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Factors Associated with Hospitalization for Blood-Borne Viral Infections Among Treatment-Seeking Illicit Drug Users

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ABSTRACT

Blood-borne viral infections (BBVIs) are important health consequences of illicit drug use. This study assessed predictors of inpatient hospital admissions for BBVIs in a cohort of 4817 clients seeking treatment for drug use in Finland. We examined clients' data on hospital admissions registered in the Finnish National Hospital Discharge Register from 1997 to 2010 with diagnoses of BBVIs. Cox proportional hazards regression analyses were separately conducted for each of the three BBVI groups to test for association between baseline variables and hospitalizations. Findings were reported as adjusted hazard ratios (aHRs). Based upon primary discharge diagnoses, 81 clients were hospitalized for HIV, 116 for hepatitis C, and 45 for other types of hepatitis. Compared to those admitted for hepatitis C and other hepatitis, drug users with HIV had higher total number of hospital admissions (294 versus 141 and 50 respectively), higher crude hospitalization rate (7.1 versus 3.4.and 1.2 per 1000 person-years respectively), and higher total length of hospital stay (2857 days versus 279 and 308 respectively). Trends in hospitalization for all BBVI groups declined at the end of follow-up. HIV positive status at baseline (aHR: 6.58) and longer duration of drug use (aHR: 1.11) were independently associated with increased risk for HIV hospitalization. Female gender (aHR: 3.05) and intravenous use of primary drug (aHR: 2.78) were significantly associated with HCV hospitalization. Having hepatitis B negative status at baseline (aHR: 0.25) reduced the risk of other hepatitis hospitalizations. Illicit drug use coexists with blood-borne viral infections. To address this problem, clinicians treating infectious diseases need to also identify drug use in their patients and provide drug treatment information and/or referral.

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1. Introduction

Blood-borne viral infections (BBVIs) such as HIV, hepatitis C (HCV), and other types of hepatitis are important health consequences of illicit drug use (EMCDDA, 2004). Intravenous drug use has been implicated in the majority of BBVIs in many parts of the world due to risky behaviors such as sharing of non-sterile injecting equipment (Aceijas & Rhodes, 2007; Alter, 2006; Garten et al., 2005; Grogan, Tiernan, Geogeghan, Smyth, & Keenan, 2005; Li et al., 2006; Loebstein et al., 2008; Maher, Chant, Jalaludin, & Sargent, 2004; Mathers et al., 2008; Nelson et al., 2011; Partanen, Vikatmaa, Tukiainen, Lepäntalo, & Vuola, 2009; Pereira et al., 2013; Xia, Luo, Bai, & Yu, 2008). BBVIs have also been reported among drug users who share non-injecting drug paraphernalia such as straws, tubing, or pipes (Caiaffa et al., 2011; Tortu, McMahon, Pouget, & Hamid, 2004) and those who are homeless (Andiá et al., 2001). Engaging in some sexual behaviors (such as having unprotected sex and multiple sex partners) and skin penetration practices (such as tattooing and piercing) also increase the risk of exposure to BBVIs (Brodish et al., 2011; Fethers, Marks, Mindel, & Estcourt, 2000; Fry & Lintzeris, 2003; Liu, Grusky, Li, & Ma, 2006; Niccolai, Shcherbakova, Toussova, Kozlov, & Heimer, 2009; Turner et al., 2006).

Globally, BBVIs among drug users is a concern to public health systems because they could be a bridge population for transmitting these infectious diseases to sero-negative drug users and to non-drug using members of the society through social and sexual interactions (Liu et al., 2006; Niccolai et al., 2009). Morbidity arising from BBVIs further impacts health systems through treatment and inpatient hospital admissions. For example, a study conducted in three HCV treatment centers in the Netherlands (Helsper et al., 2012) found that the costs per cured HCV patient including side effects were €28,500 and €15,400 for

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genotype 1/4 and genotype 2/3 respectively. This, in addition to their drug use, could have considerable public health and financial burden both to the society and drug-using individuals. Monovalent and combination vaccines against hepatitis A and B are currently available (Lugoboni, Quaglio, Civitelli, & Mezzelani, 2009) but there is none for HIV and HCV, so primary prevention and treatment are the only strategies.

The use of hospital services for BBVIs in drug-using population is less studied. Studies have shown differential hospitalization by injectors, females, and persons who received highly active antiretroviral therapy (Barash, Hanson, Buskin, & Teshale, 2007; Bassetti, Hoffmann, Bucher, Fluckiger, & Battegay, 2002; Floris-Moore et al., 2003; Schoenbaum, Lo, & Floris-Moore, 2002; van Haastrecht et al., 1996). However, these studies were limited by focusing on HIV and on opiate users. Predictors of hospitalization might differ for BBVIs other than HIV and for persons who use other types of illicit drugs. To address this gap, we considered a wide range of BBVIs in a population using different types of drugs. This study aimed to assess patterns of hospitalization, and factors associated with increased risk of hospitalization for BBVIs among a cohort of Finnish drug users seeking treatment.

2. Methods

2.1. Study population

The study population consisted of 4817 clients (3365 males and 1452 females) who sought treatment for drug use between 1997 and 2008 at Helsinki Deaconess Institute (HDI). The HDI is a large public utility foundation located in Helsinki that offers drug treatment services to the residents of Helsinki and other surrounding municipalities that comprise the Greater Helsinki area (about 1.3 million residents). Services are rendered free to the clients but their municipalities pay the service fees. The service where the clients sought treatment provides treatment for illicit drug users, but there were some occasional clients including minors with severe alcohol use problems, and polydrug users with alcohol and prescription medicines contributing most to the reasons for seeking treatment. This study population made up the epidemiological part of "huumehoito tietokanta" (HUUTI, translated as drug treatment database) consortium research project, and includes all consecutive drug users who sought treatment at HDI during 1997–2008. Here, we focused on a subset of clients with diagnoses of BBVIs during the follow-up period. The Ministry of Social Affairs and Health of Finland, and research ethics committees of HDI and North-Savo Hospital District approved the HUUTI project. Informed consent was not required because data released to the researchers were anonymized and the clients were not contacted.

2.2. Data collection

Clinicians used a structured questionnaire to conduct interview at each client's first visit in order to obtain their self-reported drug use history, and their social, and medical and psychiatric histories. Full details of the cohort have been described elsewhere (Onyeka et al., 2012; Onyeka et al., 2013). Clients' data were linked to the Finnish National Hospital Discharge Register (FHDR) using personal identifiers. The FHDR has a total coverage of inpatient care provided at all hospitals and municipal health centres since 1969, and contains admission and discharge dates, discharge diagnoses, personal identity codes, hospital identifier codes and other information (Haikonen, Lunetta, Lillsunde, & Sund, 2013). The administrative health and social register system in Finland is reliable with good accuracy and completeness (Gissler & Haukka, 2004; Sund, 2012). The follow-up period was from the first day of the first visit to HDI until 31 December 2010.

2.3. Definitions

Causes of inpatient hospital admissions were coded using the 10th version of the International Classification of Diseases (ICD-10); clients' records contained the main/primary diagnosis and 1–3 additional/secondary diagnoses. By examining primary discharge diagnoses that fell within the disease-related chapters of the ICD-10 coding system (A00–R99), BBVIs were defined as follows: HIV (B20–B24), HCV (B17.1 and B18.2), and other hepatitis (B15.0, B15.9, B16.2, B16.9, B17.8, B18.1, B18.9, and B19.9). Apart from HCV, ICD-10 codes denoting other hepatitis subtypes were grouped as "other hepatitis" in order to increase statistical power.

2.4. Statistical analyses

Statistical analyses were carried out using SPSS version 21 for windows. Clients' demographic data and other baseline characteristics were summarized using frequencies, mean and standard deviation (SD). Baseline differences between each of the three BBVI groups versus the other clients were tested using χ^2 test or Fischer's exact test for categorical variables and Mann–Whitney test for continuous variables. BBVIs were analyzed based upon primary (or main) discharge diagnoses and we restricted analyses to primary diagnoses for the first admission. The proportions of BBVI hospitalizations per year from 1997 to 2010 were calculated. Crude hospitalization rates (CHRs) were calculated by dividing the observed total number of hospitalizations for each BBVI group by the total person-years (PY) of follow-up for the cohort, expressed per 1000 PY. Cox proportional hazards regression analyses were performed separately to determine baseline variables that independently predicted the risk of being hospitalized for HIV infection, HCV, and other hepatitis.

2.5. Covariates for multivariate analyses

We assessed the association between baseline variables and BBVI hospitalizations first in univariate models, and subsequently in multivariate models. To test for the assumptions of Cox model, log minus log and log survival functions were plotted for relevant covariates and those that violated the assumptions were excluded from the models. Apart from socio-demographic variables (age, and gender), we also considered clients' living and health conditions, and drug use behaviors that might predispose them to BBVIs including: homelessness (defined as the presence or absence of postal code/address), BBVI status at baseline, duration of illicit drug use (defined as the difference between chronological age and age at initiation of illicit drug use), route of administration of primary drug, and past month frequency of primary drug use. For primary drugs, cannabis was chosen as a reference category because preliminary Kaplan–Meier analysis showed that cannabis users had significantly higher (or better) survival for hospitalization than the other illicit drugs (data not shown). Due to large amounts of missing data for BBVI status at baseline, these important variables were handled in a special way than the other covariates in the models by using the "missing data" as a reference category. Variables with P-value ≤ 0.05 in the univariate analyses were included in multivariate model. Results of the multivariate models were presented as adjusted hazard ratios (aHRs) and 95% confidence intervals (95% CIs). Predictor variables with P-value of ≤ 0.05 were considered significant.

3. Results

A total of 4817 clients were followed up: 3365 males and 1452 females. The mean follow-up period was 8.6 years (SD = 3.3, range 0.01–13.9 years) and clients contributed a total of 41567.5 person-years. Using the national hospital discharge register, 76.7% (n = 3693) were hospitalized at least once, and a higher proportion of females (84.5%, n = 1227) experienced hospitalizations compared to males (73.3%, n = 2466). The overall mean number of hospital admission was 4.7 times (SD = 7.3), and the overall mean length of hospital stay was 67.3 days (SD = 198.5). The overall CHR was 540.2/1000 PY (95% CI: 533.1–547.3) and the overall standardized hospitalization ratio

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