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Research report

The epidemiological modelling of dysthymia: Application for the Global Burden of Disease Study 2010

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ABSTRACT

Background: In order to capture the differences in burden between the subtypes of depression, the Global Burden of Disease 2010 Study for the first time estimated the burden of dysthymia and major depressive disorder separately from the previously used umbrella term 'unipolar depression'. A global summary of epidemiological parameters are necessary inputs in burden of disease calculations for 21 world regions, males and females and for the year 1990, 2005 and 2010. This paper reports findings from a systematic review of global epidemiological data and the subsequent development of an internally consistent epidemiological model of dysthymia.

Methods: A systematic search was conducted to identify data sources for the prevalence, incidence, remission and excess-mortality of dysthymia using Medline, PsycINFO and EMBASE electronic databases and grey literature. DisMod-MR, a Bayesian meta-regression tool, was used to check the epidemiological parameters for internal consistency and to predict estimates for world regions with no or few data.

Results: The systematic review identified 38 studies meeting inclusion criteria which provided 147 data points for 30 countries in 13 of 21 world regions. Prevalence increases in the early ages, peaking at around 50 years. Females have higher prevalence of dysthymia than males. Global pooled prevalence remained constant across time points at 1.55% (95%CI 1.50–1.60). There was very little regional variation in prevalence estimates.

Limitations: There were eight GBD world regions for which we found no data for which DisMod-MR had to impute estimates.

Conclusion: The addition of internally consistent epidemiological estimates by world region, age, sex and year for dysthymia contributed to a more comprehensive estimate of mental health burden in GBD 2010.

1. Introduction

Whilst not as clinically striking as major depressive disorder (MDD), dysthymia is a debilitating disorder, with longer lasting symptoms (American Psychiatric Association, 2000) and is often comorbid with other mental and physical disorders (Weissman et al., 1988; Markowitz et al., 1992; Kessler and Ustun, 2008). Although large scale studies and reviews provide us with National and sub-national epidemiological data for dysthymia (Waraich et al., 2004; Kessler and Ustun, 2008; Bland, 1997; Wittchen et al., 1994), to-date, there are no published attempts to statistically pool or model the global epidemiology of dysthymia. This is necessary for understanding the global burden of the disorder as well as the psychosocial or environmental factors which alter its distribution.

The public health impact of depressive disorders was highlighted in the 1990 Global Burden of Disease (GBD) Study which quantified burden in terms of a disability adjusted life year (DALY) (Murray and Lopez, 1996). Depressive disorders were the 4th leading cause of burden in 1990 (Murray and Lopez, 1996) and the 3rd leading cause of burden and the leading cause of disability in the 2000 revision (Ustun et al., 2004). The GBD 2010 published in late 2012, is the most comprehensive re-assessment of disease burden since 1990 for 291 diseases and injuries in 21 world regions and the years 1990, 2005 and 2010 (Vos et al., 2013; Murray et al., 2013). The GBD 1990 and 2000 studies presented the burden of depressive disorder as 'unipolar depression', an amalgamation of diagnostic and statistical manual of mental disorders (DSM)/international classification of diseases (ICD) depressive disorder categories. In order to capture the differences in burden between the subtypes of depression, the GBD 2010 estimated the

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burden of dysthymia and MDD separately, which can be then be combined to provide a more representative estimate for the burden of depressive disorders. Although the separate burden estimation of dysthymia has been done at a national level by some countries, e.g. Australia (Mathers et al., 2000), this is the first time at the global level. It is important to recognise that frequently an individual may transition between dysthymia and major depressive disorder diagnoses at different time-points over the lifespan (Judd, 1997; Angst and Wicki, 1991). However, estimation of disorder prevalence for GBD 2010 is done for a population at a specific moment in time (i.e. point prevalence), allowing for individual modelling of these two closely intertwined disorders.

Non-fatal burden estimates in GBD 2010 were made from prevalent Years Lived with Disability (YLD) rather than incident YLDs which were incorporated into DALY estimates of previous GBD studies. Prevalent YLDs are the simple multiplication of prevalent cases and a disability weight that reflects the relative severity of a given disease on a scale where 0 is equivalent to being disease free and 1 is equivalent to death (Murray et al., 2012). The calculation of prevalent cases requires the collation, analysis and modelling of data on the global epidemiology of both MDD and dysthymia, respectively. Here we will focus on summarising these epidemiological inputs for dysthymia. A similar paper on MDD has been submitted for review (Ferrari et al., submitted for publication).

Collating epidemiological data across multiple studies that used different methods of data collection and assessment requires statistical methods that can tease out methodological confounding from true variation in disease occurrence among the heterogeneous epidemiological data. Furthermore, burden estimates in GBD 2010 were required for 21 world regions by age and sex, and for the years 1990, 2005 and 2010. This requires methods to predict estimates for regions with little or no data. Lastly, data across epidemiological parameters of prevalence, incidence, remission and excess mortality needs to be evaluated simultaneously in order to derive an 'internal consistent' disease model (Kruijshaar et al., 2002).

For GBD 2010, a Bayesian meta-regression tool was developed. It combined a generic incidence-prevalence-mortality model (Appendix 1) with a facility to make estimates for regions/parameters with sparse data, through the use of covariates (Barendregt et al., 2003; Global Burden of Disease, 2009; Kruijshaar et al., 2005). DisMod-MR also addresses some of the key data limitations in burden of disease analyses including data reported using a wide variety of age intervals and studies with different case definitions and/or sampling strategies.

The aim of the present paper is to outline this disease epidemiology data and modelling process for dysthymia. First, a systematic review of the literature was conducted to determine estimates of prevalence, incidence, remission and excess mortality attributable to dysthymia. Secondly, the data were aggregated into a comprehensive epidemiological profile of dysthymia and a format required for burden of disease calculations through the use of DisMod-MR. More specifically, this paper reports findings related to:

1. The availability and summary statistics of global dysthymia epidemiological data.
2. Development of an internally consistent epidemiological model of dysthymia.
3. Derivation of estimates for regions with missing data.

The discussion provides insight into the differences in epidemiological estimates found from examining the inputs versus modelled data.

2. Methods

All methods and reporting in this review are in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (Moher et al., 2009).

2.1. Search strategy and data extraction

A systematic search was conducted to identify data sources for the prevalence, incidence, remission and all-cause excess mortality of cases which meet DSM-IV-TR or ICD-10 diagnostic criteria for dysthymia (DSM: 300.4; ICD-10: F34.1), excluding those cases due to a general medical condition or substance induced cases (American Psychiatric Association, 2000; World Health Organization, 1992) (Fig. 1). The first stage of the systematic search involved a review of literature identified through relevant electronic databases. A research librarian assisted in identifying the most appropriate electronic databases and developing search strings (listed at http://www.qcmhr.uq.edu.au/BODP/). Electronic databases that were used in the initial search were Medline, PsycINFO and EMBASE. Searches were limited to human subjects and publication dates between 1980 and 2008. No limitations were set on language of publication. Additional searches focused on the grey literature. Potential sources included government and non-government organisation population health reports, ongoing international collaborative research projects, internet search engines and reference lists. A list of the identified data sources was circulated to experts in the field for review and any additional data sources not yet identified through previous methods were requested, including as yet unpublished data. All potentially relevant data was extracted into a Microsoft Access database.

Strict inclusion criteria were imposed on study selection requiring: (1) study samples be representative of the general population, excluding samples of inpatients, pharmacological treatment groups, and specific population subgroups, (2) accepted studies report from either cross-sectional or longitudinal population-based surveys, (3) survey instruments use DSM or ICD diagnostic categorisations, and (4) data must be for the period 1980 onward.

Data extracted included information on the country and year of study, parameter value and type (e.g. point or 12-month prevalence), sample coverage (community, regional, national), sample urbanicity (rural, urban, mixed), sex (male, female, persons), age range, case ascertainment period (recorded as the midyear time point), response rate, diagnostic criteria (ICD, DSM) and survey instrument. Countries were stratified into GBD regions created on the basis of both epidemiological homogeneity and geographic contiguity (Murray et al., 2012). Measures of uncertainty (standard error or 95% confidence intervals) around every estimate were also extracted if reported or else calculated using $SE = \sqrt{2.1(P(1-P)/N)}$, where P is prevalence, N is sample size and 2.1 the average design effect found in 130 studies of affective disorders included in GBD 2010.

Prevalence was defined as the proportion of cases in the population and included point (current or past-month) and period (12-, 6- and 3-month) prevalence. Lifetime estimates were excluded as they are most likely influenced by recall bias (Kruijshaar et al., 2005; Moffitt et al., 2010; Simon and Vonkorff, 1995; Susser and Shrout, 2010). Furthermore, lifetime estimates do not fit with the GBD focus of summarising the current disability attributable to a disease (Global Burden of Disease, 2009). Incidence was captured as an annual population rate, i.e. an instantaneous rate of new cases per person-years of follow-up. For the purpose of the GBD 2010, remission from dysthymia was defined as no longer fulfilling the diagnostic criteria for the disorder. To capture more stable remission estimates, the follow-up period required for the sample was a minimum of 2 years. Papers were sought that reported all-cause mortality (as relative risk or