Because suicide is a principal cause of adolescent mortality [1], preventing suicide is an urgent task. To this end, Horowitz et al. [2] have completed an impressive series of studies leading to the development of a suicide risk screen, the Ask Suicide Questionnaire (ASQ) instrument that can be used in medical settings for children and adolescents. In this journal [3], this group examines whether the ASQ is superior to a commonly used mental health screener, the Patient Health Questionnaire-adolescent version (PHQ-A) [4], as means to identify hospitalized youths at increased risk of suicide. Here, we discuss what Horowitz et al. [3] have achieved and discuss next research questions on the hospital screening of adolescents for suicide prevention.

In a sample of 600 youths aged 10–21 years admitted to urban pediatric hospitals, Horowitz et al. studied how well each instrument predicted scores on a gold standard suicide risk instrument, the Suicidal Ideation Questionnaire [5]. Impressively, the ASQ identified 97% of those youths who were positive on the Suicidal Ideation Questionnaire, compared with only 70% for the PHQ-A. Therefore, the ASQ will detect many youths who may be at risk for suicide but who would be missed by the PHQ-A. However, the false-positive rate (FPR) of the ASQ was 9%, more than twice the 4% of the PHQ-A. Because most youths admitted to the hospital for medical treatment are not at suicide risk, a 9% FPR can pose significant challenges with postscreening follow-up. So, the next question in suicide risk screening research should be, "can we reduce the FPR?"

One possible way to reduce the FPR of a screen is to use a computerized adaptive test to personalize the questions to the patient in response to the patient’s answers. If there is uncertainty about whether a patient has a condition based on the patient’s initial responses, a computerized adaptive test will ask additional questions to reduce that uncertainty, thereby reducing both false-positive and false-negative errors. In a recent study, King et al. [6] report the development of a suicide risk computerized adaptive test, the Computerized Adaptive Screen for Suicidal Youth (CASSY). (The CASSY uses questions from the ASQ, among other sources.) King et al. clinically validated the CASSY based on its ability to predict suicide attempts within three months of an index visit. The predictions of the ASQ and the CASSY have not yet been compared in a head-to-head study, and this should be another of the next research questions investigated.

We further urge that future suicide prediction or prevention studies use suicide attempts as the primary outcome instead of either suicidal ideation (e.g., the Suicidal Ideation Questionnaire) or completed suicides. On the one hand, suicidal ideation predicts suicide attempts or completed suicides only weakly, while the latter outcomes motivate prevention research. On the other hand, preventing attempts is an infeasible outcome in most studies because completed suicides are rare among adolescents. In a cohort study of teens seen in emergency departments in Canada [7], the risk of suicide within five years of the index visit was six in 10,000, a far higher rate than the general adolescent population, but too rare to be a feasible outcome in a prediction instrument validation study. As King et al. illustrate, however, suicide attempts are common enough to be a feasible outcome in a validation or prevention study.

Another critical research question is whether suicide risk screening, with the ASQ or any other instrument, delivers significant benefits for hospitalized adolescents? It may seem unlikely that suicide screening could fail to deliver benefit, but consider prostate-specific antigen screening programs. Prostate-specific antigen tests have value as screens for prostate cancer, and there are effective ways to treat that disease. Nevertheless, randomized controlled trials of prostate-specific antigen screening programs have not conclusively demonstrated that screening reduces mortality [8]. Why is it challenging to make screening work?

To understand what makes screening challenging, suppose that we have decided to screen pediatric medical admissions for suicide risk (Figure 1). Let us follow a youth who is a suicide risk as they traverse the screening process. Step (1): The admitting nurse must administer the screen. This nurse must be adequately trained to administer the tool and score it, with training in the protocol to follow-up on a positive response. There are individual nurse factors (inadequate training or discomfort in doing the task) and environmental factors (high clinical demand, shortage of staff) that may lead to omitting the screen in the admission process. These factors can make it challenging to sustain high staff adherence to screening protocols.

See Related Article on p.1183

Conflicts of interest: The authors report no conflicts of interest related to this work.

Funding: This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.
Patient at risk of suicide

Was the patient screened?
- No: Unscreend patients at suicide risk.
- Yes: False negative screening errors.

Was the suicide risk detected?
- No: Patients at suicide risk discharged without an inpatient evaluation.
- Yes: Patients at suicide risk receiving community mental health care.

Did an inpatient MH staff see the patient?
- No: Patients at suicide risk discharged without an inpatient evaluation.
- Yes: Patients at suicide risk receiving community mental health care.

Was the patient connected to community care?
- No: Patients at suicide risk discharged without an inpatient evaluation.
- Yes: Patients at suicide risk receiving community mental health care.

Figure 1. Suicide risk prevention service delivery chain.

Nevertheless, supposing that the nurse administered the screen, step (2) is that the screen has to identify the youth’s suicide risk correctly. As discussed previously, Horowitz et al have made significant progress on this problem, but there is a remaining chance of a false negative error. However, suppose that the screen correctly identifies the youth’s suicide risk. Then, in step (3), a mental health clinician must be contacted and available to conduct a complete risk assessment to confirm or disconfirm the screen result, accomplishing this task before the patient is discharged. Unfortunately, many hospitals will not have sufficient mental health staff to follow up on positive ASQ screens.

However, let us assume that there is a clinician who confirms that the youth is at risk. Then, in step (4), something needs to be performed to benefit the youth. The mental health clinician must also be trained in a discharge protocol, with the capacity to facilitate a psychiatric unit admission, discharge to community care, or discharge home with educational materials. Suppose that this youth does not need hospital admission but does need community care. Unfortunately, a substantial proportion of community referrals do not result in completed treatment. Finally, assuming that the hospital has screened a youth, detected the risk of a suicide attempt, and arranged to deliver a mental health treatment, and the youth attends the appointment, then that treatment has to work to prevent a suicide attempt.

If the chain of screening, service delivery, and effective treatment breaks at any point, prevention will not occur. The overall probability of success in the service delivery chain will necessarily be less than the probability of success at its weakest link, and in many settings, the probability that at least one link in the chain will break will be substantial. For these reasons, screening-based suicide prevention efforts may be less effective than proponents hope. These obstacles do not mean that we should give up on suicide prevention. However, screening-based suicide prevention will require more than just the excellent psychometric work reported by Horowitz et al. An additional next step for hospital-based suicide prevention research will be to show that hospitals can work with community mental health providers to organize highly reliable service-delivery chains that can reliably screen, evaluate, and deliver evidence-based treatments to patients.

Acknowledgments

We thank Paula Cloutier, MS, Tea Rosic, MD, and Kelly Kel- leher, MD MPH, for their comments on this article.

William Gardner, Ph.D.
CHEO Research Institute and School of Epidemiology and Public Health
University of Ottawa
Ottawa, Ontario, Canada

Kathleen Pajer, M.D., M.P.H.
Children’s Hospital of Eastern Ontario and University of Ottawa
Faculty of Medicine
Ottawa, Ontario, Canada

References