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Research paper The economic burden of bipolar I disorder in the United States in 2015



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A R T I C L E I N F O	A B S T R A C T
<i>Keywords:</i> Bipolar disorder Economic burden Healthcare costs Indirect costs	<i>Background:</i> The current societal costs of bipolar I disorder (BDI) have not been comprehensively characterized in the United States, as previous studies are based on data from two decades ago. <i>Methods:</i> The costs of BDI were estimated for 2015 and comprised direct healthcare costs, non-healthcare costs, and indirect costs, calculated based on a BDI prevalence of 1%. The excess costs of BDI were estimated as the difference between the costs incurred by individuals with BDI and those incurred by individuals without BD or individuals from the general population. Direct healthcare costs were assessed using three large US claims da- tabases for insured individuals and the literature for uninsured individuals. Direct non-healthcare and indirect costs were based on the literature and governmental publications. <i>Results:</i> The total costs of BDI were estimated at \$202.1 billion in 2015, corresponding to an average of \$48,333 per individual. The largest contributors to excess costs were caregiving (36%), direct healthcare costs (21%), and unemployment (20%). In sensitivity analyses, excess costs ranged from \$101.2 to \$124.3 billion. <i>Limitations:</i> Direct non-healthcare costs were calculated based on a BDI diagnosis, thus excluding undiagnosed pa- tients. Direct non-healthcare and indirect costs were based on combined estimates from the literature. <i>Conclusions:</i> Besides direct healthcare costs, BDI was associated with substantial direct non-healthcare and in- direct costs. More effective treatments and practices are needed to optimize therapeutic strategies and contain direct and indirect costs.

1. Introduction

Bipolar disorder (BD) is a chronic mental disorder characterized by manic, hypomanic, and major depressive episodes (Anderson et al., 2012). The most recent version of the American Psychiatric Association (APA) Diagnostic and Statistical Manual of Mental Disorders (DSM) classifies BD into four main subtypes (American Psychiatric Association, 2013): Bipolar I disorder (BDI), bipolar II disorder (BDI), cyclothymia, and BD not otherwise specified. Collectively, the four BD subtypes are estimated to affect 4.4% of the population in the United States (US), with BDI and BDII each associated with a prevalence of approximately 1% (Merikangas et al., 2007b, 2011).

BDI is typically the most severe form of BD (Escamilla and Zavala, 2008). Symptoms of BDI include hyperactivity, decreased need for sleep, pressured speech, irritability, agitation, and altered judgment (Belmaker, 2004; National Institute of Mental Health, 2016). The sudden changes in mood and behavior that characterize BDI adversely affect many aspects of the lives of both patients and caregivers

including employment, financial functioning, and social interactions (Hawke et al., 2013; IsHak et al., 2012; Michalak et al., 2007). Compared to the general population, individuals with BDI are known to present a higher suicide rate and an increased number of comorbidities such as respiratory diseases, diabetes, cardiovascular diseases, human immunodeficiency virus, and hepatitis C (Carney and Jones, 2006; Crump et al., 2013). Altogether, individuals with BDI incur substantial direct healthcare costs (e.g. medical and pharmaceutical costs), direct non-healthcare costs (e.g. substance abuse-related costs), and indirect costs (e.g. costs associated with reduced productivity, unemployment, and caregiving) (Kleinman et al., 2003; Wyatt and Henter, 1995).

Nevertheless, the current costs of BDI have not been comprehensively characterized in the US from a societal perspective. To the best of our knowledge, the few existing estimates of the societal costs of BD are based on data from the 1990's or mostly focus on a limited number of cost components (Begley et al., 2001; Wyatt and Henter, 1995). Given that, over the past two decades, the management of BDI and mental health policies and coverage have undergone several changes in the US

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(Gitlin and Frye, 2012; Harrison et al., 2016; McGinty et al., 2015; Park et al., 2008), these estimates are likely to be outdated. Contemporary estimates of the societal costs of BDI are needed to provide healthcare stakeholders with updated information that may help optimize decision making and resource allocation. Accordingly, this study aimed to address the following research question: what are the total and excess costs associated with BDI from a societal perspective in the US.

2. Methods

2.1. Economic burden estimate

The economic burden of BDI was estimated for the year 2015 (the most recent year available in the data to estimate direct healthcare costs) and comprised direct healthcare costs, direct non-healthcare costs, and indirect costs.

Costs associated with BDI were calculated using a prevalence-based approach considering a BDI prevalence of 1.0% and the 2015 Census Bureau estimate of the US adult population (Merikangas et al., 2007a; US Census Bureau, 2015). As part of this approach, the total costs were first estimated based on the costs incurred by individuals with BDI. Successively, to estimate the incremental burden associated with BDI, the excess costs of BDI were estimated as the difference between the costs incurred by individuals with BDI (or with BD when BDI-specific cost estimates were not available) and those incurred by individuals from the general population, depending on the information available for each cost component. In the event a cost associated with a component was by definition an excess cost, total costs for individuals with BDI were defined as the excess costs of BDI and total costs of the general population were set to zero.

All costs were expressed in 2015 US dollars. Direct healthcare costs were adjusted to 2015 US dollars using the Consumer Price Index for All Urban Consumers (CPI-U), Medical Care (US Bureau of Labor Statistics, 2017a), while direct non-healthcare costs and indirect costs were adjusted using the CPI-U, All Items (US Bureau of Labor Statistics, 2017a).

All the data used in this study were compliant with the Health Insurance Portability and Accountability Act and did not contain identifiable patient information; no institutional review board approval was necessary. For all components, when information was available from multiple data sources, data from governmental publications were prioritized. When not available, other sources were considered based on the relevance and representativeness of the data. Weighted average techniques were used to incorporate information from several data sources when appropriate. The data sources used to estimate the different types of costs are detailed in the sections below.

2.1.1. Direct healthcare costs

Direct healthcare costs were estimated using a retrospective matched cohort design. They included medical and pharmacy costs and were assessed separately for insured (commercial, Medicare, and Medicaid coverage) and uninsured individuals.

2.1.1.1. Insured individuals. For the analysis of the costs incurred by insured individuals, data were derived from three large administrative US claims databases: Truven Health Analytics MarketScan® Commercial Claims and Encounters, Truven Health Analytics MarketScan® Medicare Supplemental, and Truven Health Analytics MarketScan® Medicaid Multi-State. These databases include healthcare plan enrollment history and claims for medical (provider and institutional) and pharmacy services of enrollees and their dependents. For all three databases, the data covered the period from January 2010 to December 2015.

Two cohorts were defined: the *BDI cohort* and the *non-BD cohort*. The BDI cohort comprised all adult patients (i.e. at least 18 years old) from the Truven Health Analytics MarketScan[®] databases with at least one diagnosis of BDI (based on International Classification of Diseases, 9th

and 10th Revision codes, i.e. ICD-9 and ICD-10 codes) and at least 12 months of continuous health plan coverage following a diagnosis of BDI, including at least one month in 2015. The non-BD cohort comprised all adult patients (i.e. at least 18 years old) from the Truven Health Analytics MarketScan® databases without a documented diagnosis of any type of BD (based on ICD-9 and ICD-10 codes) during the entire period covered by the data and with at least 12 months of continuous health plan coverage, including at least one month in 2015. All types of BD were excluded from this control cohort to avoid selecting patients with a potential misdiagnosis of BDI. For both cohorts, Medicare-insured patients were at least 65 years of age as of the index date (defined as the last calendar date preceding 12 months of continuous health plan coverage), while commercially and Medicaid-insured patients were under 65 years of age until the end of the study period, defined as the 12-month period following the index date.

Patients with BDI were matched on up to a 1:3 ratio to non-BD patients having the same age, gender, region of residence (commercial and Medicare only), race (Medicaid only), health plan type, and the year of the index date.

For the BDI cohort, for each type of coverage, demographic characteristics were summarized and direct healthcare costs estimated based on the sum of the amounts reimbursed by payers and patients' out-of-pocket costs.

2.1.1.2. Uninsured individuals. For uninsured individuals, direct healthcare costs were estimated based on the average medical costs reported in the literature for the general uninsured population (Coughlin et al., 2014) and the ratio of the direct healthcare costs of the BDI cohort to those of the non-BD cohort, as measured in the analysis of insured individuals.

2.1.2. Direct non-healthcare costs

Direct non-healthcare costs included research on BDI as well as substance abuse-related expenditures. Their estimates were based on the most recent literature and governmental publications. In particular, the costs of research were drawn directly from the estimates of funding for research on BDI reported by the National Institute of Health (US Department of Health and Human Services National Institute of Health, 2016). Substance abuse-related costs included costs associated with the criminal justice system, property and personal costs incurred by victims of crimes, costs associated with loss of productivity for incarcerated individuals, prevention and research costs, and costs associated with motor vehicle accidents (for alcohol abuse only - based on availability) (Bouchery et al., 2011; Collins and Lapsley, 2008; US Department of Justice, 2011). For individuals with BDI, these costs were estimated based on the average substance abuse-related costs per individual reported in the US and the rate of substance abuse among individuals with BDI compared to that of the US general population, in the case of alcohol, drug, and alcohol/drug abuse disorders (Kessler et al., 2005a).

2.1.3. Indirect costs

Indirect costs included costs associated with productivity loss from unemployment, reduced productivity at work, productivity loss from premature mortality (for all cause and suicide-related deaths), and caregiving costs (i.e. productivity loss from caregiving and incremental healthcare costs incurred by caregivers). These costs were based on the most recent literature and governmental publications and were estimated using the human capital approach. More specifically, costs associated with productivity loss from unemployment were estimated based on the employment-to-population ratio in the BDI population (Kupfer et al., 2002) and the US population (US Census Bureau, 2015), and the average annual wage in the US employed population (US Bureau of Labor Statistics, 2017b). Costs of reduced productivity at work were estimated based on the productivity weight in the BDI employed population compared to the US population (Kleinman et al., 2005), the employment to population ratio in the BDI population Download English Version:

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