not be captured if documentation were missing. Not included in this analysis are patients with no active ulcer but with peptic ulcer disease listed as a secondary diagnosis. These may be most of the patients with ulcer disease who should be screened for *H pylori* infection and eventually receive eradication therapy. Nevertheless, the diagnosis and treatment of *H pylori*–associated illness does not require sophisticated technology or unfamiliar medications. Invasive procedures are not usually required, and physicians with primary care training should be able to correctly diagnose and treat this infectious disease. If the rate of recurrence of peptic ulcer disease is to be further reduced, appropriate targeting must be developed, with educational methods directed toward physicians and patients. Educational methods that do not rely on dissemination of information by conventional media alone must be initiated, with an emphasis on organizing focus groups and enlisting clinical opinion leaders. Efforts directed toward patient education that would provide feedback to physicians (in the form of patient demand for adherence to best practices) might be an additional strategy.

Screening or treatment for *H pylori* infection was accepted in this study as documentation of the practitioner’s awareness of the current cause of peptic ulcer disease. Currently, it is recommended that patients be treated for *H pylori* infection only if they have a positive test result for diagnosis and an appropriate pathologic lesion. The automatic ordering of antibiotic drug therapy for patients with peptic ulcer disease ignores the diagnostic implications of negative *H pylori* confirmation test results. Patients who have peptic ulcer disease and a negative test result for *H pylori* infection could have occult NSAID use, Zollinger-Ellison syndrome, or gastric malignant neoplasms.

Peptic ulcer disease induced by NSAID use is also well studied and is a major cause of upper GI tract bleeding. In the present study, NSAID use screening was performed more often than *H pylori* infection screening (73.4% vs 55.6%). This may reflect the increased awareness of NSAID-related peptic ulcer disease and increased experience with treatment of complications of NSAID use by practicing physicians.

Risk factors for peptic ulcer disease also affect strategy for treatment as well as prevention of recurrence. Infection with *H pylori* confers a 5 to 7 times likelihood for the development of peptic ulcer disease. Cigarette smoking doubles the risk. Use of NSAIDs raises the risk by a factor of 10 to 20. Results of the present study reveal documentation of NSAID avoidance when possible and education about alcohol and tobacco avoidance in 70.9% of cases nationally. This percentage also correlates closely with the 5-state sample. The effect of NSAID use in patients with *H pylori* infection has not been documented as synergistic toward the development of peptic ulcers.

Prevention of recurrence of peptic ulcer disease is an excellent strategy to reduce hospitalization rates and to reduce long-term drug costs. One would expect morbidity from complications of peptic ulcer disease, including GI tract bleeding, perforation, gastric outlet obstruction, and the prevalence of *H pylori* infection, to also decline. Results of this study reveal opportunities to improve care for the Medicare population. Educational initiatives have been launched by the Centers for Disease Control and Prevention, the American Digestive Health Foundation, and the Health Care Financing Administration for the prevention of recurrence of peptic ulcer disease. Peer review organization resources are being used to implement interventions in hospitals located in the 5 project states. These interventions were strategically designed to effect a paradigm shift in the treatment of peptic ulcer disease and have the potential to improve care to all such hospitalized patients.

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REFERENCES


