Change in suicide rate attributable to individual's treatment with antidepressants

By

Annette Erlangsen[1], Vladimir Canudas Romo[2],
and Yeates Conwell[3]

[1] National Centre for Register-based Research, University of Aarhus, Denmark
[2] Population Research Institute, the Pennsylvania State University, Pennsylvania, USA
[3] Center for the Study and Prevention of Suicide, Psychiatry, University of Rochester Medical Center, New York, USA

Abstract

The objective of the present study is to decompose the suicide rate in the order to determine how large a proportion of the decrease in the rate over time can be attributed to individuals being in specific types of treatment for mood disorders. The study population consists of all Danes aged 50+ during 1995-2000. The subjects are grouped according to treatment status (SSRI, tri-cyclic anti-depressants, no current treatment). The suicide rate of the population under study is decomposed into different components. The first component accounts for changes in the suicide rate due to changes in the age structure of the population and the second component accounts for changes in suicidal behavior by treatment group. Following this procedure the actual suicide rate of each treatment group is calculated.

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Background

During the past decades the suicide rate has decreased in many industrialized countries. Over the same period a new type of medical treatment has been available for persons suffering from mood disorder. As mood disorders are considered as one of the strongest known predictors for suicide,[1 2] several studies have pointed at the relation between the decreasing suicide rate and the increased use of new types of anti-depressants, such as selective serotonin reuptake inhibitors (SSRIs).[3 4] Various studies have focused on this association. However, the relation has previously only been examined at an aggregate level by studying the suicide rate for the entire population and an aggregated yearly number of sold SSRI packages. Based on such studies it is difficult to conclude whether the suicidal behavior has actually declined among the person who received treatment with SSRIs.

Older adults have the highest suicide rates of all age groups in many countries.[5 6] It is also the population subgroup with the highest consumption rate of SSRI.[7] It is therefore highly relevant to examine to which extend the decline in the suicide rate can be attributed to a decreased suicidal behavior among older adult in SSRI treatment. Similar problems are found in the study of changes over time of life expectancies, total fertility rate (TFR), and other aggregate measures where the structure of the population has a substantial influence on the outcome. To solve this, a newly developed decomposition techniques are used to separate the change in a rate into different components accounting for changes due to age-structural developments in the population and changes due to variation between different status groups, e.g. different treatment groups.[8]

The purpose of the current study is to decompose the suicide rate by specific treatment groups in the order to determine how large a proportion of the decrease in the suicide rate over time can be attributed to SSRI treatment.

Data and methods

Data registers and data management

Danish register data offer unique opportunities for examining relatively rare events such as suicide.[9] Each person living in Denmark has a unique personal identifier that is registered when a person is in touch with the authorities, for instance, when a person is hospitalized or emigrating. The registrations are kept in various registers which can be linked via the personal id-number.[10] This way, very detailed prospective data can be compiled on an individual-level for the entire nation. Using record linkage data enables us to study the impact of individual's behavior on specific health outcomes.

The study population consists of all persons aged 50 years and older living in Denmark during the period Jan. 1 1995 – Dec. 31 2000. Individual-level register data are linked together by the personal id-number. Data on age, sex, and migration are obtained from the Centralized Civil Register.[11] While information on causes of death are available from the Registry of Causes of Death and prescriptions on anti-depressant medication handed in at pharmacies are obtained from the Registry on Medical Prescriptions. Dates on hospitalization admissions and discharges for somatic or psychiatric disorders were obtained from the National Registry of Patient and the Danish Psychiatric Central Register.[12 13] The linkage of the different registers is performed by Statistics Denmark and an anonymized version of the data is made available for the analysis.

Migration and deaths due to other causes than suicide are censored at the date of the changed status. Death by suicide, is defined as the following causes of death 'X60 – X84: Intentional self-harm' and 'Y87: Sequelae of intentional self-harm, assault and events of undetermined intent' according to the 10th revision of the International Classification of Diseases (ICD-10).[14] As persons who are currently hospitalized will be provided with medical treatment through the hospital, these person groups are excluded from the

analysis. Any person entering hospital is censored from date of admission until date of discharge.

Decomposition analysis

Decomposition methods can be used to determine whether different treatments for affective disorders contribute to the change in the suicide rate over time.[8] Let the average suicide rate be denoted as $\bar{m}_s(t)$. Additionally, a dot on top of the variable denotes the change over time of the variable, i.e. the change in the average suicide rate is $\dot{\bar{m}}_s$.

The change in the average suicide rate over time is decomposed into three components

$$\dot{\bar{m}}_s = \overline{\dot{m}_s} + Cov(m_s, r_a) + Cov(m_s, r_d)$$

where the first component $\bar{\dot{m}}_s$ is the change of the age-specific and medication-specific suicide rate over time. The second component, $Cov(m_s, r_a)$, is the covariance between the age-specific suicide rates, m_s, and the age-specific growth rates, r_a. This term accounts for the change in the age structure of the population during the examined period. The third component, $Cov(m_s, r_d)$ is the covariance between age-specific suicide rates, m_s, and the growth rates in the different medication groups, r_d. It describes changes in the structure of the medication composition. The study population will be divided into three groups: persons with no medication for mood disorders, persons receiving traditional anti-depressants, and persons receiving SSRIs. By using the decomposition methods we can calculate the exact effect that use of SSRIs has on changes in the suicide rate and compare the effect with the two other groups (no treatment and traditional treatment) taking diverging age structures into account.

Preliminary results

The overall suicide rate for Denmark has decreased over the past decades. The results of preliminary decomposition analysis show that the decline has been even more significant than it appears from the changes in the overall rate. This is due to a counter-effect caused

by the increasing proportion of elderly people in the Danish population who have a higher suicide rate than younger age groups.

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