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Incidence and predictors of 30-day readmissions in patients hospitalized with chronic pancreatitis: A nationwide analysis

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ABSTRACT

Background: Patients with chronic pancreatitis are prone to frequent readmissions. The aim of this study is to evaluate the rate and predictors of 30-day readmissions in patients with chronic pancreatitis using the Nationwide Readmission Database (NRD).

Methods: We performed a retrospective analysis of all adult patients with the principal discharge diagnosis of chronic pancreatitis from 2010 through 2014. We excluded patients who died during the hospitalization. Multivariate Cox proportional hazard regression was performed to identify demographic, clinical, and hospital factors that associated with 30-day unplanned readmissions.

Results: During the study period, 25,259 patients had the principal discharge diagnosis of chronic pancreatitis and survived the index hospitalization. Of these, 6477 (26.7%) were readmitted within 30 days. Younger age group, males, length of stay >5 days, admission to a large, metropolitan hospital, and several comorbidities (renal failure, rheumatic disease, chronic anemia, heart failure, depression, drug abuse, psychosis, and diabetes) were independently associated with increased risk of 30-day readmission. ERCP, pancreatic surgery, and obesity were associated with lower risk. The most common reasons for readmissions were acute pancreatitis (30%), chronic pancreatitis (17%), pseudocyst (2%), and abdominal pain (6%).

Conclusions: One in four patients with chronic pancreatitis is readmitted within 30 days (26.7%). Pancreatic disease accounts for at least half of all readmissions. Several baseline comorbidities and characteristics are associated with 30-day readmission risk after index admission. Knowledge of these predictors can help design interventions to target high-risk patients and reduce readmissions and costs of care.

Introduction

Chronic pancreatitis is a disorder of the pancreas in which longstanding inflammation leads to fibrosis and eventual loss of pancreatic function. Patients experience abdominal pain, nausea, vomiting, diarrhea, and malnutrition. In addition, chronic pancreatitis can lead to several complications such as peripancreatic fluid collections, duodenal obstruction, vascular complications, bile duct strictures, and various malabsorptive disorders [1]. Due to the wide spectrum of possible complications, these patients are prone to frequent hospitalizations [2,3]. In the United States, chronic pancreatitis accounts for 19,724 hospitalizations per year [4], and 10.4% of total digestive disease related hospitalizations are associated with the primary diagnosis of chronic pancreatitis [5].

Recurrent hospital admissions are a major cause of morbidity to patients, and they pose a significant burden on the healthcare system. In 2012, reduction in hospital readmission became a major quality initiative for the Center for Medicare and Medicaid Services (CMMS), as well other government and private insurance companies. The Hospital Readmissions Reduction Program was created to reduce 30-day readmission rates [6]. There are limited data on readmission rates in chronic pancreatitis. A recent study found that the 30-day readmission rates after surgery for chronic pancreatitis was 30% [7]. Another study evaluated the 30-day readmission rates in a group of patients with acute and chronic pancreatitis (n = 373), and reported a readmission rate of 5% at 30 days and 29% at 1 year [8]. Patients with chronic pancreatitis suffer from several

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comorbidities such as chronic pain syndrome, pancreatic cancer, cerebrovascular accidents, peptic ulcer disease, renal insufficiency, diabetes and chronic lung disease [9]. These comorbidities can increase the risk of readmission. Currently, there are no population level data to evaluate the rate and predictors of 30-day readmission after an initial hospitalization for chronic pancreatitis. Such data would provide insight on the disease burden of chronic pancreatitis on the healthcare system, and could help hospitals and clinicians create preventive interventions to reduce readmissions in high-risk patients.

The aim of this study is to evaluate the rate of 30-day readmissions in patients hospitalized with chronic pancreatitis using a large nationally representative database. We also evaluate the role of various socio-demographic, clinical, and hospital factors in predicting readmissions.

Methods

We used data from the Nationwide readmission database (NRD) from 2010 to 2014. This is an all-payer hospitalization database developed by the Agency for Healthcare Research and Quality (AHRQ) as part of the Healthcare Cost and Utilization Project (HCUP). The database samples 22 state inpatient databases and account for 51.2% of the total U.S. population and 49.3% of all hospitalizations in the United States [10]. The database utilizes International Classification of Diseases, Ninth Revision; Clinical Modification (ICD-9-CM) codes to identify clinical diagnoses and procedures. Each hospitalization record contains up to 25 diagnosis codes and 20 procedure codes. It also contains several hospital specific variables, and 29 predefined comorbidities (Elixhauser comorbidities). In order to analyze readmissions, each record is marked with special patient linkage numbers that can be used to track patients' admissions to any hospital within a particular state, but not across state lines. The database and description of data elements are publicly available through the HCUP website [10]. The Emory University Institutional Review Board determined that the study does not require review because it does not meet the definition of human subject research. This is because the database contains completely de-identified observations that cannot be linked to any specific subject.

Study population

We used specific ICD-9-CM codes to define the study variables and select the study population (Table 1). We identified an index admission for chronic pancreatitis as any adult patient (age $\geq$18 years) with a primary discharge diagnosis (dx1) of chronic pancreatitis. Since our main objective is to study 30-day readmission rates, we excluded patients who died during the hospitalization and those who were discharged in the month of December. We also excluded records of patients that were discharged and readmitted the same day (same-day stay records), and those with metastatic cancer as a comorbidity variable. Finally, we excluded records that fit the criteria for index admission for chronic pancreatitis, but were also identified as readmissions within 30 days of a previous chronic pancreatitis admission. These records were not considered separate index admissions, but were included in the readmission analysis. We used the special tracking variables to identify all unplanned readmissions within the 30-day period post-discharge from index hospitalization. Elective readmissions were excluded. Patients who were readmitted within 30 days for any cause were compared to those who did not require readmission. We used the Clinical Classifications Software (CCS for ICD-9-CM) developed by the AHRQ to formulate the top reasons for

Table 1
ICD-9 Codes for biliary diagnoses and interventions.

Diagnosis/procedure	ICD-9
Diagnosis	
Chronic pancreatitis	577.1
Acute Pancreatitis	577.0
Pancreatic pseudocyst (cyst and pseudocyst of pancreas)	577.2
Other specific disease of pancreas	577.8
Malignant neoplasm of pancreas	157.x
Benign neoplasm of pancreas	211.6, 211.7
Cholangitis	576.1
Abdominal pain	789.x
Jaundice	782.4
Obstruction of the bile duct	5762
Current smoker (tobacco use disorder)	305.1
History of tobacco use	V15.82
Procedure	
Endoscopic Retrograde Cholangiopancreatography (ERCP)	
ERCP general code	51.10
Endoscopic sphincterotomy and papillotomy	51.85
Biliary ERCP	
Endoscopic Retrograde Cholangiography	51.11
Endoscopic dilation of ampulla and biliary duct	51.84
Endoscopic insertion of stent (tube) into bile duct	51.87
Endoscopic removal of stone(s) from biliary tract	51.88
Endoscopic biopsy of bile duct	51.14
Pancreatic ERCP	
Endoscopic Retrograde Pancreatography	52.92
Endoscopic insertion of stent (tube) into pancreatic duct	52.93
Endoscopic removal of stone(s) from pancreatic duct	52.94
Endoscopic dilation of pancreatic duct	52.98
Endoscopic biopsy of pancreatic duct	52.14
Pancreatic surgery	
Pancreatic resection	52.51, 52.52, 52.53, 52.59, 52.6, 52.7,52.09
Transplant of pancreas	52.8×
Pancreatic drainage operation	52.3, 52.4, 52.96

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