European Psychiatry xxx (2017) xxx–xxx

Contents lists available at ScienceDirect

European Psychiatry

journal homepage: http://www.europsy-journal.com

Original article

Contributions of specific causes of death to lost life expectancy in severe mental illness

N. Jayatilleke *, R.D. Hayes, R. Dutta, H. Shetty, M. Hotopf, C.-K. Chang [1], R. Stewart [1]

Institute of Psychiatry, Psychology, and Neuroscience, Psychological Medicine Dept, King's College London, PO Box 92, De Crespigny Park, SE5 8AF London, United Kingdom

ARTICLE INFO

Article history:
Received 21 November 2016
Received in revised form 23 February 2017
Accepted 26 February 2017
Available online xxx

Keywords:
Severe mental illness
Schizophrenia
Bipolar disorder
Life expectancy
Cause of death
Physical illness

ABSTRACT

The life expectancy gap between people with severe mental illness (SMI) and the general population persists and may even be widening. This study aimed to estimate contributions of specific causes of death to the gap. Age of death and primary cause of death were used to estimate life expectancy at birth for people with SMI from a large mental healthcare case register during 2007–2012. Using data for England and Wales in 2010, death rates in the SMI cohort for each primary cause of death category were replaced with gender- and age-specific norms for that cause. Life expectancy in SMI was then re-calculated and thus, the contribution of that cause of death estimated. Natural causes accounted for 79.2% of lost life-years in women with SMI and 78.6% in men. Deaths from circulatory disorders accounted for more life-years lost in women than men (22.0% versus 17.4%, respectively), as did deaths from cancer (8.1% versus 0%), but the contribution from respiratory disorders was lower in women than men (13.7% versus 16.5%). For women, cancer contributed more in those with non-affective than affective disorders, while suicide, respiratory and digestive disorders contributed more in those with affective disorders. In men, respiratory disorders contributed more in non-affective disorders. Other contributions were similar between gender and affective/non-affective groups. Loss of life expectancy in people with SMI is accounted for by a broad range of causes of death, some varying by gender and diagnosis. Interventions focused on multiple rather than individual causes of death should be prioritised accordingly.

1. Introduction

Premature death among people with mental disorders is an international concern [1]. Individuals with severe mental illness (SMI), including schizophrenia, schizoaffective disorder and bipolar disorder, experience particularly higher all-cause mortality and lower life expectancy [2,3]. This is an important indicator for policy development to improve on current health inequality; however, contributions of individual causes of death to the life expectancy gap remain unclear, limiting the evidence. Previous research has suggested excesses of both natural and unnatural causes of death, and that the excess of natural causes may cross several mental disorder groups [4]. Nevertheless, standardised mortality ratios cannot be translated into the more important construct of life expectancy, which accounts for the age of death as well as the absolute risk. Specifically, life expectancy as a measure adds value because it is a demographic index, which is a feature of overall mortality emphasizing the impact of deaths occurring in younger age groups. It can thus be claimed to have considerably more 'meaning' for a population as an indicator of disadvantage, compared to a relative risk or hazard of mortality over a defined period of time. Life expectancy as a measure is obtained from estimates from the age-specific mortality of a specific cohort over a given period of time using the life table method and is calculated from the accumulated person-years contributed by the entire cohort divided by the total population number at birth.

The substantial disadvantage in life expectancy experienced by people with SMI represents a major health inequality. Recent studies have shown how the impact of chronic illness varies between people with SMI and the general population. For example, the relative risk of type 2 diabetes is elevated in younger populations of SMI compared to general population. In one study, most associations persisted despite adjustment for antipsychotic prescriptions, and ethnic minority groups also had a higher prevalence of type 2 diabetes in the presence of severe mental illness [5]. On a similar note, the prevalence of multimorbidity

* Corresponding author. Tel.: +44 2032 288 590; fax: +44 2032 288 551.
E-mail address: chin-kuo.chang@kcl.ac.uk (C.-K. Chang).
[1] Joint last authors.

http://dx.doi.org/10.1016/j.eurpsy.2017.02.487
0924-9338/

(which often encompasses combinations of mental and physical illnesses) is recognised to increase with higher deprivation [6]. Further, in people with SMI, prevalence of obesity, metabolic syndrome, diabetes mellitus, symptoms of cardiovascular disease, and respiratory disease all exceed those in the general population at least two-fold, and HIV prevalence may be increased as much as eight-fold [7]. This increased prevalence of chronic disease may be largely responsible for a five-fold increased risk of death [7].

An analysis was strongly warranted to add clarity to this 'survival gap', particularly as interventions have been proposed, which focus on individual pathways without clear evidence on the contribution of those pathways to the overall outcome. Using data from a large clinical cohort, we estimated the contribution of the major groups of causes of death to shortened life expectancy in people with SMI, delineating to what extent this gap could conceivably be closed if mortality rates for each cause of death could be equalised with those in the general population.

2. Methods

2.1. Data sources and cohort

The South London and Maudsley NHS Foundation Trust (SLAM) is one of Europe's largest secondary mental healthcare providers, serving a single geographic catchment of approximately 1.36 million residents in four southeast London boroughs. In 2006, fully electronic health records were implemented across all SLAM services, and, in 2008, the Clinical Record Interactive Search (CRIS) system, supported by the National Institute of Health Research (NIHR) Biomedical Research Centre for Mental Health at SLAM, was developed to allow search and retrieval of anonymised but complete medical records within a robust patient-led governance framework [8,9]. Using CRIS, individuals who had a primary diagnosis of SMI (schizophrenia, ICD-10 coded F20; schizoaffective disorder, F25, or bipolar affective disorder, F31) and had at least one active contact with SLaM during the period between 1st Jan 2007 and 31st Dec 2012 were included in this analysis. Recorded primary diagnoses in structured fields of the record were supplemented by a natural language processing application developed using Generalised Architecture for Text Engineering (GATE) software to identify diagnostic statements in open text fields (e.g. correspondence and clinical notes) [9,10].

2.2. Mortality

Date and primary cause of death for our study subjects in the same period (i.e. 2007–2012 inclusive) were retrieved from a CRIS linkage to death certifications, held by the UK Office of National Statistics, which is updated regularly [11], by NHS numbers through an anonymised process. The same data source (i.e. UK Office of National Statistics), but this time via online data files, was used to obtain age-, gender-, and cause-specific mortality for England and Wales population in 2010 [12].

2.2.1. Analysis: baseline life expectancy at birth

Using Microsoft Excel software, life expectancy at birth was estimated using Chiang's abridged life table method [13]. In brief, the accumulated person-years were calculated by gender based on age- and gender-specific mortality experienced by a specified male/female cohort in five-year age bands, and then divided by the total number of male/female cohort subjects at baseline. Because of dynamic nature of our cohort during the six-year follow-up period (2007–2012), the number of deaths observed was weighted by the average at risk period of each age and gender band. The life expectancy at birth for the England and Wales population using 2010 data was also estimated for the purpose of validation using Chiang's abridged method [13,14]. Since SMI diagnoses are relatively unlikely to be given to people under the age of 15 years, mortality rates up to that age were assumed to be equal to those in the general population of England and Wales in 2010.

2.2.2. Analysis: re-calculated life expectancies by equalising mortality rates

Our aim was to estimate the improvements in life expectancy which might be achieved if people with SMI experienced the same age- and gender-specific mortality rates for particular causes of death as those in the general population. For this, a life expectancy simulation was used to examine the contribution of major causes of mortality to the reduced life expectancy in people with SMI. Death rates in SMI cohort for each major primary cause category were sequentially replaced with England and Wales gender- and age-specific rates for that cause of death, obtained from UK Office of National Statistics [12]. The expected numbers of deaths in each five-year age band were then re-calculated using these national gender- and age-specific rates. These re-estimations were carried out for cause-of-death categories by the order of number of deaths observed in the SMI study cohort:

- circulatory diseases;
- cancer;
- respiratory diseases;
- digestive diseases;
- suicide;
- deaths due to other (non-suicide) external causes;
- all remaining causes of death.

In this study, in accordance with the ICD-10 manual, external causes comprised mortality involving injury, poisoning and certain other external causes. Causes of death in this broad group of scenarios include examples, such as "accidental poisoning by amphetamine" (X41) or "driver of car injured in non-collision transport accident" (V48.5). Here, the underlying cause is classified according to the circumstances of the fatal injury, rather than the nature of the injury, which is coded separately. Of note, this means that direct alcohol related mortality is considered under external causes. Where there was a reverse association identified for any cause-of-death category (i.e. a lower life expectancy for SMI subjects following equalisation of a specific cause-of-death category to general population), its contribution to loss of life expectancy was set at zero. The percentage of person-year contribution to the life expectancy gap for each category of death was then calculated accordingly. In a sensitivity analysis, the adjustment for cancer was re-applied taking into account reference to cancer anywhere on the death certificate (i.e. rather than just as the primary cause of death). Finally, we carried out an additional stratification by affective (bipolar/schizoaffective) and non-affective (schizophrenia) SMI diagnosis in order to compare cause of death contributions between these subgroups.

3. Results

Calculated by Chiang's method, the life expectancy at birth for the England and Wales population in 2010 was 78.5 (95% CI 78.1–78.8) years for males and 82.4 (95% CI 82.1–82.7) years for females: identical to values previously reported by the UK ONS [14]. In the SLAM cohort, there were 1558 deaths during the observation period among 19,106 subjects with SMI (816 deaths among 10,414 males and 742 deaths among 8692 females). The life expectancy at birth in people with SMI was estimated to be 67.9 years (95% CI 67.1–68.6) for men and 72.2 years (95% CI 71.5–72.8) for women – i.e. reduced by 10.6 years for men and 10.2 years for women.

Please cite this article in press as: Jayatilleke N, et al. Contributions of specific causes of death to lost life expectancy in severe mental illness. European Psychiatry (2017), http://dx.doi.org/10.1016/j.eurpsy.2017.02.487