Population Health Outcome Models in Suicide Prevention Policy

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Background: Suicide is a leading cause of death in the U.S. and results in immense suffering and significant cost. Effective suicide prevention interventions could reduce this burden, but policy makers need estimates of health outcomes achieved by alternative interventions to focus implementation efforts.

Purpose: To illustrate the utility of health outcome models to help in achieving goals defined by the National Action Alliance for Suicide Prevention's Research Prioritization Task Force. The approach is illustrated specifically with psychotherapeutic interventions to prevent suicide reattempt in emergency department settings.

Methods: A health outcome model using decision analysis with secondary data was applied to estimate suicide attempts and deaths averted from evidence-based interventions.

Results: Under optimal conditions, the model estimated that over 1 year, implementing evidence-based psychotherapeutic interventions in emergency departments could decrease the number of suicide attempts by 18,737, and if offered over 5 years, it could avert 109,306 attempts. Over 1 year, the model estimated 2,498 fewer deaths from suicide, and over 5 years, about 13,928 fewer suicide deaths.

Conclusions: Health outcome models could aid in suicide prevention policy by helping focus implementation efforts. Further research developing more sophisticated models of the impact of suicide prevention interventions that include a more complex understanding of suicidal behavior, longer time frames, and inclusion of additional outcomes that capture the full benefits and costs of interventions would be helpful next steps.

(Am J Prev Med 2014;47(3S2):S137–S143)

Introduction

Suicide is the tenth-leading cause of death in the U.S., with more than 36,000 deaths as a result of suicide in 2009.[1] The cost of completed suicide is immense, including lost life and potential of the individuals who die from suicide as well as the long-lasting impact of suicide on families and communities. In addition, people who attempt suicide often have significant medical costs, lost time from work, and other impairments in functioning following an attempt.[2,3]

Recently, a public–private partnership, the National Action Alliance for Suicide Prevention (Action Alliance), launched an initiative to apply a comprehensive public health approach to quickly and substantially reduce suicide deaths in the U.S. A part of this initiative, the Action Alliance's Research Prioritization Task Force (RPTF) is charged with defining a research agenda that, if fully implemented, could reduce suicide attempts and deaths by 20% in 5 years.[4] Part of the RPTF initiative is to map the burden of suicide in the U.S., including four steps to improving the evidence base related to suicide prevention: (1) develop a taxonomy of high-risk target subgroups; (2) identify and pair effective practices and policies with specific high-risk groups; (3) estimate the potential impact of implementing effective interventions within targeted intervention platforms; and (4) estimate time horizons for intervention implementation and future research.[4] This paper explores the third step and focuses on one approach that has frequently been used in decision making: models of population health outcomes.

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0749-3797/$36.00

http://dx.doi.org/10.1016/j.amepre.2014.05.022

Models of Population Health Outcomes

Population health outcome models are statistical models that estimate the likely health outcomes that could be achieved by alternative interventions aimed at addressing a specific health issue.[5–7] Health outcome models use estimates from rigorous scientific studies, data on population characteristics, clinical settings, and population risk factors to project likely health outcomes of alternative interventions. Models can be very sophisticated and incorporate many aspects of the disease course, or may be much simpler and focus on a narrower clinical or health policy question.

Estimating Outcomes in the Context of Suicide Prevention

Because death by suicide is a rare event, longitudinal studies of suicide preventive interventions are often small and relatively brief. Therefore, it is difficult for individual studies to follow a sufficient number of subjects to examine important outcomes related to suicide. Models could provide a way to begin to understand the population impact of implementing effective interventions in a population. In addition, the modeling process can help to identify important gaps in knowledge for future research. To date, there is little research estimating population health outcomes related to suicide prevention.[8]

The purpose of this paper is to begin a conversation about health outcome modeling of suicide prevention interventions and to identify gaps in current research that, if filled, could help guide future efforts. The approach is illustrated using the example of one specific policy question: If we optimally delivered evidence-based psychotherapeutic interventions designed to prevent suicide reattempt in emergency department (ED) settings, how many suicide attempts and deaths could we avert in 1 year? In 5 years?

Methods

To address this question, a simple health outcome model was developed. Similar models have been used in previous studies of psychiatric interventions.[9,10] The model is a Markov cohort simulation. Models were constructed in Microsoft Excel 2007. The structure of the model is shown in Figure 1. The cycle length of the model is 1 year. The model estimated suicide attempts and suicide deaths for each therapeutic scenario over 1- and 5-year time frames, as defined by the RPTF.

Data Sources

The sample of individuals who could potentially benefit from a psychotherapeutic intervention following a suicide attempt was obtained from the U.S. Consumer Product Safety Commission (CPSC) injury surveillance and follow-back system, the National

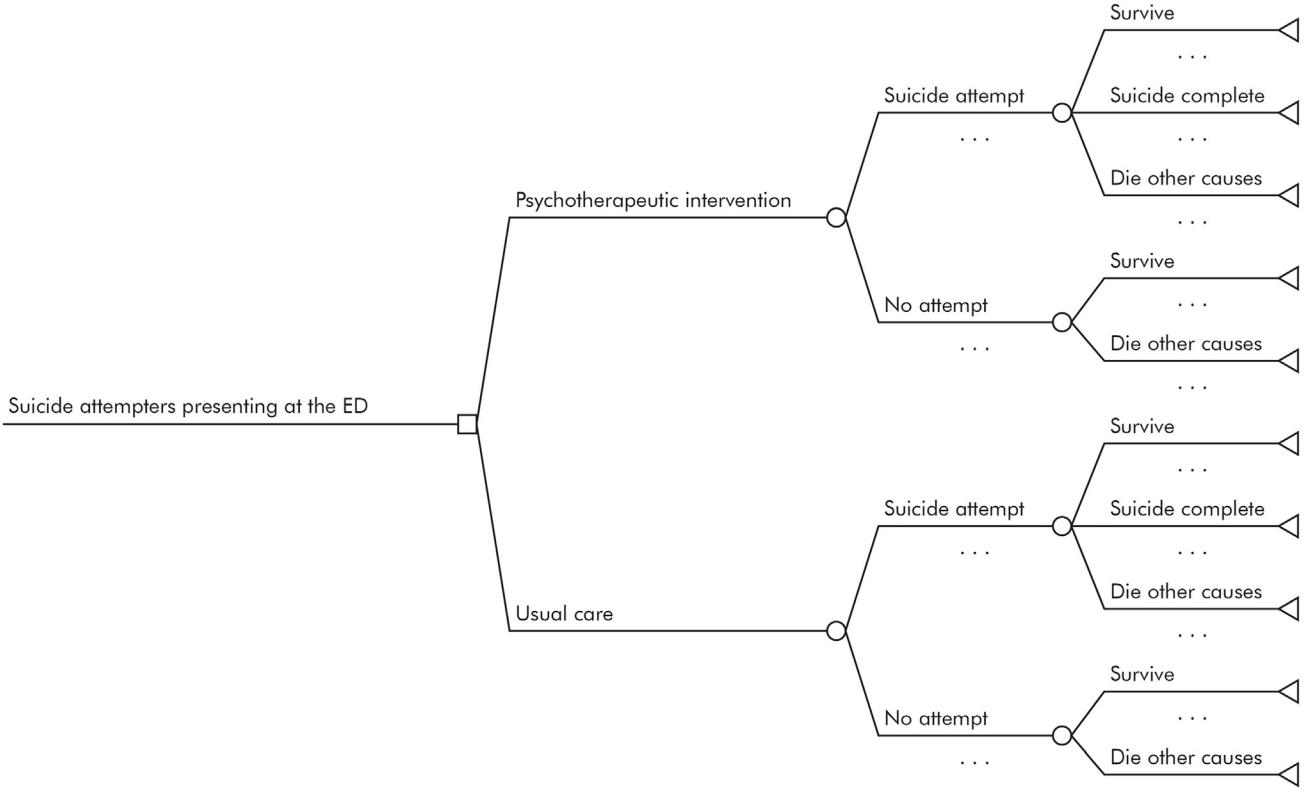

Figure 1. Structure of the model
ED, emergency department