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Suicide deaths by intentional self-poisoning in people with cardiovascular disease

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ABSTRACT

Objective: We aimed to characterize self-poisoning deaths in people with cardiovascular disease (CVD) and compare to other suicide decedent groups.
Methods: Suicide deaths by self-poisoning in people with CVD (n = 151) were compared to suicide deaths by other methods in people with CVD (n = 260) and suicide deaths by self-poisoning in people without CVD (n = 509). Sub-analysis of the CVD self-poisoning group compared people with depression and without depression. Toxicology reports were compared between intentional self-poisoning groups.
Results: A higher proportion of suicide deaths were due to self-poisoning in the CVD group compared to the non-CVD group. People with CVD were less likely to have any identified stressor (excluding medical stressor) prior to dying from self-poisoning compared to those without CVD. Female sex, past suicide attempts, living circumstances, and comorbid substance abuse were each significantly associated with self-poisoning as the method of suicide in people with CVD. Opioid, any antidepressants, benzodiazepines, and tricyclic antidepressants (TCAs) were commonly identified as lethal in people with CVD. Compared to people in the CVD self-poisoning without depression group, people in the CVD self-poisoning with depression group were more likely to have lethal levels of TCAs.
Conclusions: Our findings characterize suicide deaths in people with CVD, and identified notable differences based on method of death and presence of depression.

1. Introduction

Various medical illnesses have been identified as risk factors for suicide attempt [1–3] and suicide death [4,5]. The risk of suicide in people with physical illness appears to be higher in those with multiple medical comorbidities [5–8], recent and multiple hospitalizations for

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physical illness [6], a history of a psychiatric disorder, and in people who developed a psychiatric disorder after a medical illness diagnosis [9].

Several studies have described that 8 to 17% of individuals with cardiovascular disease (CVD) experience suicidal ideation, with rates varying based on the methodology of the study, how CVD was defined, the clinical setting and the screening tool used to assess suicidal ideation [10–13]. While it has been suggested that the association between CVD and suicidal ideation may be mediated by the presence of psychiatric illness [10,11], not all studies have reported this relationship [2,10,13].

Patients with myocardial infarction (MI) have been found to have a 3-fold increased risk of suicide compared to those without MI, even after adjusting for other medical comorbidities or psychiatric illness [14]. In a study conducted in Taiwan, people with acute coronary syndrome had an increased risk of suicide compared to the control group, which remained significant after adjusting for sociodemographics, physical comorbidities or psychiatric disorders [15]. Jia et al. (2014) found an increased risk of suicide in individuals with heart disease (O.R = 3.07) after adjusting for sex, age and presence of a physical illness other than the specified [8]. However; the risk was not maintained after further adjusting for marital status, education level, family annual income, and family history of suicidal behavior. The risk of suicide has been also found to be increased in the elderly with heart disease after adjusting for multiple factors including demographic and socioeconomic factors, physical comorbidity, and psychiatric disorders [5,7]. However, heart disease has not been consistently found as a risk factor for suicide in adults [16,17] or seniors [18,19] and at least one study finding a reduced suicide risk in men with ischemic heart disease compared to those without ischemic heart disease [20].

Evidence suggests there are several factors contributing to the risk of suicide in people with CVD, including psychological distress, physical disability and decreased function, negative expectations about the future, and depression [14,21]. Suicide is associated with psychiatric illness more often than not [22] and considering that a significant number of people develop depression/depressive symptoms after a MI [23,24], this is an important factor in this population. It has also been suggested that people with physical illness(es) can habituate to the fear of self-injury or dying since many of these patients are exposed, often repeatedly, to pain or medical interventions and this could attenuate these fears [9].

Self-poisoning is the second most common method of suicide in Canada and the United States [25,26]. A small number of studies have described suicide methods in people with physical illnesses who died from suicide. Juurlink et al. (2004) found that 21% of elderly suicide decedents with physical illness died by self-poisoning [5]. Studying suicide deaths across Denmark, Qin et al. (2014) found that among suicide cases, those with physical illness died significantly more often from self-poisoning compared to people without a recorded physical illness (38% vs. 32%, $p < 0.0001$) [9]. We previously reported that 60% of females and 26% of males with CVD and comorbid depression who died from suicide, died from self-poisoning [21].

Overall, there is a paucity of studies fully characterizing these groups and examining suicide methods in the physically ill. Furthermore, data describing the substances or medications present and/or lethal in blood at the time of death in this population is generally lacking. Based on prior work done by our group and others, we hypothesized there would be a number of differences between the CVD and non-CVDs groups that died by self-poisoning. These reflect differences in access to potentially more lethal medications, greater physical vulnerability to the effects of self-poisoning, as well as differences in precipitants to suicidal behaviour such as distress, disability and comorbid depression. While such data would not assist in the assessment of risk of suicide in people with CVD, the information could add to the developing literature trying to fully characterize and understand this group of suicide decedents. In the future, sufficient information may be obtained to help guide suicide prevention approaches for those groups, for instance, by having physicians consider a patient's access to medications that could potentially be lethal in self-poisoning. It is also important to identify whether there are specific factors contributing to self-poisoning method in people with CVD, again as a foundational step to developing targeted suicide prevention approaches. Our study examines these data in a sample of suicide decedents with CVD and comparison groups.

2. Methods

2.1. Study design

Data from The Office of the Chief Coroner (OCC) of Ontario charts were collected for all deaths occurring in the city of Toronto from 1998 to 2012, inclusive, that were ruled as suicides. Each chart contained a coroner's investigation report, a pathology report, and a toxicology report as part of the determination of the cause of death. We did not include deaths considered indeterminate with respect to suicide as the cause. The coroner's report also contains transcripts of interviews with family members and acquaintances; letters from family members; police reports; physician's and hospital records; and copies of suicide notes when available. This methodology is similar to previous studies [27,28]; it is well validated but distinct from psychological autopsy studies in that, given the high volume of cases, it was not possible to directly interview people close to the deceased. Sociodemographic and clinical data, as well as suicide relevant details were present in > 99% of coroner's records.

The deceased was considered to have CVD if the coroner recorded the presence of CVD anywhere in the full report. This could have been derived from the investigation (e.g., Mr. Smith was known to have had an MI last year), medical records or interviews with treating physicians, or autopsy results. We recorded CVD if there was any mention of heart attack (history of or recent event), “heart condition”, or more specifically if cardiovascular disease, atherosclerosis, or congenital heart condition were noted in the coroner's report.

Other data extracted from the charts included, (A) Demographics: age, sex, marital status and living circumstances (living with others or alone); (B) Clinical variables:, depression (as indicated by a prior history and/or treatment of depression, or any collateral (family/friend/other) statement indicating that, for example, the decedent appeared to be “depressed” in the days leading up to their death), substance abuse history (including alcohol, drugs, or both), known past suicide attempts, contact with psychiatric or emergency services in the week prior to death; (C) Recent stressors *for the previous year to the suicide:* employment/financial, interpersonal stressor (conflict or relationship breakup), medical/health (Cancer, Other Medical Illness including Infections, Broken Bones, Other Serious Conditions or Conditions Necessitating a Recent Hospital Visit, Diminishing Health, Disability or Illness of Other, Loss of Independence as Evidenced by Suggested/Actual move to Nursing Home or Driver's License Suspension, Vision Deterioration/Loss), police/legal, bereavement; (D) Details of suicide: method, location of death and presence of a suicide note.

The self-poisoning cases were included based on the coroner's determination that the self-poisoning was intentional and independently sufficient to cause death, therefore no toxicology data were available for the CVD group who died by suicide using other methods. Toxicology reports included information on the level (present or lethal) and distribution of psychotropic medications, non-psychotropic medications, over the counter medications, alcohol, illicit substances, and poisons. Such determinations are complex, as they can depend on the individual's medical history as well as the timing of the collection of the blood and/or urine sample. We relied exclusively on the pathologists' expert determination of the presence and/or lethality of specific substances in each case.

People dying from suicide were grouped according to the presence