



# Mortality among a national population sentenced to compulsory care for substance use disorders in Sweden: Descriptive study



Taylor Hall<sup>a,\*</sup>, Deborah Chassler<sup>a</sup>, Björn Blom<sup>b</sup>, Robert Grahn<sup>b</sup>, Marcus Blom-Nilsson<sup>b</sup>, Lisa Sullivan<sup>c</sup>, Lena Lundgren<sup>a</sup>

<sup>a</sup> Center for Addictions Research and Services, Boston University School of Social Work, 264 Bay State Road, Boston, MA 02215, USA

<sup>b</sup> Department of Social Work, Umeå University, SE-901 87 Umeå, Sweden

<sup>c</sup> Boston University School of Public Health, Crosstown Center, 801 Massachusetts Avenue, Boston, MA 02118, USA

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## ABSTRACT

Sweden's compulsory addiction system treats individuals with severe alcohol and narcotics use disorders. Merging data from three national level register databases of those sentenced to compulsory care from 2001 to 2009 ( $n = 4515$ ), the aims of this study were to: (1) compute mortality rates to compare to the general Swedish population; (2) identify leading cause of mortality by alcohol or narcotics use; and (3) identify individual level characteristics associated with mortality among alcohol and narcotics users. In this population, 24% were deceased by 2011. The most common cause of death for alcohol users was physical ailments linked to alcohol use, while narcotics users commonly died of drug poisoning or suicide. Average age of death differed significantly between alcohol users (55.0) and narcotics users (32.5). Multivariable logistic regression analysis identified the same three factors predicting mortality: older age (alcohol users OR = 1.28, narcotic users OR = 1.16), gender [males were nearly 3 times more likely to die among narcotics users ( $p < .000$ ) and 1.6 times more likely to die among alcohol users ( $p < .01$ )] and reporting serious health problems (for alcohol users  $p < .000$ , for narcotics users  $p < .05$ ). Enhanced program and government efforts are needed to implement overdose-prevention efforts and different treatment modalities for both narcotic and alcohol users.

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## 1. Introduction

### 1.1. Mortality among those sentenced to compulsory care in Sweden

Many prior Swedish studies examining mortality of those sentenced to compulsory care tend to have small sample sizes (less than 140), represent specific geographic regions of the country or only examine mortality of those who completed their compulsory care sentence (SOU (Statens offentliga utredningar), 2011). For example, in 2012, a government report followed 4341 compulsory care completers and estimated that 5% had died within 12 months of completion of care and that this population had a mortality rate 6 times higher than the national population (Larsson & Leiniö, 2012).

Our study uses Swedish government institution register data to calculate death rates among those who received a sentence to enter compulsory care compared to the death rate of the general Swedish population. Secondly, the study uses government institution mortality data to identify causes of mortality. Finally, the study uses national register to identify client characteristics predicting mortality for two groups; those who stated that their primary substance abuse problem was alcohol related versus narcotics related. A large number of studies [summarized in a Swedish government report (SOU (Statens offentliga utredningar), 2011)] suggest that there may be significant differences in cause of death for those who are alcohol dependent and those who are narcotics dependent in Sweden. Our study provides policy makers, evaluators, and addiction treatment providers with results on: (1) the extent to which individuals who are sentenced to compulsory care are at higher risk of mortality compared to the general population; (2) the extent to which primary causes of mortality are substance use related; and (3) identifies client characteristics associated with mortality for clients who describe alcohol dependence as their

\* Corresponding author. Tel.: +1 617 358 5531; mobile: +1 508 246 0606.  
E-mail address: [tlhall@bu.edu](mailto:tlhall@bu.edu) (T. Hall).

primary problem and for those with narcotics dependence as their primary problem. Hence these findings will help inform future national level compulsory care program planning efforts.

### 1.2. Prior research on mortality specific to alcohol and narcotics users in the US and Sweden

In the United States, few studies have focused both on the mortality rates of alcohol and narcotics users and existing studies tend to focus on specific populations. For example, one study examined nationwide mortality rates of alcohol related deaths among the college-aged population (18–24 years of age). This study showed that 38% of deaths in this age group in 2001 were alcohol related (Hingson, Heeren, Winter, & Wechsler, 2005). Keyes, Liu, and Cerda (2012) found that Native American populations were more likely to die from alcohol related causes than any other race/ethnicity. Recent data from the US Department of Health and Human Services show that 29 deaths per 100,000 are a result of mortality attributable to alcohol and that for people 15–64 years of age in the US in 2005, alcohol was responsible for 55,974 deaths (46,461 for men; 9513 for women) representing 9.0% of all deaths (Shield et al., 2013).

As for narcotics mortality rates in the United States, many times this is studied in conjunction with comorbidity in specific populations, like veterans (Blow et al., 2012) or mothers (Hser, Kagihara, Evans, & Messina, 2012). Few studies have been able to specifically focus on mortality associated with narcotics use alone. Using the National Vital Statistics System, Paulozzi and Ryan (2006) found more broadly that in 2002, 92.2% ( $n = 16,394$ ) of unintentional drug poisoning deaths were due to “narcotics” per death certificates. This is largely attributed to non-medical use of pain relievers (SAMHSA, 2010). Data on mortality from the National Center for Health Statistics shows that in 2007, deaths resulting from opioid use were higher than deaths resulting from cocaine use (Warner & Chen, 2010). More specifically, those who died as a primary result of methadone use were significantly younger (aged 18–24) than those who had died from the use of other opioids, although the results show that both groups had reported past substance use and pain (Maxwell, 2011; Paulozzi et al., 2009). While motor vehicle death used to be the leading cause of death by injury in the United States, poisoning, most often by drug overdose, has now taken the top spot (Centers for Disease Control and Prevention, 2005). Similarly, drug use has been one of the leading causes of mortality, with approximately one drug overdose death per hour over the last two decades (European Monitoring Centre for Drugs and Drug Addiction, 2011) for young people in Europe. These rates should be conservative estimates, though, because death certificate data and Census Bureau data can many times underestimate the true number of deaths caused directly by alcohol or narcotics use (Wise, Bialek, Finelli, Bell, & Sorvillo, 2008).

The situation in Sweden, in some regards, is similar to the US. Of course, in Sweden, too, the mortality rates are significantly higher among narcotics users and heavy drinkers than in the general population. When it comes to narcotics, the mortality numbers can be calculated in slightly different ways. The Public Health Agency of Sweden (Folkhälsomyndigheten) specifies three different sources for calculating mortality: (1) The National Narcotics Index (Sweden’s official index for drug related deaths); (2) The International Index (this index only includes underlying causes of death and not always contributing causes of death, but serves as an indicator for comparisons between European countries); and (3) Toxreg, which is based upon forensic findings. The National Narcotics Index serves well for an illustration of narcotics related deaths in Sweden.

### 1.3. 1.3 Prior research on demographic, history of compulsory care use, physical care, mental health, addiction treatment and criminal justice status factors predicting mortality among individuals with a substance use disorder in the US and Sweden

There are no prior quantitative studies on client characteristics predicting mortality in those sentenced to compulsory care for a substance use disorder. Overall, in the US, age, gender (Rockett et al., 2012), socioeconomic status (Huie, Krueger, Rogers, & Hummer, 2003), low levels of physical activity (Lantz, Golberstein, House, & Morenoff, 2010) comorbid disorders (Saydah, Imperatore, & Beckles, 2013), minority status (Ly et al., 2012), being a public mental health client (Colton & Manderscheid, 2006), alcohol related problems (John et al., 2013), and length of time incarcerated (Patterson, 2013) are significant predictors of mortality across many different substance using populations. It has been shown in Sweden that age (Nyhlén, Fridell, Hesse, & Krantz, 2011; Storbjörk & Ullman, 2012), low levels of social networks (Sundquist et al., 2014), living alone (Sundquist & Johansson, 1997), low educational attainment (Sundquist & Johansson, 1997), self-reported poor health status (AfSillén, Nilsson, Månsson, & Nilsson, 2005; Burström & Fredlund, 2001; Larsson, Hemmingsson, Allebeck, & Lundberg, 2002; Sundquist & Johansson, 1997), having a chronic illness (Bardage, Isacson, & Pedersen, 2001), unemployment (Voss, Nyhlén, Floderus, Diderichsen, & Terry, 2004), and mental health issues (Weitoff & Rosen, 2005; Larsson, Hemmingsson, Allebeck, & Lundberg, 2002) are significant predictors of mortality across many different populations, including substance abusing populations.

## 2. Study aims

The aims of this study were to: (1) calculate mortality rates among individuals entering the Swedish compulsory care system between 2001 and 2009 and to compare those with the general Swedish population; (2) identify if diagnosed primary causes of death varied by primary substance use problem (alcohol or narcotics use); and (3) to identify individual level characteristics associated with mortality for alcohol and narcotics users.

To understand client characteristics associated with mortality bivariate and multivariable analyses were conducted. For clients reporting alcohol as their primary problem, we examined the relationship between age, gender, education, employment, age of first use of alcohol, number of times in compulsory care (1999–2009), number of times in compulsory care for individuals younger than 18 years (1999–2009), history of compulsory psychiatric care, number of voluntary inpatient and outpatient drug treatment episodes, history of conviction to psychiatric care as a result of a crime, history of serious physical health problems, and mortality by 2011. A second series of analyses were conducted examining, for clients reporting narcotics use as their primary problem, the relationship between age, gender, education, employment, whether heroin is the primary drug, age for first use of narcotic, number of years of heroin use, number of times in compulsory care (1999–2009), number of times in compulsory care for individuals younger than 18 years (1999–2009), history of compulsory psychiatric care, number of voluntary inpatient and outpatient drug treatment episodes, history of a conviction for a crime and history of conviction to psychiatric care as a result of a crime, history of serious physical health problems, and mortality by 2011.

## 3. Methods

### 3.1. Register databases

This secondary analysis of Swedish registry data used de-identified individual-level data from a database provided by the

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