

State Variation in Certifying Manner of Death and Drugs Involved in Drug Intoxication Deaths

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ABSTRACT: National statistics on drug intoxication deaths are based solely on data derived from death certificates. This study examines the variation in the manner of death classification by state, and the specificity of drugs involved in drug intoxication deaths by state and by type of death investigation system. The National Vital Statistics System Multiple Cause of Death mortality files (2008-2010) were analyzed. Drug intoxication deaths were those with ICD-10 Underlying Cause of Death of X40-X44 (unintentional), X60-X64 (suicide), X85 (homicide), or Y10-Y14 (undetermined intent). Among drug intoxication deaths, deaths involving non-specified drug(s) were those with Multiple Cause of Death (MCO) of T50.9, and no MCO in the range T36-T50.8. State death investigation systems were categorized as follows: centralized state medical examiner offices, county/district medical examiners, hybrid, and decentralized county coroners. In 2008-2010, there was an average of over 37,250 drug intoxication deaths per year in the U.S. The manner was undetermined for 8% for the U.S., ranging from 1% to 85% among the states. During 2008-2010, 75% of the drug intoxication deaths had at least one specific drug reported on the death certificate. States with centralized state medical examiner systems had a higher percent (92%) of drugs specified than did those with other systems. Across the U.S., there is variation in the percent of drug intoxication deaths classified as having undetermined manner of death and with specific drugs identified on death certificates. This variation has significant implications for public health surveillance and for prevention efforts.

KEYWORDS: Forensic pathology, Death certification, Surveillance, Manner of death, Drug overdose

INTRODUCTION

In recent years, analyses of data from the National Vital Statistics System have documented a dramatic increase in drug intoxication deaths (often referred to as drug poisoning deaths or drug overdose deaths in public health literature) in the United States (1, 2). Since 2010, when more than 38,000 such deaths occurred, drug intoxication has become the leading cause death due to injury. These national statistics are based solely on data derived from death certificates. Medical examiners and coroners determine the cause and manner of death on the death certificate for almost all drug intoxication deaths, and toxicologists, both forensic and clinical, are often involved in determining the drugs involved.

Two significant problems related to certification limit the usefulness of the death certificate data for public health prevention efforts. First, the manner of death (i.e., homicide, suicide, accident) is frequently recorded as “undetermined.” Second, many certificates do not specify the drugs involved in intoxication deaths. Accurate information on both the manner of death and the drugs involved is essential for determining the scope of the public health problem. In addition, prevention measures will differ depending on whether the drug intoxication deaths are unintentional versus suicidal and the types of drugs involved. This paper highlights state differences in the completeness of death certificate information regarding the manner of death and the drugs involved in drug intoxication deaths. The relationship between the type of death investigation

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system and the reporting of the types of drugs involved is also described.

METHODS

The National Vital Statistics System (NVSS) Multiple Cause of Death (MCO) mortality files for data years 2008-2010 were analyzed. The NVSS is compiled from information recorded on death certificates, which is processed and reported at the state level, and then provided to the National Center for Health Statistics (NCHS) through the Vital Statistics Cooperative Program for compilation and national reporting.

Deaths with an underlying cause of death (UCOD) of drug intoxication were identified using the following ICD-10 codes: X40-X44 (unintentional), X60-X64 (suicide), X85 (homicide), or Y10-Y14 (undetermined intent). Among deaths with an underlying cause of drug intoxication, those which specified one or more drugs were identified with ICD-10 MCO in the range T36-T50.8. Deaths involving non-specified drug(s) were identified as those with MCO of T50.9 (other and unspecified drugs, medicaments, and biological substances) and no mention of any other drugs (i.e., without MCO in the range T36-T50.8). Deaths among U.S. residents were classified by state based on the state in which the death occurred. State death investigation systems were categorized depending on whether the state had a centralized medical examiner, county/district medical examiners, a mix of medical examiners and coroners, or county coroners (3).

RESULTS

In 2008-2010 in the U.S., there was an average of over 37,250 drug intoxication deaths per year (36,450 in 2008; 37,004 in 2009; 38,329 in 2010). During this time period, the manner of death was undetermined for 8% of the drug intoxication deaths and determined for 92% of the deaths [i.e. accident (78%), suicide (14%), homicide (<1%)]. The percentage of deaths with an undetermined manner of death ranged from 1% to 85% (Figure 1). In two states the manner of death was undetermined for more than one third of the deaths (85% in Maryland and 40% in Utah), while in 11 states (CA, FL, ME, NJ, NV, OH, RI, SC, TX, VA, WY), the manner of death was undetermined for 4% or fewer of the deaths. When the states with the two highest percentages were excluded from the analysis, the manner of death was undetermined for an average of 6% of the drug intoxication deaths.

During 2008-2010, 75% of the drug intoxication deaths had at least one specific drug reported on the death certificate. For the remaining 25%,

the type of drug(s) involved was not specified. For many of the deaths with no drug specified, the text on the death certificate indicating that the cause of death involved drugs was limited (e.g., "multiple drug intoxication" or "drug overdose"). The percentage of deaths with specific drugs mentioned varied by type of death investigation system and by state (Table 1). States with centralized state medical examiner systems had a higher percent (92%) of drugs specified than did those with decentralized county coroner systems (62%). The remaining systems had between 71-73% specified. In ten states, the drugs involved were specified for 95% or more of the deaths. In 11 states, the drugs involved were specified for only 33-65 % of the deaths.

DISCUSSION

The percent of drug intoxication deaths classified as having undetermined manner of death and with specific drugs identified on death certificates varies widely across the United States. This variation has significant implications for public health prevention efforts. For example, to prevent drug intoxication deaths, it is important to know the manner of death so that targeted prevention strategies can be developed. Interventions designed to change behaviors will be different for programs focusing on suicidal compared with unintentional (e.g., accidental, overdose, abuse-related) intoxication. In addition, it is important to know the type of drug or drugs involved. For 75% of the deaths nationally, some information about the drug involved is provided on the death certificate. However, this leaves one quarter of the deaths in the U.S. with no further information other than that the death involved a drug.

For public health surveillance, the variations by state in the availability of manner of death information and in the specificity of drugs involved make some comparisons among states misleading. For instance, when comparing state-specific death rates for unintentional or suicidal drug intoxication deaths, the magnitude of the problem will be underestimated in states with high percentages of death in which the manner is undetermined. When comparing drug-specific death rates (e.g., heroin, methadone), rates will be underestimated for states with high percentages of deaths lacking specific drug information (4).

Drug intoxication deaths are among the hardest to determine manner of death. In the late 1960s, in recognition that for a small proportion of deaths there may be ambiguity in the manner of death even after a complete investigation, the revised U.S. Standard Death Certificate included "undetermined" as an option (5). The U.S. mortality data show that among all external causes of death

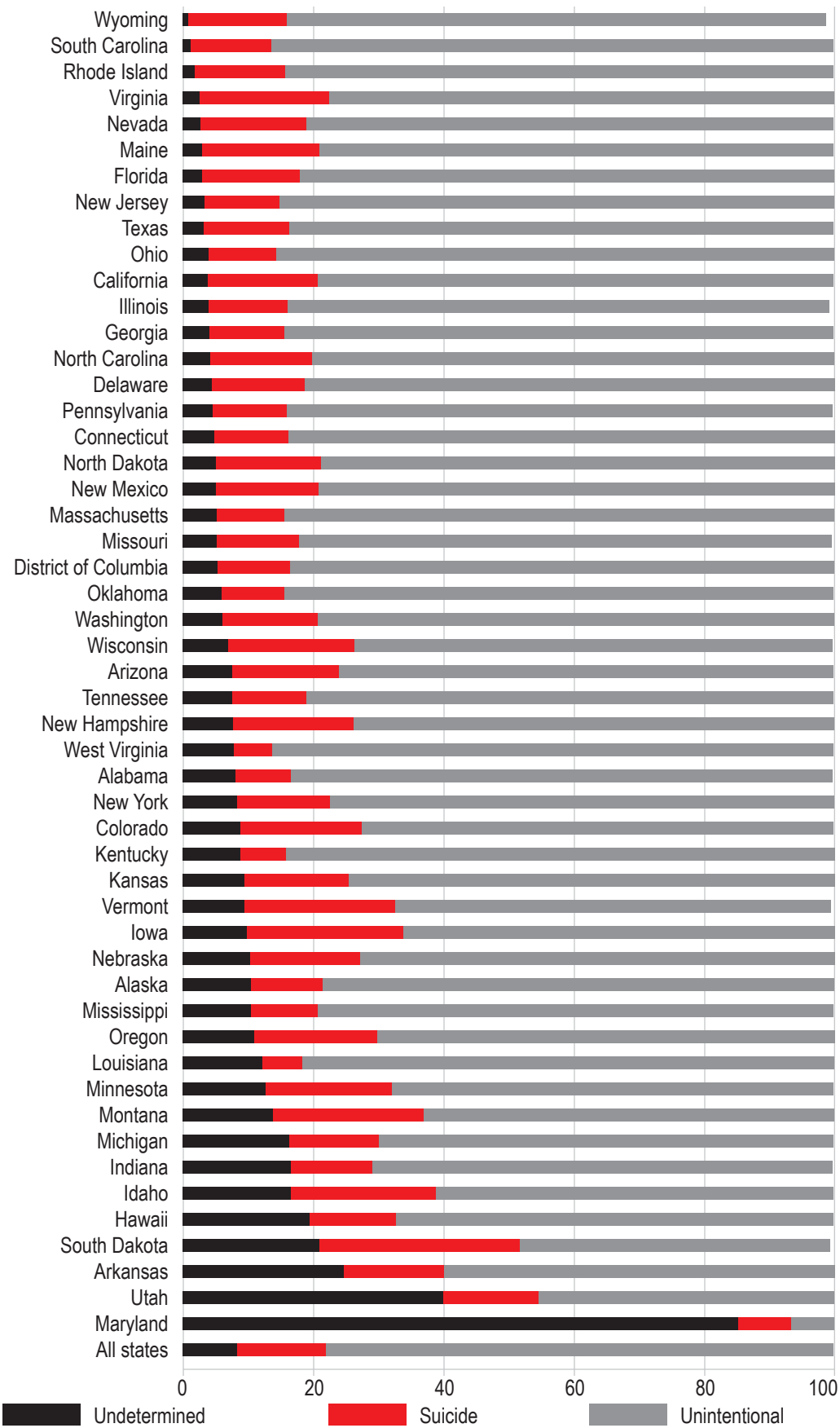


Figure 1: Percent of drug intoxication deaths by manner and state, 2008-2010.

(i.e., non-natural deaths), the overall proportion of deaths certified with an undetermined manner is about 2.8%. Of the leading external causes in 2010, poisonings (including drug intoxication and toxic substances) had the highest proportion with an undetermined manner (7.4%), followed by drowning (4.0%) and fire/hot object (4.0%) (6).

Figure 1 documents the wide range by state in the proportions of death with an undetermined manner of death for drug intoxication deaths. The variation may be due to differences in death investigation methods, in criteria used to determine a manner of death, or a combination of the two. Although the type of death investigation system may play a role, when manner of death classification was categorized by death investigation system no patterns were obvious. Over the years, many publications have provided insight into how best to determine manner of death (7-11). Previous studies focused on manner of death certification practices for drug intoxication deaths have found that certification practice var-

ies among states and suggest that the ambiguity is typically because of the inability to distinguish between accident and suicide (12-14). Because depression, chronic pain and medication abuse are all frequently found in the history of drug intoxication deaths, determining a person's intent for using the drug can be a challenge for a medical examiner or coroner (15). Medical examiner or coroners may also be challenged with limited information about the deaths. In particular, for some deaths involving the use of illicit or legal substances obtained illicitly, witnesses and family may share fewer details. In addition, bodies may be found in locations that don't appear to be where the death occurred (e.g., alleys); not only does this make death scene investigation impossible, it also indicates that someone witnessed or was aware of the death, but clearly did not want the circumstances known.

Table 1 provides the percentage of drug intoxication deaths with drugs specified by state and death investigation system, and shows specification varied widely among the states. The amount

Table 1: Percent of Drug Intoxication Deaths with Drugs Specified by State and Death Investigation System, 2008-2010

Death Investigation System	State	Percentage of Drug Intoxication Deaths with Drugs Specified
All states		75.1
Centralized state medical examiner		92.1
	West Virginia	99.4
	New Hampshire	99.1
	Vermont	98.9
	Maryland	98.6
	Rhode Island	97.3
	Oklahoma	97.2
	Massachusetts	97.0
	Alaska	95.5
	Utah	94.2
	North Carolina	92.9
	Virginia	92.7
	Oregon	91.2
	Maine	89.7
	Delaware	79.3
	Connecticut	76.8
	New Mexico	68.7

Table 1: Continued

Death Investigation System	State	Percentage of Drug Intoxication Deaths with Drugs Specified
Decentralized county or district medical examiner (physician)		71.1
	Iowa	96.1
	Arizona	80.2
	Tennessee	77.8
	Florida	68.8
	Michigan	65.8
	New Jersey	59.3
Hybrid system: county coroner and medical examiners (state and/or county)		73.2
	New York	94.0
	Washington	92.6
	Illinois	86.5
	Wisconsin	85.9
	Hawaii	83.1
	Minnesota	82.4
	Missouri	79.3
	Texas	74.7
	California	73.1
	Ohio	71.4
	Georgia	71.4
	Montana	69.9
	Kentucky	64.8
	Pennsylvania	45.0
	Alabama	45.0
	Mississippi	43.4
Decentralized county coroner		62.4
	Nevada	97.7
	South Dakota	88.8
	North Dakota	87.9
	Arkansas	76.7
	Colorado	70.4
	Nebraska	69.4
	Wyoming	64.8
	South Carolina	59.8
	Idaho	59.6
	Kansas	58.8
	Indiana	45.8
	Louisiana	34.8

of specification on the death certificate results from several possible factors that may vary by jurisdiction, including the circumstances in which the tests are performed, the substances tested for, and the practice of recording on the death certificate. When categorized by death investigation systems, in states with a centralized medical examiner system, more than 90% of drug intoxication deaths had a drug specified, while in states with a decentralized county coroner system, only two-thirds of the drug intoxication deaths had a drug specified. States with a mix of medical examiner and coroner systems had proportions of drugs specified between these two. Differences between centralized statewide and county-based systems, and medical examiner and coroner systems, might explain the disparity in specification of drugs responsible for death (3, 16-18).

County based systems, particularly those serving smaller populations, might perceive or experience more barriers to using toxicologic services to determine the types of drugs involved. The 2004 Bureau of Justice Statistics' Census of Medical Examiner and Coroners' Offices found that offices serving jurisdictions of 250,000 or more conducted toxicology analyses in a greater percentage of accepted cases (57%), compared to offices serving smaller jurisdictions (34%) (19). To address the issue of toxicological testing, the Kentucky legislature recently revised its Coroner's Statute to require coroners to test for the presence of controlled substances in postmortem examinations unless another cause is clearly established (20).

In addition to differences in toxicological testing for the drugs involved, organizational structure of death investigation within a state may also play a role in the approach taken to completing the death certificate. For instance, with decentralized systems there may be more certifier-to-certifier or office-to-office variability in comparison to centralized systems, where the Chief Medical Examiner is able to provide oversight or even mandate a practice. Within county-based coroner or medical examiner systems, there may be fewer mechanisms to rely on for standardization. However, national and state associations do provide a forum for these issues.

Differences in background and training between many coroners and medical examiners may also be a factor in some cases. Coroners are typically non-physicians, and are sometimes elected officials, whereas medical examiners are usually physicians who have specialized in pathology and subspecialized in forensic pathology (16-18). Coroners typically don't have medical training and have less familiarity with toxicological

terminology, which could explain some differences in the level of detail reported on the death certificate concerning the drugs causing death. Although in many cases, coroners will work with or employ forensic pathologists to determine the cause of death, the coroner may be filling out the cause of death section of the death certificate based on reports. In addition, coroners may have more limited contact with medical and forensic toxicologists than medical examiners, especially in highly decentralized systems. Outreach educational efforts to the medical examiner and the coroner communities might facilitate more comprehensive surveillance for these deaths.

The number of drug intoxication deaths has increased six-fold since 1980 (2), and detailed documentation of the specific causes is important for understanding this problem. This short report highlights the surveillance challenges and is intended to bring awareness to issue. A recent position paper from the National Association of Medical Examiners and the American College of Medical Toxicologists makes recommendations for conducting investigations and for improving the specification of manner and type of drug for opioid-related intoxication deaths (21). The position paper discusses the importance of accurate death certification, and includes guidance for certifying deaths, regardless of the system of death investigation. Improving the quality of death investigation and certification will maximize the utility of our existing national registration of deaths for public health surveillance and research, and contribute to the design of programs to prevent drug intoxication deaths.

DISCLOSURES

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention (CDC).

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