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Identification and medical utilization of incident cases of alcohol dependence: A population-based case-control study

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ABSTRACT

Background: Patients with alcohol dependence (AD) often seek help from medical professionals due to alcohol-related diseases, but the overall distribution of medical specialties identifying new AD cases is unclear. We investigated how such cases were identified and how medical resources were utilized before the identification of AD in a nationwide cohort.
Methods: We enrolled a population-based cohort (N = 1,000,000) using the National Health Insurance Research Database of Taiwan; 8181 cases with incident AD were retrieved between January 1, 2000, and December 31, 2010. For this nested case-control study, four controls were matched for age and sex with each case based on risk-set sampling. We measured various dimensions of medical utilization before AD was diagnosed, including department visited, physical comorbidity, and medication used. Conditional logistic regression was used for estimating the variables associated with AD.
Results: Patients living in less urbanized areas who were unemployed were more likely to develop AD. The highest proportions (34.2%) of AD cases were identified in the internal medicine department, followed by the emergency (22.3%) and psychiatry (18.7%) departments. AD patients had a higher risk of comorbid chronic hepatic disease (adjusted RR = 2.72, p < 0.001) before identification of AD than controls. AD patients also had greater numbers of hospital admissions than controls, including non-psychiatric and psychiatric hospitalizations. Outpatient visit numbers were similar for AD patients and controls.
Conclusions: The findings indicate that clinicians providing care in diverse medical settings should be prepared to screen for unhealthy alcohol use and to mitigate its detrimental effects.

1. Introduction

According to a WHO report (World Health Organization, 2014), harmful use of alcohol causes approximately 3.3 million deaths every year (or 5.9% of all deaths), and 5.1% of the global burden of disease is attributable to alcohol consumption. From a public health view, 4% of the global disease burden is attributable to alcohol, which is almost equal to the negative effect of tobacco and hypertension (Room et al., 2005). Alcohol has associations with more than 60 different medical problems (Rehm et al., 2003), especially liver cirrhosis, cancer, hypertensive disease, and stroke. The WHO (World Health Organization, 2014) reports that cardiovascular and gastrointestinal diseases were the leading causes of alcohol-attributable deaths in 2012 at 33.4% and 16.2% respectively. In a record-linkage study, patients with alcohol dependence (AD) had a higher mortality risk than patients with heroin dependence, and the leading cause was gastrointestinal diseases such as liver cirrhosis (Chen et al., 2001).

AD is a conception that comprises biological elements (e.g., tolerance and withdrawal), cognitive elements (e.g., craving), and behavioral elements (e.g., impaired control) as described in the DSM-IV criteria (American Psychiatric Association, 1994). Before the development of AD, patients can experience the onset of various medical

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consequences (Schuckit et al., 1993). These physical illnesses warrant further investigation. Knowledge gained from these investigations could help clinicians to identify AD earlier in its course.

A substantial proportion of alcohol-related problems are detected in primary care settings (Cherpitel and Ye, 2008; Dawson et al., 2012; Rehm et al., 2015a) and emergency departments (Crane, 2013; Mullins et al., 2017) in most Western countries. For example, in a U.S. national alcohol survey, AD patients used primary care 1.63 times more frequently than non-alcohol users (Cherpitel and Ye, 2008). Another recent U.S. study (Dawson et al., 2012) revealed primary care and student health services were important types of initial medical utilization for patients whose alcohol problems required intervention. A recent large cross-sectional study in Europe pointed out that though general practitioners could identify alcohol dependence, the cases they recognized were different from those identified with the Composite International Diagnostic Interview using the DSM-IV criteria (Rehm et al., 2015a). Another recent study (Mullins et al., 2017) showed that there is an increasing rate of alcohol-related visits to emergency departments in the U.S., revealing a growing burden on the health delivery system. In a 5-year follow-up study, compared to the alcohol-free group, heavy alcohol drinkers had an increasing emergency department and inpatient resource utilization (Kline-Simon et al., 2014). Thus, it seems general or emergency department practitioners identify most new cases of AD. Additionally, patients with AD could visit a psychiatrist to seek abstinence treatment or for alcohol-related mental problems (Hung et al., 2015). The global view of the distribution of the medical specialties identifying incident cases of AD is unclear and deserves investigation.

The treatment gap among AD patients is relatively wide compared to other mental disorders (Kohn et al., 2004; Rehm et al., 2015b). The treatment gap represents the absolute difference between the true prevalence of a disorder and the treated proportion of individuals affected by the disorder (Kohn et al., 2004). AD patients rarely seek help within the addiction treatment system possibly due to a perceived stigma (Kohn et al., 2004). Understanding the health-seeking behavior patterns of AD patients could lead to the detection of alcohol-related problems earlier and, thus, decrease the treatment gap.

In the present study, we enrolled a large Asian nationwide cohort of the general population over a long period, ascertained the incident cases of AD, and investigated how such patients were identified. For selecting suitable controls for comparison and avoiding selection bias, we conducted a nested case-control study with controls derived from the cohort. We then investigated various topics, including the distribution of the specialties that identified the new AD cases, medical utilization within the 1 year before the diagnosis of AD, and the physical comorbidity associated with the development of AD.

2. Methods

2.1. Study population

The single-payer National Health Insurance (NHI) program was launched in Taiwan on March 1, 1995, and covered nearly 99.9% of the Taiwanese population in 2014 (National Health Insurance Administration, 2014). The NHI database contains registration files and original claims data for medical reimbursements. The database is managed by the National Health Research Institute (NHRI), which has established the National Health Insurance Research Database (NHIRD) (http://nhird.nhri.org.tw/en/) to provide data for research purposes.

This study used the Longitudinal Health Insurance Database 2005 (LHID 2005), which contains all the original claims data of 1,000,000 beneficiaries enrolled in 2005 randomly sampled from the 2005 Registry for Beneficiaries (ID) of the NHIRD. There are approximately 25.68 million individuals in this registry. All registration and claims data of these 1,000,000 individuals collected by the NHI program constitute the LHID 2005 (Supplemental e-Figure 1). There was no significant difference in the sex or age distributions between patients in

the LHID 2005 and the original NHIRD. Information that can be used to identify beneficiaries and medical care providers is scrambled by the NHI Administration to maintain patient and provider confidentiality. All investigators signed an agreement guaranteeing patient confidentiality before using the database. This study was approved by the Institutional Review Board of the Committee on Human Subjects of Taipei City Hospital, and informed consent was waived due to the retrospective nature of the study.

2.2. Identification of cases of incident alcohol dependence

For sampling, the definition of the population at-risk for the development of AD (Supplemental e-Figure 1), we initially excluded patients with AD (ICD 9 code 303**) or alcohol psychosis (ICD 9 code 291**) between January 1, 1996, and December 31, 1999 (n = 1399). Then, we enrolled the study cohort (N = 998,601) and defined the baseline date as January 1, 2000. We broadly searched all of the claims data from the baseline to December 31, 2010, and consequently, 8181 cases with incident AD were retrieved.

2.3. Nested case-control study

We conducted a nested case-control study to compare the pattern of identification and medical utilization of the patients with AD with the controls. For comparability, we used the controls for each case randomly derived from the study cohort that represented the general population of Taiwan.

We selected four controls for each case subject, matched for age and sex, using risk-set sampling. The date of the newly diagnosed AD was defined as the index date. Controls were assigned the same index date as their corresponding case. Cases that were identified later during the follow-up were eligible to serve as controls for earlier cases. In addition, each control patient had at least one claim record after the corresponding index date to confirm that the controls were alive before the corresponding index date. Finally, 8181 cases were completely matched with 32,724 controls.

2.4. Variables of medical utilization

In this study, demographic variables included sex, age, employment, and urbanization (Table 1) for each case and the corresponding controls. We applied urbanization stratification (Liu et al., 2006) specifically used in Taiwan, and the level of urbanization was categorized as level 1 (highly urbanized area), level 2 (moderately urbanized area), level 3 (newly urbanized area), level 4 (township area), and level 5 (rural area). In addition, we used the Charlson comorbidity score (Quail et al., 2011; Quan et al., 2005) as the severity of physical comorbidity. The Charlson comorbidity score, which is the sum of the weighted scores of 31 comorbid conditions, is widely used to assess general health status (Quail et al., 2011; Quan et al., 2005). The specialty of the medical doctors who identified each case was also collected.

Based on the DSM-IV criteria (American Psychiatric Association, 1994), AD is defined as a maladaptive pattern of alcohol use, occurring at any time in the same 12-month period, leading to clinically significant impairment or distress, as manifested by three (or more) of the seven dependent-related items such as tolerance, withdrawal, loss of control with the use, and failure to control alcohol use. Thus, the medical utilization within the 12 months before AD was identified was investigated. We measured various dimensions of medical usage within the 12-month period before the index date, such as the department visited, numbers and costs of the procedures examined, physical comorbidity, and concomitant use of medications.

The categories of medications were based on information obtained from the Anatomical Therapeutic Chemical Classification system (WHO Collaborating Centre for Drug Statistic Methodology, 2016).