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A Cost-Benefit Analysis of Wisconsin's Screening, Brief Intervention, and Referral to Treatment Program: Adding the Employer's Perspective

Andrew Quanbeck, MS, **Katharine Lang**, **Kohei Enami**, and **Richard L. Brown, MD, MPH**
University of Wisconsin—Madison, Madison, Wis.

Abstract

Objective—A previous cost-benefit analysis found Screening, Brief Intervention, and Referral to Treatment (SBIRT) to be cost-beneficial from a societal perspective. This paper develops a cost-benefit model that includes the employer's perspective by considering the costs of absenteeism and impaired presenteeism due to problem drinking.

Methods—We developed a Monte Carlo simulation model to estimate the costs and benefits of SBIRT implementation to an employer. We first presented the likely costs of problem drinking to a theoretical Wisconsin firm that does not currently provide SBIRT services. We then constructed a cost-benefit model in which the firm funds SBIRT for its employees. The net present value of SBIRT adoption was computed by comparing costs due to problem drinking both with and without the program.

Results—When absenteeism and impaired presenteeism costs were considered from the employer's perspective, the net present value of SBIRT adoption was $771 per employee.

Conclusions—We concluded that implementing SBIRT is cost-beneficial from the employer's perspective and recommend that Wisconsin employers consider covering SBIRT services for their employees.

INTRODUCTION

Approximately 15.5 million Americans suffer from alcohol abuse and dependency.[1] Most societal approaches to the problem of alcohol abuse have focused on the most severe cases, even though a wide spectrum of at-risk, problem, or dependent drinkers are more likely to cause serious personal and social harms.[2] Alcohol disorders result in myriad costs to the individual and society at large, including alcohol-related crime, violence, motor vehicle accidents, injuries, and deaths. Problem drinking also leads to less-recognized though significant issues such as decreased workplace productivity, absenteeism, and adverse psychological effects on the drinker's family, peers, and coworkers.[3]

Of the $10.5 billion spent on alcohol treatment in the United States in 2003, 74% was publicly funded by state/local governments, Medicare/Medicaid, and other federal sources.4 Private sources (including private insurance and out-of-pocket expenditures) accounted for the remaining 26% of spending on alcohol treatment. Policymakers confront the challenge of

Corresponding Author: Andrew Quanbeck, MS, 1513 University Ave, Mechanical Engineering 4161B, Madison, WI 53706; phone 608.890.1016; fax 608.890.1438; andrew.quanbeck@chess.wisc.edu.

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allocating limited public funds in the most cost-effective manner possible to treat alcohol problems. One approach that seeks to meet this challenge is Screening, Brief Intervention, and Referral to Treatment (SBIRT). SBIRT aims to reduce or eliminate consumption by a wide spectrum of at-risk, problem, and dependent drinkers through screening during standard medical appointments. An analysis of 360 clinical trials of alcohol treatments, supplemented by 30 years of alcohol research, concluded that Screening and Brief Intervention (SBI, a component of SBIRT) is the most cost-effective alcohol treatment available.5 A previous study of SBIRT in Wisconsin (named Project TREAT) indicated significant reductions in the total amount of alcohol consumed and the frequency of at-risk and problem drinking among patients receiving SBIRT services. The study also found SBIRT to be highly cost beneficial from a societal perspective, with benefits (in the form of reduced health care expenditures, legal costs, and injury/accident costs) outweighing costs by a ratio of 39:1.6 According to the National Commission on Prevention Priorities, alcohol SBIRT services are ranked 4th among clinical preventive services for cost-effectiveness and clinically preventable burden (after daily aspirin use, childhood immunizations, and smoking cessation advice). 7

Given a shift toward evidence-based approaches to health care, the demand for SBIRT services is increasing nationwide. In 2007, the Office of Personnel Management announced that federal health insurance will cover SBIRT services for the 5.6 million individuals under this plan. According to the 2008 *eValue8* ™ survey administered to 150 US health plans by the National Business Coalition on Health, 58% are willing to pay for SBIRT. In Wisconsin, national plans that cover SBIRT include Aetna, CIGNA, and Anthem Blue Cross and Blue Shield.[8] While the benefits of SBIRT seem clear from a societal perspective, the service has not been widely implemented yet throughout the health care system. The purpose of this analysis is to consider the costs and benefits of SBIRT implementation from the employer's perspective: Should employers be willing to pay for SBIRT services?

STUDY SETING

Wisconsin struggles with alcohol problems. Between 2002 and 2006, alcohol abuse rates among the Wisconsin population ages ≥12 ranged from 9% to 11%, compared to the national rate of 8%. In addition, Wisconsin per capita driving-under-the-influence arrests are 1.5 times that of the United States as a whole, and the rate of drinking and driving is the highest in the nation at 26%.9 According to a 2008 needs assessment project report by the Wisconsin Department of Health Services (DHS), the state's health care, social services, and criminal justice systems incur more than $2.6 billion each year due to alcohol-related injuries, hospitalizations, arrests, treatments, and deaths.[10] A study of alcohol use in primary care settings in south central Wisconsin revealed that 20% of patients screened were positive for risky, dependent, or abusive drinking patterns (referred to as "problem drinking") in accordance with guidelines set out by the National Institute on Alcoholism and Alcohol Abuse: >14 drinks/week for men, >7 drinks/week for women, or binge drinking.11 Using these criteria, 1 in 5 Wisconsin residents are drinking more than they should.

In an effort to combat alcohol abuse and problem drinking, in 2006 the DHS was awarded a 5-year grant to provide SBIRT services in 20 primary care clinical sites across the state.[12] Providers use the World Health Organization's Alcohol, Smoking, and Substance Involvement Screening Test, which was developed to detect and manage alcohol abuse and other substance problems.[13] The patient undergoes a brief screening, which consists of 4 questions asked once a year during routine health care visits. Individuals who score positive for problem drinking are given a brief intervention consisting of 1–3 consultations. If necessary, patients may consent to referral to more intensive outpatient or residential treatment.

While SBIRT has been demonstrated to be cost beneficial from a societal standpoint,[6] research on the program's impact on employers has been limited. Of the adult population with an alcohol problem, 82% are employed.[14] Problem drinking may reduce the productivity of labor force participants by causing absenteeism, diminishing the quality of work, and lowering coworkers' morale. A study by Ames et al shows that, after controlling for drinking patterns, job characteristics, and personal background, drinking on the job and hangovers predict work-related problems.[15] A study by Gmel and Rehm showed that heavy drinking, abuse, and dependence reduces productivity among a firm's employees.[3]

This analysis focuses on 2 types of productivity losses that may be caused by problem drinking: absenteeism (days where problem drinking causes an employee to miss work), and impaired presenteeism (days where an employee comes to work, but functions less productively due to inebriation or hangover). The cost of absenteeism to an employer is conventionally estimated by applying the daily wage rate of the absent worker. However, the literature suggests that the conventional approach underestimates the true cost of absenteeism to a firm. The cost of employee absenteeism depends upon the ease of finding a replacement for the absent worker, the extent to which the worker plays a team role, and the time sensitivity of the worker's output.[16] While the daily wage rate provides a lower bound, a multiplier (≥ 1) must generally be applied to reflect the true cost of absenteeism to a firm.

The cost of impaired presenteeism due to problem drinking may be substantial to a firm, though less apparent than costs due to absenteeism. To the authors' knowledge, no empirical estimates exist for cost reductions due to SBIRT in the form of reduced presenteeism. The literature suggests that impaired presenteeism costs due to chronic conditions such as alcohol misuse may be substantial, and potentially much greater in magnitude than absenteeism costs.[17] While a day of absenteeism is more costly than a day of impaired presenteeism, impaired presenteeism costs tend to overshadow absenteeism costs in the long term because there are many more days of impaired presenteeism.

Marginal problem drinkers—those who are clinically in need of treatment, but do not receive it—may account for significant hidden expenses to employers. Although several studies have demonstrated quantifiable effects of alcohol on the workplace,[18–20] and researchers have begun to study how SBIRT may benefit employers,[14] uncertainty remains about how SBIRT may impact productivity. In this study, we employ Monte Carlo simulation techniques to estimate the potential for SBIRT to reduce absenteeism and impaired presenteeism costs to an employer. Monte Carlo simulation is used widely in the discipline of systems engineering to conduct "what-if" analyses of complex systems. In Monte Carlo simulation, the investigator first specifies relevant parameters and constructs a mathematical model of the system under study. Ranges of values for input parameters are modeled across multiple simulation runs, to study how varying parameter levels affect model outputs.

Simulation modeling is an appropriate technique to employ in systems that do not lend themselves readily to study through experimental design. In this analysis, we extend the cost-benefit framework laid out in Project TREAT[6] to include the employer's perspective. The analysis presented here is predicated on the ideas that (1) absenteeism and impaired presenteeism costs are real and potentially significant to an employer, (2) problem drinking can lead to absenteeism and impaired presenteeism, (3) SBIRT can reduce levels of problem drinking and, therefore, SBIRT may reduce absenteeism and impaired presenteeism costs to an employer.

METHODS

We conducted a cost-benefit analysis for employers using a model to present the business case for investing in employee health.[21] The employer bears program costs and productivity benefits in the form of reduced absenteeism and impaired presenteeism. We developed a simulation model to compare the costs of problem drinking to an employer with and without SBIRT services. Each impact category is monetized on a per employee basis, adjusted for inflation.

A theoretical employer is specified with a preintervention prevalence of problem drinking of 20% (defined as >14 drinks/week for men, >7 drinks/week for women, or binge drinking). This figure is based on a sample of 19,372 patients screened for alcohol use in clinics within 100 miles of Madison, Wis.[11] We assume that SBIRT is 57% effective in eliminating problem drinking among employees, based on the reduction rate observed in Project TREAT.6 An average hourly wage rate of $18.46 is assumed based on statistics from the Wisconsin Department of Workforce Development.22 In the model, employees are screened at a rate of 25% per year during annual checkups by their primary care physicians. Though clinics might incur startup costs in delivering SBIRT services, no startup costs are assumed for employers. Costs and benefits are modeled over a 4-year time horizon, which corresponds to the follow-up period in Project TREAT.6 Benefits may wane for employers over time because of staff turnover. It is assumed that staff members will leave the theoretical organization at an annual rate of 23.9% over the 4-year analysis period, which is the US industry-average turnover rate. 23 Costs and benefits are discounted using a standard social discount rate of 3.5%24 that is applied at the end of each year. We assume a fixed screening and treatment cost of $247 per employee[6] (ie, screening costs for non-problem drinkers are included in the average intervention cost for problem drinkers). Total absenteeism costs to the firm are calculated by multiplying the rate of missed work days due to problem drinking[14] by 1.28 times the average daily wage rate.16 A multiplier of 0.10 times the daily wage rate is used to estimate the cost of impaired presenteeism due to problem drinking. The 0.10 multiplier was determined through interviews conducted as part of the Pauly study on impaired presenteeism,17 where managers were asked to estimate the extent to which alcohol problems reduce employees' ability to work. Model parameters are summarized in Table 1.

RESULTS

The primary outcome of the analysis is net present value (NPV), which is calculated by subtracting program costs from program benefits and discounting appropriately over time. Benefits and costs of SBIRT adoption are summarized in Table 2. After discounting and adjusting for staff turnover, absenteeism costs were reduced by $175 per employee over the 4-year modeling period; impaired presenteeism costs were reduced by $823 per employee. Therefore total benefits were $175+$823=$997 per employee. Screening costs amount to $227 per employee (slightly less than the $247 per employee figure listed in Table 1 due to discounting).

Subtracting implementation costs from benefits results in a net present value of $771 per employee. Represented another way, the ratio of benefits to costs is 4.4:1 ($997/$227). Projects with a NPV >0 and a ratio of benefits to costs >1 are worthwhile investments from the theoretical employer's perspective.

DISCUSSION

These results suggest that the net benefit from implementing the SBIRT program would be positive and substantial. To test the sensitivity of the model to the specification of parameters summarized in Table 1, 1000 Monte Carlo trials were run. The model is relatively sensitive to

estimates for the decrease in problem drinking due to SBIRT, baseline prevalence of problem drinking, and the multiplier applied to impaired presenteeism. NPV increases with increasing levels of reduction in problem drinking, higher levels of baseline problem drinking, and higher multipliers for impaired presenteeism. The model is largely insensitive to the other parameters.

The model is most sensitive to the estimate used for the reduction in problem drinking due to SBIRT. For modeling purposes, important assumptions were made with respect to the relationship between problem drinking reduction and absenteeism and impaired presenteeism costs: we assume that these costs will be reduced proportionally with the decrease in problem drinking among the firm's employees. This central assumption warrants further scrutiny.

In the model, employees who screen positive for problem drinking receive a brief intervention. In Project TREAT,[6] the baseline rate of self-reported problem drinking in the intervention group was 46.7%, and the 12-month rate was 20.1%, corresponding to a 57% decrease in problem drinking (the reduction persisted over the 4-year follow-up period as well). For modeling purposes, therefore, it was assumed that the intervention is 57% effective in reducing absenteeism and impaired presenteeism costs from baseline.

In Project TREAT,[6] a significant reduction in problem drinking was observed in the control group as well as the intervention group. This effect is not well understood, but consensus is that the improvement among controls is a combination of 2 effects: (1) an intervention effect of eligibility screening, where patients with problem drinking habits begin taking stock of the negative consequences of their drinking as a result of being asked about it, and (2) regression toward the mean. The relative contribution of these effects is unknown. An alternative approach to calculating the effect rate would be to compare the intervention group to the control group at each point in time. The effect rate would then be calculated as follows:

$$\frac{\text{(Percent reduction in problem drinking in the SBIRT treatment group)}}{\text{(Percent reduction in problem drinking in the control group)}}$$

Using this approach yields an effect rate of 0.37 (rather than 0.57). All else equal, NPV is substantially reduced (but still positive) to $421 per employee when an effect rate of 0.37 is employed in the model. Figure 1 illustrates the relationship between the estimated problem drinking reduction rate and NPV across a range of values. The "break-even" point (at which NPV=0) occurs at a problem reduction drinking rate due to SBIRT of 13%. In other words, if SBIRT reduces problem drinking by at least 13% among a firm's employees, it will be cost beneficial from the firm's perspective (Figure 1).

If SBIRT has no effect on problem drinking rates (and therefore no effect on absenteeism and impaired presenteeism costs), NPV falls to a minimum of −$227 per employee, simply reflecting the cost of screening. Conversely, if SBIRT is 100% effective in eliminating problem drinking among the workforce, NPV would rise to a maximum level of $1523 per employee.

We attempted to be conservative in our estimates of parameters and modeling assumptions. We chose to focus solely on absenteeism and impaired presenteeism costs in our analysis, and did not include potential benefits to employers (such as reduced health care costs, emergency department visits, and costs to dependents) that have been estimated elsewhere.[14] The cost-benefit ratio of 4.4:1 calculated in this analysis is modest compared to the 39:1 ratio published in Project TREAT's6 analysis from a societal perspective. In both cases, the potentially significant benefits of SBIRT outweigh the program's relatively low costs. There appears to be a business case for employers to pay for SBIRT if the program can lower problem drinking rates among employees, even if problem drinking is not eliminated altogether.

CONCLUSION

This study presents one of the first attempts to model the potential productivity benefits of SBIRT from the employer's perspective. We employed simulation techniques based on empirical estimates for model parameters because we believe it would be challenging (for a number of reasons, privacy concerns being paramount) to incorporate the employer's perspective within the context of a randomized clinical trial. Across a variety of modeling assumptions, NPV of SBIRT implementation is positive from the employer's perspective.

We believe that simulation modeling is the best method currently available to determine costs and benefits of SBIRT from the employer's perspective. While this study provides a framework for analyzing the costs and benefits of implementing SBIRT to a theoretical firm in Wisconsin, the methods of this study may be generalizable to different types of firms across different states. Further research is needed.

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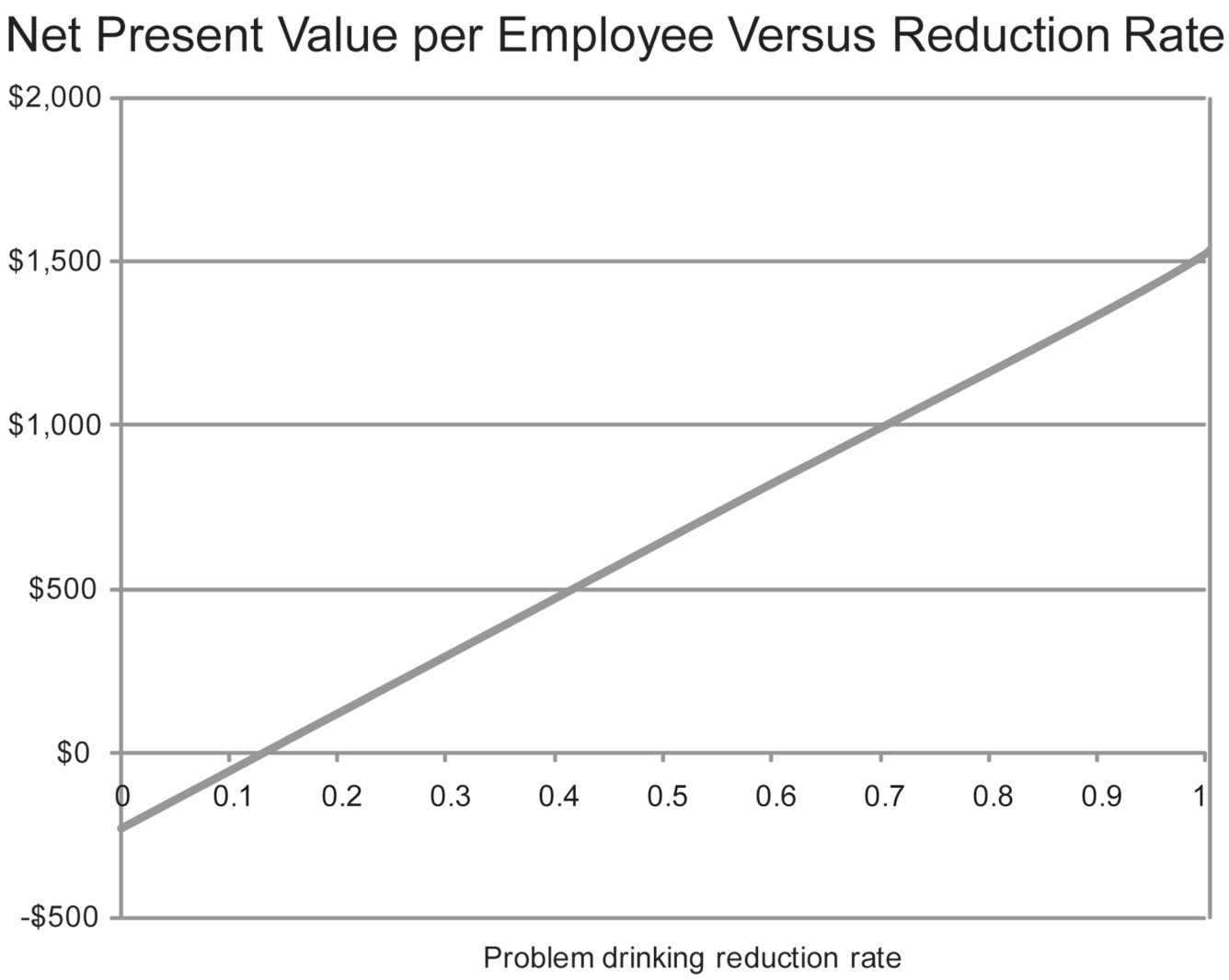

Figure 1.
The relationship between the estimated problem drinking reduction rate and net present value (program benefits minus program costs) across a range of values.

Table 1

Model Parameters

Category	Description
Intervention costs	$247 per employee
Reduction in problem drinking due to SBIRT	57%
Annual staff turnover	23.9%
Baseline incidence of problem drinking	20%
Hourly wage rate	$18.46
Baseline absenteeism costs	1.28 times the daily wage per absence due to problem drinking
Baseline impaired presenteeism costs	0.10 times the daily wage for problem drinkers

Table 2

Net Present Value (NPV) Due to Screening, Brief Intervention, and Referral to Treatment (SBIRT)

Cost Category	Cost/Benefit (per Employee)
Absenteeism cost reduction	$175
Impaired presenteeism cost reduction	$823
Implementation cost	$227
NPV	$771