Suicide by children and adolescents is the ultimate expression of disaffection and alienation. No type of injury induces more pain or social repercussions. Suicide is not only an expression of intent and an outcome, but an under-recognized ‘health status’ measure of our collective mental and social wellbeing. It is a marker for the success of social institutions to successfully integrate youth into adult society. Like the death of a canary in a coal mine, suicide serves as sentinel event for all individuals living in a community, not just for the surviving families. Suicide draws much less attention from society than other forms of violence, perhaps because the victim also kills the perpetrator or simply because it’s too painful to attend.

Epidemiology has been used to study suicide. Compared with 30 years ago, we know much more, thanks to a recent series of high quality population based case-control studies of individual risk factors.1-7 These epidemiological investigations have yet to result in successful widespread approaches to suicide prevention, yet this body of literature will guide injury control researchers and advocates in the quest for prevention of this horrible injury. The translation of knowledge of individual risk into development and evaluation of prevention activities may require us to rethink our traditional approaches toward the control of injury.

In particular, we need to re-examine our current paradigm for injury prevention. Using Haddon’s matrix as applied to youth suicide, we know the following: (1) that the primary risk factors for the host are largely related to mental health disorders, substance abuse, and some acute precipitating factors; (2) that the agent is the method of self harm that the host chooses to use, most commonly firearms, nooses, or poisons; and (3) that the environment can be viewed as either the physical setting in which the suicide attempt occurs (usually the home) or the peer and nuclear family environment, which is often also laden with social and behavioral risk. Our traditional teaching is that interventions that depend on actively changing behavior are the most difficult, and thus, the least desirable, approaches.

Instead, environmental and passive approaches are preferred. Our best hope in this area may revolve around environmental control of access to firearms and other methods. Yet, suicide attempts are inextricably tied to behavioral intent. Working with colleagues in the behavioral sciences, we will have to learn more about their science of prevention and their systems of care to develop mixed models of prevention. Traditional public health activities, such as active surveillance to improve reporting of suicide attempts, will lead to the design of systems to track the highest risk individuals. Viewing active-passive approaches as a dichotomy may no longer be a helpful paradigm for this type of injury.

More than ever, the reduction of suicide will require collaboration between disciplines not used to working together, disciplines with different perspectives on suicide prevention.

The ethnocentric view of suicide as solely a problem of individual pathology needs re-examination. Given their person focused view, Western societies have treated suicide as a problem of defective individuals. Though few would challenge the assertion that suicide results from a failure of an individual’s integration into society, the vast majority of high quality research has focused on the individual, and to a lesser extent, family and peer relations. The social and cultural risk factors are least understood but may be the key to understanding community approaches to prevention. Variations and patterns in the rates of suicide between geographic subunits exist.

What is the cause of this variation? Can it be explained solely by a disproportionate concentration of individuals with individual risk factors living in these areas? Or, more likely, are community level factors at work? In his investigation of the geographic variation of suicide rates in 19th century Europe, Durkheim postulated that some of the variation between nations was likely related to cultural and religious differences, since Catholic and Protestant religions appeared to differ in their views of suicide as a taboo act.8

Investigations of youth suicide clusters and the recognition of the contagion potential of suicide are further evidence that community level risk factors have an impact on individuals.9 Injury control practitioners need to know more about the effect of economics, social institutions, and laws—especially those related to mental health care, firearms’ access, and alcohol availability—on variations in suicide outcomes. The study of variations in rates could enhance our understanding of community risk factors for suicide.

The article by Clarke and colleagues in this issue of Injury Prevention (p 126) appropriately recognizes the potential of sociocultural risk factors in their review of suicide among indigenous peoples. Suicides among young Native American males have been far higher than the much publicized rates of homicide among African-American males of similar age. To ascribe this recent epidemic simply to increased access by victims to alcohol and firearms, both known risk factors, would lead us to ignore the vast, mostly negative, changes that have occurred in Alaskan Native villages, and the rest of Alaska, during the past 40 years.10 Indian and Native leaders often view suicide as a community problem, amenable to community healing that involves the entire membership, not just ‘high risk’ individuals or surviving families.11

We sorely lack information about successful prevention strategies. Though the prevention of suicide is the obvious outcome of interest in an evaluation of explicitly labeled suicide prevention programs, the evaluation of indirect approaches to suicide prevention can also be accomplished by examining interventions with different principal aims. For example, large randomized trials directed toward the prevention of teen substance abuse or major depression should be designed to include suicide attempts as a potential outcome measure, give the strong association between the two phenomena. Though sample sizes and power considerations may preclude the collection of definitive data from a single study on suicide prevention, future cohort studies or meta-analyses may yield this information. Hence we must seek opportunities to use other indirect, ongoing research efforts to provide the answers.

Finally, parochialism should not prevail here. Broadly conceived and integrated efforts to control substance abuse, interpersonal violence, suicide, teen pregnancy, and school drop-out should be combined where logical and possible. Common sense, and corroborative scientific evidence, tells us that these outcomes, though often distinguished as different phenomena, share many common risk factors and
Epidemiology and injury prevention

It is widely recognized that epidemiology is the basic science in public health.\(^1\) Since injuries represent a major public health problem throughout the world, it is only natural to turn to epidemiology as a resource for identifying the underlying causes of injury and, eventually, for controlling them. Indeed, the editor of this journal, and a large portion of the contributing authors are card-carrying epidemiologists. A more careful examination, however, of the contribution of epidemiology to the prevention of injuries poses some questions.

A comparison of past accomplishments of epidemiology in various fields of public health illustrates this point. Epidemiology was the battleground in which the war against most infectious diseases was fought and won.\(^2\) Even with respect to AIDS, for which molecular research has reached unprecedented depths, successful control of disease spread has been accomplished by implementing lessons learned from epidemiologic studies.\(^3\) Moreover, epidemiology has been instrumental in the identification of much of what is currently known about the etiology of cardiovascular diseases, including the role of hypertension, hyperlipidemia, tobacco smoking, diet, and physical activity.\(^4,5\) Lastly, epidemiology has contributed to the documentation of all but a few of the established human carcinogens, including tobacco smoking, virtually all occupational carcinogens, hepatitis viruses B and C, strains of human papilloma virus, and ionizing and ultraviolet radiation.\(^6 7\)

Set against this impressive background, the contribution and the potential of injury epidemiology appears more limited. Is this because epidemiologic instruments are not appropriate for the investigation of the occurrence of injuries? Or does it reflect the fact that injuries have not been recognized as a major public health problem until recently?

The first explanation cannot be easily dismissed. There are important differences between the pathobiology that underlies most human diseases and the constellation of external factors that trigger most ‘accidents’. Many of the component causes of cardiovascular, neoplastic, or infectious diseases are distinct and identifiable physical, chemical or biologic entities, whereas the factors contributing to injuries are frequently behavioral, poorly defined, and inadequately operationalized. In addition, most chronic, and several acute, diseases have natural histories with identifiable stages that allow a consideration of time sequence in the establishment of causation. Such timing is frequently impossible in the study of injuries.

These differences create genuine problems in the application of traditional epidemiologic methods\(^8\) to the investigation of the causes of injuries. Thus, a cohort study that is frequently thought of as the method of choice in observational research is compromised by our inability to specify in advance the relevant proximal exposures, be these behavioral or environmental—for instance, how a driver reacted to unpleasant or exciting news on the radio. Case-control studies, on the other hand, face not only the problem of selection bias generated by instantaneous death (a problem shared by cardiovascular epidemiology) but also the fact that proximal to the accident, events and conditions are difficult to ascertain because of post-traumatic shock or denial of responsibility on the part of the victim. Moreover, manifestational homogeneity, created by the inclusion of injuries of similar nature and severity does not necessarily imply etiologic homogeneity, and heterogeneity hinders statistical substantiation of causality. Last, but by no means least, control selection—challenging in any epidemiologic study—confronts an additional major difficulty: should controls have had no history of accident, and, if not, how far back should the time horizon be extended?

The argument that epidemiologic studies of diseases different in nature require different paradigms is not new.\(^9\) It has been invoked in relation to infectious diseases, in the context of deductive investigation of outbreaks due to known causes, for example salmonella outbreak, as well as in inductive investigations of diseases of unknown etiology, for example breast cancer. These arguments, however, do not challenge the applicability of the discipline of epidemiology, but call for its enrichment with methods customized to address the specific problems characterizing different disease entities. This is particularly true with respect to injuries, for which neither animal studies nor randomized experiments can be contemplated.

Progress in the prevention of injuries has relied until now either on theoretical arguments based on laws of physics or on observational research that has essentially been based on case studies, case series, or critical incident analyses. The observational approaches are essentially epidemiological, except that statistical uncertainty and confounding are evaluated informally on the basis of common sense and background knowledge. They are more useful for hazard identification than risk estimation. These processes are not


Watching the canary: the prevention of suicide.

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