Confronting Death From Drug Self-Intoxication (DDSI): Prevention Through a Better Definition

Suicide and other self-directed violence deaths are likely grossly underestimated, reflecting inappropriate classification of many drug intoxication deaths as accidents or unintentional and heterogeneous ascertainment and coding practices across states.

As the tide of prescription and illicit drug-poisoning deaths is rising, public health and research needs would be better satisfied by considering most of these deaths a result of self-intoxication. Epidemiologists and prevention scientists could design better intervention strategies by focusing on premorbid behavior.

We propose incorporating deaths from drug self-intoxication and investigations of all poisoning deaths into the National Violent Death Reporting System, which contains misclassified homicides and undetermined intent deaths, to facilitate efforts to comprehend and reverse the surging rate of drug intoxication fatalities. (*Am J Public Health.* 2014;104:e49–e55. doi:10.2105/AJPH.2014.302244)

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SUICIDE IS THE 10TH LEADING cause of death in the United States [1] and has surpassed motor vehicle crashes as the leading cause of injury mortality.[2] Although these rankings alone attest that suicide is a major public health problem, suicide and other self-directed violence fatalities[3] are likely grossly underestimated. Suicide itself is undercounted.[4] The rapidly growing burden of deaths owing to drug intoxication, whether related to prescribed or illicit compounds, likely obscures drug intoxication suicides.[5–8] Moreover, the vast majority of drug-related poisoning deaths reflect self-intoxicating behavior, but these deaths are seldom characterized as such.[9] Rather, they are usually called "accidents" and typically assume public prominence only when they involve the premature deaths of celebrities of the stature of, for example, Philip Seymour Hoffman, John Belushi, Elvis Presley, and Janis Joplin. Although their deaths may have been unintended, there was nothing unintentional about their use of intoxicating substances. Therefore, the resulting fatal drug overdoses or interactions were not true accidents.

The term "accident" commonly implies that injuries are random or determined by fate and, hence, unavoidable and impervious to preventive interventions. By contrast, in his transformative 1968 article, William Haddon proposed that characterizing accidents as predictable and preventable injuries would enable them to be studied in a structured, scientific fashion.[10] His core premise was that it was possible to institute measures that would shrink injury incidence and mortality rates (e.g., motor vehicle crash death rates) without stressing individual behavior change. Others have reasserted the view that injury can be prevented by the application of scientific principles,[11,12] and the US Centers for Disease Control and Prevention (CDC) championed a movement during the 1980s and 1990s to have "unintentional injury" supplant "accidental injury" in classification and coding and to have "intentional injury" cover self- and other-directed violence.

Acceptance and application of these labels and their meaning now permeate the injury epidemiology and public health practice literature.[13] However, despite this progress, "accident" remains intact as a working concept in the medicolegal lexicon and in the law pertaining to manner of death certification. Injury manner of death is categorized on the death certificate as homicide, suicide, accident, or undetermined, subject to the differential determination of medical examiners and coroners about any perpetrator or decedent intent. These distinctions persist across underlying cause of injury death codes V01–X59 in the 10th revision of the *International Classification of Diseases*[14] and are likely to continue in the 11th revision.

We argue that the current nomenclature used in the National Violent Death Reporting System (NVDRS) and in CDC data reports, derived from necessary medicolegal standards for characterizing injury manner of death, substantially impedes research on and prevention policy development of suicide and drug-poisoning mortality. Increasing at an extraordinary rate,[15] drug-poisoning deaths are poorly differentiated in terms of decedent action and intent. This lack of clarity will continue to impair the design and targeting of appropriate and effective preventive interventions until new approaches to classification and coding are adopted.

The poor classification of self-poisoning deaths is likely the main reservoir both for misclassified suicides and for nonsuicide deaths arising from drug abuse and misuse. The unintentional (i.e., nonsuicidal and nonhomicidal) drug intoxication mortality rate rose by 156% between 2000 and 2011 (most recent data), from 4.16 to 10.61 deaths per 100 000 population,[16] a sevenfold greater increase than that in the suicide rate, with which it is converging. Because of the propensity for medicolegal authorities to misclassify deaths owing to prescription and other drug intoxication,[8,17–19] the 22% increase in the official suicide rate from 10.43 deaths per 100 000 in 2000 to 12.68 in 2011 is likely a serious underestimate. Of the total deaths owing to drug

intoxication in 2000 and 2011, 92% and 91%, respectively, were classified as "unintentional poisoning."[16] However, the bulk are not accidents (which would include, e.g., the inadvertent poisoning of children) or involuntary but instead reflect deliberate drug use behaviors.

In response to the burgeoning challenges the classification and prevention of poisoning mortality pose, we propose a new working category: death from drug self-intoxication (DDSI). The first step in preventing a potentially preventable cause of death or adverse outcome is accurate definition of the problem. We intend the use of DDSI as a category to circumvent the problematic dependence of researchers and the public health community on the manner of death classification system that medical examiners and coroners are mandated to use. That system requires these medicolegal authorities to follow a strict set of guidelines that includes the need to achieve a high degree of certainty in certifying suicide.

Our proposal does not require any change in the determinations of medical examiners and coroners, as illustrated by the following 2 examples that hypothetically could appear on death certificates: (1) DDSI; owing to nortriptyline poisoning; manner: suicide; and (2) DDSI; owing to heroin poisoning; manner: accident. The DDSI category would cut across 3 of the 4 injury manner of death categories, namely, suicide, accident, and undetermined intent. We derived this category from decedent premorbid behaviors, not inference about any fatal intent. Medical examiners and coroners would report DDSI on the basis of accumulated evidence for the use of associated agencies and other interested parties to enable them to better define and quantify decedents' lethal premorbid drug use behavior. Thus, the DDSI category would apply to suicide when there is sufficient confirmatory evidence; cases of uncertain intent when such evidence is lacking; and cases determined as unintentional except when medical examiners and coroners are certain that the drug consumption involved no intention for intoxication of any kind (as in a child poisoning case). We further propose that the CDC's NVDRS become the vehicle to enable operationalization and implementation of the DDSI category by its incorporating poisoning deaths and supplemental data from prescription drug–monitoring programs.

The CDC recently promulgated an extension of the suicide paradigm that encompasses both nonsuicidal self-injury deaths and suicides within a self-directed violence taxonomy.[3] However, the nonsuicidal self-injury designation has roused considerable international controversy about morbidity and clinical care, with commentators variously highlighting its unreliability, tenuous connection to self-poisoning, focus on adolescents and young adults, and distinction from attempted suicide.[20–22] Potentially more inclusive than nonsuicidal self-injury in the morbidity context is deliberate self-harm, which depends solely on describing incident behavior.[23]

From the vantage point of a clinician in an emergency department, for example, it may be feasible to determine that a given nonfatal self-injury case involved no suicidal intent. In a postmortem situation, however, the challenges are greater, and discerning decedent intent may be impossible. On the other hand, it may be relatively straightforward for medical examiners and coroners to determine that intravenous heroin, repeated consumption of prescription medications, or heavy consumption of alcohol resulted in fatal drug self-intoxication, independent of evidence necessary for them to establish an intent to die. A precise description of abuse or misuse of prescribed drugs, illicit drugs, or alcohol on the death certificate, buttressed by toxicology and autopsy reports, will help enhance the understanding and clarity of injury mortality statistics for surveillance, research, and prevention. In transcending the current manner of death classification, the DDSI category will advance the field of study on suicide and other self-directed violence.

HIGH EVIDENTIARY STANDARDS AND UNDERCOUNTING

To determine a suicide, medical examiners and coroners usually must establish that the decedent intended to die and delivered the means.[24,25] Satisfying the high evidentiary standards for confirmation of suicide may require the compilation of many corroborative elements, such as forensic evidence from the scene, identification of the injury mechanism and accompanying apparatus, autopsy and toxicology results, testimony from a reliable eyewitness, a suicide note, and record of suicide attempts.[26,27] However, death investigation and emergency health care systems are severely underresourced, which may plausibly compromise the acquisition of appropriate data and their correct interpretation.[28–30] Other pressures that likely decrease suicide counts include life insurance penalties,[31] social stigma,[27] and moral and religious proscriptions.[32] Undetermined intent is regarded as the manner of death category most susceptible to suicide misclassification cross-nationally,[33–37] although it is predictably of far less absolute importance in the United States in this respect than is the accident category.[8] In deference to this high susceptibility, some countries present their suicide counts as the combination of undetermined injury intent and suicide deaths,[38] and researchers have employed this combination in estimating lower limits for true suicide rates and assessing suicide data quality.[39,40]

Suicide is undercounted nonrandomly by method or injury mechanism,[5,6,38,41] which has differential implications for accurately assessing risk among various sociodemographic groups. A multivariable, multiple cause of death study showed that in the United States mechanism of injury was by far the strongest predictor of the likelihood that medical examiners and coroners would classify a decedent whose manner of death was suicide or undetermined intent as undetermined.[7] Mechanism was differentiated as less active (violent), exemplified by poisoning and drowning, versus more active (violent), exemplified by firearm and hanging or asphyxiation. Medical examiners and coroners were 46 times more likely to classify manner of death as undetermined intent for the less active group than for the more active one. Poisoning deaths predominated in the former group, and firearm trauma and hanging or asphyxiation deaths in the latter.

The statistical adjustment for the activity of injury mechanism level has eliminated a differential in the likelihood of an undetermined intent classification for gender, but not age, race/ethnicity, and education. Using data from the

NVDRS, an adaptation of the multiple cause of death study showed a 66 times higher likelihood of classification under undetermined intent for the poisoning group among Whites and a 229 times higher likelihood among African Americans relative to their referents: their counterparts in the firearm trauma group.[42] In concert, the results of these 2 recent studies strongly suggest that US researchers, policymakers, and prevention scientists be far more concerned about undercounting suicides by poisoning than those by firearm or hanging or asphyxiation. These 3 methods accounted for 90% of reported suicides in 2011.[16]

MENTAL HEALTH DATA GAPS AND SUICIDE ASCERTAINMENT

Psychopathology, psychological distress, and interpersonal conflicts loom large as ingredients in the mix of life circumstances related to suicide. A meta-analysis of 27 psychological autopsy studies and a systematic review of 22 case–control studies and 54 case series jointly indicate that approximately 90% of suicides in the Western world have a diagnosable psychiatric disorder at time of death.[43,44] Even when viewed as an inflated estimate, because of strong retrospective reporting and classification biases, it is evident that psychological distress and significant psychopathology play an important role in suicide occurrence. On the other hand, related data gaps appear to augur negatively for case ascertainment of suicides in the United States, particularly those from drug intoxication and other poisoning.[7] Signaling this problem, a national multiple cause of death study found that psychiatric comorbidity was documented on only 7% and 10% of the death certificates of, respectively, male and female suicide decedents.[45]

An expert multidisciplinary panel, which the CDC convened during the 1980s to develop operational criteria for suicide determination, recommended that medical examiners and coroners use multiple data sources for suicide-related death investigations, including sources that would help identify the psychological and psychiatric characteristics of the decedents.[24] In investigating equivocal intent cases, including many drug intoxication cases, medical examiners and coroners would need to enlist the participation of psychiatrists or clinical psychologists who are proficient in assessing self-harm proximal to injury death[46] and incorporate interviews with family, friends, and acquaintances of the decedent. The coupling of an in-depth review of medicolegal records with follow-back interviews of key informants is labeled a "psychological autopsy."[47] Evolving through a history of more than 50 years,[48] this procedure is now well developed in the research arena.[49] However, there is no trained workforce widely available to provide equivalent support to medical examiners and coroners where needed.

A testable hypothesis is that medical examiners and coroners are impeded in identifying drug intoxication suicides, especially in the presence of the unfolding surge in poisoning deaths, because of a paucity of psychiatric and psychological consultation and data. Results from a recent English study underscore the issue.[19] In this study, 3 of the investigators, all prominent psychiatrists or suicidologists, independently and blindly assigned manner of death to a set of vignettes on the basis of coroner court-determined suicide, undetermined intent, and accident cases. Collectively resolving interrater discrepancies in reaching consensus, it was found that the expert panel consistently determined more of these cases to be suicides over the observation period (1990–2005) than had the coroners.

In light of their training, expertise, and experience, their collective counts across the 3 selected manners of death better approximate a criterion standard than do respective coroner counts. The investigators reported a decline from 72.0% to 65.4% between 1990 and 2005 in the proportion of researcher-defined suicides that had received suicide verdicts from the coroners. They attributed this growing discrepancy to an increase in accident or misadventure verdicts—primarily involving misclassified pharmaceutical poisoning cases; indeed, they found that half of the pharmaceutical deaths were probable suicides. Such results invite similar quality assurance assessments in the United States.

Systematic reviews of cohort studies of suicide show that psychiatric disorders, including alcohol and other substance use disorders, are strongly associated with excess suicide risk.[50,51] Yet 3 multivariable multiple cause of death studies, 2 US and 1 Australian, revealed that substance use disorders differed from other major psychiatric disorders in being associated with an accident manner of death, rather than a suicide, classification.[45,52,53] These findings reflect a paradox in suicide case ascertainment, a paradox that emerges as an important empirical question for the United States. Although alcohol and other substance use disorders are known risk factors for suicide, foreign studies have shown that confirmatory knowledge of substance abuse problems decreases rather than increases the likelihood that medicolegal authorities will ascertain a true suicide.[54–56]

MANNER OF DEATH CLASSIFICATION AND PREVENTION

When medical examiners and coroners are confronted with a death from self-directed violence, with a lesser degree of confirmed intentionality than suicide, they are administratively compelled to default to an accidental (unintentional) or undetermined intent manner of death. However, there appears to be considerable interstate variation in how medical examiners and coroners exercise these respective defaults in drug intoxication cases. For example, during 2008 to 2010, the combined suicide, accident, and undetermined intent drug intoxication deaths that medical examiners and coroners classified as undetermined ranged from 1% to 85% and were less than 5% in 11 states and 15% or higher in 8.[57] In turn, this variable magnitude affected the relative proportion of drug intoxication deaths classified as suicides and accidents. These facts show the need for a standardized assessment procedure with a clear diagnostic algorithm commencing with the suggested DDSI diagnosis and followed by further intent specifications founded on scientific criteria.

Germane to a valid suicide classification for a drug intoxication death, we inferred from a study of injury and intentionality that people who attempt to kill themselves with drugs are more likely to die than are those whose intoxication is inadvertent.[58] They

probably also consume a higher toxic dose because of their intention to die[59] and are more likely to use multiple drugs.[60,61] Potentially complicating ascertainment of suicides, however, medical examiners and coroners variably factor in alcohol and other substance abuse as suicide determinants.[54,62] In addition, the dual social stigma characterizing drug abuse and suicide may synergistically induce undercounting.[63] The classification of the great preponderance of drug intoxication deaths by medical examiners and coroners as accidents (80% nationally in 2011)[16] is also problematic for designing and mounting effective prevention strategies, programs, and other countermeasures.

Are most of these deaths truly accidental or unintentional? Do they really equate, for example, with a typical fatal fall down stairs or a motor vehicle crash death on a bridge in a flash flood? Fatal drug intoxications often reflect personal recklessness, indifference, or ambivalence about living[18,64] and a history of dependence or addiction.[65] We also argue that the assurance of validly classifying a drug or other poisoning death as an accident demands affirmative inclusion criteria consistent with those for classifying suicide. Such criteria have not been formulated for the United States. Relative to the intentionality continuum underlying the injury manner of death classification, the DDSI category would cover all drug-poisoning deaths in the suicide category and most in the current undetermined intent and unintentional categories.

We conclude that constraints implicit in the medicolegal paradigm—including both the limited resources and expertise that are available to medical examiners and coroners for death investigations across most jurisdictions[28,66] and heterogeneous data collection, analysis, and reporting practices[57,67–70]—reveal a major need for researchers and prevention communities to end their reliance on prevailing manner of death distinctions for classifying fatal drug intoxications. This reliance inhibits prevention by diluting and distorting the characterization of high-risk sociodemographic groups and their associated life circumstances. We present the DDSI category as a feasible alternative approach. We posit that this category is optimal and is an attainable conceptual fit for most drug intoxication deaths, because it would explicitly characterize high-risk premorbid behavior by the decedent, whether the death was a confirmed suicide or of lesser or misclassified intentionality. It also invites clearer codification of involved toxic compounds, which would foster better comprehension of the mix of substances (prescribed or not, legal or illicit) involved in these deaths.

OPERATIONALIZING AND IMPLEMENTING THE DDSI CATEGORY

What kind of self-intoxication drug deaths would qualify for a DDSI designation? A comprehensive and definitive answer must await discussion, debate, and consensual recommendations from multidisciplinary experts representing diverse constituencies, including universities; government health, law enforcement, legislative, and regulatory agencies; and drug treatment facilities. Nonetheless, we suggest some candidates for the DDSI category, while acknowledging current deficits in the means to generate the requisite data for its operationalization, such as provision for a new entry on the death certificate.

Leading contenders are overdose deaths that medical examiners and coroners attribute to the self-administration of schedule I drugs (heroin and other drugs with no current medicinal value and a high potential for abuse and subsequent psychological and physical dependence), cocaine or alcohol (ethanol), or schedule II pharmaceuticals (e.g., the opioid analgesics oxycodone, hydrocodone, and fentanyl, which have only slightly less potential than do schedule I drugs for abuse and dependence) for which there is evidence of doctor or pharmacy shopping or misuse in the absence of a prescription. Other potential candidates are self-intoxication deaths that implicate certain polysubstance interactions, for example, between schedule I drugs and schedule II drugs or such schedule IV pharmaceuticals as benzodiazepines and selective serotonin reuptake inhibitors. And, of course, heavy consumption of alcohol amplifies the lethality of such interactions. We envisage DDSI categorization and coding that will permit substance specificity as crucial for informing and targeting treatment and prevention, for example, DDSI (ethanol), DDSI (heroin), DDSI (cocaine), DDSI (oxycodone), DDSI (ethanol, temazepam), DDSI (heroin, fentanyl, and substance x), DDSI (not otherwise specified), and DDSI (unknown).

Although difficult for formal national vital statistics classification, our DDSI category could initially be enabled for research and prevention purposes through the expansion of the data domain of the NVDRS. This publicly accessible, state-based surveillance system links police reports, medical examiners and coroner records, and crime and toxicological laboratory reports to death certificates to generate detailed individual-level information on sociodemographics, risk factors, and circumstances of suicides, homicides, and undetermined intent injury deaths. We call for the NVDRS to include unintentional poisoning deaths reinforced by additional information on decedent behavior and substance source and type on all poisoning deaths that could be accessed through prescription drug–monitoring programs.

An expanding number of states are tracking the problematic use of pharmaceuticals through their prescription drug–monitoring programs data,[71–73] although at the national level the programs remain a work in progress.[74] Medical examiners and coroner and death review team access to prescription drug–monitoring programs should be universally legal. This provision would enable medical examiners and coroners to better identify drug-related deaths that variously implicate doctor and pharmacy shopping in addition to identifying abuse or misuse of pharmaceuticals as indicated by the absence of a prescription or excess dose relative to prescribed dose. Also, placing more emphasis on toxicological analyses would permit the monitoring of emerging drug trends and the targeting of the availability of highly toxic substances, whether use was intentional or not.

By combining unintentional poisoning deaths with the suicide and undetermined intent poisoning deaths that are currently integrated into the system, the NVDRS would greatly enhance the scope and flexibility of its data for injury surveillance, research, policy, planning, prevention, treatment, and evaluation. In total, poisoning deaths were 42% more

frequent than were firearm trauma deaths in 2011.[16] The NVDRS has already incorporated unintentional firearm trauma deaths into its data domain to officially acknowledge that they contain both misclassified homicides and undetermined intent deaths.[75] The addition of unintentional poisoning deaths could enable the system to generate the requisite data for better characterizing the epidemic of drug intoxication deaths—including the specification of groups at high risk for suicide and other fatal self-directed violence—and for informing etiology and the design and evaluation of interventions.

A pilot study in New Jersey demonstrated the feasibility and value of including all poisoning deaths in the NVDRS.[76] In concert with additional funding for medical examiners and coroner offices and prescription drug–monitoring programs in NVDRS states, the incorporation of unintentional poisoning deaths would be a preliminary step toward facilitating the quest of the National Association of Medical Examiners and American College of Toxicology to make death certification more precise and uniform.[77]

CONCLUSIONS

The escalation, magnitude, and plausible overlap of national suicide and unintentional poisoning mortality rates jointly reveal an urgent need for a shift from the prevailing suicide paradigm to a broader self-directed violence paradigm that incorporates all DDSIs, whether their official manner of death classification is suicide, accident, or undetermined intent. More fundamentally, the epidemiological paradigm for investigating fatal drug intoxications needs separation from the medicolegal paradigm to advance suicide and other self-directed violence mortality research, surveillance, prevention, and treatment. This is justified because injury deaths that directly implicate premorbid drug abuse or misuse by decedents likely require markedly different prevention strategies than do drug-induced deaths that are true accidents. Unlike nonsuicidal self-poisoning morbidity, mortality from self-intoxication by drugs has largely constituted a conceptual gap or intellectual blind spot in suicide research. Fatal self-directed violence will continue to be seriously underestimated as a psychiatric, public health, and socioeconomic problem as long as it remains operationally confined to known suicides or described as accidental or unintentional.

In sum, a clarified self-directed violence mortality category could begin to be developed and implemented in the United States through the augmentation of NVDRS data with unintentional poisoning deaths, and universal authorization and facilitation of medical examiners and coroner offices and associated death review teams to access prescription drug–monitoring program data. Crucial for combating the current poisoning epidemic, accurate characterization, measurement, and quantification of drug intoxication deaths are essential first steps in evidence-based prevention and treatment. It is time for the nation to resolve the obvious and readily addressable conceptual and data problems inherent in the codification of poisoning deaths. ■

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