


Overcoming the limitations of 'accident' as a manner of death for drug overdose mortality: case for a death certificate checkbox

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ABSTRACT

Collectively, the epidemic increases in the United States of opioid-related deaths and suicides during the first two decades of the 21st century have exposed shortcomings in current forensic and epidemiological approaches for determining and codifying manner of death—a vital function fulfilled by medical examiners, coroners and nosologists—the foundation for the National Violent Death Reporting System (NVDRS), an incident-based surveillance system providing individual-level information on decedent characteristics, manner, cause and circumstances of suicide, homicide and other violent injury deaths. Drug intoxication deaths are generally classified as 'accidents' or unintentional, a fundamental mischaracterisation; most arose from repetitive self-harm behaviours related to substance acquisition and misuse. Moreover, given the burden of affirmative evidence required to determine suicide, many of these 'accidents' likely reflected unrecognised intentional acts—that is, suicides. Addition of a simple checkbox for self-injury mortality on the death certificate would enrich the National Death Index and NVDRS, and in turn, inform prevention and clinical research, and enhance the evaluation of prevention programmes and therapeutic regimens.

INTRODUCTION

Collectively, the epidemic increases in the United States (US) of opioid-related deaths and suicides during the first two decades of the 21st century have exposed shortcomings in current forensic and epidemiological approaches for determining and codifying manner of death (MOD)—a vital function fulfilled by medical examiners, coroners and nosologists.¹ The past two decades have seen sustained increases in deaths related to prescription opioid misuse and opioid use disorder,² and more recently, there have been rapid rises in deaths related to cocaine and methamphetamine use.³ Dominating media coverage and public health attention, these drug mortality trends have influenced⁴ but overshadowed the steady rise in suicide mortality since 2000.⁵ We and others have written extensively on the potential to misclassify drug overdose deaths as 'accidents' or unintentional injury deaths, sometimes the default MOD when insufficient data are available to provide confidence to medical examiners and coroners to code suicide as the manner.^{6–8} 'Undetermined' is used when there are equivalent indications that an overdose fatality was either intentional or unintentional.⁹ Contrasting with

suicide and homicide, 'accident' lacks affirmative criteria for corroboration as a MOD and is based on the absence of intent to harm or cause death. Of the 526 070 drug overdose deaths in the US during the period 2009–2018, 83.8% were classified as 'accidents', 10.0% as suicides, 6.0% as undetermined and 0.2% as homicides.¹⁰ Of the 69 711 overdose deaths in 2018, corresponding percentages were 87.7, 7.0, 5.1 and 0.2.

To enhance injury surveillance, aetiological understanding, prevention and treatment, we previously proposed the addition of a simple checkbox on the death certificate to signify registered suicides and other deaths that implicate repetitive self-harm behaviours—especially fatal drug overdoses—even if not satisfying the standards to affirm a suicide MOD.^{8 11} Our rationale follows.

SUICIDE UNDERCOUNTING

Among the four injury manners of death (homicide/suicide/'accident'/undetermined), suicide appears the most prone to undercounting, and hence plausibly the most problematic for aetiological understanding, prevention and treatment. While suicide now officially kills 2.6 times more Americans than does homicide—48 344 deaths versus 18 829 deaths in 2018¹⁰—medical examiners and coroners are much more under-resourced to conduct exhaustive suicide investigations.¹² Police officers usually are neither trained nor mandated to investigate potential suicide deaths, and no analogous agency exists to fill the void.

Exacerbating case ascertainment, psychiatrists or clinical psychologists with suicide expertise are normally not part of the investigative process and nor are psychological autopsies.¹³ The psychological autopsy, the gold standard for reinforcing medicolegal death investigations in equivocal intent cases, is an intensive retrospective analysis of the decedent's mental state and intentionality based on semi-structured interviews with potential key informants, such as next-of-kin, friends, neighbours, work acquaintances and attending healthcare personnel.¹⁴ Compounding the dearth of resources available for in-depth assessments are substantial state-to-state and within-state variations in medical examiner and coroner death investigation systems, such as those pertaining to the conduct of autopsies, toxicological testing and radiological imaging.¹⁵ Moreover, stigma-associated sociocultural and religious proscriptions contribute to the unwillingness or reluctance of



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families and communities to provide the types of insights necessary for medicolegal investigators to accurately discern possible intent—the central issue for affirmatively determining suicide as the MOD to the exclusion of other possibilities.^{16 17} Punitive provisions in life insurance policies also tend to depress suicide counts.¹⁸

Refining the nature of the suicide reporting deficit for epidemiological, clinical and public health purposes is of paramount importance, especially since undercounting is not uniform by method. Firearm (gunshot wound), hanging/suffocation and poisoning are the three leading methods of suicide nationally in the US, accounting for 92% of all suicides in 2018.¹⁰ Poisoning suicide appears most susceptible to gross undercounting due to its less forensically and behaviourally overt nature, and the challenges of determining intent in individuals who often have concurrent substance use and other mental health issues.¹¹ Administered by the CDC, the National Violent Death Reporting System (NVDRS) is a state, territory and incident-based surveillance system that employs public health informatics for enabling data linkages to generate individual-level information on decedent characteristics, manner, cause and circumstances of suicide, homicide and other violent injury deaths; data sources include death certificates and toxicology, law enforcement, medical examiner and coroner investigative reports.¹⁹ A multi-level (individual/county), multivariable analysis of microdata from the NVDRS showed detection of poisoning suicides was more strongly associated than suicides by firearm and hanging/suffocation—far more lethal methods—with various elements of psychological/psychiatric history, differentiated as evidence of a suicide note, prior suicide attempt(s), and such serious comorbid mental disorders as major depression or affective mood disorder.²⁰ Complicating their detection, these types of potential corroborative evidence are often absent. Undercounting of suicide during the opening decades of the 21st century appears considerably more problematic in drug poisoning cases (both illicit drugs and misuse of prescription drugs) than cases of non-drug poisoning, for example, carbon monoxide, pesticides and heavy metals, owing to the high magnitude and rapid escalation of the opioid epidemic and the unlikelihood that these other substances would be used recreationally.²¹

PUBLIC HEALTH AND THE MEDICOLEGAL DOMAIN

Although public health considerations for medical examiners and coroners have been subordinated to public safety and criminal justice obligations,²² their profile has been rising within the medicolegal domain.^{23 24} In 2006, Hanzlick referred to a triangle of criminal justice, public safety and (clinical) medicine that had evolved into a quadrangle incorporating public health.²⁵ Attesting to the heightened status of public health in the medicolegal domain was the multidisciplinary composition of a panel that the CDC convened in Atlanta in 2015 to address challenges for MOD classification in drug intoxication cases. Participants included representatives of the police, medical examiners, coroners and toxicologists, as well as epidemiologists, psychiatrists and social scientists. Among topics raised was a new definition, death from drug self-intoxication, which incorporated many non-suicide deaths as well as suicides. Emphasising premorbid decedent behaviour rather than postmortem inference of decedent intent in drug cases, death from drug self-intoxication was the product of a multidisciplinary research team that approximated the constituency of the panel.⁷ A summary report of the panel proceedings was published in 2017.¹

SELF-INJURY MORTALITY (SIM)

To facilitate research and to better understand common antecedents of suicides and drug overdose deaths involving illicit drug use and prescription drug misuse, we have argued for an added designation, 'self-injury mortality' (SIM), to denote deaths—whether intentional (ie, suicide) or unintended—that were the product of intentional, motivated behaviours (ie, preventable behaviours) that are instrumentally and proximally associated with a person's death.^{26 27} SIM has been developed as a way of side-stepping post hoc attempts to discern a decedent's intent, a task that is fraught with speculation when there is no suicide note or psychological/psychiatric history to examine or when the person used a less forensically obvious method of suicide (ie, a fatal overdose rather than a firearm or hanging/suffocation). Thus, it opts for a behavioural rather than a cognitive perspective, based on an individual's instrumental acts that induced death *imminently*. We distinguish SIM from indirect actions, such as smoking (also self-harm), which is a potent factor in the longer-term development of fatal chronic obstructive pulmonary disease, lung cancer and cardiovascular diseases, and drinking alcohol to such an extent that it leads to hepatic or gastrointestinal diseases. On the other hand, certain patterns of reckless drinking would fit the SIM definition; for example, college students using a hose and funnel to pour grain alcohol directly into their stomachs. Cases with behaviours fitting the SIM categorisation could be classified as suicide, 'accident' or undetermined manners of death. Not all fatal drug-related 'accidents' would fit the SIM categorisation. A young child who died through ingesting medications he/she believed were candy would be classified as an 'accident' or unintentional but not SIM, as would a death due to lethal drug–drug interactions occurring in a patient adhering to a prescribed medication schedule. Some cases are difficult to classify. For example, an individual hospitalised for drug poisoning who developed a supervening condition that might nor might not be linked to the drugs could be challenging for a potential SIM categorisation. Like other aspects of medical death certification (cause and manner of death), the coroner or medical examiner's classification reflects a 'more likely than not' opinion.

Associated with substance acquisition as well as misuse, most so-called 'accidental' or unintentional drug overdose deaths reflect repetitive self-injurious behaviours the individual comprehended could adversely and profoundly alter the probability of death.⁷ Exemplified by repetitive self-injection of illicit drugs, or repetitive overuse or misuse of controlled substance medications, ensuing deaths are therefore not true 'accidents' or unintentional, unlike the cases of toddlers who died after ingesting pills lying on the floor. SIM emphasises this distinction from 'accident' and seeks to group deaths resulting from patterns of intentional self-injurious behaviours in surveillance databases for further investigatory efforts addressing prevention. It qualifies rather than changes MOD determinations.

Desire to die and intention to die are continuous variables among those with mental health and substance use disorders, that is, ranging from no desire or intention to die, to strong desire and intention to die, and with varying combinations of severity of desire to die and intention to die between these two extremes.^{28 29} Given the paucity of research regarding desire and intention to die prior to fatal or non-fatal drug overdose, research efforts directed towards understanding SIM should enhance both the prevention of suicides and also drug-related overdose deaths that challenge the binary coding of 'intentional' versus 'unintentional'.²⁷

We deem SIM to be a dynamic not a static concept. In its operationalisation to date, we have only augmented registered suicides by any method with estimated non-suicide drug self-intoxication deaths.^{8 27 30 31} This is justified by the magnitude of the opioid (and other drug) mortality epidemic³ and the fact that current data collection systems, with appropriate guidance, would be better positioned to directly provide the data that supported identification of those non-suicide drug deaths than of other non-suicide SIM. However, we envisage linked data systems will eventually allow SIM to incorporate other self-injury deaths whose underlying cause was some other external cause besides drug poisoning, such as some types of firearm death (eg, Russian Roulette) with ambiguous intent, and unintentional motor vehicle traffic trauma, drowning, cutting and burning associated with alcohol and/or other substance misuse.

CHECKBOX SOLUTION

The simplest and quickest way for researchers and other stakeholders to access information on SIM would be through the addition of a targeted yes/no/unknown checkbox on the standard death certificate when medical examiners and coroners decide to label the MOD as suicide, 'accident' or undetermined. That is, for any injury death not definitively identified as homicide, medical examiners and coroners would respond "yes" or "no" or "unknown" to the question: "Was there any evidence of self-injurious behaviours occurring shortly before death?" Since less than 1% of drug intoxication deaths are classified as homicides,³² we assume suicide and 'accident' are the major competing manners of death in an undetermined assignment. To corroborate proximal self-harm in drug intoxication cases, medical examiners and coroners would be able to employ objective behavioural evidence derived from their investigations, autopsies, advanced radiological imaging, toxicological findings, and police or other first responder reports. Evidence of SIM could include signs on the corpse, such as drug injection-induced scarring from other behavioural self-injuries (eg, cutting, burning and other signs of self-injury), positive toxicology tests for lethal illicit drugs or corroboration of acute alcohol poisoning (eg, an empty bottle of liquor by the corpse and high blood alcohol content) involved with prescription drug toxicity, and drug paraphernalia at the death scene linked to the decedent. Other salient behavioural evidence of proximal self-harm/drug misuse might include doctor or pharmacy 'shopping' for psychoactive medications, which medical examiner and coroner offices could obtain from the electronic statewide prescription drug monitoring databases (now available in all states except Missouri), or input from family and other collateral informants.

The SIM checkbox would act as a 'tag' for surveillance and encourage relevant evidentiary data to be included in the standard death certificate description of how an injury occurred, that is, the circumstances. Optimally and ultimately, the narrative of the circumstances of non-suicide drug self-intoxication and other non-suicide self-injury deaths would routinely complement registered suicides from the MOD section in completing capture of SIM through the checkbox.

Revision of the standard United States death certificate to accommodate a SIM checkbox would require buy-in from all states. Consequently, a prudent preliminary step would be a mixed-methods pilot project in two or three states to test its feasibility and acceptability—including evaluating objective criteria for determining the non-suicidal drug-fatality component of SIM—and also to help anticipate and preclude problems for users, if nationally adopted, and to develop training

materials. A source for guiding this research, a new report on the pregnancy checkbox, which was incorporated into the 2003 revision of the standard death certificate, identified deficits as well as benefits.³³ Of critical importance, a SIM checkbox on the death certificate would fortify the value of the National Death Index for researchers conducting cohort studies of risk factors for suicide and other SIM, and for evaluating the effectiveness of prevention programmes and therapeutic regimens.

Examples of potential applications of a checkbox for researchers include comparisons of SIM suicides with SIM 'accidents' regarding types of self-injury, prominence of injection drug use versus other, age-associated and gender-associated factors in order to determine if there are patterns of SIM that more often predict suicide versus 'accident' or if patterns appear indistinguishable, which would question the validity of current MOD determinations. Some patterns may relate more frequently to age or gender or race/ethnicity. Any meaningful associations would then be relevant for further prevention research in terms of targeted interventions and examination of 'upstream' risk factors.

An opportunity for a potentially important innovation involving SIM is now emerging. CDC is currently supporting 32 states and the District of Columbia to aggregate and report timely and comprehensive data on drug-related fatalities for their State Unintentional Drug Reporting System (SUDORS).^{34 35} Incorporating undetermined (intent) deaths, but neither suicides nor homicides, this system is quite separate from NVDRS, which recently expanded to all 50 states.³⁶ Like NVDRS, SUDORS primarily derives its data from death certificates, toxicological testing, and medical examiner and coroner records, although it does not use law enforcement reports. While CDC keeps them separate, these systems fail to provide insight into the prevalence of SIM. However, linking them into a standardised data system to examine unnatural (ie, 'external') causes of death would foster critically important public health and clinical research. In this context, a functional SIM checkbox would expeditiously enrich system data for epidemiologists, public health and clinical researchers, and policy leaders, and is buttressed by the prominence of the prescription and illicit drug epidemics.^{3 37 38} Moreover, we anticipate a sharp escalation in the upwards trend of SIM, as well as suicide, in the wake of COVID-19,³⁹ with its associated social/physical distancing and the unfolding, wide-ranging economic recession/depression.

CONCLUSION

Having readily available, reliably collected information on SIM will allow policy-makers and practitioners to develop and deploy prevention and therapeutic efforts that address the large overlapping populations of drug and suicide decedents who share common risk factors. Moreover, it will foster the development of group-specific interventions for those who do not.

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