# RESEARCH LETTER

## A Large Proportion of Hospital Encounters With Gastrointestinal Bleeding–Not Otherwise Specified Coding Can Be Otherwise Specified: A Retrospective Observational Study

Gastrointestinal bleeding (GIB) is a frequent cause for hospitalization, accounting for nearly $5 billion in costs to the health care system annually.[1] In a national study of 159,000 Medicare beneficiaries hospitalized with GIB, approximately 40% of patients were coded through the International Classification Diagnosis (ICD) system as GIB with a source that is not otherwise specified (NOS).[2] ICD codes are used by insurers to assess hospital performance as well as hold hospitals financially accountable, through payment models like Centers for Medicare and Medicaid Services' bundled payment models for GIB.[3] The codes are also used by researchers conducting observational studies that utilize large data sets. Studies that exclude the GIB-NOS cohort have selection bias, whereas studies that include the cohort have a higher burden of unexplained heterogeneity. Better characterizing this cohort is important to better understanding prognosis, resource utilization, and associated costs for patients with GIB. In this study, we sought to determine how often NOS codes are used when a more specific source has been identified through endoscopic evaluation or other procedures and when another source was identified, whether a more specific diagnostic code was available.

The study used data from 4 hospitals within the University of Pennsylvania Health System. Among the 4 hospitals, there were a total of 5496 hospitalizations coded for GIB from 2016 to 2018. These studies were defined utilizing the Medicare-Severity Diagnosis-Related Groups specific to GIB (377, 378, 379). Of those, 1947 (35.4%) hospitalizations had a primary GIB-NOS, as categorized in prior literature, and did not have a more specific GIB code in any of the additional 9 ICD codes utilized for the hospitalization.[2] This Medicare-Severity Diagnosis-Related Group designation indicates that the primary driver of the hospitalization was GIB but that there was no specific code for etiology of the bleed in this cohort. We estimated that a sample size of 175 would result in a maximum width of a binomial 95% confidence interval of approximately ±7%. Thus, 175 hospitalizations were chosen using stratified random sampling to identify 50 patients with a discharge diagnosis code of UGIB-NOS (hematemesis, K92.0), 50 with LGIB-NOS (hemorrhage of anus and rectum, K62.5), and 75 with GIB-NOS (melena, K92.1, and GIB unspecified, K92.2), with an oversampling of the GIB-NOS codes as these were less specific than the upper and lower bleeding.

For the 175 hospitalizations, a retrospective chart review was conducted by 1 physician and 1 research assistant (S.P. and A.P.). We reviewed discharge summaries by the discharging provider and, if applicable, gastrointestinal consultative service consultation notes, endoscopy procedure reports, and relevant interventional radiology procedure reports. Variables collected included the following: principal diagnosis, recorded ICD-10 code, admitting team, presence of GIB on admission, number and type of procedures including endoscopies and interventional radiology procedures performed during the hospitalization, presence of active bleeding or old blood during the endoscopy, identification of a suspected source, and selection of an existing ICD-10 code to categorize the hospitalization, when appropriate. Based on the documentation, 2 gastroenterologists (S.P. and S.S.) assessed the appropriateness of the GIB-NOS code. We deemed the code appropriate if there was no source of GIB identified or if the source identified was not otherwise categorized by existing ICD-10 codes. The code was deemed inappropriate if the source of GIB was identified and could be categorized by another existing code.

Study data were collected and managed using REDCap electronic data capture tools hosted at the University of Pennsylvania.[4,5] This project was reviewed and determined to qualify as quality improvement by the University of Pennsylvania's Institutional Review Board.

Of the 175 hospitalizations, the code was deemed inappropriate in 49 hospitalizations (28.0%, 95% confidence interval [CI] 24.5%–35.3%), in which a source fitting a more specific ICD-10 code was documented. A source was identified on endoscopy in 41 hospitalizations; in the remaining 8 hospitalizations, the source was identified from nonendoscopic procedures (computed tomography angiography, interventional radiology procedure, or digital rectal examination) or endoscopic procedures performed prior to hospitalization. The most common bleeding source identified was peptic ulcer disease in 19 (10.9%) hospitalizations.

In the remaining 126 of 175 hospitalizations (72.0%, 95% CI 64.7%–78.6%), the GIB-NOS code was deemed appropriate. In 14 hospitalizations (8.0%, 95% CI 4.4%–13.1%), a source was identified, but there was no available more specific ICD-10 code to assign, most commonly small bowel bleeding vessels (n = 6) (Table). In the remaining 112 hospitalizations, no source was identified. Endoscopy performed in 62 of 112 hospitalizations had no source documented; endoscopy was deferred in 50 of 112

**Table.** Assessment of GIB-NOS Code Appropriateness and Frequency

| Assessment of GIB-NOS code | Frequency (%) |
|---|---|
| Inappropriate code | 49 (28.0) |
|   Upper source | |
|     Peptic ulcer (K25.0, K25.4, K26.0, K26.4, 27.0, 27.4, K63.3) | 19 (10.9) |
|     Esophagitis or Mallory Weiss tear (K20.81, K22.6) | 11 (6.3) |
|     AVM of stomach and duodenum (K31.811) | 2 (1.1) |
|     Gastritis or portal-hypertensive gastropathy (K29.31, K76.6) | 2 (1.1) |
|     Esophageal varices (I85.01) | 1 (0.6) |
|     Gastrojejunal ulcer (K28.4) | 1 (0.6) |
|   Lower source | |
|     Ulcer of rectum or anus (K62.6) | 5 (2.9) |
|     AVM of colon (K55.21) | 3 (1.7) |
|     Diverticulosis (K57.51) | 2 (1.1) |
|     Hemorrhoids (K64.9) | 2 (1.1) |
|     Post-procedural hemorrhage (K91.840) | 1 (0.6) |
| Appropriate code | 126 (72.0) |
|   No source identified | 112 (64.0) |
|   Source with no specific code | 14 (8.0) |
|     Distal small bowel AVM or visible vessel | 6 (3.4) |
|     Anastomotic friability/ischemia | 3 (1.7) |
|     Mass/tumor | 3 (1.7) |
|     Friable mucosa | 2 (1.1) |

The code was deemed inappropriate if the source of GIB was identified and could be categorized by another existing code. A code was deemed appropriate if there was no source of GIB identified or if the source identified was not otherwise categorized by existing ICD10 codes. Proposed alternative codes for sources identified are grouped by clinical conditions. AVM, arteriovenous malformation.

hospitalizations because of patient factors including clinical stability and goals of care (17/50), recent endoscopy with no intervenable lesions (4/50), or the determination that endoscopy was not appropriate urgently during hospitalization (30/50).

The proportion of hospitalizations for GIB coded as GIB-NOS in our data is comparable with a prior analysis of national data.[2] To our knowledge, this is the first study characterizing this large GIB-NOS cohort and providing relevant granularity. Because studies often exclude the GIB-NOS population despite the relatively large proportion (approximately 40%), there is a missed opportunity to further understand this population which predominantly comprises patients with obscure bleeding with no identified etiology (72.0%) or small bowel bleeding.[1,2,6,7] These data may be used for statistical imputation in future studies or quality improvement initiatives.

In a sample of 175 hospitalizations coded with GIB-NOS, 28.0% were incorrectly coded, as a more specific code identifying the source was available. Strategies to improve coding, like linking to endoscopy reports, may aid further research on specific causes for GIB by reducing the burden of GIB-NOS. Prior studies have shown poor validity of ICD-9 codes for nonvariceal GIB diagnoses with reported PPV of 27%, which is improved to 51% when a procedural code is added for identification.[8] Future studies on validation for ICD-10 codes will also be beneficial in identifying GIB hospitalizations.[9]

In addition, another 10.9% of hospitalizations had an identified source, but the ICD-10 system did not have a code specific for those conditions. This study thus highlights the limitations of ICD-10 coding, which do not currently capture small bowel bleeding, including arteriovenous malformations, malignancy-related bleeding, and friable mucosa.

A major strength to this study is the level of details evaluated on diagnoses, endoscopic findings, and the proportion of deferred evaluation within this cohort. A limitation is generalizability as the data are from one hospital system. Another limitation is the retrospective nature of the study, dependent on chart review of documentation by prior providers.

In conclusion, GIB-NOS codes are frequently used in hospitalizations for GIB when a source has been identified. Addressing coding methods and limitations in ICD-10 coding may reduce the burden of GIB-NOS, allowing for more accurate understanding of GIB hospitalizations. Further research is needed to evaluate associated outcomes, including costs, for patients with GIB-NOS to improve quality of care for this patient population.

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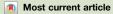
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