Drug and Alcohol Dependence 147 (2015) 32–37

Contents lists available at ScienceDirect

Drug and Alcohol Dependence

journal homepage: www.elsevier.com/locate/drugalcdep

Mortality among older adults with opioid use disorders in the Veteran's Health Administration, 2000–2011☆

Sarah Larney[a,b,*], Amy S.B. Bohnert[c,d], Dara Ganoczy[c,d], Mark A. Ilgen[c,d], Matthew Hickman[e], Fred C. Blow[c,d], Louisa Degenhardt[a,f]

[a] National Drug and Alcohol Research Centre, University of New South Wales, Sydney, New South Wales, Australia
[b] Alpert Medical School, Brown University, Providence, RI, USA
[c] Department of Psychiatry, University of Michigan Medical School, Ann Arbor, MI, USA
[d] Veterans Affairs Center for Clinical Management Research, Ann Arbor, MI, USA
[e] School of Social and Community Medicine, University of Bristol, Bristol, UK
[f] School of Population and global Health, University of Melbourne, Melbourne, Victoria, Australia

ARTICLE INFO

Article history:
Received 11 July 2014
Received in revised form
26 November 2014
Accepted 13 December 2014
Available online 30 December 2014

Keywords:
Opioid dependence
Mortality
Aging
Veterans

ABSTRACT

Background: The population of people with opioid use disorders (OUD) is aging. There has been little research on the effects of aging on mortality rates and causes of death in this group. We aimed to compare mortality in older (≥50 years of age) adults with OUD to that in younger (<50 years) adults with OUD and older adults with no history of OUD. We also examined risk factors for specific causes of death in older adults with OUD.

Methods: Using data from the Veteran's Health Administration National Patient Care Database (2000–2011), we compared all-cause and cause-specific mortality rates in older adults with OUD to those in younger adults with OUD and older adults without OUD. We then generated a Cox regression model with specific causes of death treated as competing risks.

Results: Older adults with OUD were more likely to die from any cause than younger adults with OUD. The drug-related mortality rate did not decline with age. HIV-related and liver-related deaths were higher among older OUD compared to same-age peers without OUD. There were very few clinically important predictors of specific causes of death.

Conclusion: Considerable drug-related mortality in people with OUD suggests a need for greater access to overdose prevention and opioid substitution therapy across the lifespan. Elevated risk of liver-related death in older adults may be addressed through antiviral therapy for hepatitis C virus infection. There is an urgent need to explore models of care that address the complex health needs of older adults with OUD.

1. Introduction

Opioid use disorders (OUD) are associated with significant mortality. Regular and dependent opioid users die at nearly 15 times the rate of their age- and sex-matched peers, with a crude mortality rate of 2% per year (Degenhardt et al., 2011). Common causes of death include drug overdose, suicide, trauma, and AIDS-related illnesses. The relative contribution of specific causes of death to overall mortality varies with factors such as geography, background HIV prevalence and access to opioid substitution treatment (Degenhardt et al., 2011).

One factor plausibly affecting mortality in OUD that has received little research attention is aging. Observational cohort studies of people with OUD have demonstrated that, among those who survive into their fifties and sixties, ongoing opioid use (whether regular or occasional) is more common than long-term abstinence (Hser et al., 2007, 2001). In recent years, concomitant with the aging of the general population, there have been substantial increases in the numbers of older drug users. In the United States, an increasing proportion of first-time entrants to drug treatment programs are aged over 55, and the proportion of these reporting heroin as a problem drug is also increasing (Arndt et al., 2011). Projected continued increases in the number of older people with substance use

☆ Supplementary material can be found by accessing the online version of this paper. Please see Appendix A for more information.

* Corresponding author at: National Drug and Alcohol Research Centre, University of NSW, Sydney, NSW 2052, Australia. Tel.: +61 2 9835 0477.
E-mail address: s.larney@unsw.edu.au (S. Larney).

http://dx.doi.org/10.1016/j.drugalcdep.2014.12.019
0376-8716/

disorders (Han et al., 2009) suggest a need to better understand the health of this group, including mortality rates and causes of death as indicators of areas for intervention.

Although a small number of studies have reported that all-cause mortality rates increase with age (Degenhardt et al., 2009; Ødegård et al., 2007), there has been little analysis of how cause-specific mortality in older people with OUD may differ from that seen in younger cohorts. Deaths not directly related to drug use are more common among older people with OUD than their younger counterparts (Beynon et al., 2010; Ødegård et al., 2007); however, no studies on this issue have used a large enough sample to allow for further disaggregation of non-drug-related causes of death. As such, it is unclear what non-drug causes of death are most important as people with OUD age. It is also unclear if drug-related mortality among people with OUD decreases with age, and is replaced by non-drug deaths, or if non-drug deaths comprise an additional burden on people with OUD (Beynon et al., 2010; Ødegård et al., 2007).

A related question is how mortality in older people with OUD may be similar to, or differ from, mortality in same-age peers without OUD. It may be that aging-related increases in certain causes of death affect people with and without OUD similarly, and for these causes, mortality rates in older people with OUD may simply be as they are in older people generally. In one opioid-dependent cohort, cancer mortality was elevated compared to the general population in those aged 35–54, but at age 55 and over, there was no significant difference between opioid dependent persons and the general population (Randall et al., 2011). This may not be the case, however, for causes of death that are directly drug-related, such as overdose, or indirectly drug-related, such as HIV or liver disease subsequent to hepatitis C infection.

There are few data sources that permit direct comparisons of mortality between people with and without OUD, or that contain detailed information about comorbidities that may affect mortality. One possible avenue for examining these relationships with sufficient sample size are electronic health records (EHR) linked to cause-specific mortality record. One such source of data is the Veterans Health Administration (VHA). The VHA is the largest integrated health system in the United States and has long used EHR nationally to record demographic and diagnostic information for all treatment contacts of patients seen anywhere in the national WHA system. Recent efforts have led to the linkage of VHA EHR data with cause-specific mortality data from the Centers for Disease Control and Prevention's National Death Index. Veterans who receive care from the VHA are a particular population of interest for the study of OUD and mortality among older adults. Although many Veterans who receive care from VHA are from recent conflicts, the majority of VHA patients are older adults. Opioid prescribing is common in VHA (Bohnert et al., 2014), and VHA patients have a high rate of drug-related mortality (Bohnert et al., 2011a).

In light of the aging of the OUD population and the lack of knowledge of how aging may impact cause-specific mortality in this group, this paper aimed to (a) describe mortality in a cohort of older (≥50 years) adults with a history of OUD; (b) compare mortality in this cohort to that in younger (<50 years) adults with a history of OUD, and older (≥50 years) adults with no record of OUD and (c) determine risk factors for cause-specific mortality in older adults with a history of OUD.

2. Methods

This study was approved by the Institutional Review Boards of the Ann Arbor Veterans Health Administration (VA) and University of Michigan.

2.1. Data sources and linkage

Clinical data were obtained from the VA's National Patient Care Database (NPCD). The NPCD contains records of all clinical visits nationally in the VA system. The study cohort was defined as people with a lifetime diagnosis of an OUD in a 5% random sample of patients in the NPCD who were aged 50 years or over during FY2000-2011 (older OUD group). Individuals with an OUD diagnosis who reached 50 years during this time period entered the cohort on the date of their 50th birthday.

Two comparison cohorts were also defined. The first consisted of people with a lifetime diagnosis of OUD in a 5% random sample of patients in the NPCD who were aged under 50 years (younger OUD group). The second was an age- and sex-matched sample of VA patients aged 50 years or over during FY2000-2011, with no record of an OUD in the NPCD (older non-OUD group). In light of low rates of remission from opioid dependence, in each OUD group, we assumed ongoing OUD from the time of diagnosis to the end of follow-up (Calabria et al., 2010; Darke, 2011; Grella and Lovinger, 2012; Hser et al., 2001). This may bias mortality rates downwards, as drug-related mortality risk would decrease with cessation of opioid use.

In addition to patient demographics (sex, date of birth, race and ethnicity), data extracted from the NPCD for each participant were used to measure the Charlson Comorbidity Index (Quan et al., 2005) in the year prior to cohort entry (dichotomised as 0 or ≥1) and diagnoses recorded any time prior to or on the date of cohort entry. Included diagnoses were hepatitis C virus, HIV, chronic pain, headache, neuropathy, alcohol use disorder, non-opioid drug use disorder, mood disorder, post-traumatic stress disorder, other anxiety disorder and schizophrenia.

The NPCD data were linked to mortality data from the Centers for Disease Control and Prevention National Death Index (NDI) Plus database. Variables from the NPCD submitted for linkage with the NDI were Social Security Number, last name, first name, middle initial, date of birth, race/ethnicity, sex and state of residence. Previous linkages between the NPCD and NDI have found that 99% of deaths are matched on complete Social Security Number (Bohnert et al., 2011b). Data returned from the NDI were date and cause of death. Deaths were categorized by cause, using a framework adapted from Randall et al. (2009). ICD-10 codes used to categorize causes of death are provided in the supplementary materials.

2.2. Data analysis

Demographic and diagnosis differences between the older OUD group and each comparison group were assessed using the χ^2 test. All-cause and cause-specific crude mortality rates (CMRs) were calculated, along with 95% confidence intervals, for each group. The older OUD CMRs were divided by the younger OUD CMRs to produce rate ratios and associated confidence intervals. Mortality in the older OUD group was compared to that in the older non-OUD group to obtain all-cause and cause-specific standardized mortality ratios and 95% confidence intervals.

The final analysis included only the older OUD group. A competing risks Cox regression model (Lunn and McNeil, 1995) was generated, comparing the hazard of death from accidental drug-related causes, suicide, accidental injury (together, the three most common external causes of death in the cohort), liver-related causes, cardiovascular disease, cancer (together, the three most common disease-related causes of death) and all other causes of death. In order to create mutually exclusive categories, liver cancer deaths were excluded from the cancer category and included in the liver-related category. Hazard ratios are reported for the three most common external causes of death, and the three most common disease-related causes of death.

Statistical analyses were completed in SAS v9.3 (SAS Institute, Cary, NC). Given the large sample size and potential for type 1 errors, care was taken in interpreting associations that were statistically significant, but potentially spurious. Only those risk ratios and hazard ratios of 2.0 or greater, or 0.5 or less, with 95% confidence intervals excluding 1.0, were interpreted as being potentially clinically important (Grimes and Schulz, 2012).

3. Results

The older OUD cohort comprised 36.608 patients (97.3% male) with a median age of 55 years at cohort entry (Table 1). Compared to younger OUD, older OUD were more likely to be male and less likely to be Caucasian or 'other' race. By design, the older non-OUD patients were of the same age and sex as the older OUD patients; however, older OUD were more likely than older non-OUD to be African American.

Older OUD patients were significantly more likely than younger OUD patients to have a Charlson Comorbidity Index of greater than zero, and significantly more likely to have been diagnosed with hepatitis C, HIV, chronic pain, neuropathy, mood disorder and post-traumatic stress disorder. Younger OUD patients, however, were significantly more likely than older OUD patients to have been diagnosed with alcohol use disorder or non-opioid drug use disorder. Compared to older non-OUD patients, older OUD patients were significantly more likely to have a Charlson Comorbidity Index