

# Prioritizing Research to Reduce Youth Suicide and Suicidal Behavior

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The goal of the National Action Alliance for Suicide Prevention is to reduce suicide and suicide attempts in the U.S. by 40% in the next decade. In this paper, a public health approach is applied to suicide prevention to illustrate how reductions in youth suicide and suicidal behavior might be achieved by prioritizing research in two areas: (1) increasing access to primary care-based behavioral health interventions for depressed youth and (2) improving continuity of care for youth who present to emergency departments after a suicide attempt. Finally, some scientific, clinical, and methodologic breakthroughs needed to achieve rapid, substantial, and sustained reductions in youth suicide and suicidal behavior are discussed.

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## Introduction

Suicide is the third-leading cause of death in young people aged 10–19 years in the U.S. and represents a worldwide public health problem.<sup>1,2</sup> Nonfatal suicidal behavior is more prevalent and results in significant morbidity and increased risk of suicide.<sup>2–4</sup> The National Action Alliance for Suicide Prevention (Action Alliance) envisions “a nation free from the tragic experience of suicide”<sup>5,6</sup> and charged its Research Prioritization Task Force (RPTF) with developing a public health-oriented research agenda aimed at reducing rates of suicide and suicidal behavior in the U.S. by 40% within the next decade.<sup>6</sup> For young people aged 10–19 years, this would represent roughly 700 fewer suicide deaths and more than 100,000 averted suicide attempts annually.<sup>1,3</sup>

The RPTF’s research agenda development process identified 12 aspirational goals (AGs), defined as important, practical, and results-oriented research efforts that have the potential to rapidly and substantially reduce suicide in the U.S.<sup>7</sup> AGs are assumed to be “big ideas” rather than circumscribed research projects.<sup>5,7</sup> This

article will discuss youth suicide prevention within the context of two AGs: (1) AG8 aims to ensure that affordable, accessible, and effective care is available to all individuals at risk for suicidal behavior; and (2) AG9 aims to reduce treatment dropout at all stages of the care process by enhancing continuity of care for suicidal individuals.<sup>5</sup>

The authors first describe how rapid reductions in youth suicide might be achieved by prioritizing research targeting access to behavioral health interventions for depressed youth in pediatric primary care settings. Next, rapid reductions in youth suicide are discussed within the context of improving continuity of care for young people who present to emergency departments (EDs) after a suicide attempt. These two service settings are emphasized because the majority of young people who die by suicide have had contact with a primary care clinician (PCC) or ED in the year prior to death.<sup>8,9</sup> Finally, some methodologic/conceptual barriers to achieving these AGs in youth suicide prevention research are discussed.

## Public Health Approach to Youth Suicide Prevention

The public health-based approach to suicide prevention adopted by the Action Alliance and the National Institute of Mental Health (NIMH) involves four steps: (1) identifying large subgroups of individuals with elevated risk of suicide and in service settings appropriate for intervention; (2) pairing at-risk subgroups with effective interventions; (3) estimating the results of implementation; and (4) assessing timelines for implementation and research.<sup>6</sup> An additional element is to identify targets for

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intervention that are prevalent, strongly associated with suicide risk, and modifiable.<sup>10</sup>

Two risk factors, depression and suicide attempts, are highlighted below as targets for intervention in pediatric primary care and ED settings. Depression is common, impairing, and likely the most relevant remediable risk factor for youth suicide, given its association with suicide attempts and 30-fold increased risk of completed suicide.<sup>2,11</sup> According to the 2011 National Youth Risk Behavior Survey, 7.8% of all students in Grades 9–12 attending public and private school in the U.S. attempted suicide in the past year, and 2.4% made a serious attempt requiring medical attention.<sup>3</sup> A prior suicide attempt is the single most potent predictor of youth suicide.<sup>2</sup>

The authors describe below how the first three steps of the public health-based approach to suicide prevention can be applied to prioritizing research to improve access to care for depressed youth and continuity of care for adolescent suicide attempters. It must be emphasized that the estimates and underlying assumptions used to calculate potential reductions in youth suicide are imprecise, owing to limitations of the existing evidence base.

### **Aspirational Goal 8: Access to Effective Care**

Pediatric primary care is an ideal service setting for intervention research aimed at rapidly reducing suicide and suicidal behaviors among U.S. youth. In 2010, there were more than 25 million adolescents aged 12–17 years in the U.S.,<sup>1</sup> and national survey data suggest that 82% visit their PCC at least once annually.<sup>12</sup> PCCs prescribe most pediatric psychoactive medications<sup>13</sup> and up to 80% of youth who die by suicide were seen by their PCC or an outpatient physician in the year prior to their death.<sup>8,9</sup> The American Academy of Pediatrics recognizes suicide prevention as a priority for pediatricians<sup>14</sup> and has endorsed guidelines for the care of depressed youth in primary care.<sup>15,16</sup>

Meaningful improvements in the management of psychiatric disorders in primary care settings require systemic changes in primary care practice and access to a comprehensive system of mental health services.<sup>17</sup> Collaborative care models integrate mental health professionals into primary care as educators, consultants, and clinicians in order to bridge the gap between specialty and primary care, improve communication and continuity of care, and determine the most appropriate level of care.<sup>18</sup>

Collaborative care interventions for depressed older adults within primary care that improve recognition of depression and access to evidence-based diagnosis and treatment have proven successful in decreasing both depressive symptomatology and suicidal ideation.<sup>19–22</sup> Applying lessons learned from these studies, the Youth

Partners in Care (YPIC) study compared a 6-month quality improvement intervention designed to improve access to evidence-based cognitive-behavioral therapy (CBT) and antidepressant medication for adolescent depression in primary care ( $n=211$ ) to usual care ( $n=207$ ) enhanced by PCC education. Six months after baseline assessment, patients who received the intervention experienced significantly greater improvements in access to mental health care, depressive symptoms, mental health-related quality of life, and satisfaction with care.<sup>23</sup>

The rate of suicide attempts or self-harm declined by 55% in participants receiving the intervention, from 14.2% at baseline to 6.4% at 6 months, compared to an 18% reduction (11.6% to 9.5%) for patients receiving usual care. The difference was not statistically significant ( $OR=0.55$ , 95%  $CI=0.23, 1.34$ ;  $p=0.19$ ), perhaps because of the low base rate of suicidal behavior at study entry.<sup>23</sup> Collectively, collaborative care interventions in primary care show promise in improving care for youth with depression and reducing suicidal ideation and attempts.

The following example assumes an annual prevalence rate of roughly 8% for suicide attempts in youth with depression, and that 200–300 suicide attempts are made for every completed pediatric suicide.<sup>1,2,11,24</sup> Based on the available literature<sup>23,25</sup> and assuming a screening measure with adequate sensitivity and specificity,<sup>26</sup> broad-scale screening for depression in pediatric primary care that reached 25% of adolescents aged 12–17 years in the U.S. would identify more than 1 million youths who are screen positive for major or minor depression (Table 1). According to the promising YPIC study results,<sup>23</sup> if the rate of suicide attempt within 1 year could be halved by a collaborative care depression intervention relative to usual care, then about 125–208 lives a year could be saved. This represents 13%–22% of the 936 suicide deaths that occurred on average in the U.S. among 12–17-year-olds between 2006 and 2010 (Table 1).

### **Aspirational Goal 9: Continuity of Care**

Adolescents presenting to the ED after a suicide attempt represent a high-risk target subgroup,<sup>6</sup> with more than 103,000 presenting to U.S. EDs in 2011 after deliberate self-harm, and 77,000 after a suicide attempt (Table 2).<sup>27</sup> Most (73%) are discharged to the community from the ED, yet less than 40% receive a follow-up visit within 30 days<sup>28</sup> despite being at high risk for reattempt, especially within the first 6 months.<sup>2</sup> Moreover, up to 50% of youth who die by suicide present to the ED within the year preceding death.<sup>8</sup>

Three RCTs of interventions to promote mental health treatment engagement and compliance for adolescents

**Table 1.** Estimated number of suicide deaths in youth aged 12–17 years averted with primary care–based collaborative care intervention for depression

U.S. Census Data (2010)	
Number of youths aged 12–17 years in the U.S.	25,344,492
Expected number of youths having an annual primary care visit (0.82) (USDHHS, 2009)	20,782,483
Screening for depression implemented in primary care practices impacting 25% of all patients	5,195,621
Expected number of youths screening positive for depression (0.2) <sup>25–27</sup>	1,039,124
Expected estimates of suicide attempt within 1 year <sup>a</sup>	
Group A: Suicide attempts expected within 12 months of primary care visit after usual follow-up care (0.08 × 1,039,124)	83,130
Group B: Suicide attempts expected within 12 months of primary care visit after collaborative care intervention (0.04 × 1,039,124)	41,565
Expected estimates of suicide deaths (based on roughly 200–300 suicide attempts for every completed suicide)	
Group A: Deaths expected within 12 months of ED discharge after usual follow-up care (0.003 × 83,130) (0.005 × 83,130)	250–416
Group B: Deaths expected within 12 months of ED discharge after collaborative care intervention (0.003 × 41,565) (0.005 × 41,565)	125–208
Range of potential number of suicide deaths averted through application of collaborative care interventions in primary care	
(250 – 125 = 125)	<b>125–208<sup>b</sup></b>
(416 – 208 = 208)	

Note: Average annual number of suicide deaths in young persons aged 12–17 years, 2006–2010, U.S.=936.<sup>1</sup>

<sup>a</sup>Assumes annual suicide attempt rate of 8% in usual follow-up care patients and a 4% attempt rate in patients receiving the collaborative care intervention

<sup>b</sup>125–208 averted suicide deaths would represent an approximate 13%–22% annual reduction

ED, emergency department

presenting with suicidal behaviors in the ED have yielded encouraging results.<sup>29–32</sup> One promising approach is the Family Intervention for Suicide Prevention (FISP), a family-based CBT intervention specifically designed for use in the ED to increase motivation for follow-up treatment, support, coping, and safety.<sup>33</sup> Asarnow and colleagues<sup>32</sup> randomized 181 suicidal adolescents to usual care (provider education alone) or FISP with care linkage via telephone to increase motivation for follow-up. FISP intervention patients were significantly more likely to attend any outpatient treatment (92% vs 76%,

$p=0.004$ ); attend more outpatient treatment visits; receive psychotherapy; and receive combined psychotherapy and medication.<sup>32</sup>

The following example assumes that the 12-month recurrence rate of youth suicide attempts is 18% and that roughly 0.5%–2.0% of recurrent attempters will die by suicide within 12 months.<sup>34,35</sup> Applying the findings of Asarnow et al.<sup>32</sup> to the CDC data (Table 2), approximately 71,000 youths who received a treatment engagement intervention will attend outpatient mental health care after ED discharge compared with 58,000 youths receiving usual care. CBT is effective in preventing recurrent suicide attempts in adults.<sup>36</sup> Although there is currently no intervention specifically designed to prevent adolescent suicide reattempts,<sup>37</sup> if such an intervention could halve the reattempt rate compared with usual care, then about 27–127 lives each year may be saved. This represents 1%–7% of the 1,821 suicide deaths that occurred on average in the U.S. among 10–19-year-olds between 2006 and 2010.

### Breakthroughs Needed

The above-noted examples are simple illustrations of how the public health approach to suicide prevention might be applied to high-risk pediatric subgroups in two important general medical settings. A full discussion of other promising approaches and service settings is beyond the scope of this article. Although it is likely that improving access to care in general diminishes youth suicide risk,<sup>38</sup> a major scientific roadblock toward achieving rapid reductions in youth suicide and suicidal behavior is the lack of specific interventions with proven effectiveness in reducing recurrent suicide attempts in RCTs.<sup>37,39</sup>

Most RCTs testing psychotherapeutic or psychopharmacologic interventions for depression have excluded suicidal youth, making findings from these studies difficult to translate to depressed, suicidal youth. This means that scientific guidance is lacking with regard to treatment choice, even if treatment engagement interventions are 100% effective in linking suicidal youth with mental health services after discharge from the ED or other general medical settings.

There is an urgent need to develop, test, and refine the most promising interventions to reduce adolescent suicide attempts, which include (1) attachment-based family therapy to target family processes associated with depression and suicide<sup>40</sup>; (2) integrated CBT for suicidal, alcohol- or substance-abusing adolescents<sup>41</sup>; and (3) CBT for suicide prevention, which consists of a chain analysis of the index suicide attempt, development of a safety plan, and an individualized treatment plan designed to reduce reattempts.<sup>37</sup>

**Table 2.** Estimated number of suicide deaths in youth aged 10–19 years averted with ED-based mental health treatment engagement interventions and interventions to reduce suicide attempts

<b>WISQARS Non-fatal Injury Reports (2011)<sup>28</sup></b>	
Number of youths treated in an ED for any reason	5,354,995
Number of youths presenting for self-harm (all injury causes)	103,342
Expected number of youths presenting after a suicide attempt (1.0 × 49,937 self-poisoning) + (0.5 × 30,943 self-cutting) + (0.5 × 22,462 all other causes)	76,640
<b>Application of the findings of Asarnow et al.<sup>33</sup> to estimate outpatient follow-up mental health treatment engagement</b>	
Group A: Number of youths expected to attend mental health treatment after ED discharge in usual care (0.762 × 76,640)	58,400
Group B: Number of youths expected to attend mental health treatment after ED discharge in enhanced mental health intervention (0.921 × 76,640)	70,586
<b>Expected estimates of suicide reattempt</b>	
Group A <sub>1</sub> : Reattempts expected within 12 months of ED discharge after usual follow-up care (0.18 × 58,400)	10,512
Group A <sub>2</sub> : Reattempts expected within 12 months of ED discharge after EB intervention (0.09 × 58,400)	5,256
Group B <sub>1</sub> : Reattempts expected within 12 months of ED discharge after usual follow-up care (0.18 × 70,586)	12,706
Group B <sub>2</sub> : Reattempts expected within 12 months of ED discharge after EB intervention (0.09 × 70,586)	6,353
<b>Expected estimates of suicide deaths</b>	
Group A <sub>1</sub> : Deaths expected within 12 months of ED discharge after usual follow-up care (0.005 × 10,512) (0.02 × 10,512)	53–212
Group A <sub>2</sub> : Deaths expected within 12 months of ED discharge after EB intervention (0.005 × 5,256) (0.02 × 5,256)	26–105
Group B <sub>1</sub> : Deaths expected within 12 months of ED discharge after usual follow-up care (0.005 × 12,706) (0.02 × 12,706)	64–254
Group B <sub>2</sub> : Deaths expected within 12 months of ED discharge after EB intervention (0.005 × 6,353) (0.02 × 6,353)	32–127
<b>Range of potential number of suicide deaths averted through application of mental health treatment engagement interventions in EDs and subsequent EB suicide prevention interventions after discharge from the ED</b>	
Intervention with no additional treatment engagement intervention: (53 – 26 = 27) (212 – 105 = 107)	<b>27–127<sup>a</sup></b>
Intervention plus treatment engagement intervention: (64 – 32 = 32) (254 – 127 = 127)	

Note: Average annual number of suicide deaths in youth aged 10–19 years, 2006–2010, U.S.=1,821.<sup>1</sup>

<sup>a</sup>27–127 averted suicide deaths would represent an approximate 1%–7% annual reduction. EB, evidence-based; ED, emergency department; WISQARS, Web-based Injury Statistics Query and Reporting System

The lack of psychopharmacologic research specifically targeting suicidal behavior in youth is particularly striking. Accumulating evidence suggests that lithium carbonate has a preventive effect on suicide in adults with

mood disorders,<sup>42</sup> yet claims data suggest that adolescent use of lithium is declining in favor of other medications.<sup>43</sup> Studies must be statistically powered to examine treatment effects on the rate of suicide attempts, not just proxy outcomes like ED visits or suicidal ideation, and should explore predictors of treatment dropout. If specific interventions prove efficacious, future studies can examine effectiveness, alone or in combination with other promising interventions.

Dissemination, implementation, and diffusion studies in real-world treatment settings can follow if effectiveness studies demonstrate a robust treatment signal. Over time, it will be necessary to demonstrate the cost-effectiveness of intervention programs designed to treat and ameliorate suicidal behavior in young people, but such cost-effectiveness calculations are complex and difficult to model. As patients who are suicidal or who have attempted suicide are often excluded from clinical trials, it is also essential to test interventions of known efficacy in reducing depression, substance abuse, or other known, modifiable risk factors of suicide in patients at acutely elevated risk for suicide such as in inpatient/ED settings.

Rapid, substantial, and sustained reductions in youth suicide are unlikely to occur in the U.S. unless effective interventions penetrate community healthcare settings. Although collaborative care interventions for depression have been well tested for older adults in primary care, a large-scale pediatric study analogous to the Improving Mood-Promoting Access to Collaborative Treatment (IMPACT) study<sup>21,22</sup> of depressed elderly deserves consideration, particularly if potentially suicidal youth are not excluded and the study is adequately powered.

Suicide risk stratification tools are needed to optimally implement collaborative care interventions, and if used in

conjunction with validated suicide risk screening measures, could help clinicians identify and refer suicidal youth to the most appropriate level of care.<sup>26</sup> Similarly, large-scale quality improvement interventions such as

the Perfect Depression initiative,<sup>44</sup> which succeeded in reducing the rate of suicide in a large HMO, deserve study in pediatric settings.

Academic–community research partnerships targeting vulnerable yet hard-to-reach patients could make effective interventions accessible to youth from racially/ethnically and geographically diverse backgrounds while fostering a science-to-practice process that culturally refines, adapts, and translates evidence-based interventions into community interventions. Federally Qualified Health Centers (FQHCs) serving predominantly low-income, uninsured, and racial/ethnic minority populations may be prime settings for such collaborative research.

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