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Predictive Value of Acute Pancreatitis Diagnosis Code in Diabetic Patients Is Similar to Nondiabetic Patients

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To the Editor:

Acute pancreatitis (AP) is among the most common gastrointestinal causes of inpatient admissions in the United States.¹ Patients with diabetes mellitus (DM) exhibit a 3-fold increased risk of AP compared with the general population.^{2,3} Clinical practice guidelines recommend that the diagnosis of AP be made if at least 2 of 3 typical features are present—upper abdominal pain, elevation of serum pancreatic enzymes at least 3 times the reference value, and imaging findings consistent with AP.⁴ However, serum pancreatic enzymes are often elevated in diabetic patients in the absence of AP.⁵ Conversely, pancreatic enzymes may be minimally elevated in hypertriglyceridemia-induced pancreatitis, which is more common among patients with DM.⁶

Administrative data sets in large populations are increasingly utilized to evaluate associations, severity, and outcomes in many conditions,^{7,8} including AP. The validity of administrative codes for AP in patients with diabetes has been understudied and may be limited by the aforementioned variations in pancreatic enzymes in diabetic patients. The aim of this study was to evaluate the predictive value of the diagnosis code for AP based on the presence of preexisting DM.

We performed a retrospective analysis of all 579 patients hospitalized at the University of Pittsburgh Medical Center Presbyterian Medical Center between June 2009 and August 2014 with a first-time, primary inpatient discharge diagnosis code of AP International Classification of Diseases 9, Clinical Modification 577.0). Demographic and clinical information was abstracted from the electronic health record. The diagnosis of AP was confirmed if 2 or more of the following criteria were present—a mention of upper abdominal pain in clinical notes, serum amylase, and/or lipase elevation of 3 or more times

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the upper limit of normal, and imaging findings consistent with pancreatitis from imaging reports. Diabetes was confirmed in patients with a documented clinical history of DM, use of oral or injectable hyperglycemic agents, or hemoglobin A1c of 6.5% or greater.

The mean age of patients was 53.7 (standard deviation [SD], 18.3 years). Patients were predominantly White (68.4%) and male (55.6%). Preexisting DM was noted in 170 (29.4%) patients, 164 of whom had a DM-related diagnosis code. There were no differences between diabetic and nondiabetic patients with respect to age, sex, ethnicity, history of tobacco use, and history of prior cholecystectomy. Diagnostic criteria for AP were met in 459 of 579 patients (positive predictive value [PPV] = 0.79), and did not vary significantly with DM status (PPV = 0.76 in diabetics vs PPV = 0.81 in non-diabetics; $P = 0.19$). About one fourth of patients identified by billing codes as having sentinel-episode AP had documentation of prior acute and/or chronic pancreatitis.

Diabetic patients with AP were older than nondiabetic patients (age, 56.6 years [SD, 17.1 years] vs 52.8 years [SD, 18.7 years]; $P = 0.046$), but were otherwise similar with respect to sex, ethnicity, history of smoking. There were significant differences in the etiology of AP based on preexisting diabetic status, with gallstone pancreatitis as the most common etiology in both groups, but hypertriglyceridemia was more prevalent in patients with DM, and alcohol was more prevalent in nondiabetics (Table 1).

Among 120 patients who did not meet the diagnostic criteria for AP, 85 (70.8%) fulfilled 1 criterion (31 [25.8%] typical pain, 24 [20.0%] enzyme elevation, 30 [25.0%] abnormal imaging), whereas 35 (29.2%) did not fulfill any of the 3 criteria. There was no difference in the distribution of these criteria based on DM status.

Our study confirmed findings of prior studies that approximately 4 of 5 patients, who receive first-time primary inpatient discharge diagnosis code of AP, meet guideline-recommended criteria for diagnosis. Ours is the first study to demonstrate that this predictive value is similar in patients with and without prevalent DM. We hypothesized that elevated serum pancreatic enzymes would be observed more frequently in diabetic patients, leading to increased rates of false AP diagnosis in this subset. Although pancreatic enzymes can be elevated in non-AP abdominal pain in diabetics, they are rarely above 3 times the upper limit of the normal required to meet diagnostic criteria, which may explain this finding.⁹

Our study is limited by the use of the electronic health record as the criterion standard for diagnosis, which likely resulted in an underestimation of diagnosis-code accuracy. As a referral center, the lack of comprehensive patient medical records introduces the potential for further error. Finally, lacking a control group of patients without AP, we are unable to identify other test characteristics, such as sensitivity, specificity, likelihood ratios, and so on, for the AP diagnosis code.

In conclusion, approximately 1 in 5 patients were overdiagnosed as having AP based on International Classification of Diseases 9, Clinical Modification discharge diagnosis code from an administrative data set, regardless of DM status. These findings show that use of diagnosis codes from administrative data sets is a valid and important tool that may help identify key features of the natural history of AP and related outcomes in the setting of DM.

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TABLE 1.
Demographics, Select Risk Factors, and Etiology in Patients Who Met Diagnostic Criteria for AP

	Total (N = 459)	Diabetics (n = 129; 28.1%)	Nondiabetics (n = 330; 71.9%)	P*
Age, mean (SD), y	53.9 (18.3)	56.6 (17.1)	52.8 (18.7)	0.046
Sex, male, n (%)	256 (55.8)	75 (58.1)	181 (54.8)	0.52
Ethnicity, White, n (%)	309 (67.3)	80 (62.0)	229 (69.4)	0.13
Tobacco use ever, n (%)	223 (48.6)	68 (52.7)	155 (47.0)	0.27
History of cholecystectomy, n (%)	91 (19.8)	29 (22.5)	62 (18.8)	0.37
First episode of AP, n (%)	344 (74.9)	91 (70.5)	253 (76.7)	0.17
Etiology, n (%)				<0.001
Biliary	149 (32.5)	49 (38.0)	100 (30.3)	
Alcohol	102 (22.2)	15 (11.6)	87 (26.4)	
Hypertriglyceridemia	23 (5.0)	16 (12.4)	7 (2.1)	
Idiopathic	114 (24.8)	31 (24.0)	85 (25.8)	
Other	71 (15.5)	18 (14.0)	51 (15.5)	

Bolded *P* values identify characteristics which were significantly different (*P* 0.05) between diabetic and nondiabetic cohorts.

* *P* value compares diabetic and nondiabetic patients.