H.L. Holley · G. Fick · E.J. Love

Suicide following an inpatient hospitalization for a suicide attempt: a Canadian follow-up study

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Abstract This study contributes a Canadian perspective to a growing body of international studies examining suicide among cohorts of suicide attempters, and a much more limited literature on the epidemiology of suicide in Canada. We evaluated the 13-year mortality experience of a regional cohort of 876 first-ever inpatient hospital admissions for a suicide attempt admitted between 1979 and 1981. Compared to the general population, study subjects were 4 times more likely to die of any cause, but 25 times more likely to commit suicide and 15 times more likely to die of accidental or adverse causes. Ten years after the first hospitalization for attempted suicide, 5.9% of study subjects had committed suicide. Baseline age appeared to be a risk factor for women, but not for men. Women under 60 years had the best 10-year survival (3.6% had committed suicide) and women over 60 years had the poorest (17.5%). A total of 8.7% of men under 60 years and 10% of those over 60 years committed suicide within 10 years. The remainder of the analysis focused on those under 60 years of age at the time of their index inpatient hospitalization. Three factors were prognostic for suicide: being male, which had a relative risk (RR) of 5.0, living in a lower income area (RR = 3.2), and having used a violent method during the index attempt (RR = 2.5). The periods of greatest risk for suicide were within the 1st and 4th years following first-ever inpatient hospitalization, with the 4th year representing the time of highest risk. The identification of time periods subsequent to first-ever hospitalization when patients are at greatest risk of suicide can be used to guide the timing and duration of clinical interventions and aftercare to ensure that patients are appropriately supported during periods of highest risk.

Introduction

Clinical and scientific interest in prognosis for suicide following a suicide attempt has been high. One aim has been to identify the point in time when risk is imminent in order to ensure that treatment and prevention efforts are appropriately targeted [1]. Toward this end, the first large studies of suicide among suicide attempters were conducted in the United States [2, 3], followed by others conducted in the United Kingdom [4–7], Scandinavian countries [8–11], and, most recently, other countries in Europe [12, 13]. The present study contributes a Canadian perspective to this growing body of international work and to the much more limited body of knowledge on the epidemiology of parasuicide in Canada [14].

More specifically, this paper describes the mortality experience of a cohort of persons undergoing their first-ever inpatient hospitalization for a suicide attempt who followed over a 13-year period. Suicides, deaths from accidental or adverse causes, and natural deaths are compared to the general population to determine the magnitude of increased risk experienced by study subjects. Natural deaths refer to deaths associated with disease processes that are not a result of suicide, accident, or other adverse cause (such as homicide). Next, the 10-year cumulative suicide mortality is described for the study cohort as a whole, and for pertinent age and gender groupings, followed by an assessment of putative psycho-social prognostic factors. Finally, the rate of suicide over time is examined to identify the periods of highest risk for suicide subsequent to a first hospitalization following a suicide attempt.
**Methods**

**Study design**

A consecutive series of individuals who were residents of Southern Alberta having a first-ever inpatient admission to any acute care general hospital in Calgary for a suicide attempt between 1979 and 1981 was followed for a maximum of 13.3 years.

**Cohort assembly**

A key requirement for a prognostic study is that the study subjects share a common “zero time,” defined as the same well-defined location along the course of the condition being studied. This has been variously defined in terms of first onset of symptoms, first diagnosis, or first treatment [15]. The number of prior suicide attempts has been shown to be a key predictor of subsequent suicide in hospital populations; the greater the number of previous attempts, the greater the risk [16]. Therefore, we defined a common zero time as constituting first-ever inpatient hospitalization for a suicide attempt, thus excluding individuals having a previous inpatient hospitalization for a suicide attempt.

Hospital administrative data from five hospitals were used to identify patients having a final ICD9 (Clinical Modification) diagnosis indicating a suicide attempt (E950 codes) [17]. Individuals having a prior inpatient hospitalization for a suicide attempt were identified using two procedures. First, hospital records of all potential study candidates were reviewed in detail. Admission histories, consultation notes, nursing notes, and discharge summaries of all admissions contained on the chart were scrutinized for any report of an inpatient hospitalization for a suicide attempt predating the study. The remaining eligible individuals were then cross-checked in the computer systems of all study hospitals to rule out previous suicide-related inpatient admissions that may not have been documented in the clinical notes. Matching was based on name, date of birth, and, when available, health care number. Less than 1% of the subjects were excluded as a result of the second-level cross-checking, suggesting that the cumulative clinical notes provided a relatively complete picture of past inpatient hospitalizations.

A total of 1572 charts of individuals having a final diagnosis including an E950 suicide code were reviewed. Of these, 876 (55.7%) patients experienced their first-ever inpatient hospitalization for a suicide attempt during the study years, so were included for study. Of those remaining, 507 (32.3%) had a previous inpatient hospitalization for a suicide attempt. 121 files (7.7%) had been misdiagnosed with respect to either the final diagnosis (i.e., were not suicide attempts), or the inpatient status (i.e., were outpatients); 27 (1.7%) made minor suicide attempts while hospitalized for another reason (usually a psychiatric illness); and 7 patients (0.4%) had been counted more than once in the hospitalization data, having been admitted to more than one hospital. Finally, 34 subjects (2.2%) were excluded for miscellaneous reasons including insufficient chart documentation to permit follow-up, court-ordered admissions for a forensic assessment, or misfiled charts which could not be located.

**Follow-up**

Follow-up varied from 1 day (when death occurred as a result of the index attempt), to 13.3 years. Both provincial and national mortality searches were conducted. Locally, hospital records in the five study hospitals were read to identify subsequent deaths. Secondly, subjects were tracked through available provincial computerized motor vehicle and correctional services registries. Individuals having a valid driver’s license were considered to be alive on the date the most recent license was issued. Similarly, individuals who were charged with a criminal offense were considered to be alive as of the date of the most recent court appearance.

Finally, the provincial files of the Chief Medical Examiner were reviewed for vital status and manner of death.

A computerized file containing all study information, the presumed vital status, and the last date known to be alive or presumed dead was then forwarded to Statistics Canada for follow-up through the National Mortality database. This database covers all deaths in the country and, at the time of this research, was complete up to 31 December 1988. Vital status and endpoints collected through the provincial search provided Statistics Canada staff with independently gathered information to assess the validity of their own record linkage procedure. Few discrepancies occurred, and these were resolved by returning to hospital files to look for errors in dates, or variations in name spellings. There was only one subject identified as deceased in the provincial search whose death remained unconfirmed by Statistics Canada. The vital status of this subject was determined from the Motor Vehicles Administration Database, which includes reports made by relatives of decedents. Although not specified, it is possible that this person died outside of Canada. As this could not be confirmed, this individual was included in the analysis only until the last date known to be alive and treated as a censored observation thereafter.

To protect the confidentiality of subjects, project staff conducted all provincial follow-up searches and no confidential information was released to any provincial agency. Identification information that was released to Statistics Canada was purged from the linked data file before being returned to the investigators. This made it impossible to identify any individual in the dataset. This procedure received ethical approval from The University of Calgary Conjoint Biomedical Ethics Committee, the Provincial Solicitor General’s Department (for access to both motor vehicles and correctional databases), the Office of the Chief Medical Examiner, and Statistics Canada.

**Prognostic data**

Prognostic data at baseline were abstracted from the hospital records using a standardized data collection form designed for this purpose and pretested on 100 records. Research assistants underwent reliability testing using 25 of the records that were coded during the pretest. Weekly meetings were held to clarify emerging issues and prevent coding drift.

Social and clinical factors were chosen for study if prior literature revealed them to be risk factors for suicide, and if they could be reliability abstracted from the health record using the standardized protocol. These reflected baseline characteristics and included gender, age group (under 21; 21–30; 31–40; 41–50; 51–60; over 60), marital status (married/common-law; living alone), ethnic background (Caucasian; non-Caucasian), most responsible diagnosis (grouped according to ICD9 codes into psychotic disorders; depressive disorders; other disorders; no diagnosis recorded), psychiatric comorbidities (multiple comorbidities; single comorbidity; no diagnosis), physical comorbidities (yes; no), prior non-hospitalized suicide attempts (yes/no or unknown), prior inpatient psychiatric admissions non-suicide related (yes/no or unknown), alcohol as a factor in the suicide attempt as identified on the paramedic or emergency room report (yes/no), and violent suicide method (e.g., gun, explosives, hanging, jumping, etc). Because depressive symptoms are considered to be strongly predictive of suicidality, ‘depressive disorders’ were defined in their broadest sense to include any non-schizophrenic disorder in which the primary feature was a disturbance of mood, regardless of the etiology. This category included presenile and senile dementia with depressive features (290.13, 290.21), arteriosclerotic dementia with depressive features (290.43), affective psychoses (296), depressive-type psychoses (298.0), neurotic depression (300.4), affective personality disorder (301.1), acute reaction to stress with predominant disturbance of emotions (308.0), brief depressive reaction (309.0), prolonged depressive reaction (309.1), adjustment reaction with mixed emotional features or disturbance of emotions (309.28, 309.4), depressive disorders not elsewhere classified (311), and misery and unhappiness disorder (313.1). Psychoses included codes for...