The impact of psychiatric illness on suicide: Differences by diagnosis of disorders and by sex and age of subjects

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ABSTRACT

People with a psychiatric illness are at high risk for suicide; however, variation of the risk by patients' sex and age and by specific diagnosis needs to be explored in a more detail. This large population study systematically assesses suicide incidence rate ratio (IRR) and population attributable risk (PAR) associated with various psychiatric disorders by comparing 21,169 suicides in Denmark over a 17-year period with sex-age-time-matched population controls. The study shows that suicide risk is significantly increased for persons with a hospitalized psychiatric disorder and the associated risk varies significantly by diagnosis and by sex and age of subjects. Further adjustment for personal socioeconomic differences eliminates the IRRs associated with various disorders only to a limited extend. Recurrent depression and borderline personality disorder increase suicide risk the strongest while dementia increases the risk the least for both males and females. The influence of various disorders generally weakens with increasing age; however, there are important exceptions. Schizophrenia affects people aged ≤35 years the strongest in terms of both IRR and PAR. Recurrent depression increases suicide risk particularly strong in all age groups and the associated PAR increases steadily with age. Borderline personality disorder has a strong effect in young people, especially those ≤35 years. Alcohol use disorder accounts the highest PAR of suicides in males of 36–60 years old. For the elderly above 60 years old, reaction to stress and adjustment disorder increases the risk for suicide the most in both sexes. These findings suggest that approaches to psychiatric suicide prevention should be varied according to diagnosis and sex and age of subjects.

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1. Objectives of the study

Suicide in people with psychiatric illness is a major health concern in many countries. Evidence, from both clinical and population-based studies, has consistently demonstrated that patients with various psychiatric disorders are at an excess mortality of suicide (Harris and Barraclough, 1997) and that a history of psychiatric illness is the strongest risk factor for suicide in the general population (Cheng, 1995; Foster et al., 1997; Hawgood and De Leo, 2008; Oldham, 2006; Osborn et al., 2008; Saha et al., 2007). Our previous studies, based on data from Danish national population registers, have confirmed these findings and further indicated a significant gender difference in suicide risk associated with a history of hospitalized psychiatric illness (Qin et al., 2000; Qin and Nordentoft, 2005; Qin et al., 2003). Meanwhile, it has been evident that suicide risk in relation to psychiatric illness differs according to diagnosis, e.g., from schizophrenia, depression

to substance use disorders (Burcusa and Iacono, 2007; Harris and Barraclough, 1997; Qin and Nordentoft, 2005).

In general, the impact of psychiatric illness on suicide differentiates by important factors such as specific diagnosis of disorders, sex and age of patients. Systematic studies taking these factors into consideration could provide valuable insights for making strategies to reduce suicidal behavior among this high risk population. In the present study I extend our early research to investigate in a more detail suicide risk in relation to psychiatric illness according to specific diagnosis of disorders and by sex and age of subjects. I also want to assess diagnosis-specific population attributable risk (PAR) — a measurement that takes into account both the effect size on suicide and the prevalence of exposure in the population.

2. Materials and methods

2.1. Settings

This study is based on the entire 5.2 million population of Denmark (Pedersen et al., 2006), a country where hospital treatment is free of charge for all residents. Individual data were

retrieved from several Danish longitudinal registers including the Cause-of-Death Register (Juel and Helweg-Larsen, 1999), the Danish Psychiatric Central Register (Munk-Jorgensen and Mortensen, 1997), and the Integrated Database for Labour Market Research (so-called IDA Database) (Danmarks Statistik, 1991). Details about these registers were described elsewhere in our previous studies (Qin et al., 2003).

Briefly, the Cause-of-Death Register (Juel and Helweg-Larsen, 1999), records cause and date of all deaths in Denmark with computerized data available from 1969 and onwards. The Danish Psychiatric Central Register (Munk-Jorgensen and Mortensen, 1997) covers all psychiatric facilities in Denmark and cumulatively records all admission and discharge information with computerized data since 1969. Diagnoses of illness and causes of death in Danish medical registers are coded according to the 8th edition of the International Classification of Diseases (ICD-8) until the end of 1993 and according to the 10th edition (ICD-10) thereafter. In general, diagnoses of psychiatric illness are made by psychiatrists but are not systematically validated against research diagnostic criteria according to ICD-10/DSM IV (Munk-Jorgensen and Mortensen, 1997). Before the data are transferred to the Danish Psychiatric Central Register, the data undergo intensive validation from psychiatric hospitals, departments, outpatient clinics, and community psychiatrists (Munk-Jorgensen and Mortensen, 1997). Mortality data, collected by the Danish National Board of Health, is based upon information from the death certificates which are filled in by physicians (Juel and Helweg-Larsen, 1999). In case the cause of a death is uncertain, the police will require a forensic medical examination. In accordance to previous studies on suicide in Denmark, I included only suicide cases for which the coroner's verdict was "suicide" by contrast to some studies from other countries that include cases of undetermined cause.

The IDA Database (Danmarks Statistik, 1991) contains longitudinal information on labor market conditions and socio-demographic information for all residents in Denmark from 1980 and onwards. Personal data on socioeconomic status for a given calendar year are complete only for persons who are living in Denmark on December 31st of that year. The personal identifier (the so-called CPR-number), assigned to all Danes at birth and to new residents of Denmark (Pedersen et al., 2006), was used as a key to retrieve and merge individual data from different register databases.

2.2. Study subjects

From the Cause-of-Death Register, all definite suicides in Denmark from the year 1981–1997 were identified (codes E950-959 in ICD-8 or X60-84 in ICD-10). Subjects who were not residing in Denmark on December 31 of the preceding year were not included because their socioeconomic data in the IDA database were incomplete. The final cases comprise 13,681 male and 7488 female suicides which accounts for 99.64% of the total suicide deaths in Denmark during the study period.

Through a nested case–control design (Clayton and Hills, 1993), up to 20 live controls per suicide case, matched for sex, age and date of suicide, were recruited from the general population in Denmark. To make the selection process manageable and to minimise the computational burden, controls were randomly drawn from a 5% representative sample of the national population. If more than 20 eligible controls were available for a suicide case, 20 controls were randomly chosen from that group. In a few cases of suicide involving people older than 93 years, it was not possible to find 20 controls, then all available controls were included. With this risk set sampling procedure, 273,371 male and 149,757 female population controls were enrolled into the study.

2.3. Data on psychiatric disorders and confounders

Personal data on psychiatric illness from April 1, 1969 to the date of suicide or index match date of controls were retrieved from the Danish Psychiatric Central Register. In order to minimize the complexity of co-morbidity handling, I considered only the main diagnosis at the most recent psychiatric hospitalization prior to the time of suicide or matching. The disorders were categorized into 13 diagnostic groups, as shown in the panel (Table 1), primarily according to the ICD-10 chapter heading groups about psychiatric illnesses. Conversion from ICD-8 codes to ICD-10 codes was made according to the WHO recommendation (World Health Organization, 1994) in combination with the Danish Disease Classification System (Sundhedsstyrelsen [The Danish National Board of Health], 1988). ICD-9 was never used in the Danish medical system.

Personal information on marital status (living as a single, cohabitating or being married), income level (categorized into quartiles according to the sex-age-specific income levels in the population) and place of residence (the Capital and its suburbs, provincial cities or the rest area of the country) was considered for adjustment because these variables were highly associated with both suicide and mental illness in Denmark (Byrne et al., 2003; Kessing et al., 2003; Mortensen et al., 2003; Qin et al., 2003). Data on these variables were retrieved from the IDA database based on the records in the preceding year of suicide.

2.4. Statistical analysis

The risks of suicide associated with various psychiatric disorders were computed using conditional logistic regression with the PhReg procedure in SAS version 9 (SAS Institute Inc., NY). Because the comparison controls were randomly sampled from individuals at risk for suicide at the time, i.e., risk set sampling, the estimated odds ratios in this study are unbiased estimates of incidence rate ratios (IRR) (King and Zeng, 2002). The estimates were calculated separately for males and females because our early study (Qin et al., 2003) indicated that the influence of psychiatric history on suicide differed significantly by sex. Crude IRRs were adjusted for age and

Table 1
ICD codes used for categorization of diagnostic group of psychiatric disorders.

Diagnostic groups	Codes in ICD-8, 1969–1993	Codes in ICD-10, 1994–1997
Schizophrenia	295	F20, F25
Other schizophrenia spectrum disorders	297, 298.2, 298.3, 298.8, 298.9, 301.0, 301.2	F21-F24, F26-F29, F60.0, F60.1
Bipolar disorders	296.1, 296.3	F30, F31
Recurrent depression	296.2, 296.8, 296.9	F33
Other affective disorders	296.0, 298.0, 298.1, 300.4, 301.1	F32, F34-F39
Borderline personality disorders	301.3, 301.83	F60.3
Other personality disorders	301.4–301.7, 301.8 (excl. 301.83), 301.9	F60.2, F60.4-F60.9, F61
Reaction to severe stress or adjustment disorders	307	F43
Other anxiety disorders	300.0, 300.2, 300.3	F40, F41, F42
Substance use disorders	304, 294	F11-F19
Alcohol use disorders	303, 291	F10
Dementia	290, 293.0, 293.1, 293.4, 293.9	F00-F03
Other psychiatric disorders	codes not listed above	codes not listed above