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Alcohol use disorders among surgical patients: Unplanned 30-days readmissions, length of hospital stay, excessive costs and mortality

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ABSTRACT

Aims: Alcohol use disorders (AUD) have been associated with an increased risk of unplanned hospital readmissions (URA). We analyzed in a sample of 87 Spanish Hospitals if surgical patients with AUD had a higher risk of URA and if among patients with URA, those with AUD had an excess length of hospital stay, higher hospital expenses and increased risk of mortality.
Method: We analyzed data of patients who underwent surgical operations during the period between 2008 and 2010. URA was defined as unplanned readmissions during the first 30 days after hospital departure. The primary outcome was risk of URA in patients with AUD. Secondary outcomes were mortality, excess length of stay and over expenditure.
Results: A total of 2,076,958 patients who underwent surgical operations were identified: 68,135 (3.3%) had AUD, and 62,045 (3.0%) had at least one URA. Among patients with AUD 4212 (6.2%) had at least one URA and among patients without AUD 57,833 (2.9%) had at least one URA. Multivariable analysis demonstrated that AUD was an independent predictor of developing URA (Odds ratio: 1.56; 95% CI: 1.50–1.62). Among surgical patients with URA, those with AUD had longer lengths of hospital stay (2.9 days longer), higher hospital costs (2885.8 Euros or 3858.3 US Dollars), higher risk of death (OR: 2.16, 95% CI: 1.92–2.44) and higher attributable mortality (11.2%).
Conclusions: Among surgical patients, AUD increase the risk of URA, and among patients with URA, AUD heighten the risk of in-hospital death, and cause longer hospital stays and over expenditures.

1. Introduction

Readmissions have emerged internationally as an important outcome measure, as they occur frequently (all-cause readmissions range from 13% to 20%) and are very costly events (Kossovsky et al., 1999; Friedman and Basu, 2004; Jencks et al., 2009). The hospital readmission rate has been proposed as an outcome indicator of quality of health care computable from routine statistics because a link between poor quality of care and subsequent readmission seems intuitively reasonable, and because readmission rates are easy to monitor through administrative hospital databases (Henderson et al., 1989; Milne and Clarke, 1990). Numerous studies have shown that premature discharge or substandard care during initial hospitalization increases the risk of readmission (Ashton et al., 1995; Wei et al., 1995). Hospital readmissions are considered a marker of general complications and potential substandard care. Reducing rates of rehospitalization has attracted attention from policymakers as a way to improve quality of care and reduce costs. Payment incentives to avoid readmissions have been cited in the Department of Health and Human Services' strategic plan for 2010 through 2015 as an example of quality of care improvement (DHHS, 2012).

Furthermore, several studies have shown the impact of patient related factors, such as case mix, severity of disease, comorbidities and chronic conditions on the risk of readmission (Henderson et al., 1989; Kossovsky et al., 1999; Librero et al., 1999; Halfon et al., 2002). Alcohol use disorders (AUD) are a risk factor for numerous comorbidities and may influence the risk of hospital admission and

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subsequent readmissions, for both surgical and medical conditions. AUD are a risk factor for intensive-care readmission in patients undergoing elective vascular and thoracic surgical procedures (Maxson et al., 1999) and AUD are a risk factor for post-discharge surgical infections (Daneman et al., 2010). AUD affects the course of diabetes, leading to increased morbidity, hospital admissions and readmissions, and mortality (Engler et al., 2013). AUD are a risk factor for hospital discharge against medical advice, and patients discharged against medical advice have higher readmission rates and have higher in-hospital mortality (Southern et al., 2012). AUD have been recognized as a significant variable in predictive multivariate models of hospital unplanned readmissions (Billings et al., 2006; Howell et al., 2009).

A recent systematic review on readmission prediction suggests that patient characteristics are strongly associated with readmission risk, but the quality of inpatient care is also an important predictor (Kansagara et al., 2011), and any analysis of AUD as a risk factor for unplanned readmissions (URA) should take into account hospital-level factors such as size and complexity of hospitals.

With the increasing focus on containing health care costs, in the United States and elsewhere, a better understanding of factors contributing to the risk of URA is important. However, there is a notable lack of information in epidemiological literature about the impact of AUD in the risk of URA, in the risk of mortality among cases with URA and in the attributable mortality among patients with AUD and URA, if AUD influences the length of hospital stay among cases of URA and the magnitude of over expenditures caused by AUD among URA cases.

To assess the impact of AUD on the risk of unplanned hospital readmissions among surgical patients we used a large administrative database. We sought to determine the incidence of URA in patients with AUD and without AUD, and the impact of AUD among patients with readmissions on length of hospital stay, excessive costs and in-hospital mortality, after controlling other individual and hospital-level factors. We analyzed these events in patients who underwent surgical operations in a sample of 87 Spanish Hospitals.

2. Method

2.1. Source of data

Data for hospital admissions and readmissions were captured by the administrative minimal basic data set (MBDS) of 87 Spanish Hospitals during the period of 2008–2010. From written or digitalized information that is provided by the hospital physician who signs the clinical record, each patient's diagnosis, external causes and procedures are codified according to International Classification of Diseases, 9th review (ICD-9-CM) codes. Codification and data entry in the electronic database are performed by dedicated administrative personnel who have completed in-depth training on medical data registration. This administrative database has demographic data, admission and discharge dates, surgical operation date, type of admission and type of discharge, diagnostic codes for principal cause and secondary diagnoses, external causes and procedures using ICD-9-CM codes. Diagnosis-related groups (DRG) and a classification of hospital groups based on size and complexity are included in this national database (Spanish Ministry of Health, 2012).

2.1.1. Inclusion and exclusion criteria. We included all patients aged 18 years or older who received a primary surgical procedure code and who underwent in-patient surgery. Patients who were transferred to another hospital were excluded.

2.2. Variables

2.2.1. Definition of alcohol use disorders. AUD were defined as alcohol dependence, alcohol abuse, alcohol-induced mental disorders, alcoholic polyneuropathy, alcoholic cardiomyopathy, alcoholic gastritis, alcoholic liver disorders, excessive blood alcohol level, alcohol toxicity and alcohol poisoning. Table 1 details the ICD codes used to diagnose AUD. We used principal diagnostic code and secondary diagnostic codes (13 fields).

2.2.2. Other variables. Other variables collected included age, gender, tobacco dependence (ICD-9 code 305.1), hospital group, and 29 comorbidities: obesity, uncomplicated hypertension, complicated hypertension, cardiac arrhythmias, pulmonary circulation disorders, valvular disease, deficiency anemia, blood loss anemia, fluid and electrolyte disorders, weight loss, coagulopathy, myocardial infarction, congestive heart failure, peripheral vascular disorders, cerebrovascular disease, dementia, chronic pulmonary disease, rheumatic disease, peptic ulcer disease, mild liver disease, diabetes without chronic complications, diabetes with chronic complications, hemiplegia or paraplegia, renal disease, moderate or severe liver disease, drugs use disorders, cancer, leukemia or lymphoma, metastatic cancer and AIDS. We used ICD-9 codes proposed for these comorbidities (Quan et al., 2005). We followed the classification of the Spanish Ministry of Health, which divides hospitals into five categories ranging from lower size and complexity to higher size and complexity, included in the MBDS (Spanish Ministry of Health, 2012), as depicted in Table 2.

Table 1
International classification of diseases codes (9th review) used to identify patients with alcohol use disorders.

Variables	ICD-9 codes
Alcohol use disorders	
Alcohol dependence	303.00–303.93
Alcohol abuse	305.00–305.03
Alcohol-induced mental disorders	291.0–291.9
Alcoholic polyneuropathy	357.5
Alcoholic cardiomyopathy	425.5
Alcoholic gastritis	535.30–535.31
Alcoholic liver diseases	571.0–571.3
Excessive blood alcohol level	790.3
Alcohol toxicity	980.0–980.9
Alcohol poisoning	E860.0–E860.9

2.3. Data analysis

The primary outcome of interest was to compute the risk of unplanned readmissions (URA) in the first 30 days after hospital discharge in patients with AUD. Secondary analyses were used to determine risk of mortality and attributable mortality, length of hospital stay and costs in patients with and without AUD who had URA.

Spanish Ministry Of Health calculates yearly the cost for every diagnosis related group (DRG) in a sample of Spanish Hospitals. These hospital costs include 12 items: nursing, standard daily care, structure, medical care, critical care, surgery, pharmacy, radiology, laboratory, medical supplies, therapies and clinical services. These costs are calculated for every DRG adjusted to the type of hospital, because costs of DRGs are higher in more complex hospitals. We applied these estimated national costs for every DRG and type of hospital in our multivariate estimation of costs (Spanish Ministry of Health, 2012). Charlson Comorbidity Index was calculated for every patient (Charlson et al., 1987).

Univariate analysis examining association between AUD and URA, age, gender, tobacco dependence, type of hospital and comorbidity were performed (t test and Chi-square tests, or their equivalent non-parametric tests). Cohen's d was calculated for continuous variables (age and Charlson Index) and because of large sample size

Table 2
Spanish Ministry of Health Classification of Hospitals according to complexity and size.

Group	Characteristics
1	Small hospitals with an average of fewer than 150 beds, with nearly no high technology equipment, limited means, and low complexity in terms of care
2	Basic general hospitals, mean size fewer than 200 beds, minimum of high technology equipment, certain teaching activity, and somewhat greater complexity
3	Area hospitals, with a mean size of around 500 beds. More than 50 medical residents and an average of 269 physicians. Intermediate complexity (1.5 complex services and case-mix, 1.01)
4	Group of large hospitals, but more heterogeneous in terms of equipment, size and activity. Highly intense teaching activity (more than 160 medical residents) and high complexity (an average of 4 complex services and case-mix >1.2). In this group, 81% of the hospitals have fewer than 1.000 beds
5	Hospitals of great importance in the structural context and intense activity. Complete range of services. More than 680 physicians and around 300 medical residents. Includes the large hospital complexes. A hospital may consist of a single center or two or more that are organized and integrated into the hospital complex. The latter is identified by its unified administration and management. Thus, a hospital complex can consist of two or more hospitals, which can even be far apart, and one or several specialty centers. In this group, 88% of the hospitals have more than 1000 beds.