



Self-poisoning with medications in adolescents: a national register study of hospital admissions and readmissions

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ABSTRACT

Objective: To examine characteristics of hospital admissions and risk factors associated with rehospitalization for self-poisoning with medications in adolescents aged 10–19 years.

Method: This study used data from the Norwegian Patient Register from 2008 to 2011. The main outcome was hospital readmission within the observation period. A complementary log–log regression model was used to assess the effect of characteristics at index hospital admission on readmission.

Results: Of 1497 patients, 76.4% were females and 89.8% were aged 15–19 years. At their first hospital admission, about one third received a secondary psychiatric diagnosis. Females (47.5%) were registered with an E-code for intentional self-harm more often than males (33.7%), and females were more often than males discharged to further treatment (27.8% vs. 21.5%). As many as 18.4% were rehospitalized for self-poisoning by medications. Significant predictors for hospital readmission were female sex [hazard ratio (HR)=2.4, 95% confidence interval (CI) 1.7–3.6], discharge to further treatment (HR=2.3, 95% CI 1.8–2.9) and psychiatric secondary diagnoses (HR=1.5, 95% CI 1.2–1.9).

Conclusion: This national study demonstrated significant sex differences in adolescents treated in hospital for self-poisoning with medications. Psychiatric secondary diagnoses had a strong predictive effect on readmission, which indicates the importance of psychiatric/psychosocial assessment of adolescents who are admitted to hospital for self-poisoning with medications.

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1. Introduction

Adolescents who ingested a harmful dose of medications are frequently seen in acute hospital settings in Western countries [1,2]. Most of these young patients are females in their late adolescence [1,3,4]. Nonopioid analgesics, such as paracetamol, are the most common substances ingested, but benzodiazepines, antidepressants and antipsychotics are also used [3,5,6]. Significant sex differences have been found regarding suicidal intent [1], psychiatric disorders and place of discharge [7].

Usually, hospital-treated cases of adolescent self-poisoning represent either overdoses with recreational drugs or intentional self-harm [4] where the individual purposely ingests a substance in excess of the prescribed or generally recognized therapeutic dosage [8]. Both types are associated with current psychiatric problems [6,9] and increased risk of developing psychiatric disorders [10], premature death and

suicide [4,11]. The risk of a fatal outcome, from poisoning or other causes, is further enhanced among those who repeat their self-poisoning behavior [12,13]. Furthermore, repeated self-poisonings represent severe psychological distress for the adolescents and their families as well as use of substantial amounts of health care resources [14]. Previous studies found that about one-third of the adolescents who were admitted to hospital for self-poisoning had a history of previous self-poisoning(s) [15] and 15%–20% were readmitted within 6–12 months for subsequent self-poisoning(s) [15,16]. However, these studies included only cases defined as intentional self-harm and cannot be generalized to the total population of adolescents who visit hospital for self-poisoning. Other studies found that 6%–7% were rehospitalized within one year, but these studies were completed two decades ago and limited to hospital activity data from only one city-region [11,17]. There is a lack of studies examining risk factors for hospital readmission for self-poisoning in adolescents in a national population-wide context. Targeted treatment and prevention strategies depend on updated and representative data of what characterizes those adolescents who self-poison with medications. In particular, those adolescents who repeatedly self-poison form a high-risk population yet are little studied;

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thus, more knowledge is needed to inform clinicians about factors associated with rehospitalization.

The current study extended the research on adolescent self-poisoning with medications by using national data from the Norwegian Patient Register (NPR) of hospital admissions from 2008 to 2011. We identified all adolescents aged 10–19 years who were admitted to hospital for acute self-poisoning with medications irrespective of the apparent purpose of their act [18]. Side effects or unanticipated reactions from medications taken correctly were not included, nor were poisonings with substances predominantly used for nonmedical reasons (such as pesticides or rodenticides) or intoxications due to addiction [19].

The aims of the study were (a) to examine the characteristics (sex, age, E-code for intentional self-harm, psychiatric disorders) and management (lengths of hospital stay and place of discharge) of hospital admissions for self-poisoning in those aged 10–19 years and (b) to examine whether or not these factors were associated with hospital readmission for self-poisoning.

2. Method

The NPR contains data on all hospital admissions and outpatient consultations in Norway. In Norway, nearly all of the hospitals are publicly funded, and all Norwegian citizens are covered by public health insurance which provides access to free medical treatment. The NPR was used to retrieve all cases of acute hospital admissions from 2008 to 2011 for individuals aged 10–19 years with a primary diagnosis of self-poisoning with medications. The primary diagnosis describes the condition that health care is mainly provided for during the hospital stay or consultation. If more than one condition is topical, the one that has required the largest proportion of medical resources is recorded as the primary diagnosis. Secondary diagnoses describe conditions that exist simultaneously with the main condition or that develop during the treatment period, and which are subjected to examination and treatment, which must be taken into account or which has consequences for the patient management [20]. Diagnostic coding was done locally by each hospital and entered into the Norwegian Patient Registry.

In the current study, self-poisoning is defined as “poisoning by drugs, medicaments and biological substances” according to the Norwegian version of the World Health Organization (WHO)’s *Tenth Revision of the International Statistical Classification of Diseases and Related Health Problems* (ICD-10). In the Norwegian classification system, these poisonings are coded as “T4n,” a generic code covering about 125 specific codes of poisonings including T36–T40, T42–T49 and T50. A supplementary classification, referred to as E-code, is intended to be used to indicate the nature of the condition [19]. From the available data, it was impossible to identify cases of poisoning that could have been inflicted on the person by others, but their numbers are negligible [21].

The period of adolescence is defined by the WHO as 10–19 years of age [22]. Previous research found differences in the hospitalization rates for self-poisoning between adolescents in early and late adolescence [1]. Thus, we separated the adolescents into two groups: 10–14 years and 15–19 years, consistent with previous literature [4,9,23].

For each adolescent, the first recorded hospital admission with a principal diagnosis of acute self-poisoning in the years 2008–2011 was termed the “index” hospital admission. An encrypted version of patient’s Norwegian personal identification number was used to capture all repeated hospital admissions for acute self-poisoning from 2008 to 2011. Admissions that occurred within 1 day of the previous hospital admission were excluded to avoid counting transfersals between hospital departments as recurrent hospital admissions. Patients who had two or more hospital admissions from 2008 to 2011 were then counted as repeaters.

We examined index hospital admissions for self-poisoning in relation to sex and age groups, psychiatric secondary diagnoses, E-code (external cause of injury) for intentional self-harm, length of hospital stay (0 day versus 1 day+) and discharge to the home versus further

treatment, including hospital psychiatric department, hospital department for treatment of drug addiction or “other” health care institution (unspecified). We then examined the bivariate association between respective sex and age groups and the following: psychiatric secondary diagnoses, E-code for intentional self-harm, length of hospital stay and place of discharge at the index hospital admission. Lastly, we examined the association of each covariate with hospital readmission in univariate and multivariate analyses.

The project used anonymous register data with no personal information that could be linked to the patients and, therefore, was not submitted to the Regional Committees for Medical and Health Research Ethics and did not require a license from the Data Inspectorate to process sensitive personal data [24].

3. Statistical considerations

Standardized incidence rates by age and sex with 95% confidence intervals (CIs) were calculated using direct standardization method and population numbers from Statistics Norway [25]. Differences in hospitalization rates between the two sexes and age groups were tested by Poisson regression and reported as incidence-rate ratios (IRR). Bivariate associations were tested using Pearson χ^2 test; P values $\leq .05$ were considered statistically significant. A complementary log–log regression was used to fit discrete-time intervals for hospital readmission for self-poisoning in the period 2008–2011, estimating hazard ratios (HRs) with 95% CIs for covariates having an effect on readmission. Information on the specific dates of hospital presentation was not available; the time variable was only available in calendar years. Therefore, the analysis time scale was calendar years from index hospital admission to readmission. The time interval was set to 0, 1, 2 or 3 years if the patient had a recurrent hospital stay in the period. A time interval of 0 meant that readmission took place in the same year as the index hospital presentation. Change of status was an event. If the patient was not readmitted in the period, time was computed to the end of the period, and status was censored (i.e., it was set to 0). Stata Survival Analysis and Epidemiological Tables Reference Manual [26] was used as a guideline to create the auxiliary variables needed to run the complementary log–log regression model. The crude and adjusted hospital readmission rates were allowed to vary from year to year over the observation period. Additionally, an offset variable was created to adjust for the fact that, on average, a patient was under risk of readmission only half a calendar year after the index admission because admission could occur at any time during the year. The analyses were carried out in STATA/IC version 13 for Windows.

4. Results

From the year 2008 through 2011, 1497 patients aged 10–19 years were recorded in the Norwegian Patient Register on one or more occasion(s) with a primary diagnosis of self-poisoning with medications. These patients had in total of 2123 hospital admissions for self-poisoning with medications within this time period. There were no statistically significant differences in incident numbers of hospital admissions across the calendar years from 2008 to 2011.

The 1497 adolescents who were admitted to hospital for self-poisoning correspond to an age- and sex-standardized hospitalization rate of 59.6 per 100,000 persons per year (95% CI 55.6–62.6) for the

Table 1

Hospitalization rate (per 100,000 persons per year) for self-poisoning with medications (primary diagnosis) in adolescents aged 10–19 years in Norway 2008–2011.

	Female hospitalization rate (95% CI)	Male hospitalization rate (95% CI)	Total hospitalization rate (95% CI)
Age group			
10–14 years old	20.4 (16.8–24.0)	4.3 (2.7–5.9)	12.1 (10.2–14.1)
15–19 years old	166.5 (156.4–176.7)	49.3 (44.0–54.7)	106.2 (100.6–111.9)
All ages	94.0 (88.6–99.4)	27.0 (24.2–29.9)	59.6 (55.6–62.6)

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