Monetary conversion factors for economic evaluations of substance use disorders

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ABSTRACT

Aims: Estimating the economic consequences of substance use disorders (SUDs) is important for evaluating existing programs and new interventions. Policy makers in particular must weigh program effectiveness with scalability and sustainability considerations in deciding which programs to fund with limited resources. This study provides a comprehensive list of monetary conversion factors for a broad range of consequences, services, and outcomes, which can be used in economic evaluations of SUD interventions (primarily in the United States), including common co-occurring conditions such as HCV and HIV.

Methods: Economic measures were selected from standardized clinical assessment instruments that are used in randomized clinical trials and other research studies (e.g., quasi-experimental community-based projects) to evaluate the impact of SUD interventions. National datasets were also reviewed for additional SUD-related consequences, services, and outcomes. Monetary conversion factors were identified through a comprehensive literature review of published articles as well as targeted searches of other sources such as government reports.

Results: Eight service/consequence/outcome domains were identified containing more than sixty monetizable measures of medical and behavioral health services, laboratory services, SUD treatment, social services, productivity outcomes, disability outcomes, criminal activity and criminal justice services, and infectious diseases consequences. Unit-specific monetary conversion factors are reported, along with upper and lower bound estimates, whenever possible.

Conclusions: Having an updated and standardized source of monetary conversion factors will facilitate and improve future economic evaluations of interventions targeting SUDs and other risky behaviors. This exercise should be repeated periodically as new sources of data become available to maintain the timeliness, comprehensiveness, and quality of these estimates.

1. Introduction

Substance use disorders (SUDs) represent major challenges to the healthcare sector, criminal justice systems, all types of workplaces, and other sectors of the economy. In the United States, the annual societal cost of SUDs amounts to about $740 billion in medical care spending and productivity losses, and SUDs are listed among the top ten non-genetic causes of death globally (Mokdad, Marks, Stroup, & Gerberding, 2004; National Institute on Drug Abuse, 2017; Yach, Hawkes, Gould, & Hofman, 2004). Opioid use disorders (OUDs), in particular, have attained epidemic status in the U.S. and have become a major focus of clinical interventions and public policy initiatives (Florence, Zhou, Luo, & Xu, 2016; Harris, 2016). Among individuals with OUDs, rates of HIV and viral hepatitis are substantially higher than in the general population, implying significantly higher costs to society for individuals with these co-occurring conditions (Hagan, Pouget, & Des Jarlais, 2011; Hess, Hu, Lansky, Mermin, & Hall, 2017). As the healthcare system in the U.S. continues to reassess commitments to disease prevention, parity for substance use and mental health services, and the creation of more patient-centered systems of care, estimating the economic consequences of SUDs is important for evaluating existing programs and new interventions, as well as for assessing the overall efficiency of health services delivery.

Understanding the economic consequences of SUD programs is also important for those policy makers who must weigh program

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effectiveness with scalability and sustainability considerations in deciding which programs to fund with limited taxpayer dollars (George, Harris, & Mitchell, 2001; Hutubessy, Baltussen, Torres-Edejer, & Evans, 2002; Torres-Edejer et al., 2003). Consistent with these considerations, the Second Panel on Cost-Effectiveness in Health and Medicine recently released new recommendations for conducting rigorous and standardized cost effectiveness analyses (CEAs), which emphasize the importance of incorporating economic consequences occurring outside of the health sector into the calculation of cost-effectiveness ratios (Neumann, Sanders, Russell, Siegel, & Ganiats, 2017; Sanders et al., 2016). The Second Panel outlines two reference cases for CEA; one representing the health care sector and the second including society as a whole. The Second Panel recommends using an impact inventory to identify non-health sector consequences such as patient/family time costs, criminal justice and social services costs, and productivity losses. In both reference cases, the ability to assign values to nonpecuniary outcomes is essential.

Successful integration of economic analyses into randomized clinical trials and quasi-experimental studies of SUD interventions has produced a number of CEAs and cost-benefit analyses (CBAs), which largely show support for SUD interventions, especially those that reduce criminal activity along with substance use (Ettner et al., 2006; French, Salome, Sindelar, & McLellan, 2002; McCollister & French, 2003; Zarkin et al., 2015). Other economic studies, however, have evaluated programs where the cost of providing services outweighed the benefits (Alexandre, Salome, French, Rivers, & McCoy, 2002; Aos, Miller, & Drake, 2006). Additional economic evaluations are needed as behavioral health services become more integrated with primary care. Under integrated service delivery models, the streams of costs and benefits are likely to be quite different from conventional programs that operate more independently as silos of behavioral health care (Buntin, Burke, Hoaglin, & Blumenthal, 2011; Hutubessy et al., 2002; Mechanic, 2012; Torres-Edejer et al., 2003; Woltmann et al., 2012).

The continued importance of CEA and CBA in SUD research notwithstanding, measurement challenges remain because the consequences of SUD-related interventions are measured across several distinct and independent outcomes such as robberies, emergency department visits, reliance on public assistance programs, days of homelessness, and workplace absenteeism. Monetary conversion factors (MCFs), sometimes referred to as unit prices or unit costs, are necessary for estimating the economic consequences and costs of services across these disparate measures.

The primary objective of the present study is to provide a comprehensive and updated list of MCFs that can be used to estimate the economic value of services, consequences, and outcomes associated with SUDs in the United States, including co-occurring conditions such as HCV and HIV. This list of MCFs can serve as an important tool for clinicians, researchers, and policy makers seeking to quantify the economic impact of SUD treatment and related interventions that are proven to be clinically effective. We build on a previous study by French and Martin (1996), now more than two decades old, to present an updated set of measures and MCFs that can be used in a variety of program and policy evaluations. The Materials and methods section outlines our approach to assembling relevant service/consequence/outcome domains and measures, and describes the data sources for the MCFs. The overarching goal is to promote and expand the use of CEA and CBA in evaluating programs and interventions targeting SUDs and other risky behaviors, while at the same time fostering an appreciation for the significant limitations analysts face when monetizing items across multiple domains.

2. Materials and methods

Our approach to defining domains, measures, and MCFs was designed to align closely with some of the more common clinical assessment instruments used in SUD treatment evaluations as well as national surveys containing substance use measures. This implies that the list of measures and MCFs is not exhaustive, but instead is meant to complement SUD-related research studies using a standard set of variables. Five assessment instruments were examined in detail: the Global Assessment of Individual Needs (GAIN) (Dennis, Titus, White, Unsicker, & Hodgkins, 2008), the Addiction Severity Index (ASI) (McLellan et al., 1992), Nonmedical Services (NMS) (Chandler et al., 2015), EconForm 90 (Bray et al., 2007), and the Phenx Toolkit (Hamilton et al., 2011), all of which are frequently used in randomized clinical trials and other research studies to evaluate the impact of SUDs and related clinical interventions across multiple outcome domains. In addition, we reviewed the National Longitudinal Survey of Adolescent to Adult Health (Add Health) and the National Survey on Drug Use and Health (NSDUH) for additional measures that can be used to identify the economic consequences of SUDs (Center for Behavioral Health Statistics and Quality, 2015; Chantala & Tabor, 1999).

Once appropriate measures were identified, we categorized them into eight broad domains: (1) medical and behavioral health services, (2) laboratory services, (3) substance use disorder treatment, (4) social services, (5) productivity outcomes, (6) disability outcomes, (7) criminal activity and criminal justice services, and (8) infectious diseases consequences. Although some domains include measures that are not necessarily direct or immediate consequences of substance use or dependence (e.g. Hepatitis B), we nonetheless include them here because they have been linked with SUDs (Centers for Disease Control and Prevention, 2012; Rosenberg, Drake, Brunette, Wolford, & Marsh, 2005). In addition, many of these domains are featured in existing studies of the economic burden of SUDs (Bouchery, Harwood, Sacks, Simon, & Brewer, 2011; Florence et al., 2016; Nicosia, Pacula, Kilmer, Lundberg, & Chiesa, 2009; Sacks, Gonzales, Bouchery, Tomedi, & Brewer, 2015; US Department of Justice National Drug Intelligence Center, 2011), and are considered the major drivers of the social costs of SUDs, including alcohol use disorders and smoking.

2.1. Literature search and cost data abstraction process

A comprehensive literature review and targeted searches of sources were conducted to identify economic data for the MCFs. We searched PubMed, Web of Science, EBSCOhost, and Google Scholar using the following keywords: "substance use disorder" or "substance abuse" combined with "cost," "economic consequences," "economic burden," or "social costs." For each service/consequence/outcome measure, we followed the same process, searching the literature by combining "outcome" with the cost-related keywords (e.g., "emergency department visits" and "cost"). We were initially interested in identifying systematic reviews and meta-analyses looking broadly at the economic consequences of SUDs to verify our selection of outcome measures and categorization by domain. Key to the inclusion criteria, studies had to have been published within the past 20 years, written in English, and provide cost estimates per unit of outcome, consequence, or service. In our selection of MCFs, we specifically sought data from US nationally representative sources, multi-site randomized controlled trials, or micro-costing studies. For some measures, government reports and reputable websites (e.g., Centers for Medicare and Medicaid Services) were identified as the best source of economic data. In other cases, a single study was selected based on representativeness and recency, and methodology used to estimate costs. A total of 17,653 studies were identified across all domains and cost estimates were abstracted from 34 studies and online sources. Appendix Table A1 provides additional details on the results of the search strategy and the selection process for MCFs.

Specific measures and MCFs are presented in Tables 1–5. Domains with only two or three individual measures were combined into one table (e.g., Table 3 reports social services, productivity loss, and disability measures). Results tables also show the MCFs in the original year reported and the range, whenever possible and appropriate, to facilitate sensitivity analyses. Sensitivity analysis is necessary when MCFs have