JACC: HEART FAILURE
VOL. 3, NO. 5, 2015

ISSN 2213-1779/$36.00
PUBLISHED BY ELSEVIER INC.
http://dx.doi.org/10.1016/j.jchf.2015.02.004

EDITORIAL COMMENT

Assessing the Accuracy of Emergency Department International Classification of Diseases Coding*

Alan B. Storrow, MD, Sean P. Collins, MD, MSc

Describing emergency department (ED) care has increasingly relied on multiple, large national data sources and, in particular, accurate International Classification of Diseases (ICD) coding. Although such data are contained in impressively large and longitudinal datasets, they were mostly intended for billing, not research, purposes (1). Until recently, epidemiological study of ICD coding for heart failure has largely been limited to hospitalized patients, has not distinguished between acute and chronic disease, and has not addressed coding accuracy within the ED. In this issue of *JACC: Heart Failure*, Frolova et al. (2) assess how ED discharge ICD-10th Revision (ICD-10) codes for acute heart failure (AHF) compared with expert physician adjudication, including both patients admitted to the hospital and those discharged from the ED. Such a report is important and timely; stakeholders often rely on coding accuracy to improve ED operations and health care policy decisions.

SEE PAGE 386

In a large convenience sample of patients with suspected AHF, the authors report an ICD-10 150.x diagnosis in the ED was highly predictive of AHF compared with chart-level adjudication. Although this is encouraging and useful, some limitations to their methodology should be considered before one comes to a conclusion. As the authors addressed, the population studied had "suspected AHF" at ED triage; this artificially increased both AHF prevalence (90% in this study) and positive predictive value. Furthermore, it is unclear what type of person assigned the ICD-10 code, and at exactly what point in the patient's clinical course this assignment occurred. Perhaps a broader population, such as all patients with dyspnea, would have provided more informative diagnostic test characteristics. Their sensitivity, specificity, and likelihood ratios were modest; had they been applied in a typical, undifferentiated ED cohort with dyspnea, their predictive values would likely be much less clinically useful. It would also be interesting to know how many patients initially not suspected of AHF were eventually given the diagnosis, and how many refused informed consent.

It is not clear who the adjudicators were and how many were used. Furthermore, the exact process for ruling on discrepancies, beyond simple discussion, was not described explicitly. It was not clear how many charts were reviewed in duplicate to determine inter-rater reliability. Certainly, some enrollees not given an ED diagnosis of AHF could have developed it while in the hospital. Although the use of the Carlson criteria (3) may be helpful to assess the likelihood of AHF, these criteria do contain elements challenging to assess in the emergency care setting, such as degree of jugular venous distention and the presence of a third heart sound. Prior studies have found the use of these criteria to not be very sensitive for AHF in the ED setting. The authors do importantly note the Carlson criteria were developed

*Editorials published in *JACC: Heart Failure* reflect the views of the authors and do not necessarily represent the views of *JACC: Heart Failure* or the American College of Cardiology.

From the Department of Emergency Medicine, Vanderbilt University, Nashville, Tennessee. Dr. Storrow has received research support from Abbott Diagnostics and Roche Diagnostics; and consulting fees from Roche Diagnostics, Novartis, Alere Diagnostics, Trevena, and Beckman Coulter. Dr. Collins has received research support from the National Institutes of Health/National Heart, Lung, and Blood Institute, Cardiorentis, Novartis, Intersection Medical, Trinity, and Cardioxyl; and consulting fees from Trevena, Novartis, Medtronic, Intersection Medical, Cardioxyl, and Abbott Point of Care.

long before the diagnostic use of natriuretic peptides, and thus, an adjustment to include it needed to be made. Adjustment for a B-type natriuretic peptide level <100 pg/ml would be expected to impact sensitivity more than specificity, which may be less useful in a cohort with such a high prevalence of AHF.

The ICD now includes well over 100,000 total codes, and since the 1900 ICD-1 iteration, it has substantially expanded from statistical classification of morbidity and mortality to include reimbursement, administration, epidemiology, workload tracking, resource allocation, quality of care assessment, and health services research. Thus, attention to code accuracy, defined as the extent it reflects the underlying patient's disease, has become increasingly important. The authors could have provided their specific process of coding, especially in terms of who performed it and when. This would have provided some context for other ICD users to consider coding accuracy within their unique systems and perhaps further understand potential sources of error or inconsistency (4). Such issues have been widely reported for decades. There are many potential sources of errors, including amount and quality of information, coder experience, quality of communication among stakeholders, the clinician's knowledge and experience with the illness, and the caregiver team's attention to detail (4). These challenges are at the interface between a patient's trajectory (arrival, evaluation, consultations, and discharge) and the recording of data by the caregiver team, including both in the medical record and in the eventual assignment of the ICD code. By further understanding these sources with regard to this particular study, one could better evaluate the limitations and how they compare to their system or institution.

For instance, because coding is so critical for billing, perhaps it would be expected for certain diagnoses to receive more attention, especially if the coding process was performed by one without clinical expertise. Changing of the order of codes (resequencing), although often not deliberate, could occur in a patient with respiratory failure as a result of AHF. Although AHF should be placed as the primary diagnosis, resequencing occurs when they are reversed. There may also be differences between Canada, where this investigation was performed, and other countries. Although some of these issues are outside the scope of this study, a better description of the coding process used at the participating institutions would provide the reader a better base for comparison. Note also the methodology used did not elucidate the reliability of the medical diagnosis but rather the corroboration between physician review and the ICD classifications.

These issues notwithstanding, Frolova and colleagues (2) provide some needed evidence evaluating the accuracy of ED administrative coding for AHF. Although ICD coding is complicated and prone to error, it clearly has proven valuable in prior research. Their study nicely highlights the need for further investigation into the processes that lead to a physician's diagnosis. This is important and nationally relevant given the increased use of multiple health care databases to inform ED processes of care (5) and a shift to earlier AHF diagnosis and treatment.

We used such a database, the Nationwide Emergency Department Sample (NEDS), to examine the burden of AHF on U.S. EDs from 2006 to 2010 (6). We reported nearly 1 million mean yearly visits for patients with a primary ICD-9th Revision ED code for heart failure, and an approximately 80% admission proportion. Because heart failure affects 5 million Americans and is the top reason for Medicare hospital readmissions, these statistics are staggering. If subsequently proven to be accurate, the strategy suggested by Frolova et al. (2) may be useful to evaluate the impact of policy changes on hospitalization patterns and resource use in ED patients with AHF. This may be an efficient way to study the impact of our call for new ED-based strategies to address and manage the burden of AHF, such as improved early management, and the use of observation services and shared decision making (7,8).

REPRINT REQUESTS AND CORRESPONDENCE: Dr. Alan B. Storrow, Vanderbilt University, Department of Emergency Medicine, 1313 21st Avenue South, Nashville, Tennessee 37232. E-mail: alan.storrow@vanderbilt.edu.

REFERENCES

1. Mutter R, Stocks C. Using Healthcare Cost and Utilization Project (HCUP) data for emergency medicine research. Ann Emerg Med 2014;64:458–60.

2. Frolova N, Bakal JA, McAlister FA, Rowe BH, Quan H, Kaul P, Ezekowitz JA. Assessing the use of International Classification of Diseases-10th Revision codes from the emergency department for the identification of heart failure. J Am Coll Cardiol HF 2015;3:386–91.

3. Carlson KJ, Lee DC, Goroll AH, Leahy M, Johnson RA. An analysis of physicians' reasons for prescribing long-term digitalis therapy in outpatients. J Chronic Dis 1985;38:733–9.

4. O'Malley KJ, Cook KF, Price MD, Wildes KR, Hurdle JF, Ashton CM. Measuring diagnoses: ICD code accuracy. Health Serv Res 2005;40:1620–39.

JACC: HEART FAILURE VOL. 3, NO. 5, 2015
MAY 2015:392–4

5. Owens PL, Barrett ML, Gibson TB, Andrews RM, Weinick RM, Mutter RL. Emergency department care in the United States: a profile of national data sources. Ann Emerg Med 2010;56:150–65.

6. Storrow AB, Jenkins CA, Self WH, et al. The burden of acute heart failure on U.S. emergency departments. J Am Coll Cardiol HF 2014;2:269–77.

7. Collins SP, Storrow AB. Moving toward comprehensive acute heart failure risk assessment in the emergency department: the importance of self-care and shared decision making. J Am Coll Cardiol HF 2013;1:273–80.

8. Collins S, Storrow AB, Albert NM, et al., for the SAEM/HFSA Acute Heart Failure Working Group. Early management of patients with acute heart failure: state of the art and future directions: a consensus document from the Society for Academic Emergency Medicine/Heart Failure Society of America Acute Heart Failure Working Group. J Card Fail 2015;21:27–43.

KEY WORDS acute heart failure, diagnosis, ICD coding