UNDERSTANDING AND CHALLENGING CAUSE OF DEATH: FORENSIC PATHOLOGY AND CORONERS SYSTEMS

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Guidelines for Opinions and Testimony in Forensic Toxicology

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Foreword

It is common that forensic toxicologists are called to testify in criminal and civil matters to discuss analytical results and offer their expert toxicological opinion. In these legal matters, it is important that expert testimony be constrained to areas that are based upon sufficient facts or data, be a product of reliable principles and methods, and that those principles and methods are consistently applied to the facts of the case at hand. This document provides one way of ensuring that proper toxicological testimony is allowed in legal matters by defining the general areas of forensic toxicology that are viewed as reliable by other experts in the field.

This document was revised, prepared, and finalized as a standard by the Toxicology Consensus Body of the AAFS ASB. The initial draft document was developed by the Toxicology Subcommittee of the Organization of Scientific Area Committees (OSAC).

All hyperlinks and web addresses shown in this document are current as of the publication date of this standard.

Keywords: *Opinions, Testimony, Forensic Toxicology*

Abstract: This document was developed to provide general guidance to expert witnesses called to testify on the topic of forensic toxicology, to include the expert toxicological opinions they may offer.

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Guidelines for Opinions and Testimony in Forensic Toxicology

1 Scope

This document delineates guidelines for best practices in forensic toxicology opinions and testimony. Specifically, it is intended for the subdisciplines of human performance toxicology (e.g., driving-under-the-influence of alcohol or drugs and drug-facilitated crimes), postmortem forensic toxicology, non-regulated employment drug testing, court-ordered toxicology (e.g., probation and parole, drug courts, child services), and general forensic toxicology (e.g., non-lethal poisonings or intoxications).

2 Normative References

The following references are indispensable for the application of the standard. Only the editions cited apply.

Scientific Working Group for Forensic Toxicology (SWGTOX) Standard for Laboratory Personnel. J Anal Toxicology (2015) 39 (3): 241-250

Scientific Working Group for Forensic Toxicology (SWGTOX) Standard for Breath Alcohol Personnel. J Anal Toxicology (2015) 39 (3): 231-240

3 Terms and Definitions

For purposes of this document, the following definitions apply.

3.1
body burden calculation
An estimate of the total drug in the body based on quantitative analysis of blood, urine, and/or tissue samples.

3.2
expert toxicological opinion (or "opinion")
A coherent, scientifically sound statement or statements regarding the meaning of analytical findings in a forensic case that is formulated from a consideration of the synthesis of analytical data, pre-analytical factors, case history, and other relevant information.

3.3
extrapolation calculation
An estimation of a drug concentration (e.g., ethanol) at a time other than the time of the sample collection. There are two types of extrapolation: back (retrograde) and forward (anterograde) extrapolation.

3.4
toxicologist
An individual (however named) who provides factual information and/or interpretive opinions related to the results of toxicological tests for court or investigative purposes. May be further defined by role (e.g., Toxicologist (General), Toxicologist (Alcohol), Toxicologist (Breath Alcohol)).

4 Written and Oral Opinions

4.1 Written expert toxicological opinions regarding the interpretation of analytical toxicology findings should not be part of the basic analytical toxicology report. A separate expert report should be used to convey such opinions.

4.2 Written expert toxicological opinions should include a comment that states that the opinions may be subject to change based upon new information that becomes available (e.g., case history, additional analytical testing, new research findings and publications, etc.).

4.3 An expert toxicological opinion, whether written or oral, should:

a) be expressed in a clear, coherent manner;

b) be based on established scientific principles and foundations;

c) be based on the totality of information available, including case history, observations, circumstances, and other relevant information, and not based solely on analytical results;

d) include information on case specific documents and records reviewed;

e) have references that support the opinion[1];

f) clearly state any assumptions made; and

g) clearly state any known limitations of the opinion

5 Expert Toxicological Opinions and Testimony

5.1 General

5.1.1 See the *SWGTOX Standard for Laboratory Personnel* and *SWGTOX Standard for Breath Alcohol Personnel* for recommended education, certification, and training/work experience for providing interpretive opinions related to the results of toxicological tests for court or investigative purposes.

5.1.2 A toxicologist may be asked to express an expert opinion or to testify as a fact or expert witness.

5.1.2.1 Fact witnesses typically testify to the work performed in the laboratory that includes scientific principles, instrumentation, quality assurance procedures, and/or chain of custody.

5.1.2.2 Expert witnesses typically testify to their own interpretation of results and/or opinions.

[1] References should be provided either in the expert report or made available upon request

5.2 Appropriate Opinions and Testimony by a Toxicologist

Through testimony and offering an expert toxicological opinion, it is generally appropriate for a toxicologist to:

a) discuss a laboratory report and any analytical work that supports that report. Applicable limitations should also be addressed.

b) qualify a reported concentration in the context of a given case as subtherapeutic, therapeutic, toxic or lethal when that statement can be backed by appropriate references, databases and/or other relevant information.

c) address the pharmacokinetics/toxicokinetics, as well as the pharmacodynamics/ toxicodynamics of drugs or other chemicals.

d) discuss the toxicological impact of the presence, absence and/or stability of drugs or other chemicals.

e) address impairment for the average individual to the extent that effects are consistent with documented pharmacodynamic and toxicodynamic properties of the substance and within the context of a given case.

f) perform or discuss toxicological calculations that are generally accepted in the field and can be supported by research and references, provided appropriate limitations are cited. For example, ethanol back extrapolation calculations may be performed.

5.3 Inappropriate Opinions and Testimony by a Toxicologist

The following are considered to generally be inappropriate opinions and/or testimony for a toxicologist to offer, as they currently lack consensus within the scientific community or are generally beyond the scope of the toxicologist's expertise.

a) A toxicologist should not opine as to the absolute cause of death of an individual. This does not preclude a toxicologist from addressing the toxicological impact of any substances found in the toxicological analysis of specimens from the case.

b) A toxicologist should not address behavioral intent based solely upon a drug concentration.

c) A toxicologist should not opine as to a specific individual's degree of impairment based solely on a quantitative result.

d) A toxicologist should not imply impairment of an individual based on analytical findings from urine, hair or other matrices unless supported by the literature.

e) A toxicologist should not opine as to the absolute cause of an accident.

f) A toxicologist should not perform extrapolation calculations for drugs other than ethanol.

g) A toxicologist should not calculate the dose of a drug based on a postmortem drug concentration in blood.

h) A toxicologist should not calculate the dose of a drug (with the exception of ethanol) through body burden calculations.

i) A toxicologist should not opine as to the effects of a drug or combination of drugs on a specific individual without context of a given case. This does not preclude a toxicologist from addressing general effects of drugs at varying concentrations (Section 5.2.).

j) A toxicologist should not use words such as “scientific certainty” or “reasonable degree of scientific certainty”, unless required by jurisdictional regulations.

Annex A
(informative)

Bibliography

1] *The Federal Rules of Evidence.* Michigan Legal Publishing Ltd.; 2017 edition

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National Association of Medical Examiners Position Paper: Recommendations for the Investigation, Diagnosis, and Certification of Deaths Related to Opioid Drugs

Gregory G. Davis MD MSPH and the National Association of Medical Examiners and American College of Medical Toxicology Expert Panel on Evaluating and Reporting Opioid Deaths

ABSTRACT: The American College of Medical Toxicology and the National Association of Medical Examiners convened an expert panel to generate evidence-based recommendations for the practice of death investigation and autopsy, toxicological analysis, interpretation of toxicology findings, and death certification to improve the precision of death certificate data available for public health surveillance. The panel finds the following:

1. A complete autopsy is necessary for optimal interpretation of toxicology results, which must also be considered in the context of the circumstances surrounding death, medical history, and scene findings.
2. A complete scene investigation extends to reconciliation of prescription information and pill counts.
3. Blood, urine, and vitreous humor, when available, should be retained in all cases. Blood from the femoral vein is preferable to blood from other sites.
4. A toxicological panel should be comprehensive and include opioid and benzodiazepine analytes, as well as other potent depressant, stimulant, and anti-depressant medications.
5. Interpretation of postmortem opioid concentrations requires correlation with medical history, scene investigation, and autopsy findings.
6. If death is attributed to any drug or combination of drugs (whether as cause or contributing factor), the certifier should list all the responsible substances by generic name in the autopsy report and on the death certificate.
7. The best classification for manner of death in deaths due to the misuse or abuse of opioids without any apparent intent of self-harm is “accident.” Reserve “undetermined” as the manner for the rare cases in which evidence exists to support more than one possible determination.

KEYWORDS: Forensic pathology, Forensic toxicology, Medical toxicology, Opioid, Opiate, Death certification, Autopsy, Drug abuse, Surveillance, Public health

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INTRODUCTION

The term “opioid” in this document refers to any substance that stimulates the body’s opioid receptors, whether that substance is naturally derived (e.g., morphine, codeine), semisynthetic (e.g., hydrocodone, oxycodone), or synthetic (e.g., methadone, fentanyl). Opioids marketed for pain relief are called opioid analgesics (1). Since 1999, the number of intoxication deaths involving opioid analgesics in the United States has quadrupled (2). In 2012, the American College of Medical Toxicology (ACMT) and the National Association of Medical Examiners

(NAME), with financial support provided by the Centers for Disease Control and Prevention (CDC), convened an expert panel consisting of pathologists and toxicologists to address death investigation and certification of opioid drug related deaths. This panel systematically reviewed the peer-reviewed literature regarding the topic of fatal opioid analgesic poisoning. The intent of this panel was to develop evidence-based recommendations for the practice of death investigation and autopsy, toxicological analysis, interpretation of those analyses, and death certification in order to better inform public health surveillance and epidemiologic efforts. The panel formulated six questions designed to address best practices and searched the literature to provide evidence to support those practices. Details of the development of the questions, the level of evidence available in the medical literature, and the supporting data are provided in a companion article (3); this article provides a summary of the panel's recommendations.

1. Within the bounds of state law, which deaths require assumption of jurisdiction and performance of an autopsy?

Because autopsy provides the most accurate means of determining the cause of death (4), the panel recommends that a medical examiner or coroner (ME/C) assume jurisdiction and perform an autopsy to determine the cause and manner of death whenever intoxication is suspected as a possible cause for death. NAME also recommends that an autopsy be performed whenever intoxication is suspected (5). The panel further recommends that a ME/C office receive sufficient funding and personnel to meet this standard. Local laws governing jurisdiction might also influence which cases receive autopsies (5). The panel recognizes that some drug abusers are infected with blood-borne pathogens (e.g., Hepatitis C or Human Immunodeficiency Virus) (6), but proper precautions allow those performing the autopsy and toxicological analysis to minimize the risk of infection (7). Therefore, concern regarding contracting an infectious disease while performing an autopsy in these cases is an inadequate reason to avoid internal autopsy examinations. External examination is an inadequate substitute for autopsy for the purposes of detecting and certifying drug caused deaths. The panel recommends that whenever a ME/C assumes jurisdiction in a death, the ME/C should also seek and assume jurisdiction over any laboratory specimens, such as blood, serum and urine, obtained prior to death by medical professionals (8).

2. What constitutes appropriate and necessary scene investigation?

The expert panel supports the practices recommended in the *USDOJ National Institute of Justice (NIJ) Death Investigation Guidelines* published by the United States Department of Justice (9). The panel concurs with the investigative guidelines calling for an investigator and ME/C to look for evidence of drug use, misuse, or abuse; examples are listed in **Table 1**. The ME/C should document any medical therapy, both at the scene in the form of acute resuscitation attempts (e.g., intravenous access sites, naloxone administration) and subsequently in the form of medical and prescription records concerning the decedent's medical history.

Table 1: Examples of Scene Findings Suggesting Opioid Misuse or Abuse

Opioid medications
History of methadone use
Evidence of intravenous drug abuse (needles, cooker spoons, tourniquet, crushed tablets, packets of powder or crystals, other drug paraphernalia)
Overlapping prescriptions for the same type of prescribed controlled substances, prescriptions for controlled substances from multiple pharmacies or multiple prescribers
Prescriptions in other people's names
Pills not stored in prescription vials or mixed in vials
Injection sites not due to resuscitation attempts
Altered transdermal patches
Many transdermal patches on body or transdermal patches in unusual locations, e.g., mouth, stomach, vagina, or rectum
Application of heat to increase the rate of transfer of drug from transdermal patch to decedent
Presence of naloxone

The panel recommends taking an inventory of all medications found at the scene. If possible, seek information from state prescription drug monitoring programs, which have information that can be useful in the evaluation of deaths where opioid drugs are detected. For this reason, the panel recommends that ME/Cs have access to the information available in prescription drug monitoring programs both in the decedent's state and across state lines.

3. When is it appropriate or necessary to perform toxicology testing?

The combination of history, investigative information, and autopsy is an insensitive indicator of drug intoxication (10, 11), but constraints on resources are common in forensic practice. Some forensic offices have found it useful to assess cases in the morgue for the presence of drugs based on a quick screening test of urine with a kit (11, 12). Screening tests alone offer only weak evidence, are subject to false negatives, and are inadequate for establishing a cause of death (11, 12). Therefore, the panel recommends performing toxicological analysis for controlled substances on all decedents for whom one or more of the following circumstances are true:

1. *Known history of prescription opioid or illicit drug use, misuse, or abuse (13);*

2. *Evidence of opioid or illicit drug abuse revealed by scene investigation;*

3. *Autopsy findings suggesting a history of illicit drug abuse (including needle marks, hepatic cirrhosis, and cases in which birefringent crystalline material is within foreign body giant cells in the lungs);*

4. *Massive lung edema and froth in airways present with no grossly visible explanation (e.g., heart disease) or other non-toxicological explanation (e.g., epileptic seizure) (14);*

5. *Potential or suspected smugglers of illicit drugs (mules) (15);*

6. *No unequivocal cause for death identified at autopsy;*

7. *Decedents with a potential natural cause of death visible at autopsy whenever a drug may have precipitated or contributed to death by an additive mechanism, such as opioid-induced respiratory depression; or*

8. *Traumatic deaths.*

4. What are the best techniques for specimen collection and what should be the scope of the toxicological analysis?

Factors such as delay in autopsy, sampling technique, and specimen preservation contribute more to inaccuracies associated with toxicological testing than do the testing procedures themselves (16), but procuring and storing toxicology specimens under optimal conditions mitigate these factors (8, 17). The NAME standards call for collection of blood, urine, and vitreous humor as toxicology specimens in all cases whenever these specimens are available (5). Specimens that may be particularly relevant to deaths related to opioids include blood, vitreous humor, urine, bile, and gastric contents.

Because of postmortem redistribution of drugs, the best source of a blood sample for toxicological analysis is the ilio-femoral vein (8, 17). Although some ME/Cs ligate the femoral vein and draw distal to the ligation under direct visualization, at least one study shows that samples drawn by blind stick access to the femoral vein yield closely comparable concentrations (18). If femoral vein blood is not available, then blood from the subclavian vein, the right atrium of the heart, or any other intact blood vessel is the next choice, listed in decreasing order of desirability (8). Blood obtained from a body cavity is a specimen of last resort.

Label each specimen as accurately as possible regarding the anatomical source of the specimen (e.g., "blood from femoral vein", not "blood"). Store specimens in tightly sealed containers at 4° C for short-term storage. Sodium oxalate and sodium fluoride are the anticoagulant and preservative, respectively, of choice for blood for routine cases. Articles summarize and detail specimen selection, collection, and storage (8, 17).

An adequate analyte panel for opioid substances includes all common opioid analytes, including but not necessarily limited to those listed below:

Buprenorphine
Codeine
Fentanyl
Hydrocodone
Hydromorphone
Meperidine
Methadone
6-Acetylmorphine
Morphine
Oxycodone
Oxymorphone
Propoxyphene
Tapentadol
Tramadol

An analyte panel should also include other medications such as:

Benzodiazepines
Antidepressants
Muscle relaxants
Sleep aids
Ethanol
Stimulants (e.g., cocaine and amphetamines)

This list will change over time as pharmaceutical companies market new drugs or cease production of a drug that is currently available.

5. How does the interpretation of postmortem drug concentrations affect the certification of deaths related to opioids?

Postmortem drug concentrations are useful, even essential, in the determination of cause of death, but toxicological test results must be interpreted in the context of the circumstances surrounding death, the medical history, the scene of the death, and the autopsy findings (19, 20). A ME/C must use caution when relying on case studies and published tables of toxicology results, which are often based on a few cases and provide little or no contextual information about specific case details. Given the proper circumstances and autopsy findings, a drug can cause death even at a concentration below what some consider a reported lethal range. Conversely, the simple presence of a drug concentration within the reported lethal range does not necessarily make the drug the cause of death. Drug concentrations measured in postmortem samples cannot be used to reliably calculate the precise quantity of medication consumed (21).

Postmortem redistribution (PMR) is unpredictable in magnitude and direction and may not occur in every case. Nevertheless, a ME/C can generally make reasoned, clear, and defensible determinations of the cause and manner of death by using sound judgment based on the complete investigative and autopsy findings. The existence of PMR should not serve as an excuse to avoid making decisions concerning cause and manner of death in cases with toxicological findings.

Tolerance accounts for some of the overlap between therapeutic, supratherapeutic, and lethal concentrations of opioid analgesics observed in decedents, complicating the interpretation of postmortem concentrations of opioids and other drugs (22). There is no reliable quantifiable measure of drug tolerance before or after death.

Drug-drug or drug-toxicant interactions are complex and can occur on two levels – pharmacokinetic and pharmacodynamic (23). Because many variables determine whether any interactions occur, no *a priori* method can determine whether any interaction occurred in a given case; this should not, however, preclude consideration of potential interactions with respect to cause of death determination.

Determination of the cause of death should account for pathways of drug metabolism. Given that heroin is metabolized rapidly to 6-acetylmorphine (6-AM), the presence of 6-AM rather than heroin is sufficient to ascribe intoxication to heroin. In the absence of 6-AM, heroin use can be reasonably inferred by other means. For example, pure morphine could come from the ingestion of morphine or as a metabolite of codeine. In heroin, however, codeine from the opium derived from poppies is present as a slight contaminant, and so a morphine:codeine ratio greater than 1 may be considered as evidence of heroin use (24, 25).

Interpretation of solid tissue concentrations of drugs is complicated and often impossible beyond qualitative evidence of exposure. Drugs may distribute unevenly throughout organs such as the liver or brain because of variations in blood flow, bio-accumulation, and other factors, further complicating interpretation (26).

6. What are the optimal methods for determining and recording (certifying) cause of death, manner of death, and how injury occurred (including wording on the death certificate)?

Death certificate data are often used to determine priorities in public health. Four sections of the death certificate are particularly important to research and public health work on opioid-related deaths: Cause of Death, Other Significant Conditions Contributing to Death, Manner of Death, and the section labeled "Describe How Injury Occurred." Death certificates must be completed and filed as soon as possible following death, and completion is sometimes necessary before toxicology results become available. Nevertheless, in order to maximize useful information about opioid drug deaths, the panel recommends that the death certificate be completed with the most specific details available about a given death and amended when pending results return.

Cause of Death

If a death is attributed to a single drug or to a combination of drugs, whether as cause or as a contributing factor, then the best and recom-

mended practice is to list the generic name of all of the chemical agents that the pathologist considers responsible for causing death in the autopsy report and on the death certificate (27, 28). The recommended approach applies to drugs present in concentrations sufficient to have caused death or contributed to death in a given case. Avoid vague, nonspecific descriptions such as "mixed drug intoxication" or "polypharmacy."

Other Significant Conditions

In this section, also referred to as "Part II" of the Cause of Death, list conditions that might have predisposed the person to death but which were neither necessary nor sufficient to cause death. For example, obstructive sleep apnea might contribute to death from an opioid overdose without being the underlying cause of death. The recommendations for specificity in wording the cause of death also apply to listing contributing factors.

Manner of Death

Drug-related deaths are often complex, requiring thorough investigation. This investigative information is then used in conjunction with the results of the autopsy and toxicological testing to determine a manner of death, whether accident, suicide, or homicide. The determination of suicide is often difficult; ME/Cs must base a determination of suicide on appropriate investigative information and postmortem findings and be able to defend this determination. Published guidelines from the CDC indicate that in a suicide the fatal injury must be consistent with being self-inflicted and that there should be indication of intent of self-harm (28, 29). By these criteria, intentional misuse of opioids in excess amounts for self-treatment or for the sensations that the drugs cause, while dangerous, does not by itself constitute a suicide. At the same time, assigning "undetermined" as the manner of death as a matter of course for deaths due to intoxication does not serve the public good, nor does this practice support efforts to intervene and prevent future intoxication deaths of a similar sort. The panel recommends classifying deaths from the misuse or abuse of opioids without any apparent intent of self-harm as "accident." Reserve "undetermined" as the manner for the rare cases in which evidence exists to support more than one possible determination, that is, where some evidence suggests accident and other evidence suggests suicide or homicide.

How Injury Occurred

The drugs to which fatal intoxication is attributed should be listed in the "Cause of Death" field. The "How Injury Occurred" field should include the known information about the history, route of administration, drug source, and the type of drug formulation, as shown in **Table 2**. Examples for "How Injury Occurred" might include: "history of chronic back pain, ingested drug prescribed to decedent" or "injected illicit substance." While it is true that more specific information is preferable to general statements, avoid the use of personal identifiers in this section, as such information may impede attempts to create de-identified data for public health work and may later prove to be incorrect.

SUMMARY

The recommendations of this panel are based on the best evidence provided in the medical literature for the investigation, evaluation, and certification of opioid-related deaths at the time of review. Additional detail concerning these recommendations is available in a companion paper (3). ME/Cs and toxicologists value their ability to work independently, but cooperation on a problem common to all strengthens the ME/C community's response to the opioid epidemic. Use of these recommendations will improve the detection and reporting of opioid-related deaths. Improved surveillance will reveal the magnitude of opioid-related deaths more accurately, thus clarifying attempts to decrease the number of opioid-related deaths and improving public health by monitoring the effects of these interventions.

Table 2: Useful Information for "How Injury Occurred"

Information	Examples of Details
Medical history	History of chronic pain, origin of pain (e.g., motor vehicle accident, fall, cancer), history or evidence of drug use, abuse or misuse (e.g., intravenous abuse, prescription medication abuse, methadone treatment, detoxification admissions)
Route of administration	Oral ingestion, intravenous injection, snorted, smoked, transdermal, transmucosal, unknown
Source of drug	Prescription, illicit street purchase, diverted from another person's prescription, unknown source
Type of formulation	Long-acting or extended release opioid, immediate-release opioid

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The opinions and conclusions of this paper have been reviewed and approved by the National Association of Medical Examiners Board of Directors and as such are endorsed by NAME. These opinions and positions are based on a consensus of the current literature, knowledge, and prevailing theories on this topic. As Scientific knowledge and experience grow, NAME reserves the right to revise or update these opinions. The process by which NAME position papers are initiated, written, reviewed, and approved is publically available at https://netforum.avectra.com/temp/ClientImages/NAME/2c26a527-f992-4f70-9d03-7941bff5319d.pdf. All scientific position papers endorsed by the National Association of Medical Examiners automatically expire five years after publication unless reaffirmed, revised, or retired at or before that time. This work is a product of NAME and as such, was not subjected to *Academic Forensic Pathology Journal* editorial review.

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REFERENCES

1) Yaksh TL, Wallace MS: Opioids, Analgesia, and Pain Management. In: Brunton LL, Chabner BA, Knollmann BC, eds: Goodman & Gilman's The pharmacological basis of therapeutics, 12th ed. New York: The McGraw-Hill Companies, Inc., 2011:481-525.

2) CDC 24/7: Saving lives. Protecting people [Internet]. Atlanta: Centers for Disease Control and Prevention; c2011. Morbidity and Mortality Weekly Report (MMWR) November 4, 2011; 60(43); 1487-92. Vital Signs: Overdoses of Prescription Opioid Pain Relievers — United States, 1999–2008; 2011 Nov 4

[cited 2013 Jan 16]. Available from: http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6043a4.htm.

3) Davis GG, National Association of Medical Examiners and American College of Medical Toxicology Expert Panel on Evaluating and Reporting Opioid Deaths. Recommendations for the investigation, diagnosis, and certification of deaths related to opioid drugs. *Acad Forensic Pathol*. 2013 Mar; 3(1):62-76.

4) Nashelsky MB, Lawrence CH. Accuracy of cause of death determination without forensic autopsy examination. *Am J Forensic Med Pathol*. 2003 Dec; 24(4):313-9.

5) Forensic Autopsy Performance Standards; 2011 revision [Internet]. Marceline (MO): National Association of Medical Examiners; 2011 Aug 11 [cited 2013 Jan 16]. 27 p. Available from: http://thename.org/index2.php?option=com_docman&task=doc_view&gid=160&Itemid=26.

6) Burt RD, Hagan H, Garfein RS, et al. Trends in hepatitis B virus, hepatitis C virus, and human immunodeficiency virus prevalence, risk behaviors, and preventive measures among Seattle injection drug users aged 18-30 years, 1994-2004. *J Urban Health*. 2007 May; 84(3):436-54.

7) Nolte KB, Taylor DG, Richmond JY. Biosafety considerations for autopsy. *Am J Forensic Med Pathol*. 2002 Jun; 23(2):107-22.

8) Dinis-Oliveira RJ, Carvalho F, Duarte JA, et al. Collection of biological samples in forensic toxicology. *Toxicol Mech Methods*. 2010 Sep; 20(7):363-414.

9) U.S. National Institute of Justice, Office of Justice Programs [Internet]. Washington: the Institute; [updated 2011 Jun]. Death Investigation: A Guide for the Scene Investigator [updated 2011 Jun; cited 2013 Jan 16]. Available from: http://www.nij.gov/pubs-sum/234457.htm.

10) Gruszecki AC, Booth J, Davis GG. The predictive value of history and scene investigation for toxicology results in a medical examiner population. *Am J Forensic Med Pathol*. 2007 Jun; 28(2):103-6.

11) Ceelen M, Dorn T, Buster M, et al. Post-mortem toxicological urine screening in cause of death determination. *Hum Exp Toxicol*. 2011 Sep; 30(9):1165-73.

12) Cina SJ, Collins KA, Goldberger BA. Toxicology: What is routine for medicolegal death investigation purposes? *Acad Forensic Pathol*. 2011 Jul; 1(1):28-31.

13) Poulin C, Stein J, Butt J. Surveillance of drug overdose deaths using medical examiner data. *Chronic Dis Can*. 1998; 19(4):177-82.

14) Dinis-Oliveira RJ, Santos A, Magalhães T. "Foam Cone" exuding from the mouth and nostrils following heroin overdose. *Toxicol Mech Methods*. 2012 Feb; 22(2):159-60.

15) Gill JR, Graham SM. Ten years of "body packers" in New York City: 50 deaths. *J Forensic Sci*. 2002 Jul; 47(4):843-6.

16) Linnet K, Johansen SS, Buchard A, et al. Dominance of pre-analytical over analytical variation for the measurement of methadone and its main metabolite in postmortem femoral blood. *Forensic Sci Int*. 2008 Jul 18; 179(1):78-82.

17) Skopp G. Preanalytic aspects in postmortem toxicology. *Forensic Sci Int*. 2004 Jun 10; 142(2-3):75-100.

18) Hargrove VM, McCutcheon JR. Comparison of drug concentrations taken from clamped and unclamped femoral vessels. *J Anal Toxicol*. 2008 Oct; 32(8):621-5.

19) Thompson JG, Vanderwerf S, Seningen J, et al. Free oxycodone concentrations in 67 postmortem cases from the Hennepin County Medical Examiner's Office. *J Anal Toxicol*. 2008 Oct; 32(8):673-9.

20) Andresen H, Gullans A, Veselinovic M, et al. Fentanyl: toxic or therapeutic? Postmortem and antemortem blood concentrations after transdermal fentanyl application. *J Anal Toxicol*. 2012 Apr; 36(3):182-94.

21) Cook DS, Braithwaite RA, Hale RA. Estimating antemortem drug concentrations from postmortem blood samples: the influence of postmortem redistribution. *J Clin Pathol*. 2000 Apr; 53(4):282-5.

22) Ferner RE. Post-mortem clinical pharmacology. *Br J Clin Pharmacol*. 2008 Oct; 66(4):430-43.

23) Pleuvry, BJ. Pharmacodynamic and pharmacokinetic drug interactions. *Anaesth & Intensive Care Med*. 2005;6(4):129-33.

24) Ceder G, Jones AW. Concentration ratios of morphine to codeine in blood of impaired drivers as evidence of heroin use and not medication with codeine. *Clin Chem*. 2001 Nov; 47(11):1980-4.

25) Jones AW, Holmgren A. Concentration ratios of free-morphine to free-codeine in femoral blood in heroin-related poisoning deaths. *Leg Med (Tokyo)*. 2011 Jul; 13(4):171-3.

26) Madras BK, Kaufman MJ. Cocaine accumulation in dopamine-rich regions of the brain after i.v. administration: comparison with mazindol distribution. *Synapse*. 1994 Nov; 18(3):261-75.

27) Cone EJ, Fant RV, Rohay JM, et al. Oxycodone involvement in drug abuse deaths. II: Evidence for toxic multiple drug-drug interactions. *J Anal Toxicol*. 2004 Oct;28(7):616-24.

28) National Center for Health Statistics. Medical examiners' and coroners' handbook on death registration and fetal death reporting. Hyattsville, MD: Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Health Statistics; 2003 [cited 2013 Jan 26]. Available from: http://www.cdc.gov/nchs/data/misc/hb_me.pdf.

29) Rosenberg ML, Davidson LE, Smith JC, et al. Operational criteria for the determination of suicide. *J Forensic Sci*. 1988 Nov; 33(6):1445-56.

NATIONAL COMMISSION ON FORENSIC SCIENCE

NIST National Institute of Standards and Technology U.S. Department of Commerce

Views of the Commission
Certification of Forensic Science Practitioners

Subcommittee
Accreditation and Proficiency Testing

Date of Current Version	08/12/2016
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Approved by Commission	09/12/2016

Commission Action
The Commission voted to adopt this Views Document on September 12, 2016, by a more than two-thirds majority vote (94% yes, 3% no, 3% abstain).

Note: This document reflects the views of the National Commission on Forensic Science and does not necessarily represent the views of the Department of Justice or the National Institute of Standards and Technology. The portion of the document directly labeled "Views of The Commission" represents the formal Views of the Commission. Information beyond that section is provided for context. Views documents do not request specific action by the Attorney General, and thus do not require further action by the Department of Justice upon their approval by the Commission. The National Commission on Forensic Science is a Federal Advisory Committee established by the Department of Justice. For more information, please visit: https://www.justice.gov/ncfs.

Overview

The implementation of robust and standardized certification programs using accredited certification bodies complements the accreditation of forensic science providers for the overall improvement of forensic science. Certification should be appropriate to the responsibility, activity, or function performed. This document provides recommendations for the certification of forensic science practitioners.[1]

Views of the Commission

[1] An individual who (1) applies scientific or technical practices to the recognition, collection, analysis, or interpretation of evidence for criminal and civil law or regulatory issues, and (2) issues test results, provides reports, or provides interpretations, conclusions, or opinions through testimony with respect to such evidence. Definition adopted by NCFS Commissioners on May 1, 2015.

It is the view of the Commission that Forensic Science Service Providers (FSSPs)[2] should:

- Review available certification programs, giving preference to certification bodies accredited to ISO/IEC 17024 or to those in the process of obtaining accreditation, and apply certification requirements to job descriptions for specific positions including, but not limited to, managers, analysts, and technical support. For those positions in which certification programs do not exist, review of a state or local agency certification program should be considered.
- Develop a process that ensures all practitioners apply for certification, if a program is available, and provide time and resources to achieve and maintain certification.
- Include certification requirements in position descriptions, where possible.
- Provide support to practitioners, if there is not a certification program available in a specific category of testing, to maintain knowledge and skills.

It is the view of the Commission that all forensic science practitioners should:

- Become certified in all categories of testing in which examinations are performed as soon as the requirements of the certification body are met, provided a certification examination is available.
- Obtain certification within 5 years from implementation of this document. Personnel entering the field after implementation shall obtain certification within 1 year of eligibility or within the required time limit of the certifying body.

Background

Professional certification is the recognition by an independent certification body that an individual has acquired and demonstrated specialized knowledge, skills, and abilities in the standard practices necessary to execute the duties of his or her profession. Certification also provides the general public and the judicial system with a means of identifying those practitioners who have successfully demonstrated compliance with established requirements. In addition, certification provides that professionals maintain technical proficiency and ethical standards of practice. Professional certification programs can include: written and/or practical testing; an evaluation of education, training, and practical experience; requirements for continuing education; and adherence to a code of ethics.

Recommendation 7 of the 2009 National Research Council of the National Academies report *Strengthening Forensic Science in the United States: A Path Forward* stated:

> "Laboratory accreditation and individual certification of forensic science professionals should be mandatory, and all forensic science professionals should have access to a certification process ... No person (public or private) should be allowed to practice in a forensic science discipline or testify as a forensic science professional without certification." [3]

[2] A forensic science agency or forensic science practitioner providing forensic science services. Definition adopted by NCFS Commissioners on May 1, 2015.

[3] *Strengthening Forensic Science in the United States: A Path Forward* (2009).Washington, DC: The National Academies Press. pg. 25 and pg. 125.

Professional certification bodies in forensic science have been in practice for more than 30 years.[4] However, they do not exist for all forensic science categories of testing. In 2010, the Accreditation, Certification, and Proficiency Testing Inter-Agency Working Group (ACPTIWG) of the National Science and Technology Council's Subcommittee on Forensic Science collected information on existing certification programs from representatives of several organizations[5]; this list was updated in 2016. There are vast differences in the certification examination processes and essential elements for forensic science disciplines, which leads to fragmentation of the various certification programs accredited by the same entity (Appendix B). These differences may be appropriate, depending on the category of testing. There are specialties and subspecialty categories of testing that do not have certification bodies due to the very small number of practitioners (Appendix C). It is recognized in the certification community that it is difficult to create a certification program with less than 50 practitioners.[6] The Commission acknowledges that there will be challenges for agencies requiring certification (Appendix D).

The types of confirmation of qualifications used in other professions[7] such as licensure, credentialing, certificate programs, and registration are not used in the forensic sciences primarily due to their limited scope or specific nature (Appendix E).

Requiring FSSPs to mandate the certification of their forensic science practitioners would improve the quality of services provided and enhance confidence in the judicial system. Certification demonstrates that the individual has met established criteria and proficiency in the standard practices necessary to execute the duties of his or her profession. Certification also provides the public and the judicial system with a means of identifying those practitioners who have successfully demonstrated proficiency in the domain relevant to their area of practice. Finally, certification provides another means of external oversight for practitioners.

[4] See Appendix A: Forensic Certification Bodies.

[5] https://www.whitehouse.gov/sites/default/files/microsites/ostp/NSTC/strengthening_the_forensic_sciences_may_-_2014.pdf

[6] Swift, Roy A. "Increasing the Credibility and Quality of Certification through Accreditation." Presentation to the ACPTIWG. ix A: Variations Between Certification Organizations, May 5, 2011.

[7] Corrigan, Melissa Murer. "Licensure and Credentialing in Non-Forensic Fields." Presentation to the ACPTIWG, May 5, 2011.

Appendix A: Forensic Certification Bodies

ILAC G19 Categories of Testing	Discipline/ Subdiscipline	Certification Organization	Contact Info	Accrediting Organization	Approximate No. of Diplomats or Certified Individuals	Application Fee	Examination Fee	Annual Recertification Fee or Dues
Controlled Substances	Drug Analysis	American Board of Criminalistics	www.criminalistics.com	FSAB	232	$50	$250	$50
Comprehensive Criminalistics Examination (General Criminalistics)	Criminalistics Subjects	American Board of Criminalistics	www.criminalistics.com	FSAB	111 (718)	$50	$250	$50
Hairs, Blood, Body Fluids and Tissues	Molecular Biology	American Board of Criminalistics	www.criminalistics.com	FSAB	364	$50	$250	$50
Trace Evidence	Fire Debris	American Board of Criminalistics	www.criminalistics.com	FSAB	47	$50	$250	$50
Trace Evidence	Hairs and Fibers	American Board of Criminalistics	www.criminalistics.com	FSAB	27	$50	$250	$50
Trace Evidence	Paint and Polymers	American Board of Criminalistics	www.criminalistics.com	FSAB	22	$50	$250	$50
Entomology	Forensic Entomology	American Board of Forensic Entomology	www.forensicentomologist.org		16	$50	$50	$50
Handwriting and Document Examination	Forensic Document Examination	American Board of Forensic Document Examiners	www.abfde.org	FSAB	106	$250	N/A	$250 Annual Dues
Handwriting and Document Examination	Forensic Document Examination	Board of Forensic Document Examination	www.bfde.org	FSAB	14	$100	$500	$50
Fingerprints	Latent Fingerprints	International Association for Identification	www.theiai.org	FSAB	1041	$200/IAI Members; $300/Non-Members	N/A	Recert every 5 yrs: $200/IAI Members; $300/Non-Members

ILAC G19 Categories of Testing	Discipline/ Subdiscipline	Certification Organization	Contact Info	Accrediting Organization	Approximate No. of Diplomats or Certified Individuals	Application Fee	Examination Fee	Annual Recertification Fee or Dues
Fingerprints	Ten-Print Fingerprints	International Association for Identification	www.theiai.org	FSAB	117	$200/IAI Members; $300/Non-Members	N/A	Recert every 5 yrs: $200/IAI Members; $300/Non-Members
Scene Investigation	Blood Stain Pattern	International Association for Identification	www.theiai.org	FSAB	39	$200/IAI Members; $300/Non-Members	N/A	Recert every 5 yrs: $200/IAI Members; $300/Non-Members
Scene Investigation	Crime Scene-Four Levels	International Association for Identification	www.theiai.org	FSAB	1,625: Outside FSSPs	$200/IAI Members; $300/Non-Members	N/A	Recert every 5 yrs: $200/IAI Members; $300/Non-Members
Scene Investigation	Forensic Artist	International Association for Identification	www.theiai.org	FSAB	34	$200/IAI Members; $300/Non-Members	N/A	Recert every 5 yrs: $200/IAI Members; $300/Non-Members
Scene Investigation	Forensic Photography	International Association for Identification	www.theiai.org	FSAB	57	$200/IAI Members; $300/Non-Members	N/A	Recert every 5 yrs: $200/IAI Members; $300/Non-Members
Marks and Impressions	Footwear	International Association of Identification	www.theiai.org	FSAB	105	$200/IAI Members; $300/Non-Members	$300	$200/IAI Members; $300/Non-Members

ILAC G19 Categories of Testing	Discipline/ Subdiscipline	Certification Organization	Contact Info	Accrediting Organization	Approximate No. of Diplomats or Certified Individuals	Application Fee	Examination Fee	Annual Recertification Fee or Dues
Audio, Video and Computer Analysis	Digital Evidence/ Video—Forensic Video Certification	International Association of Identification	www.theiai.org		23	$200/IAI Members; $300/Non-Members	$300	$200/IAI Members; $300/Non-Members
Marks and Impressions	Footwear/ Fingerprints	Canadian Identification Society	www.cis-sci.ca		N/A for U.S.A.	$150	N/A	$150
Audio, Video and Computer Analysis	Digital Evidence / Video—Certified Forensic Video Analyst	Law Enforcement and Emergency Services Video Association	www.leva.org		54	N/A	N/A	$55/year
Audio, Video and Computer Analysis	Digital Evidence/ Video—Certified Forensic Video Technician	Law Enforcement and Emergency Services Video Association	www.leva.org		267	N/A	N/A	$55/year
	Evidence Handling	International Association for Property and Evidence	www.IAPE.org		1,400+; Outside FSSP	$150	N/A	$100
Firearms and ballistics	Firearms	Association of Firearm and Tool Mark Examiners	www.afte.org		116	N/A	$250	$25 every 5 years
Marks and Impressions	Tool Marks	Association of Firearm and Tool Mark Examiners	www.afte.org		46	N/A	$250	$25
Firearm Distance Determination	Gunshot Residue	Association of Firearm and Tool Mark Examiners	www.afte.org		39	N/A	$250	$25

ILAC G19 Categories of Testing	Discipline/ Subdiscipline	Certification Organization	Contact Info	Accrediting Organization	Approximate No. of Diplomats or Certified Individuals	Application Fee	Examination Fee	Annual Recertification Fee or Dues
Audio, Video and Computer Analysis	Digital Evidence/ Computer Forensics— Digital Forensics Certified Practitioner and DFCA	Digital Forensics Certification Board	www.dfcb.org		178	$250	$100	N/A
Audio, Video and Computer Analysis	Digital Evidence/ Computer Forensics—Certified Computer Examiner	International Society of Forensic Computer Examiners	www.isfce.org		805	$395	N/A	$75
Audio, Video and Computer Analysis	Digital Evidence/ Computer Forensics— Certified Digital Forensic Examiner, Certified Digital Media Collector, Certified Computer Crime Investigator	DOD Cyber Crime Center	www.dc3.mil		Training source	N/A	N/A	N/A
Audio, Video and Computer Analysis	Digital Evidence/ Computer Forensics— Certified Forensic Computer Examiner	International Association of Computer Investigative Specialists	www.iacis.com	FSAB	1,963	N/A	w/ training ($2,795) wo/ training ($750)	$50
Audio, Video and Computer Analysis	Digital Evidence/ Computer Forensics— Certified Advanced Windows Forensic Examiner	International Association of Computer Investigative Specialists	www.iacis.com		26	N/A	w/ training ($1,495) wo/ training ($750)	$50

ILAC G19 Categories of Testing	Discipline/ Subdiscipline	Certification Organization	Contact Info	Accrediting Organization	Approximate No. of Diplomats or Certified Individuals	Application Fee	Examination Fee	Annual Recertification Fee or Dues
Audio, Video and Computer Analysis	Digital Evidence/ Mobile Devices— Certified Mobile Device Examiner	International Association of Computer Investigative Specialists	www.iacis.com			N/A	w/ training ($1,495) wo/ training ($750)	$50
Audio, Video and Computer Analysis	Digital Evidence/ Mobile Devices— Advanced Smartphone Forensics	Global Information Assurance Certification	www.giac.org	ANSI	GOAC number certified is not available, but 80,079 certifications granted	N/A	w/training ($1,149) wo/training ($659)	$399
Audio, Video and Computer Analysis	Digital Evidence/ Computer Forensics— Certified Forensic Analyst, Certified Forensic Examiner, Reverse Engineering Malware, many others	Global Information Assurance Certification	www.giac.org	ANSI	GOAC number certified is not available, but 80,079 certifications granted	N/A	w/training ($1,149) wo/training ($659)	$399
	Forensic Engineering	International Board of Forensic Engineering Sciences	www.iifes.org	FSAB	16; Outside of FSSP	$300	N/A	$50
	Forensic Engineering	National Academy of Forensic Engineers	www.nafe.org	Council of Engineering and Scientific Specialty	Outside of FSSP (313 Board Certified)	$125	N/A	$200–$300
	Civil Engineering	American Society of Civil Engineers	www.asce.org	ANSI	Outside of FSSP	N/A	N/A	N/A

ILAC G19 Categories of Testing	Discipline/ Subdiscipline	Certification Organization	Contact Info	Accrediting Organization	Approximate No. of Diplomats or Certified Individuals	Application Fee	Examination Fee	Annual Recertification Fee or Dues
Toxicology	Forensic Toxicology	American Board of Forensic Toxicology	www.abft.org	FSAB	410	$150	N/A	$100
Anthropology	Forensic Anthropology	American Board of Forensic Anthropology	www.theabfa.org	FSAB	79	$250	$300	$100 Annual Dues only
	Forensic Psychology	American Board of Forensic Psychology	www.abfp.com		299; (Outside of FSSP)	$125	$450	N/A
	Forensic Psychiatry	American College of Forensic Psychiatry	www.forensicpsychonline.com		Outside FSSPs	N/A	N/A	N/A
	Forensic Psychiatry	American Board of Psychiatry and Neurology	www.abpn.com	American Board of Medical Specialties	Outside FSSPs	$700	$2,300	$150
	Forensic Nursing	International Association of Forensic Nurses	www.forensicnurses.org		1500+; (Outside of FSSP)	$275/IAFN Member; $400/Non-Member	$400/IAFN Member; $525/Non-Member	$116
Odontology	Odontology—Bite Mark	American Board of Forensic Odontology	www.abfo.org	FSAB	160	$400	$1,000	$230

APPENDIX B: Variations in the Requirements of Three Accredited Certifying Bodies (CB)

Requirement	CB#1	CB#2	CB#3
Degree		X	X
Experience	X	X	X
Written Exam (initial)	X	X	X
Practical Exam (initial)	X	X	X
Oral Demonstration (initial)	X*		X**
Continuing Education	X	X	X
Retesting	X		X

*transcript or moot court

**specific to practical exam

APPENDIX C: Forensic Discipline/Subdisciplines without Certification Bodies

ILAC Guide 19 Catagories of Testing	Discipline/Sub-Discipline
Audio, Video and Computer Analysis	Digital Evidence - Audio
Firearms and Tool Marks	Serial # Restoration
Firearms and Tool Marks	Trajectory Reconstruction
Marks and Impression	Impression - Tire tread
Trace Evidence	Glass
Trace Evidence	Explosives
Trace Evidence	Soils
Trace Evidence	Botanical Material
Trace Evidence	Gun Shot Residue
Trace Evidence	Lubricants

APPENDIX D: Additional Considerations for Implementation

Additional considerations for implementation include:

- Certifying bodies have varying fee schedules.
- Educational programs or preparatory courses should be developed to help practitioners prepare for certification examinations.
- Certification bodies will need to develop programs or policies to address practitioners with more than one certification (i.e., continuing education credit hours could be used toward multiple recertifications).
- There may be human resource challenges such as revising position descriptions, certifying existing employees, and modifying employment policies and procedures. Policies and procedures need to be in place if practitioners are unsuccessful in obtaining certification or do not meet the minimum certification requirements. Further, policies and procedures need to be developed to address those practitioners who can immediately achieve certification versus those who will have to wait for a certification program to be developed, particularly if incentives are being offered.
- Licensure is not a substitution for certification, primarily because it is only recognized at the state level.
- A state or local government or agency may attempt to substitute its own certification that is not accredited.
- Budgetary constraints may impact the ability to obtain and maintain certification.

APPENDIX E: Industry Definitions for Professional Recognition Programs

1. Licensure is a mandatory process used by a governmental agency that grants a time-limited permission for an individual to perform the duties of his or her profession after verifying that this individual has met specific standardized criteria.
2. Registration is a process in which a governmental agency grants a time-limited status on a registry determined by specified knowledge-based requirements such as experience, education, or examinations. The registration allows an individual to practice, similar to licensure, but also maintains a continuous record of the individual's past and current occupational status.
3. Credentialing is a term that includes the concepts of accreditation, licensure, registration, and professional certification. Credentialing is the formal recognition or recording of the recognition status of individuals, organizations, institutions, programs, processes, services, or products that meet specific standardized criteria. Credentialing is done by an authorized and qualified entity.
4. Another form of recognizing the knowledge, skills, and abilities of an individual is through certificate programs. Certificate programs[8] are learning events developed and administered by the certificate issuer. A certificate is presented at the end of a training course as recognition of specific skills. Unlike certification programs, these certificates do not have renewal requirements and cannot be revoked.

[8] ASTM E2659-09e1, Standard Practice for Certification Programs

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A Dose of Reality:

Drug Death Investigations and the Criminal Justice System

In the midst of the tragic nationwide epidemic of drug overdose deaths, there is now also an increased push for prosecutions in drug-related deaths. This drug overdose epidemic has become a crisis for medical examiner and coroner offices, law enforcement, courts, and public health agencies. While exact numbers of such prosecutions are not available, reports of proliferating laws and prosecutions using various homicide, manslaughter, and depraved heart statutes for persons providing drugs are substantially increasing in many states.[1]

Medical examiners and coroners ("ME/C") play a vital and fundamental role in providing credible opinions about death certification to families, courts, and the criminal justice system. Medical examiner and coroner systems operate at the interface of medicine and the legal system, and investigation of most potential drug-related deaths fall under ME/C jurisdiction. With the significant paradigm shift of investigating and prosecuting drug-related deaths as criminal matters, it is even more imperative that stakeholders in the criminal justice system have access to accurate, standardized, and professional death investigation and death certification.

Unfortunately, for a multitude of reasons, many prosecutors and defense attorneys may rely on incomplete and potentially substandard death investigations, medicolegal opinions, and cause of death determinations by ME/C offices. Courts and attorneys may lack an understanding of the nature and limitations of ME/C testimony and evidence. This is becoming increasingly apparent with the push for drug-related death prosecutions. This article shares some of the common pitfalls in drug death investigations, discusses national recommendations for ME/C investigations of potential drug-related deaths, delineates the qualifications death investigation experts should possess, and explains the "but-for" cause of death concept from a medical perspective.

Not Every Death Investigation Is Equal

Ideally, every jurisdiction would investigate deaths using the same general investigative approaches and guidelines; however, since each state has its own laws for death investigation, great variation exists in the structure, staffing, competency, policies, resources, and professionalism of the approximately 2,000 ME/C offices in the United States. As a result, the quality and accuracy of death investigations and cause of death determinations are markedly inconsistent across (and even within) jurisdictions. This variation in investigations was described and discussed at length in the publication *Strengthening Forensic Science in the United States: A Path Forward*.[2] Awareness of this marked variation in death investigation practices and personnel is a necessity when legal

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advocates and courts consider the reliability of cause of death determinations by ME/C offices. Attorneys should understand the great variation in how deaths are investigated and what impacts these variations may have on the scientific and medical opinions not only in drug-related deaths, but also in all death cases within the legal and judicial systems.

Certification and Accreditation

Qualifications and training for all medical death investigators (coroners, medical examiners, forensic pathologists, and medical/medicolegal death investigators) are extremely varied. While the terms "coroner," "medical examiner," and "death investigator" are often used interchangeably, distinct and important differences exist.

Coroners are usually elected county officials. They may or may not have medical training, may or may not perform autopsies, and may or may not have *any* formal/professional education, death investigation training, or medical experience. Some states require that coroners be law enforcement officials or physicians, although that is true in the vast minority of jurisdictions in the United States. As such, some coroners are tasked with interpretation of complicated medical and scientific evidence, such as postmortem toxicology and medical records, with no professional training or certifications that would endorse their ability to do so.

Medical examiners are generally physicians, but not necessarily pathologists. They may or may not perform autopsies and may also have limited death investigation training and experience.

In contrast, forensic pathologists are physicians who have formal postgraduate medical training in general (anatomic and/or clinical) pathology and forensic pathology. Forensic pathology is a medical subspecialty of physicians who are considered experts at determining cause and manner of death. Forensic pathologists possess the necessary specialized knowledge, training, skills, and experience for professional and standardized death investigation. Most forensic pathology graduate fellowships (after graduation from medical school and completion of residency) are one year long and consist of medicolegal autopsy training, interpretation of postmortem toxicology, death scene investigation, evidence collection and preservation, and interaction with families and the legal system.[3] A forensic pathologist should be board certified by the American Board of Pathology in forensic pathology. The American Board of Pathology is a member of the American Board of Medical Specialties, and board certification means that a physician has achieved expertise by meeting profession-driven standards and requirements.[4]

The terms *medicolegal death investigator* ("MDI") and *medical death investigator* usually refer to the frontline person in ME/C offices responsible for case screening, jurisdiction determination, and responding to death scenes. MDIs are traditionally known for on-scene death investigation, functioning as the eyes and ears of the pathologist or ME/C on scene. In fact, many of the forensic pathologist's decisions and opinions regarding cause and manner of death are contingent on scene investigative findings of MDIs. These nonphysician MDIs provide the foundation of death investigation and are used with increasing frequency in ME/C offices. There are approximately 5,000 to 8,000 MDIs in the United States, including coroners, and approximately 2,000 are certified by the American Board of Medicolegal Death Investigation ("ABMDI").[5] Individual MDI certification, offered by the ABMDI, is considered the benchmark of quality for MDIs. The registry certification process includes at least 640 hours of death investigation experience in an ME/C office and successful completion of a registry examination.[6] The ABMDI also offers an advanced board certification that indicates a "mastery of all aspects of medicolegal death investigation." The organization is accredited by the Forensic Specialties Accreditation Board.[7]

Office accreditation by the National Association of Medical Examiners ("NAME") and/or International Association of Coroners and Medical Examiners ("IACME") is considered the quality benchmark of death investigation for offices.[8] However, accreditation of ME/C offices is voluntary, and only 82 ME/C offices are fully accredited.[9] This inspection and accreditation process ensures that death investigation and forensic pathology are professionalized, that basic medical examiner community standards are being met, and that the accredited offices adhere to basic tenets of standardized medicolegal death investigation. Tennessee is the only state that mandates that medical examiner offices performing forensic autopsies be accredited by NAME.[10]

Guidelines for Drug Death Investigation

Guidelines for drug death investigation by medical examiners and coroners have been established and promulgated by several agencies, including NAME, American College of Medical Toxicology, Substance Abuse and Mental Health Services Administration, and National Institute of Justice.[11] All of these organizations' guidelines emphasize the importance of documenting and integrating death scene information, autopsy findings, medical history, and toxicology for reliable cause and manner of death certification. Perhaps most important, the guidelines emphasize that *it is not appropriate to assign a cause of death based on a drug concentration alone*. It would be inappropriate for a clinical physician to make a diagnosis based simply on a single laboratory test in a living person; instead, the physician would use that laboratory test in combination with medical history and physical examination to establish a diagnosis. Similarly, a medical examiner or coroner must not make a cause of death diagnosis based on a toxicology result alone; the cause of death must be certified in the context of the deceased person's medical history, scene findings, and examination findings. As detailed below, the drug death investigation guidelines provide specific guidance for the type of examination, components of a complete and adequate scene investigation, and ordering/interpretation of toxicology.

Autopsy Is Considered Best Practice

For a potential drug-related death, an autopsy is considered best practice for determination of cause of death.[12] An internal examination ("autopsy") is necessary for optimal interpretation of toxicology results and to exclude any other contributory anatomic cause of death. Many jurisdictions, due to financial constraints or workforce shortages, will opt to perform only an "external examination" in which only the outside of the body is examined at the death scene when drugs or drug paraphernalia are identified on scene. Unfortunately, often only a cursory body examination, with no photographic or written documentation, is commonplace in many jurisdictions. As long as a qualified individual does a thorough body examination in conjunction with a

scene investigation (if available) and review of medical history and toxicology, an external examination may be an acceptable substitution for an autopsy in some instances.

The quality and accuracy of death investigations and cause of death determinations are markedly inconsistent across (and even within) jurisdictions.

Exceptions to the general recommendation that autopsy is best practice may include cases of prolonged hospitalization prior to death, extensive medical history to explain death, the presence of significant trauma or injury, or strong family objection to autopsy. In those cases, it is still imperative that the ME/C or MDI perform a thorough external body examination and carefully document findings with photography and a written report.

One of the most important reasons autopsy is considered best practice in investigation of a potential drug-related death is to assess any role natural disease has in causing death. Some anatomic causes of death, such as stroke (cerebral infarction), heart attack (myocardial infarction) or pulmonary embolism (blood clots in the lungs), may represent an immediate, intervening cause of death even in a person who is acutely intoxicated. In addition, drug users are at increased risk of certain diseases that increase morbidity and mortality (infections of the heart valves, cirrhosis of the liver, and pneumonia, for example) due to chronic drug use. This chronic drug use may be a contributory cause of death in individuals who have a potentially lethal concentration of drugs in their bodies. The official who certifies death must use professional judgement to determine whether the natural disease, drugs, or the combination of natural disease and drugs ultimately caused death.

Scene Investigation

One of the foundations of professional death investigation is a thorough and complete scene investigation. The national standards for basic MDI scene investigation responsibilities and tasks, whether by coroner or medical examiner office, are set forth in "Death Investigation: A Guide for the Scene Investigator."[13] These tasks include, for example, maintaining chain of custody, documenting and evaluating the scene and body, establishing episodic and medical history, communicating with next-of-kin, identifying and preserving evidence, and accepting or releasing jurisdiction over the body.[14] Specifically for a potential drug-related death, a scene investigation should include documentation of known or suspected drug use and abuse (scene presence of drug paraphernalia examples including but not limited to opioid medications, needles, spoons, tourniquets, medications of opioid use disorder including buprenorphine or methadone, prescription pill bottles for multiple overlapping prescriptions or for other people, and pills in mixed bottles or unlabeled bottles).

Any evidence of nonmedical use of drugs, such as cut straws for drug inhalation ("insufflation") or needles and syringes for intravenous drug use, are important to carefully document. The investigator should complete a detailed inventory of the decedent's prescription medication. The inventory should include the name of the person to whom the medication was prescribed, when it was filled and by whom, how many pills remain, and the prescribed administration regimen. Many jurisdictions take physical control of the medication as evidence documentation and for appropriate disposal. The investigator should also document any attempts at medical intervention on the deceased by emergency medical personnel as well as by bystanders, given the relative recent over-the-counter availability of naloxone (Narcan®) in most jurisdictions.

Medical History

A decedent's medical history is very important for interpretation of toxicology and autopsy results. Medical history can be obtained from friends or family on scene or through telecommunication channels, from medications at the scene, and through review of medical records. Although ME/C access to medical records will vary, many states expressly allow ME/C direct access through statutes and administrative subpoenas. In addition, the HIPAA Privacy Rule includes a specific exemption for covered entities to release protected health information to medical examiners and coroners for use in investigations and for official duties.[15] The ME/C may obtain medical history through administrative subpoena of medical records and through examination of a state's prescription monitoring program ("PMP"). The medical history and PMP will provide information about a decedent's controlled substance prescription medication history, which is a very important component of assessing opioid tolerance and may also provide insight into a history of "doctor shopping."

Postmortem Toxicology: It Is Not Just About the Numbers

Unfortunately, the determination of whether someone died of a drug overdose or whether a specific drug caused death is not as simple as looking at a drug concentration in a toxicology report. There is marked overlap in what constitutes "therapeutic" and "lethal" concentrations for most opiates. For example, a morphine concentration of 200 ng/ml in postmortem blood may have very different

implications on the cause of death depending on the specific circumstances of the case.

Postmortem drug levels must be interpreted in the context of multiple other pieces of information such as circumstances surrounding death, scene investigation, examination findings, and medical history. This is primarily due to two reasons: first, postmortem blood is different from blood in living persons because of the well-known phenomenon called postmortem redistribution ("PMR"); and, second, because of other individual factors, such as tolerance and route of use.[16] As a result, rigid categories of "therapeutic," "toxic," or "lethal" drug concentrations, as reported in some toxicology references, simply do not exist.

Frequent communication and collaboration between medical examiners, coroners, and forensic toxicologists have never been more necessary than with the sharp increase in fentanyl analogs in drug-related deaths. Forensic toxicologists are scientists who may discuss analytic results of toxicology tests or interpretive opinions of toxicology tests. The American Board of Forensic Toxicology (ABFT) is one organization that offers certification of forensic toxicologists and accreditation of toxicology laboratories. Best practice recommendations for forensic toxicologists regarding medicolegal opinions and testimony have been published by the American Academy of Forensic Sciences Standards Board.[17] Forensic toxicologists should not offer opinions as to the ultimate cause of death, should not calculate the dose of a drug based on a postmortem drug concentration, and should not offer an opinion of the effects of a drug or combination of drugs on a specific individual without context of a given case.[18] The ME/C or forensic pathologist ultimately has the responsibility and expertise to opine about the absolute cause of death based on the totality of all investigative information.

Tolerance

Opioid tolerance refers to the reduced effects of opioids, resulting in the need for a higher dose to achieve the same desired effect with continued use. In other words, a person must take more of a drug to get the same euphoria or pain relief with prolonged use over time. A person on hospice care, or other long-term opiate user, can withstand far higher doses of opiates than an "opiate naive" user. Tolerance is primarily what accounts for the vast overlap in reported "therapeutic," "toxic," and "lethal" opioid concentrations. Tolerance is difficult to quantify but can be inferred from medical records, PMP reports, or by information from family and friends about the decedent's drug use. Reduced tolerance can also have an impact on interpretation of postmortem opiate concentrations. Two specific instances when people are most susceptible to opioid overdose are upon release from incarceration and upon leaving a drug rehabilitation facility. Both scenarios follow a prolonged period of abstinence, which in turn causes their tolerance to be diminished.

The way in which a decedent had been using a drug (route of use) may also have an impact on the interpretation of a drug concentration. Death can occur at much lower opioid concentrations with intravenous use, insufflation ("snorting"), smoking, or inappropriate use (such as chewing or otherwise orally ingesting) of transdermal application pads (transdermal fentanyl). Evidence of route of use is primarily obtained through thorough scene investigation and/or medical records.

Postmortem Redistribution

Postmortem redistribution ("PMR") is the process of drug concentrations changing in the body after death.[19] After death, cell membranes are destroyed and the complex process of drug transport and storage in different sites in the body is different than in life.[20] Moreover, after death, drugs can diffuse to and from organs, the stomach, central blood vessels, muscle, and other body tissues. This process is complex and is affected by the length of the postmortem interval, chemical properties of a drug, diffusion gradients across the tissues, duration of drug therapy, and other factors. While PMR cannot be completely eliminated, obtaining postmortem blood samples from a peripheral site, such as the femoral area, away from potential reservoirs such as the heart, liver and stomach, minimizes the effect of PMR. This is the reason *the preferred specimen for postmortem toxicology is femoral blood.* "Heart blood" and other central site samples should be considered specimens of last resort for general toxicology studies. Furthermore, due to rapid metabolism or breakdown of certain drugs in the body, such as heroin, it may be necessary to test other samples (such as urine or vitreous fluid from the eye) to correctly identify drugs causing or contributing to death. Therefore, PMR must be taken into consideration when interpreting postmortem drug concentrations, and postmortem toxicology should be interpreted by a forensic toxicologist or forensic pathologist with an understanding of PMR and drug metabolism.[21]

'Routine' Toxicology

There is no such thing as "routine" postmortem toxicology. The extent of testing varies among ME/C offices and with different forensic toxicology laboratories. Each office may have different toxicology requests depending on the individual case circumstances. Different toxicology labs offer differing testing panels consisting of commonly abused drugs, common prescription medication, and alcohol. NAME offers a general guide for what should be included in an "adequate" panel for opioid drugs, as well as what other classes of drugs should be included, such as benzodiazepines, muscle relaxants, sleep aids, and anti-depressants.[22]

At a minimum, specimens collected at autopsy or external examination should include femoral blood, vitreous fluid, and urine, if available.

Fentanyl, a potent synthetic opioid, and its analogs are now commonly encountered in postmortem toxicology; however, fentanyl analogs may be very difficult to detect due to their very low blood concentrations and with the rapid introduction of new analogs. If an ME/C suspects a fentanyl analog in a death, or if initial toxicology is negative when all other evidence indicates a drug overdose, consultation with a forensic toxicologist or accredited toxicology laboratory is necessary to ensure that the laboratory has the capability to test for fentanyl analogs or other novel psychoactive substances such as U-47700.

'But For' Cause of Death: A Medical Examiner Perspective

Cause of death may be defined as "an injury or illness that sets into motion a chain of events that leads to death." In a drug-related death, the cause of death should list specifically which drugs the certifier believes caused the death. A drug may be included in the cause of death even if it is not at sufficient concentration to cause death by itself, if the aggregate of the drugs was sufficient to cause or contribute to death, as discussed in further detail below. Certifications that only list "polypharmacy" or "mixed drug intoxication" or "drug overdose," without listing specific drugs, are inadequate.

As cause of death certifiers, most ME/C are familiar with the varying legal concepts of "proximate cause," "direct result," "caused from," and "results from," as well as the "but for" cause of death that was at issue in *Burrage v. United States*.[23] The "but-for" cause of death is fairly straightforward when toxicology shows a single drug that caused a fatal overdose. However, single drug overdose deaths are uncommon. Postmortem toxicology results are often positive for more than one drug that may cause death independently (in fact, this is true in most overdose deaths). This may complicate the medical and legal determination of the "but-for" cause of death. For example, consider the following facts of a hypothetical case:

> A 24-year-old man was found dead at home in bed with a syringe and needle in his arm. Autopsy showed pulmonary edema (fluid in the lungs) and no other anatomic findings. He has a history of intravenous opiate use. Postmortem toxicology is positive for acetyl fentanyl (a fentanyl analog) and methamphetamine.

In this case, the cause of death would be correctly certified as acute combined acetyl fentanyl and methamphetamine intoxication. Either the acetyl fentanyl *or* methamphetamine could *independently* be a "but-for" cause of death. The "but-for" cause of death may become slightly more complicated when there are additional drugs (ethanol and benzodiazepines) that may contribute to death by respiratory depression but may not independently cause death. Stimulant drugs, such as cocaine and methamphetamine, may further complicate matters since any amount of cocaine and methamphetamine could potentially be considered a "lethal" level due to the effects on the heart and vascular system.

In short, because of the potential complexity of cause of death opinions with drug overdose deaths, discussions with the certifying ME/C should include direct questions as to which drug or drugs the ME/C felt caused or contributed to death.

Manner of Death

Manner of death ("MOD") refers to the circumstances of someone's death, and MOD is classified by the medical examiner or coroner who takes jurisdiction for the death investigation. It is important to understand that for *medical certification* of MOD, the terminology used may be different than the terminology used in court or other legal or administrative proceedings. For example, medical examiners typically classify motor vehicle-related deaths as "accident," but that does not prevent legal proceedings against an impaired driver in the collision for some charge of homicide or manslaughter. Another example is medical examiner certification of an officer-involved shooting as "homicide," although the involved officer(s) may be legally justified in using lethal force.

Because mental illness, chronic pain, and opioid use disorders often co-exist in individuals who die of a drug overdose, those deaths from drug overdoses can be among the most difficult types of death for manner determination.[24] NAME recommends classifying "deaths from the misuse or abuse of opioids without any apparent intent of self-harm as 'accident.'"[25]

Classification of "undetermined" manner of death should be reserved when there are legitimate investigational considerations that indicate more than one manner of death (i.e., suicide versus accident). ME/C medical certification of manner of death as accident does not preclude prosecution under homicide or manslaughter statutes.

Final Thoughts

Cause of death opinions offered by qualified practitioners are necessary for proper adjudication of drug-related deaths. Those attorneys, civil or criminal, seeking to hold a defendant accountable for a drug-related death need to be cognizant of the disparities in death investigations throughout the United States. Similarly, those who represent the defendant need to be aware that the opinion of the plaintiff's consultant or expert may well be inaccurate and/or based on incomplete or unreliable documentation. The decision in *Daubert v. Merrell*

Dow Pharmaceuticals, Inc. established the specific criteria an expert must meet to be qualified as an expert in court and resulted in the amendment of Federal Rule of Evidence 702.[26] However, even when so vetted, it is apparent that not all experts are created equal; neither, unfortunately, are the facts upon which the experts' evidence are so based. Expert opinion is only as good as the quality of the evidence it is based upon.

Not only should an attorney be prepared for the inevitable "battle of the experts" at trial or at a hearing, but also the attorney should be confident that the selected death investigation expert was not only knowledgeable about postmortem toxicology but also proficient at evaluating the reliability of the death investigation in its totality. The evidence that the consulting (and potentially testifying) expert will be proffering an opinion on must be reliable. Therefore, it is recommended that a thorough review of the death investigation, autopsy and toxicology results, medical history, along with other factual and circumstantial evidence, be performed by a credentialed experienced death investigation expert. This review is essential for discerning the validity of litigating a drug-related death case.

The views expressed herein by Dr. Amy Hawes and Denise Martin are their own and do not represent the official views or policies of Knox County (Tennessee) Regional Forensic Center or the Office of the State Chief Medical Examiner (Tennessee).

Notes

1. Drug Policy Alliance, *An Overdose Death Is Not Murder: Why Drug-Induced Homicide Laws Are Counterproductive and Inhumane* (Nov. 2017), http://www.drugpolicy.org/sites/default/files/dpa_drug_induced_homicide_report_0.pdf.

2. National Research Council, Strengthening Forensic Science in the United States: A Path Forward (2009), https://doi.org/10.17226/12589.

3. Am. Board of Pathology, https://www.abpath.org/ (last visited Feb. 7, 2019).

4. Am. Board of Med. Specialties, *A Trusted Credential*, https://www.abms.org/board-certification/a-trusted-credential/ (last visited Feb. 7, 2019).

5. Nat'l. Sci. & Tech. Council Committee on Sci., Medicolegal Death Investigation Working Group (MDI WG), *Strengthening the Medicolegal-Death-Investigation System: Accreditation and Certification A Path Forward* (Dec. 2016), http://www.thecfso.org/advocacy/2017/OSTP_accreditation_recommendation.pdf.

6. Am. Board of Medicolegal Death Investigators, https://www.abmdi.org (last visited Feb. 7, 2019).

7. Am. Board of Medicolegal Death Investigators, https://www.abmdi.org (last visited Feb. 7, 2019); Forensic Specialties Accreditation Board, https://www.thefsab.org/ (last visited Feb. 7, 2019).

8. Nat'l Ass'n of Med. Examiners, https://theName.org (last visited Feb. 7, 2019); Int'l Ass'n of Coroners & Med. Examiners, https://www.theiacme.com (last visited Feb. 7, 2019).

9. Nat'l Ass'n of Med. Examiners, https://theName.org (last visited Feb. 7, 2019).

10. See Tenn. Code Ann § 38-7-105.

11. Gregory G. Davis, *Recommendations for the Investigation, Diagnosis, and Certification of Deaths Related to Opioid Drugs* [hereinafter Gregory Davis], Nat'l Ass'n of Med. Examiners and Am. Coll. of Med. Toxicology Expert Panel on Evaluating & Reporting Opioid Deaths, 3(1) Acad. Forensic Pathology 62 (2013), https://doi.org/10.23907/2013.010; Bruce A. Goldberger, Jane Carlisle Maxwell, Anthony Campbell & Bonnie B. Wilford, *Uniform Standards and Case Definitions for Classifying Opioid-Related Deaths: Recommendations by a SAMHSA Consensus Panel. 32* J. Addictive Disease, no. 3, at 231 (2013), DOI: 10.1080/10550887.2013.824334; U.S. Dep't of Just., Off. of Just., *Death Investigation: A Guide for the Scene Investigator*, https://www.ncjrs.gov/pdffiles1/nij/234457.pdf.

12. Gregory Davis, *supra* note 11.

13. U.S. Dep't of Just., Off. of Just., *Death Investigation: A Guide for the Scene Investigator*, https://www.ncjrs.gov/pdffiles1/nij/234457.pdf.

14. *Id.*

15. See 45 C.F.R. § 164.512.

16. *Id.*

17. ANSI/ASB Best Practice Recommendation 037, Guidelines for Opinions and Testimony in Forensic Toxicology (1st ed. 2019), http://www.asbstandardsboard.org/wp-content/uploads/2019/01/037_BPR_e1.pdf.

18. *Id.*

19. Michael Kennedy, *Interpreting Postmortem Drug Analysis and Redistribution in Determining Cause of Death: A Review,* 7 Pathology & Laboratory Med. 55 (2015), https://doi.org/10.2147/PLMI.S65245.

20. *Id.*

21. Gregory Davis, *supra* note 11.

22. *Id.*

23. *Burrage v. United States,* 134 S. Ct. 881 (2014); Thomas P. Gilson, Carole Rendon & Joseph Pinjuh, *Rules for Establishing Causation in Opiate/Opioid Overdose Prosecutions — The Burrage Decision,* 7(1) Acad. Forensic Pathology 87 (2017), https://doi.org/10.23907/2017.010; Mark Neil, *Prosecuting Drug Overdose Cases: A Paradigm Shift*, 3(1) Nat'l Association Of Att'y Gen. J. (Feb. 2018), https://www.naag.org/publications/nagtri-journal/volume-3-number-1/prosecuting-drug-overdose-cases-a-paradigm-shift.php.

24. Amy Hawes & Darinka Mileusnic-Polchan, *Medical Examiners and 'Manner of Death' — How Is a Suicide Determination Made?* 55(2) Tennessee B.J. 20 (Feb 2019), https://www.tba.org/journal/medical-examiners-and-manner-of-death.

25. Gregory Davis, *supra* note 11.

26. *Daubert v. Merrell Dow Pharmaceuticals, Inc.,* 509 U.S. 579 (1993).

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Improving Drug Specificity and Completeness on Death Certificates for Overdose Deaths: Opportunities and Challenges for States

Stakeholder Meeting Report

Feb. 23, 2018

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DEFINITION OF TERMS

ABMDI	American Board of Medicolegal Death Investigators
API	Application Programming Interface
ASTHO	Association of State and Territorial Health Officials
CDC	Centers for Disease Control and Prevention
CSTE	Council of State and Territorial Epidemiologists
DEA	Drug Enforcement Administration
DOJ	Department of Justice
EDRS	National Electronic Death Reporting Systems
EHR	Electronic Health Records
ESOOS	Enhanced State Opioid Overdose Surveillance
HIPAA	Health Insurance Portability and Accountability Act of 1996
IACME	International Association of Coroners & Medical Examiners
NAAG	National Association of Attorneys General
NAME	National Association of Medical Examiners
NAPHSIS	National Association for Public Health Statistics and Information Systems
NCFS	National Commission on Forensic Sciences
NCHS	National Center for Health Statistics
NCVHS	National Committee on Vital and Health Statistics
NEDSS	National Electronic Disease Surveillance System
NFLIS	National Forensic Laboratory Information System
NGA	National Governors Association
NHTSA	National Highway Traffic Safety Administration
NIJ	National Institute of Justice
NIST	National Institute of Standards and Technology
NVDRS	National Violent Death Reporting System
OSAC	Organization of Scientific Area Committees for Forensic Science
PDMPs	Prescription Drug Monitoring Programs
SUDORS	State Unintentional Drug Overdose Reporting System

EXECUTIVE SUMMARY

In August 2017, ASTHO convened a one-and-a-half day meeting of stakeholders to offer individual viewpoints about approaches to improving the completeness of death certificate information on drug intoxication deaths. The meeting attendees included representatives working in the medicolegal death investigation field, including coroners, medical examiners, forensic pathologists, and county, state, and federal agency officials, as well as those working in overdose death surveillance, including epidemiologists and vital registrars. The purpose of the meeting was to engage medicolegal death investigation and overdose death surveillance professionals to offer their individual perspectives on key strategies and priority and feasible action areas at the local, state, and federal levels for improving the quality of drug data on death certificates. Meeting participants discussed the importance of death certificate data for public health and safety interventions; the issues affecting the quality of mortality data, including the lack of drug specificity on death certificates; potential solutions and approaches for increasing drug specificity on death certificates; and key short-term action areas for improving death certificate data.

State and local health departments and federal public health agencies continue to play key roles in addressing the completeness of death certificate information for drug intoxication deaths. Public health interventions depend on timely, high-quality, complete data to determine where to focus efforts, how and when the interventions should be delivered, and what specific environments, systems, behaviors, beliefs, and attitudes the interventions should address.

This report provides an overall summary of this meeting. It includes information on the drug overdose crisis, key issues related to death certification for drug overdose deaths, project design and methods, and meeting outputs. It also features a summary of the six overarching discussion themes that emerged from the meeting. Lastly, it includes potential opportunities and considerations for states to improve the completeness and drug specificity on death certificates in collaboration with county and federal agencies.

DISCUSSION THEMES

After considering individual input from the stakeholder meeting, ASTHO identified six key themes and summary points, as listed below.

Discussion Theme One: **Mortality Data Systems**

Improve interoperability between mortality data systems, update essential mortality data systems, improve access to medical data, and plan for a coordinated data architecture that pulls data from multiple sectors and systems.

- State governments rely on electronic death reporting systems (EDRS) to produce official mortality data collected from death certificates. EDRS are aging and need to be updated and re-designed. Funeral homes, death certifiers, and local and state registrars enter data into EDRS, and registrars use EDRS to share death data. Stakeholders expressed an interest in modeling EDRS improvements on infectious disease platforms. For example, two options include centralizing lab reporting and making the system more user-friendly, such as by using predictive text suggestions for addresses and other similar information.

- Agencies and individuals would benefit from increased interoperability across mortality data systems, including EDRS, medical examiner and coroner case management systems, postmortem toxicology

testing results systems, electronic health records (EHRs), prescription drug monitoring programs (PDMPs), and other state and federal data systems related to mortality.

Discussion Theme Two: Postmortem Toxicology

Address the timeliness, quality, and reporting process for postmortem toxicology results, and address funding gaps for coroners and medical examiners to complete appropriate toxicology testing.

- A number of factors impact the timeliness of toxicology results, including instrumentation, personnel, the ability to keep pace with emerging drugs, and coordination.
- Toxicology testing techniques and methods need to be refined to keep pace with emerging illicitly manufactured synthetic drugs.
- Coordination between the death investigator and associated labs (e.g., crime lab, toxicology) should be optimized and medicolegal death investigation stakeholders should clarify decision-making roles and responsibilities related to toxicology testing.
- Improve and streamline toxicology reporting using infectious disease reporting systems as a model.
- Increase funding for comprehensive postmortem toxicology testing.

Discussion Theme Three: Training and Education

Develop and offer training and education to coroners and medical examiners about the importance of drug specificity on the death certificate, how to complete the death certificate, and related issues.

- Training and education for coroners, death investigators, and medical examiners is essential to improving drug specificity on death certificates. State health departments, state legal and criminal justice officials, and attorneys general can collaborate on developing and delivering such training.
- Medical examiners and forensic pathologists need continuing medical education (CME) on interpreting complicated toxicology testing and interpreting toxicology results for complicated deaths.
- Medical examiners and coroners can convene to develop joint position papers and standards for death certifiers. One possible project for such a group is to update the NAME position paper, Recommendations for the Investigation, Diagnosis, and Certification of Deaths Related to Opioid Drugs (2013), in light of the emergence of new drugs.
- Epidemiologists need to understand the medicolegal death investigation system.

Discussion Theme Four: Guidance on Filling out the Death Certificate

Develop and disseminate guidance for the death investigation and death certification processes as they relate to drug overdose deaths.

- Death certifiers need specific guidance on how to complete the death certificate. This guidance should include information on how to list drugs involved and provide sample language and example death certificates. Stakeholders at the meeting provided input on a forthcoming *Reference Guide for Certification of Drug Intoxication Deaths* under development by National Center for Health Statistics (NCHS). This guidance document will be an important source of information on how to complete the death certificate, particularly how to list drugs on the death certificate.
- The medicolegal death investigation community needs specific guidance on determining which drugs to list on the death certificate when multiple drugs are involved or present. Joint position papers are also needed on this topic.

Discussion Theme Five: Verification of Fact of Death

Develop a mechanism to provide an official certification of death that would be available for next of kin for administrative purposes, but doesn't include medical information.

- The health information on death certificates may be sensitive and is not needed for many administrative purposes. Furthermore, certifiers may not include specific and actionable information that they deem too sensitive (e.g., drug overdose, conditions that may have led to suicide) on the death certificate due to concerns that the family would be harmed.
- Creating a mechanism for an official certification of death that doesn't include medical information will require a change in the operations in vital registrars' offices, may necessitate a policy change, and would also have cost implications. However, it could have a significant, long-lasting positive impact on the quality of death data.

Discussion Theme Six: Coordination of Medicolegal Death Investigation

Enhance federal- and state-level coordination of work related to coroners, medical examiners, and other medicolegal death investigation stakeholders.

- Creating federal- and state-level offices to coordinate the medicolegal death investigation community would help consolidate activities and supports.
- Coroner and medical examiner offices need funding for computers and other technology, toxicology testing, and personnel.

KEY ACTION AREAS

Meeting participants identified key action areas, listed below, for improving drug specificity and completeness of death certificates for drug overdose deaths. These action areas were suggested as priorities for the next several years.

Financing

- Improve funding for medicolegal death investigation and vital registration.
- Integrate EDRS and medical examiner and coroner case management systems, and leverage current work around Meaningful Use and healthcare transformation to improve EDRS.

Policy

- Create federal-level policies to guide what is needed from medical examiners and coroners at the state and local levels and drive changes in local and state policy and practice.
- Create a home in the federal government for medicolegal death investigation.
- Use the Potential Solutions document included in this report to develop a menu of policy options for state health departments and other stakeholders.
- Develop model laws related to medicolegal death investigation.

Complementary Sectors and Partners

- Advance public health and law enforcement partnerships and collaboration.
- Establish coalitions comprised of local health departments and treatment centers at the county level to address mental and behavioral health issues as a part of primary prevention efforts.

- At the state level, hold an initial meeting between medical examiners and coroners, vital statistics, and epidemiologists to talk about the status of drug specificity on death certificates in their state.
- Encourage state health departments to obtain more detailed information about death certificates that lack sufficiently detailed information on the drugs involved in the death.
- Develop a train-the-trainer model that can be implemented widely to teach death certifiers about the surveillance value of providing information on the specific drugs involved and how to complete the death certificate.

Timeliness

- Improve the timeliness of toxicology data to ensure timely death certificate submissions.
- Address pending death certificates by identifying and standardizing the process for revising or amending death certificates once more information (e.g., toxicology results) is available.

Education and Training

- Update the NAME position paper on multiple drug overdose deaths.
- Conduct joint presentations to educate coroners and medical examiners about the importance of drug specificity on death certificates and actions to improve specificity.
- Develop joint position papers between medical examiners and coroners about medicolegal death investigation and death certification.
- Develop an educational slide deck that may be used for CMEs, American Board of Medicolegal Death investigators (ABMDI) credits, and other purposes.
- Develop a national standard for how drugs are listed on the death certificate and educate coroners and medical examiners about it.
- Have state health departments assist medicolegal death certifiers in getting certified and help medical examiner and coroner offices in seeking accreditation.
- Develop or find the appropriate communication mechanisms for CDC and federal and state agencies to effectively reach medical examiners and coroners.

BACKGROUND

The opioid epidemic is worsening in the United States. Based on data from the National Vital Statistics System (NVSS), there were over 63,600 deaths due to drug overdose in the United States in 2016.[1] For the same year, the age-adjusted rate of drug overdose deaths was more than three times the rate in 1999.[2] The rate of drug overdose deaths that involved synthetic opioids other than methadone—including fentanyl, fentanyl analogs, and tramadol—doubled from 3.1 per 100,000 in 2015 to 6.2 per 100,000 in 2016.[3] From 2015 to 2016, drug overdose death rates that involved heroin increased from 4.1 to 4.9.[4] For drug overdose deaths involving natural and semisynthetic opioids, such as morphine, codeine, and oxycodone, rates increased from 3.9 to 4.4 from 2015 to 2016. As communities continue to respond to this epidemic, overdose death rates increase.

State and local health departments, as well as federal public health agencies, play key roles in mitigating this epidemic. Public health interventions, such as deploying naloxone kits, promoting safer prescribing, increasing access to medication-assisted treatment, implementing harm reduction approaches, and coordinating public awareness campaigns, provide opportunities to address this crisis. However, interventions depend on timely, high-quality, complete data to determine who to target, how and when the interventions should be delivered, and what specific environments, systems, behaviors, beliefs, and attitudes the interventions should address.

Offices of medical examiners and coroners are a crucial part of the public health infrastructure because they investigate sudden and unexpected deaths, including drug overdose deaths. The data acquired through death certificates helps inform the strategies that public health organizations implement. Death certificates are a key source of drug overdose death data and essential to public health surveillance efforts. Specifying which drugs were present in a drug overdose death is a critical aspect of completing the death certificate.

Death certificates play an imperative role in public health by providing information on mortality, including the size and scope of the drug overdose crisis. To successfully complete a death certificate, the death certifier must consider many data points and technical information. For example, the death scene investigation, prescription drug and medical history, autopsy, x-rays, biopsies, CT scans, and toxicology may all add information that contributes to the certificate's completeness. After determining the cause and manner of death, the death certifier describes the causal sequence in Part 1 of the Cause of Death section on the death certificate. Information on other significant conditions that contributed to the death is included in Part 2 of the Cause of Death section, and information on how the injury occurred is captured in a separate box. The text found in Part 1 and Part 2 of the Cause of Death section and the How the Injury Occurred box is used to determine the underlying and contributory causes of death and assign the *International Statistical Classification of Diseases and Related Health Problems, 10th revision* (ICD-10) codes used for classification and data analysis.

There are numerous challenges and barriers associated with death certificate completeness:

- Timeliness of the information needed to determine cause and manner of death in order to complete the death certificate, including toxicology results.

- Thoroughness and interpretation of the scene investigation.[i]
- Difficulties with determining a manner of death, which is sometimes recorded as undetermined.
- Certifying physicians' ability to recognize cases that should be referred to the medical examiner.
- Completion of the How Injury Occurred section of the death certificate (Box 43), which death certifiers do not complete in a consistent manner.
- Differentiation between the presence of a drug and specifying that a drug contributed to or caused a fatal overdose.
- Centralization versus decentralization of the death investigation system. States with a centralized medical examiner office have approximately 92 percent of death certificates listing specific drugs[5]; many coroner offices receive less funding and do not have access to the resources required to list specific drugs.
- Difficulties with cross-state comparisons due to the variation with the completeness and specificity of drug information on death certificates for drug overdose deaths across states. The percent of death certificates that include specific drugs involved in the death range from 50-60 percent in a few states to nearly 100 percent in others.

The death certificate is one of the most important and efficient ways to get information to all of the relevant entities that need mortality data. Vital statistics receives information about deaths in the state via death certificates. Increasing drug specificity and completeness on death certificates could enhance surveillance efforts to better understand incidence, prevalence, and the drug overdose epidemic's scope and trends.

PURPOSE OF STAKEHOLDER MEETING

The purpose of this meeting was to engage those working in medicolegal death investigation and drug overdose death surveillance to hear their individual viewpoints on identifying and prioritizing feasible actions at the local, state, and federal levels to improve the quality of drug data on death certificates. ASTHO convened key stakeholders and experts for an in-person meeting, with CDC funding support, to gather individual perspectives about the importance of death certificate data in public health practice, the issues affecting the quality of mortality data, potential solutions and approaches for increasing drug specificity on death certificates, and key short-term action areas for improving death certificate data. The discussion themes, strategies, and solutions presented in this document are the result of meeting attendees' individual viewpoints. This meeting report is not a reflection of group consensus or recommendations. Rather, it is a summary of individual opinions organized within overarching themes, reflecting input from subject matter experts.

STAKEHOLDERS

ASTHO engaged individual experts to share strategies that might enhance reporting of drug-specific information on death certificates, and strived to ensure a representative group of meeting participants to reflect the roles, disciplines, and stakeholder groups working within the medicolegal death investigation system and overdose death surveillance. The stakeholders who attended included medical examiners,

[i] For more information about the medicolegal death investigation process, please see the National Institute of Justice report *Death Investigation: A Guide for the Scene Investigator*.

toxicologists, coroners, epidemiologists, death investigators, forensic pathologists, statisticians, vital registrars, and state health leadership, some of whom were also representatives of or involved in the work of related professional organizations, such as NAME, the International Association of Coroners & Medical Examiners (IACME), National Association for Public Health Statistics and Information Systems, and the Council of State and Territorial Epidemiologists (CSTE). A full list of meeting participants is included in Appendix 1.

MEETING OUTPUTS

The outputs of the August 2017 stakeholder meeting included:

- This meeting summary report.
- A comprehensive list of stakeholder-generated solutions for improving drug data on death certificates.
- A list of stakeholders' priority solutions organized by short- and medium-term timeframes.
- A matrix of stakeholders' priority solutions organized by local, state, and federal levels.
- One or two specific activities (the "how") for each of the priority solutions that stakeholders brought forward.

This project's overall goal was to engage stakeholders in identifying and refining a set of options that the medicolegal death investigation community, vital registrars, state health departments, and others can use to improve drug completeness and specificity on death certificates for drug overdose deaths.

PROJECT AND MEETING DESIGN

PROJECT DESIGN

This project included two phases. The first phase was a series of interviews with medicolegal death investigation experts (n=9) to glean insights on the major problems and barriers that they face related to death certification and drug specificity on death certificates, as well as proposed approaches to solving those problems. These initial interviews aimed to determine the most salient issues to address during the in-person meeting and created a strong foundation for the project's second phase. Using the interview findings, ASTHO created a list of possible solutions and approaches for improving drug specificity data. ASTHO used this document as the foundational resource for the in-person meeting. The second phase, the in-person stakeholder meeting, focused on engaging stakeholders and promoting discussion to both understand the key barriers around death certification and improving drug specificity, as well as to refine the list of possible solutions. Another purpose of the in-person meeting was to identify attendees' perspectives on key priorities and feasible action areas for the next several years to improve drug specificity on death certificates. The project and the meeting were informed by a systems-based approach, which aims to bring together multiple elements of public health, including policy change, financing, data, evidence-based programs, and multi-disciplinary partners, to promote collaboration, coordination, and cross-pollination and build awareness of what partners can accomplish together when working across sectors.

MEETING DESIGN

The following section provides a description of what occurred during each session of the in-person meeting that ASTHO convened in August 2017. Additional contextual or background information is also provided where pertinent. A full agenda of the meeting is included in Appendix 2.

Welcome and Overview

Jay Butler, ASTHO president and chief medical officer and director of the Alaska Division of Public Health, provided a brief welcome from ASTHO. Puja Seth, lead for the Overdose Epidemiology and Surveillance Team in CDC's Division of Unintentional Injury Prevention, provided a brief welcome from CDC. ASTHO's senior director of health improvement reviewed the agenda and the meeting's aims.

Overview of Death Investigation and Death Certificate Completion Process

Margaret Warner of the National Center for Health Statistics (NCHS) provided an overview of the death investigation and death certificate completion processes. This presentation addressed key needs, barriers, and priorities to improve death certificate data.

Stakeholder Priorities Round Robin

Meeting participants introduced themselves, sharing their names, organizations, and a priority for their work related to improving drug specificity on death certificates. Some of the priorities that stakeholders shared were:

- Improving drug data on death certificates.
- Improving data sharing between agencies.
- Developing strategies for federal agencies to support medical examiners and coroners.
- Educating death certifiers about the value of complete and accurate death certificate data.
- Modernizing data systems, such as EDRS.
- Centralizing data and reporting systems.

Participants also shared relevant disclosures of interest during the round robin introductions.

Potential Solutions from Phase One

During phase one of this project, ASTHO completed a series of key informant interviews with experts working in medicolegal death investigation to better understand key issues, barriers, and potential solutions for overcoming challenges in improving drug specificity on death certificates. These interviews informed the development of a document on potential solutions. This session of the ASTHO meeting agenda offered an opportunity for participants to add additional ideas to the Potential Solutions draft document. The document was organized around the ASTHO Systems Change Levers, a set of elements critical to making sustainable changes within public health systems, which are described below:

Leadership and vision	• Setting a vision, developing a strategy. • Formal strategic planning.
Communication	• Identifying and using effective communication channels to inform/educate the public. • Meeting audiences where they are. • Innovative forms of communication and engagement.

Policy change	• Identifying and implementing organizational, regulatory, legislative policies. • Short-term and "long haul."
Evidence-based programs	• Public health practice informed by evidence and best practices. • Education about evidence. • Research translation and dissemination.
Financing	• Coordinating funding to fuel collaborative change across sectors. • Thinking beyond program dollars. • Leveraging existing resources. • Consider complementary sectors. • Sustainability.
Data-driven action	• Improving surveillance and outcome data. • Sharing data to educate and empower stakeholders. • Informing strategies. • Assessing gaps, challenges, needs. • Coordination and access.
Complementary sectors, partners, and engaged individuals	• Collaborations between complementary sectors and partners. • Unify a vision of change. • "Health is everywhere" mindset. • Coordinating and maintaining partnerships.

Individual Priorities

This activity was designed to capture individual viewpoints and priorities from the Potential Solutions document. Each individual posted up to two priorities at each level (local, state, and federal) for improving drug specificity on death certificates. ASTHO categorized the individual priorities into themes at the local, state, and federal levels. These individual priorities and themes are available in Appendix 3.

Action Steps for Short- and Medium-Term

Participants selected three to six priority solutions from the revised Potential Solutions document and wrote a few key short- and medium-term action steps aligned with these identified solutions. This activity's goals were to (1) understand how participants envisioned making progress on selected action areas, and (2) move participants toward the meeting's final activity, which was selecting feasible action areas to address over the next several years. A streamlined version of the Potential Solutions document, with meeting attendee's action steps included, is available as Appendix 4.

Interactive Discussion with ASTHO Membership

Butler and Gary Zientek, Alaska's chief medical examiner, shared some high-level reflections about the first day of the meeting and the ways they hope to use the information to educate other SHOs and improve practice in Alaska. The purpose of this discussion was to highlight collaboration between medicolegal death investigation, state health officials, and state health departments, and bring the state health official lens to the conversation.

Feedback on *A Reference Guide for Certification of Drug Intoxication Deaths* by NCHS

This session's purpose was to engage participants in providing input to NCHS on *A Reference Guide for Certification of Drug Intoxication Deaths*, a forthcoming guidance document on how to complete the death certificate for drug intoxication deaths. Participants received the draft reference guide the week prior to the meeting to facilitate reviewing it in advance. NCHS researchers developed discussion questions and led the discussion about the guide at the meeting. Key themes from this discussion are summarized in the Key Discussion Themes section of this report.

Identification of Feasible Short- and Medium-Term Strategies

Facilitators asked participants to look at the revised Potential Solutions document and begin thinking about the most feasible action areas for the next one to three years. Participants selected at least one action area for each systems change lever. The full list of priority action areas identified at the meeting is provided in the next section of this report.

KEY DISCUSSION THEMES

The discussion themes described below emerged from the in-person meeting as participants shared their individual perspectives and opinions. One ASTHO team member developed an initial round of themes based on the meeting notes, and two ASTHO team members discussed and revised these themes based on a second review of meeting notes. Finally, the entire team reviewed and provided input on the summary of the key discussion themes. Individual written input from meeting attendees is summarized as part of the appendices included in this report.

DISCUSSION THEME ONE*:* MORTALITY DATA SYSTEMS

Improve interoperability between mortality data systems, update essential mortality data systems, improve access to medical data, and plan for a coordinated data architecture that pulls data from multiple sectors and systems.

Summary Points

- State governments rely on EDRS to produce official mortality data collected from death certificates. EDRS are aging and need to be updated and re-designed. Stakeholders expressed an interest in modeling EDRS improvements on infectious disease platforms. For example, two options include centralizing lab reporting and making the system more user-friendly, such as by using predictive text suggestions for addresses and other similar information.
- Agencies and individuals would benefit from increased interoperability across mortality data systems, including EDRS, medical examiner and coroner case management systems, postmortem toxicology testing results systems, EHR, PDMPs, and other state and federal systems related to mortality.

Interoperability

Participants indicated that better interoperability across systems would support the death certification process. Interoperability refers to the ability of data systems to exchange information with other systems.[6] Addressing interoperability relates to data systems modernization efforts: many existing data systems need to be enhanced and updated to better meet stakeholder needs and achieve interoperability with other existing data systems.[7]

Developing application programming interfaces (APIs) is critical to increasing interoperability. An API framework would allow mortality and other health data systems to draw from other data sources. An API framework would also allow authentication for specific people and authorization to access specific data, ensuring security and confidentiality. Efforts to make systems interoperable are particularly important across systems within a state to ensure that key stakeholders can access and share relevant data for death certification. Interoperability across state systems is also a key consideration in county-based death investigation systems so that data can be efficiently compiled at the state level. Efforts to improve interoperability might include PDMP, EHR, EDRS, and coroner and medical examiner case management systems. Interoperability is relevant both in the context of death certifiers needing to access other information, as well as the output from the death certification process. Because a primary responsibility of

medical examiners and coroners is to certify the cause and manner of death in a timely and accurate way, efforts to advance interoperability should also aim to make it simple and efficient to complete the death certificate.

Participants' primary suggestions on interoperability centered around: (1) Conducting a needs assessment to see which states have interoperability across multiple systems, including EHR and mental and behavioral health, and which of these systems have and do not have mechanisms to collect data from medical examiners and coroners, and (2) providing funding for working toward a data system that would "connect the dots" across medical examiners, coroners, and vital records, perhaps with the aim of developing a system similar to the National Electronic Disease Surveillance System, which has high compatibility across systems.

Participants mentioned the following key partners who should be involved in a data systems improvement effort: medical examiners, coroners, vital records, forensic science labs, hospitals, primary care, the National Violent Death Reporting System, National Forensic Laboratory Information System (NFLIS), Drug Enforcement Administration (DEA), National Highway Traffic Safety Administration, and other federal and state agencies.

Electronic Death Reporting Systems

Some participants shared that state EDRS need to be updated and improved. State governments rely on EDRS to produce official mortality data collected from death certificates. EDRS are housed in state health departments, and funeral homes, death certifiers, and local and state registrars use them to seamlessly enter death data. States could potentially leverage healthcare transformation funding and financial incentives tied to Meaningful Use to make EDRS improvements. Healthcare transformation is an effort to address the Triple Aim, which encompasses better health, better care, and lower costs.[8] Meaningful Use is using EHR technology to improve quality, efficiency, and care coordination.[9] Meaningful Use could also potentially support data systems interoperability. Several meeting participants also suggested that more ongoing collaboration between state health departments, including epidemiologists and vital registrars/vital statistics, medical examiners, coroners, healthcare providers, and other stakeholders, would help move toward systems interoperability.

With regard to EDRS updates, several participants mentioned modeling these changes on infectious disease reporting systems, the systems used to communicate "reportable conditions" to the state health department. According to several meeting participants, infectious disease systems are streamlined, automated, and include user-friendly elements that could be borrowed for EDRS. Two examples of how EDRS updates could be aligned with infectious disease reporting systems are to (1) centralize lab reporting, and (2) use predictive text suggestions for addresses and similar information. A few participants also suggested that EDRS include messaging capability to allow vital statistics to communicate with coroners and medical examiners across the state.

A few participants noted the importance of considering states' varying capacities with technology in general and EDRS specifically. For example, one state represented at the meeting doesn't have computers in all coroners' offices. One meeting participant suggested that it would be a positive step to get all offices up to a certain standard of technology and case management software. A few participants mentioned cloud-based data systems that can run on a smartphone, which could be useful for medical examiners' and coroners'

offices that have insufficient computers. States' differing capacities with technology is a key consideration for state health departments and state health officials seeking to improve death certificate data.

Integrating Data Systems Across Domains

Participants also discussed the value of having a federal-level system that integrates data from across domains, including both public health and law enforcement data. This would require achieving interoperability across systems from different domains and sectors that were not designed to work together. Several meeting participants noted that this has been achieved in other fields. One participant said that it would be helpful to explore how other fields (e.g., medical records, banking) have addressed this need. Another participant suggested that advancing such a data system at the state level might be more palatable than at the federal level. In addition, several participants mentioned data-sharing guidelines and rules that could prohibit states from sharing certain data with the federal government.

Data Access

Meeting participants discussed the importance of allowing medical examiners and coroners to access other data systems, such as PDMPs and EHRs. Accessing PDMP data can provide information and guide decisions on various parts of the death investigation, including what toxicology testing to order.[10] Some states currently allow access to such systems and others do not. Access to systems like PDMPs and EHRs has to do not only with the technical aspects of interoperability, as discussed above, but also the legal path to obtaining access. Participants suggested that allowing medical examiner and coroner access to these data sources could increase efficiency. A few participants also raised the concept of toxicology labs gaining access to PDMPs. Coroners and medical examiners currently have different levels of access to other records, such as law enforcement records. One participant stated that medical examiners are often denied access to medical records because of the Health Insurance Portability and Accountability Act of 1996 (HIPAA). One participant mentioned that coroners have subpoena power, but medical examiners generally do not. Confidentiality is a key barrier to increasing coroner and medical examiner access to law enforcement and medical records. In cases where death certifiers cannot access data on individual people, one participant suggested that some aggregate law enforcement data might be helpful and cited NFLIS data as an example of data that public health can query and might be useful.

Additional Information on Stakeholder Access to PDMPs

- PDMP Legislation Enacted in 2017
- Coroner/Medical Examiners Laws by State
- Using PDMP Data to Support Prevention Planning
- Types of Authorized Recipients – Coroners and/or Medical Examiners or State Toxicologists

DISCUSSION THEME TWO*:* POSTMORTEM TOXICOLOGY

Address the timeliness, quality, and reporting processes for postmortem toxicology results, and address funding gaps for coroners and medical examiners to complete appropriate toxicology testing.

Summary Points

- A number of factors impact the timeliness of toxicology results, including instrumentation, personnel, the ability to keep pace with emerging drugs, and coordination.
- Toxicology testing techniques and methods need to be refined to keep pace with emerging illicitly manufactured synthetic drugs.
- Coordination between the death investigator and associated labs (e.g., crime lab, toxicology) should be optimized and medicolegal death investigation stakeholders should clarify decision-making roles and responsibilities related to toxicology testing.
- Improve and streamline toxicology reporting using infectious disease reporting systems as a model.
- Increase funding for comprehensive postmortem toxicology testing.

Toxicology Timeliness and Quality

Multiple participants indicated that delays in receiving and interpreting toxicology results are a key reason for subsequent delays in completing the death certificate. There are a number of reasons for delayed toxicology results, including insufficient personnel, lack of testing standards, and the time it takes to develop testing standards for new drugs. The list of emerging illicitly manufactured drugs continues to grow, so reference materials are needed for these new drugs. Challenges that need to be addressed to improve the timeliness of toxicology results include having outdated instrumentation, not enough instrumentation, or an inability to validate instrumentation. In addition, there is geographic variation across the country in the types of testing conducted, the equipment used to run the tests, and the resources needed to request a toxicology consult. Toxicology delays also likely vary geographically. One participant said that toxicology results could be only two of the three options of "fast, cheap, or accurate," and that achieving the highest level of accuracy can take time. Another participant suggested that doing a basic drug screen on all cases and then flagging a subset of cases for further testing could speed up toxicology testing.

Several other issues feed into obtaining timely toxicology results. For example, the stability of some biological samples collected at the scene; scene data, including onsite toxicology testing; and the large amount of data the labs receive are all important

Timeliness: Toxicology and Death Certification

- Improve timeliness of toxicology results.
- Improve timeliness of death certificate completion to inform decision-making related to emerging hotspots and incidents.
- Standardize timeline for finalizing pending death certificates.
- Improve timeliness of responses to cause-of-death queries that seek more information about death certificates that lack specific or unclear information. State registrars' offices issue cause-of-death queries to obtain more information about a death. The response to the query allows the state registrar to add information to the death record. (CSTE, 2016)

considerations. One participant indicated that better coordination between the medicolegal death investigator and crime lab could result in better integration of the evidence, including digital forensics and toxicology. Decisions about what toxicology to run are important because there is only so much of any one sample available, yet several participants indicated it is not always clear who decides which toxicology tests to perform. Ensuring coordination between the death investigator and associated labs (e.g., crime, toxicology) and clarifying who makes decisions about toxicology testing could also improve toxicology delays.

Finally, the medicolegal death investigation system is overburdened. One participant noted that toxicology labs are overwhelmed with samples to process. Similarly, medical examiner and coroner offices are overtaxed, so it has become routine to complete minimal toxicology and often no autopsy, even though this is against all standards. The offices are doing their best to keep up.

Toxicology Standards

Some participants raised the possibility of creating a national standard for toxicology, which would guide what to test for, and suggested that this has the potential to improve the quality of toxicology testing for drug overdose deaths. A few participants shared divergent opinions on the value of this approach. On the one hand, toxicology standards could help get more results more quickly. On the other hand, there are cost barriers to this approach, as well as a constantly evolving list of drugs. There are also regional variations in new drugs, and not all regions would benefit from testing for a new drug that is only present in one area. Several participants suggested that a national accreditation standard for toxicology labs is more crucial than a national standard for what to test. A few participants discussed how to decide which post-mortem toxicology panels to run, and one state shared an example of using seizure data to inform selection of the basic or enhanced toxicology panel. Finally, a few participants discussed creating standards for the timeliness of returning toxicology data.

Funding for Toxicology Testing

Many participants indicated that funding for toxicology is insufficient. One participant stated that better funding of the whole U.S. death investigation system would yield more complete information. The group discussed two grant programs that support toxicology and improving drug specificity data. For FY 2017, CDC provided supplemental funding through the Enhanced State Opioid Overdose Surveillance's (ESOOS) State Unintentional Drug Overdose Reporting System and required that at least 60 percent of the supplemental funds go directly to supporting medical examiners and coroners, including comprehensive toxicology testing. Awarded states have selected different ways of distributing the money to medical examiners and coroners.

Another funding source for toxicology is the Paul Coverdell Forensic Science Improvement Grants Program, which the U.S. Department of Justice's National Institute of Justice (NIJ) administers to improve the quality and timeliness of forensic science and medical examiner/coroner services. Coverdell program funds may be used to support DNA testing or toxicology testing, but this funding stream provides funding for all forensic science services, not just toxicology and medicolegal death investigation. The proportion of Coverdell funds that go to states is decided statutorily, and states allocate the money to counties in different ways. Over the last few years, states have distributed a higher proportion of the total funds available directly to medical examiners and coroners. Working closely with a state administering agency, such as a criminal justice division, public safety office, or governor's office, could be very helpful in receiving Coverdell funds (all state administering agencies are listed on the Coverdell website). Several participants said they were not aware of

programs such as ESOOS and Coverdell.

Benefits and Drawbacks of Different Types of Toxicology Labs

Participants discussed the value of private and fee-for-service labs, particularly as a way to get toxicology results more quickly. Several participants seemed to value private labs over public ones, whether fee-for-service or not. One participant suggested that death certifiers should have a greater awareness of the options for toxicology testing, including private labs, and suggested creating a decision tree to help medical examiners and coroners assess which type of lab to use. A handful of medical examiners and coroners stated that they already have internal toxicology labs funded to do their testing, so they cannot choose a private lab. A few participants shared mixed views about private versus municipal toxicology labs and acknowledged that private labs are a good option for some pieces of particular cases when they are accredited and use a validated method. One participant also noted that there are government forensic toxicology labs that work quickly.

DISCUSSION THEME THREE: TRAINING AND EDUCATION

Develop and offer training and education to coroners and medical examiners about the importance of drug specificity on the death certificate, how to complete the death certificate, and related issues.

Summary Points

- Training and education for coroners, death investigators, and medical examiners is essential to improving drug specificity on death certificates. State health departments, state legal and criminal justice officials, and attorneys general can collaborate to develop and deliver such training.
- Medical examiners and forensic pathologists need continuing medical education (CME) on interpreting complicated toxicology testing and interpreting toxicology results for complicated deaths.
- Medical examiners and coroners can convene to develop joint position papers and standards for death certifiers. One possible project for such a group is to update the NAME position paper, Recommendations for the Investigation, Diagnosis, and Certification of Deaths Related to Opioid Drugs (2013), in light of the emergence of new drugs.
- Epidemiologists need to understand the medicolegal death investigation system.

Education for Coroners and Medical Examiners

Many meeting participants said that one of their key priorities is educating coroners, death investigators, and medical examiners on improving drug specificity on death certificates. Some participant comments suggested that coroners may need more education than medical examiners. One coroner said that the coroner community is "one of the most neglected groups nationally … and they need education on why this data is important." Several coroners agreed that identifying channels and methods for messaging and education for coroners would take effort. The Organization of Scientific Area Committees for Forensic Science (OSAC), part of the National Institute of Standards and Technology (NIST), and ABMDI were named as key partners in educating and communicating with coroners and medical examiners. In some cases, the state health department staff and vital registrar staff could be additional resources for coroner training and education. For example, one

Suggested Topics for Coroner and Medical Examiner Training and Education

- Provide specific instructions for medical examiners and coroners about how to complete the death certificate to improve drug specificity.
- Educate participants about how the lack of drug specificity on death certificates limits a region's access to data that can inform prevention and intervention efforts. This can then limit access to funding opportunities to improve medicolegal death investigation systems and processes.
- Provide education on how drug specificity information is used to inform public health efforts.
- Train coroners and medical examiners on how to use electronic reporting and other data systems.
- Deliver training during medical examiner fellowships that addresses how to interpret toxicology results in cases of complicated deaths and complete the death certificate.

method of direct education for coroners and medical examiners is for the state health department to query medical examiners and coroners, as some states already do, to obtain more information when there is not enough detail initially submitted on the death certificate. Not only does this assist a state in obtaining needed information, it educates the death certifier for similar situations in the future. Additionally, state health departments, state legal and criminal justice officials, and attorneys general could collaborate to develop and deliver training for coroners and medical examiners. Numerous meeting participants acknowledged the importance of bringing together medical examiners and coroners to develop joint position papers and standards. These two groups are not often exposed to each other's educational materials, according to several participants. As mentioned previously, for FY 2017, CDC provided supplemental funding through ESOOS and required that at least 60 percent of supplemental funds go directly to support medical examiners and coroners. Some states have used these funds for training and education activities. The specific education and training topics discussed at the stakeholder meeting are included in the box above.

Education for Epidemiologists

Epidemiologists in attendance indicated that they and their peers, along with their fellow state health department colleagues and vital statistics staff, also need education about the medicolegal death investigation process, including information about the roles and responsibilities of medical examiners, coroners, and medicolegal death investigators. This education and training would also necessitate input and engagement from the legal side of the medicolegal death investigation field, such as state legal and criminal justice officials and attorneys general. Epidemiologists also said that better ongoing relationships and coordination between state health departments, medical examiners or coroners, and epidemiologists will help build a state's knowledge of its own data on drug specificity for drug overdose deaths. This would lead to continuous assessment of selected indicators over time and lay a foundation for ongoing improvements to death certificate data for drug intoxication deaths. This feedback loop between multiple stakeholders would have a positive impact on surveillance data and general coordination across sectors, and would build awareness of the administrative and legal processes essential to providing high-quality death certificate data, current successes, and areas for improvement in a state's drug specificity on death certificates.

Additional Conversations

Participants discussed several other noteworthy topics related to coroner and medical examiner education. These conversations touched on several topics:

- Building connections between medical examiners and coroners and their associations (more on this in Appendix 4).
- Increasing certification of medicolegal death investigators, coroners, and medical examiners, and increasing accreditation of coroner and medical examiner offices.
- Addressing the shortage of forensic pathologists through policy change.

The Medicolegal Death Investigation Subcommittee of the National Commission on Forensic Sciences (NCFS) has released a number of reports relevant to certification and accreditation, listed below:

- Certification of Medicolegal Death Investigators
- Accreditation of Medicolegal Death Investigation Offices
- View of the Commission Certification of Medicolegal Death Investigators
- View of the Commission Accreditation of Medicolegal Death Investigation Offices

- Views of the Commission Increasing the Number, Retention, and Quality of Board-Certified Forensic Pathologists

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DISCUSSION THEME FOUR: GUIDANCE ON FILLING OUT THE DEATH CERTIFICATE

Develop and disseminate guidance on the death investigation and death certification processes as they relate to drug overdose deaths.

Summary Points

- Death certifiers need specific guidance on how to complete the death certificate. This guidance should include information on how to list drugs involved and provide sample language and example death certificates. Stakeholders at the meeting provided input on a forthcoming *Reference Guide for Certification of Drug Intoxication Deaths,* which NCHS is developing. This guidance document will be an important source of information on how to complete the death certificate, particularly how to list drugs on the death certificate.
- The medicolegal death investigation community needs specific guidance on determining which drugs to list on the death certificate when multiple drugs are involved or present. Joint position papers are also needed on this topic.

Guidance on Completing the Death Certificate

Many meeting participants expressed a need for guidance on completing the death certificate. This resource would ideally provide both general guidance about completing the death certificate, as well as very specific guidance, including example death certificates and scenarios and model language. *A Reference Guide for Certification of Drug Intoxication Deaths*, forthcoming from NCHS*,* will be an important part of this guidance. The box to the right contains a summary of the main themes from the discussion about the NCHS guide on completing the death certificate.

Themes from Discussion about NCHS Reference Guide

- Clarify where to write the drugs contributing to the death and where to write the other drugs. Which drugs are listed should be discussed with a medical professional.
- Address how the public health sector uses the drug information. Death certifiers should know the value of that data for prevention, education, intervention, and surveillance.
- Create a glossary of terms in the reference guide. Language and terminology on the death certificate are important for reducing stigma and ensuring accuracy.
- Clarify NCHS guidance on completing Box 43 (how the injury occurred).
- Include examples of death certificates.

In addition to the reference guide, participants indicated that states could use the following strategies to improve drug specificity: (1) Submit pending death certificates to meet timeliness requirements, and adhere to agreed-upon timelines for providing completed death certificates after the toxicology results have been submitted, and (2) query medical examiners and coroners, as some states already do, to obtain more information when there is not enough detail initially submitted on the death certificate. A participant mentioned that the NIST OSAC Medicolegal Death Investigation Subcommittee could support a process to formalize guidance into standards for the death certification process, and OSAC

could communicate the standards to stakeholders. Creating such standards would take time, but multiple meeting participants said the field needs standards for how to complete the death certificate. A few participants also mentioned throughout the meeting that it would be beneficial to have more cross-pollination and connection between coroners and medical examiners. Both coroners and medical examiners noted that resources developed by one group were not often shared with the other, but that such sharing would be beneficial.

Drug Intoxication Deaths with More than One Drug Present

An ongoing challenge directly related to completing the death certificate is how to address drug overdose death cases where more than one drug is found to be involved or present in a death. Participants shared two main perspectives on this topic: (1) Develop and codify guidance on how to approach these deaths and complete the death certificate, and (2) develop a way for certifiers to communicate to stakeholders that it wasn't possible to determine which drug was responsible for the death. According to an organizational representative, NAME is planning to write a position paper on this issue in the future.

DISCUSSION THEME FIVE: VERIFICATION OF FACT OF DEATH

Develop a mechanism to provide an official certification of death that would be available for next of kin for administrative purposes, but doesn't include medical information.

Summary Points

- The health information on death certificates may be sensitive and is not needed for many administrative purposes. Furthermore, certifiers may not include specific and actionable information that they deem too sensitive (e.g., drug overdose or conditions that may have led to suicide) on the death certificate due to concerns that the family would be harmed.
- Creating a mechanism for an official certification of death that doesn't include medical information will require a change in the operations in vital registrars' offices, may necessitate a policy change, and would also have cost implications. However, it could have a significant, long-lasting positive impact on the quality of death data.

Mechanism for Administrative Certification of Death

Throughout the meeting, a number of participants raised the idea of developing a mechanism to provide an official certification of death that doesn't include medical information. One participant suggested that this approach be established as a national standard. This certification of death would be for next of kin administrative purposes, such as closing bank accounts. This idea came up because there are several issues related to providing a complete death certificate with the current system. One issue is the concern that certifiers may not include specific and actionable information that they deem too sensitive, such as a drug overdose or conditions that may have led to suicide, on the death certificate because of concern for the family and the stigma related to certain medical issues. Another issue is related to the value of having additional space on the death certificate that is not public to write more information, context, and findings. This additional information may be useful for surveillance and data purposes.

Implications

With the advent of electronic death registration, vital registrars are no longer relying on paper certificates, so it is technically possible to generate a portion of the death certificate without health information. The policy implications of this shorter death certificate would need to be explored. For example, could families use this version as an official document to settle estates, close accounts, and complete other administrative actions? There may also be other ways to bypass paper altogether by using electronic retrieval systems to verify fact of death. Many participants mentioned that this solution would take significant time and could be costly. It would likely require a policy change. Other considerations for such a change include existing statutes and regulations within that jurisdiction, feasibility for the registrar's office, and the certificate paper vendor. Nonetheless, many participants seemed interested in exploring this possibility. With growing concern about the privacy of health information, this provides a logical next step in the effort to modernize vital records.

DISCUSSION THEME SIX: COORDINATION OF MEDICOLEGAL DEATH INVESTIGATION

Enhance federal- and state-level coordination of work related to coroners, medical examiners, and other medicolegal death investigation stakeholders.

Summary Points

- Creating federal- and state-level offices to coordinate the medicolegal death investigation community would help consolidate activities and supports.
- Coroner and medical examiner offices need funding for computers and other technology, toxicology testing, and personnel.

Establishing Federal and State Offices for Medicolegal Death Investigation

Several participants suggested creating federal- and state-level offices to coordinate work related to coroners, medical examiners, and other medicolegal death investigation stakeholders. Several commissions have explored the concept of a federal-level office, including Recommendation to the Attorney General Formation of a National Office for Medicolegal Death Investigation,[11] which was adopted by the NCFS Medicolegal Death Investigation Subcommittee. There is currently no single federal agency that serves as the central coordinating body for the medicolegal death investigation community and oversees its many streams of work; a similar office at the state level may also be useful. Participants mentioned that a federal office could potentially oversee the following areas: coordinating related data systems, convening the medicolegal death investigation community, fostering relationships across stakeholders, overseeing accreditation and certification programs (including potentially requiring mandatory certification of offices), and funding systems change/coordination efforts at the local and state levels to improve data collection.

In states with a county-based death investigation system, a state office could coordinate and facilitate education, collaboration, and other support systems for death certifiers and medicolegal death investigators. Some states already have a state medical examiner with coordinating responsibilities, but many states do not have a system in place for state-wide coordination. Such an office could contribute to greater collaboration and alignment across agencies and sectors (e.g., health, justice).

Resource Development

Meeting attendees devoted time throughout the meeting to discussing the need for financial resources across coroner and medical examiner offices, such as funding for computers, toxicology testing, and personnel. Funding and resource development could be another role for a central office that oversees activities related to medicolegal death investigation.

ACTION AREAS TO CONSIDER FOR IMPROVING DRUG SPECIFICITY ON DEATH CERTIFICATES

During the final session of the in-person meeting in August 2017, meeting participants generated and prioritized specific actions that they considered to be feasible over the next one to two years across the five key areas, listed below. These are the areas where meeting participants suggested focusing initial energy to improve the completeness and specificity of drug information on death certificates for drug overdose deaths. Where discussed, key stakeholders are listed for each action area. Additional ideas for improving drug specificity and completeness on death certificates are available in Appendix 4 in the Potential Solutions document.

Financing

- Improve funding and data systems for medicolegal death investigation. *Key stakeholders to engage:* Medical examiner and coroner groups, local government groups, ASTHO, National Governors Association, and National Association of Attorneys General.
- Integrate EDRS and medical examiner and coroner case management systems, and leverage current work around Meaningful Use and healthcare transformation to improve EDRS. *Key stakeholder to engage:* National Committee on Vital and Health Statistics.

Policy

- Create federal policies that will guide what is needed from medical examiners and coroners at the state and local levels, which can guide changes in local and state policy and practice.
- Create a home in the federal government for medicolegal death investigation.
- Use the Potential Solutions document to develop a menu of policy options for state health departments and other stakeholders.
- Develop model laws related to medicolegal death investigation.

Complementary Sectors and Partners

- Advance public health and law enforcement partnerships and collaboration.
- Establish coalitions comprised of local health departments and treatment centers at the county level to address mental and behavioral health issues.
- At the state level, hold an initial meeting between medical examiners and coroners, vital statistics, and epidemiologists to talk about the status of drug specificity on death certificates in their state.
- Encourage state health departments to obtain more detailed information about death certificates that lack sufficiently detailed information on the drugs involved in the death. This can be done through a query process performed by the state registrar's office to obtain more information about a death. The response to the query allows the state registrar to add information to the death record.[12]
- Develop a train-the-trainer model that can be implemented widely to teach death certifiers about both how to complete the death certificate and the surveillance value of providing information on the specific drugs involved.

Timeliness

- Improve the timeliness of toxicology data to ensure timely death certificate submissions.

- Address pending death certificates by identifying and standardizing the process for revising or amending the death certificate once more information is available (e.g., toxicology results).

Education and Training

- Update NAME position paper on multiple drug overdose deaths.
- Use joint presentations to educate coroners and medical examiners about the importance of drug specificity on death certificates and actions to improve specificity.
- Develop joint position papers between medical examiners and coroners about medicolegal death investigation and death certification.
- Develop an educational slide deck and use it for CMEs, ABMDI credits, and other purposes.
- Develop a national standard for how drugs are listed on the death certificate and educate coroners and medical examiners on it.
- Have state health departments assist medicolegal death certifiers in getting certified and support medical examiner and coroner offices in seeking accreditation. There are currently two organizations—NAME and IACME—that offer accreditation for medical examiner and coroner offices, while ABMDI offers certification for medicolegal death investigators.[13]
- Develop or find the appropriate communication mechanisms for CDC and federal and state agencies to effectively reach medical examiners and coroners.

IMPLICATIONS AND NEXT STEPS

Based on stakeholder contributions at the meeting, ASTHO offers the following considerations and opportunities for medicolegal death investigation, state health officials, and state health departments in Table 2. The list contains potential actions to address the underlying issues, challenges, and opportunities that individual participants presented.

TABLE 2. IMPLICATIONS OF ASTHO MEETING FOR MEDICOLEGAL DEATH INVESTIGATION AND STATE HEALTH DEPARTMENTS

Medicolegal Death Investigation Field	State Health Officials/ State Health Departments
Leadership and Vision	
• Coroner, medical examiner, and death investigator associations can play a role in building connections across medicolegal death investigation stakeholders. • Federal agencies, including NCHS, CDC, and others, can play a key role in providing guidance and setting standards and expectations for ongoing death certificate data improvements. • Coordination between leaders in the coroner and medical examiner communities and sister agencies would support the development and implementation of a long-range vision to improve drug specificity data.	• State health officials and their teams have an opportunity to partner with and convene medical examiners and coroners, their associations, vital registrars, and others to improve drug specificity on death certificates.
Communication	
• Professional associations representing coroners, medical examiners, and death investigators have an opportunity to develop effective communication channels to reach coroners and medical examiners with information about partnerships and coalitions, how to apply for funding, and accessing education opportunities.	• State health departments can ensure that medical examiners and coroners are on the state health alert network to receive relevant information. • They can also support communication and education efforts to reach coroners and medical examiners, both via existing state health department communication channels or the development of new efforts via web, email, print, and virtual engagement.
Policy	
• Medicolegal death investigation stakeholders can communicate new standards, guidance, and policy changes to death certifiers at the state and local levels.	• State health departments should be aware of and/or help inform policy initiatives, such as (1) increasing medical examiner/coroner access to EHRs and PDMPs, and (2) creating a two-part death

	certificate (fact of death and separate, detailed information for surveillance).
Timeliness	
• The medicolegal death investigation community has an opportunity to engage in discussions to establish a process for finalizing pending death certificates. • The medicolegal death investigation community may benefit from working with partners to leverage more funding to address this issue and learn from best practices in the field.	• State health departments could play a convener role in the process to standardize how death certificates go from pending to final. • State health departments and state health officials could help with or lead proposals to fund additional toxicology, including re-allocations of current budgets, and support efforts to address timeliness of toxicology reporting.
Education and Training	
• Medicolegal death investigation stakeholders could generate educational materials about emerging standards and guidelines for completing the death certificate and share them broadly within the medicolegal death investigation community.	• State health departments should be seen as a partner in developing and delivering some of these educational opportunities for coroners and medical examiners, particularly around how the data are used to inform public health prevention and intervention efforts.
Financing	
• There are significant financial implications related to toxicology testing, increasing the number of forensic pathologists, improving data systems, and achieving interoperability across data systems. • Another side of financing for medicolegal death investigation is ensuring that medical examiners and coroners are notified of and supported to apply for available funding opportunities. This requires both better communication and more intentional partnerships with stakeholders who can share funding opportunities with medical examiners and coroners.	• State health departments should be aware of the significant financial needs for toxicology. Additional funding for toxicology could be directed to personnel, instrumentation, or a new results delivery system. • Improving and updating EDRS is also a financial priority. • An additional area to explore is student loan forgiveness for forensic pathologists, which could increase the number of forensic pathologists working in the field. • State health departments could address some of these issues by partnering with the medicolegal death investigation community to apply for funding or address and adjust current budgets.
Data-Driven Action	
• Two areas of opportunity are (1) engaging coroners and medical examiners in improving data systems, and (2) building coroner and medical examiner capacity around using data systems. • Key leaders in the medicolegal death investigation field could provide more	• Supporting effective data capture, systems interoperability, and access are the biggest areas of opportunity for state health departments and state health officials. • State health officials and their teams can apply for funding to support developing and integrating data systems and convene

education about the public health importance of the data included on the death certificate.	relevant partners to help improve data integration and access for medical examiners and coroners, including educating stakeholders about why this is important.
Complementary Sectors and Partners and Engaged Individuals	
• Medical examiners, coroners, and death investigators are key stakeholders in improving drug specificity on death certificates and need to be engaged in multi-sector and multi-stakeholder efforts on this topic.	• State health departments have an opportunity to support coordination and collaboration throughout the medicolegal death investigation system by partnering closely with state legal and criminal justice officials, including attorneys general. • State health departments and state health officials are expert conveners. State health departments are sometimes home to key medicolegal death investigation stakeholders, but they can also bring together disparate partners. State health departments can both support and drive these necessary coalitions.

APPENDICES

1. Full Meeting Participant List – Appendix 1
2. Full Meeting Agenda – Appendix 2
3. Stakeholder Individual Priorities – Appendix 3
4. Potential Solutions with Action Steps – Appendix 4

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[1] Hedegaard H, Warner M, Miniño AM. Drug overdose deaths in the United States, 1999–2016. NCHS Data Brief, no 294. Hyattsville, MD: National Center for Health Statistics. 2017.
[2] Ibid.
[3] Ibid.
[4] Ibid.
[5] Warner M, Paulozzi LJ, Nolte KB, Davis GG, Nelson LS. "State variation in certifying manner of death and drugs involved in drug intoxication deaths." Acad Forensic Pathol. 2013;3(2):231-237.
[6] CDC. "National Notifiable Diseases Surveillance Systems (NNDSS)." Available at https://wwwn.cdc.gov/nndss/data-collection.html. Accessed 11-8-17.
[7] National Science and Technology Council. "Strengthening the Medicolegal Death Investigation System: Improving Data Systems." Available at https://obamawhitehouse.archives.gov/sites/default/files/microsites/ostp/NSTC/strengthening_the_medicolegal_death_investigation_system_final.pdf. Accessed 12-20-17.
[8] Healthcare Transformation Task Force. "About Us." Available at: http://hcttf.org/aboutus/. Accessed 11-13-17.
[9] Office of the National Coordinator for Health Information Technology (ONC). "EHR Incentives and Certification." Available at https://www.healthit.gov/providers-professionals/meaningful-use-definition-objectives. Accessed 11-8-17.
[10] Tharp-Myers A, Hobron K, Orr R. "The Utility of a Prescription Monitoring Program in Death Investigation: The Virginia Experience." Academic Forensic Pathology. Vol 7, issue 1.
[11] National Commission on Forensic Science. "Recommendation to the Attorney General: Formation of a National Office for Medicolegal Death Investigation." Available at https://www.justice.gov/archives/ncfs/page/file/905561/download. Accessed 12-1-17.
[12] Council of State and Territorial Epidemiologists. "Recommendations and Lessons Learned for Improved Reporting of Drug Overdose Deaths on Death Certificates." April 2016. Available at http://c.ymcdn.com/sites/www.cste.org/resource/resmgr/PDFs/PDFs2/4_25_2016_FINAL-Drug_Overdos.pdf. Accessed 11-2-17.
[13] National Science and Technology Council. "Strengthening the Medicolegal Death investigation System: Accreditation and Certification, a Path Forward." Available at http://www.thecfso.org/advocacy/2017/OSTP_accreditation_recommendation.pdf. Accessed 11-2-17.

pennsylvania
DEPARTMENT OF DRUG AND ALCOHOL PROGRAMS

DDAP-EFM-1500
Rev. 09-20

CORONER'S DRUG DEATH REPORT

This form should be submitted within 7 days of the completion of cause and manner of death.

Coroner's Name: **County:**

Date of Death: **Time of Death:**

Coroner's Case #: **County of Residence:**

Decedent's Age: **Gender:**

Race: **Marital Status:**

Manner of Death:

Cause of Death:

Was prescription medication or illicit drug a cause or contributing factor in the death? ☐ Yes ☐ No

Was methadone a cause or contributing factor in the death? ☐ Yes ☐ No

Was law enforcement involved? ☐ Yes ☐ No
- **If yes, what agency?**
- **Contact Person:**
- **Incident #**

Was autopsy performed? ☐ Yes ☐ No

Was a toxicology test performed? ☐ Yes ☐ No
- **Date of Result:**

Describe drug(s) evidence found on person/scene (i.e., packing, stampings, markings, etc.:

Additional notes/remarks:

Submit completed form to:
- **By email to:** mailto:ra-daod@pa.gov
- **Or by fax to: 717-787-6285**

For questions and additional information, contact:

Kathy Stence, Drug & Alcohol Program Analyst
Department of Drug and Alcohol Programs
Bureau of Treatment, Prevention and Intervention
02 Kline Village
Harrisburg, PA 17104-1503
Email: mailto:kstence@pa.gov
Phone: 717-783-8200

If prescription, please provide the following information:

Name & Address of Prescriber:		Name & Address of Pharmacy:	
Medication:		RX Date:	Prescription No.
Amount Prescribed:	Amount Found:	Date Issued:	Dosage:
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			

Name and address of Narcotic Treatment Center:

Substances/Chemicals/Drugs/Alcohol/Poisons	Levels	Name

Pennsylvania State Coroners Association

Report on Overdose Death Statistics 2016

"To the living we owe respect, but to the dead we owe only the truth." Voltaire

"And I looked, and behold a pale horse: and his name that sat upon him was Death"
Revelations Chapter 6 Verse 8

This report in the following pages provides statistics on deaths where drugs caused or contributed to the death of an individual. In reviewing the numbers on these pages we must be mindful that each number represents a history of an individual with hopes and dreams and families and friends. It is hoped that these numbers can assist in developing policies that will help abate this terrible scourge of drug related deaths.

Data Collection

Of the cases investigated by the State's Coroners and Medical Examiners, toxicology results determined that the drugs listed below were present at the time of death. It is important to note that each death is a single case, while each time a drug is detected represents an occurrence. The vast majority of the decedents had more than one drug occurrence.

A drug is indicated as the cause of death only when, after examining all evidence and the autopsy and/or toxicology results, the Coroner/Medical Examiner determines the drug is present or identifiable in the deceased and has played a causal or contributing role in the death. It is not uncommon for a decedent to have multiple drugs listed as a cause of death. This report is limited to deaths where the manner of death is accident, suicide, homicide or undetermined. The reported deaths herein do not include natural deaths, where there may be a significant number of drugs in the person's system, but the drugs are not determined to be the cause of death. But, if the drugs were determined to have a underlying impact on a death, which is otherwise due to medical complications, it is included in this report even though it has been determined to be a natural death.

Data and demographics may be missing or flawed from certain counties which will alter the outcome of various totals to a certain degree.

The Coroners and Medical Examiners who took time out of their busy schedules serving the people of their counties in determining the cause and manner of death of those who have died as a result of violent acts, unintentional or intentional, are gratefully acknowledged. Without their assistance this report would not have been possible.

Any perceived opinions in this Report are those of the compiler of the Report and do not necessarily reflect the opinions of the Pennsylvania State Coroners Association, nor any individual Coroner or Medical Examiner in the State of Pennsylvania.

Susan M. Shanaman, Attorney
PSCA Solicitor/Legislative Liaison

Report Summary

The CDC has stated that our country is in the midst of an overdose epidemic. The President has declared this crisi an epidemic. Drug overdoses are now the leading cause of unintentional injury death in the United States, exceeding the number of deaths from motor vehicle crashes and gunshots combined.

The New York Times quoted Dr. Hamilton Wright of Ohio stating "Of all the nations of the world, America consumes the most opium in one form or another. The habit has this Nation in its grip to an astonishing extent. … The drug habit has spread throughout America until it threatens us with a very serious disaster." What is astonishing about these comments is not that they were said, but when they were said. These remarks were made in 1911 by the first appointed US Drug Czar (appointed by President Theodore Roosevelt).

Drug related deaths have continued to increase. In 2014 that number reached at least 2,489 individuals. The year 2014 showed an average increase of about 20% over the prior year for many counties. The data for 2015 showed 3,505 deaths. And in 2016 the data indicates 4,884 drug related deaths. And, if preliminary data from 2017 is any indication, the number of deaths will continue to increase.

Thirteen (13) people die every day in Pennsylvania from drug related causes. Not known are the number of persons who overdose but survive.

The slight majority of deaths are found in the age group 25 – 34 years old. The typical decedent is white, male, aged 25 – 34 and single. Males represent approximately 70% of the deaths with females making up the remaining 30%. The racial breakdown of the deaths is consistent with the racial make-up of the State with whites making up about 77%, blacks at 12%, Hispanics at 4% and others at 7%.

Opioids, both prescription painkillers and heroin are still found in most of the deaths. However cocaine is seeing a recurrence across Pennsylvania. And the drug fentanyl with its synthetic versions have outstripped all other drugs in Pennsylvania overdose deaths. Fentanyl is found frequently with heroin or cocaine.

The fentanyls found were fentanyl, acetyl fentanyl, furanyl fentanyl, 3-methyl fentanyl, U-47700, 4-fluoroisobutyrfentanyl, carfentanil,sufentanil, 4-methoxy-butyryl fentanyl, acryl fentanyl and fluorobutyryl fentanyl.

The most frequently found drugs in the overdose deaths were heroin, fentanyl, oxycodone, ethanol, cocaine, alprazolam, diazepam, clonazepam, diphenhydramine and levamisole.

This report is based upon a review of toxicology results and does not include any review of a decedent's prescription history, evidence at the scene (which may be collected by coroners or law enforcement based upon county protocol), autopsy results, investigatory reports or interviews with next of kin, friends or witnesses.

Glossary of Drugs

Amphetamines – A group of synthetic psychoactive drugs called central nervous system (CNS) stimulants. The collective group of amphetamines includes amphetamine, dextroamphetamine, and methamphetamine. Methamphetamine is also known as “meth,” “crank,” “speed” and “tina.”
Benzodiazepines – A family of sedative-hypnotic drugs indicated for the treatment of stress, anxiety, seizures and alcohol withdrawal. Benzodiazepines are often referred to as “minor tranquilizers.” Xanax (Alprazolam) and Valium (Diazepam) are the most commonly prescribed drugs in this drug class.
Buprenorphine – A semi-synthetic opioid known as Buprenex, Suboxone, and Subutex indicated for the treatment of opioid addiction and moderate to severe pain.
Cathinones - a family of drugs containing one or more synthetic chemicals related to cathinone, an amphetamine-like stimulant found naturally in the Khat plant. They are 'cousins' of the amphetamine family of drugs, which includes amphetamine, methamphetamine and MDMA (ecstasy). It often goes by the street name of “Molly.”
Cannabinoids – A series of compounds found in the marijuana plant, the most psychoactive of which is THC, a strong, illicit hallucinogen. Street names for this drug are often associated with a geographic area from which it came but also include generic names like “ganja,” “MJ,” “ragweed,” “reefer” and “grass.”
Carisoprodol – Muscle relaxant indicated for the treatment of pain, muscle spasms and limited mobility. It is often abused in conjunction with analgesics for enhanced euphoric effect. It is marketed as Soma.
Cocaine – An illicit stimulant. Powdered cocaine goes by many street names including “C,” “blow,” “snow,” and “nose candy,” while freebase cocaine is mostly commonly known as “crack.”
Ethanol – ethyl alcohol.
Fentanyl – Synthetic narcotic analgesic (pain killer) used in the Durgesic transdermal patch. Also available in a solid “lollypop” sold under the brand name Actiq.
Flunitrazepam (Rohypnol) – Commonly referred to as a “date rape” drug. It is a sedative-hypnotic drug in the Benzodiazepine class. It often goes by the street name “roofies”.
Gamma-Hydroxybutyric Acid (GHB) – A depressant, also known as a “date rape” drug. GHB often goes by the street name “easy lay,” “scoop,” “liquid X,” “Georgia home boy” and “grievous bodily harm.”
Heroin – An illicit narcotic derivative. It is a semi-synthetic product of opium. Heroin also has multiple street names including “H,” “hombre” and “smack,”and others too numerous to mention.
Hydrocodone – A narcotic analgesic (pain killer). Vicodin and Lortab are two common drugs containing hydrocodone.
Hydromorphone – A narcotic analgesic (pain killer) used to treat moderate to severe pain. Marketed under the trade name Dilaudid, it is two to eight times more potent than morphine. Commonly used by abusers as a substitute for heroin.
Ketamine – An animal tranquilizer and a chemical relative of PCP. Street names for this drug include “special K,” “vitamin K” and “cat valium.”
Levamisole-A drug originally developed for use in treating cancer but discontinued for human use due to its negative effects on the human body. Generally found in the Philadelphia area as a cutting agent for cocaine.
Meperidine – A synthetic narcotic analgesic (pain killer) sold under the trade name Demerol, it is used for pre-anesthesia and the relief of moderate to severe pain.
Methadone – A synthetic narcotic analgesic (pain killer) commonly associated with Heroin detoxification and maintenance programs but it is also prescribed to treat severe pain. It has been increasingly prescribed in place of oxycodone for pain management. Dolophine is one form of methadone.
Hallucinogenic Phenethylamines/Piperazine – Includes such drugs as MDMA (Ecstasy, a hallucinogen), MDA (a psychedelic), MDEA (a psychedelic hallucinogenic) and Piperazine derivatives. Ecstasy has

multiple street names including “E,” “XTC,” “love drug,” and “clarity.” MDMA is often also known by a large variety of embossed logos on the pills such as “Mitsubishis” and “Killer Bees.”

Hallucinogenic Tryptamines – Natural tryptamines are commonly available in preparations of dried or brewed mushrooms, while tryptamine derivatives are sold in capsule, tablet, powder, or liquid forms. Street names include “Foxy-Methoxy”, “alpha-O”, and “5-MEO.”

Morphine – A narcotic analgesic (pain killer) used to treat moderate to severe pain. MS (Morphine Sulfate), Kadian, and MS-Contin are the tablet forms; Roxanol is the liquid form.

Nitrous Oxide (N2O) – Also known as "laughing gas," this is an inhalant (gas) that produces light anesthesia and analgesia. “Whippets” are a common form of nitrous oxide.

Oxycodone – A narcotic analgesic (pain killer). OxyContin is one form of this drug and goes by the street name “OC.” Percocet, Percodan, Roxicet, Tylox, and Roxicodone also contain Oxycodone.

Oxymorphone – A narcotic analgesic (pain killer), that is often prescribed as Opana, Numorphan and Numorphone.

Phencyclidine (PCP) – An illicit dissociative anesthetic/hallucinogen. Common street names for this drug include “angel dust,” “ace,” “DOA” and “wack.”

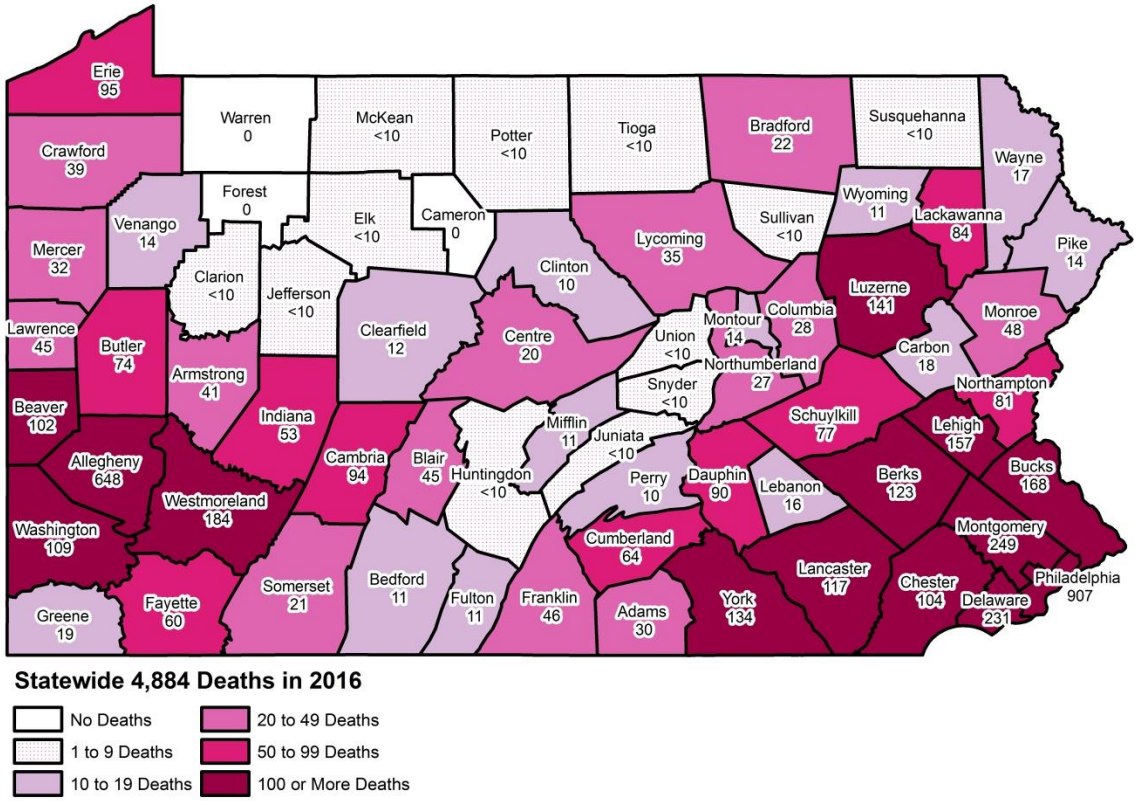
Synthetic Cannabinoids – Synthetic cannabinoids are man-made chemicals that are applied (often sprayed) onto plant material to mimic the effect of delta-9-tetrahydrocannabinol (THC), the psychoactive ingredient in the naturally grown marijuana plant (cannabis sativa). Synthetic cannabinoids, commonly known as “synthetic marijuana”, “Spice” or “K2”, are often sold in retail outlets as “herbal incense” or “potpourri”, and are labeled “not for human consumption.”

Sympathomimetic Amines – A group of stimulants including phentermine (an appetite suppressant) and other sympathomimetic amines not tracked elsewhere in this report.

Tramadol – A synthetic narcotic analgesic sold under the trade name Ultram and Ultracet. Indications include the treatment of moderate to severe pain. It is a chemical analogue to Codeine. Not currently a scheduled drug.

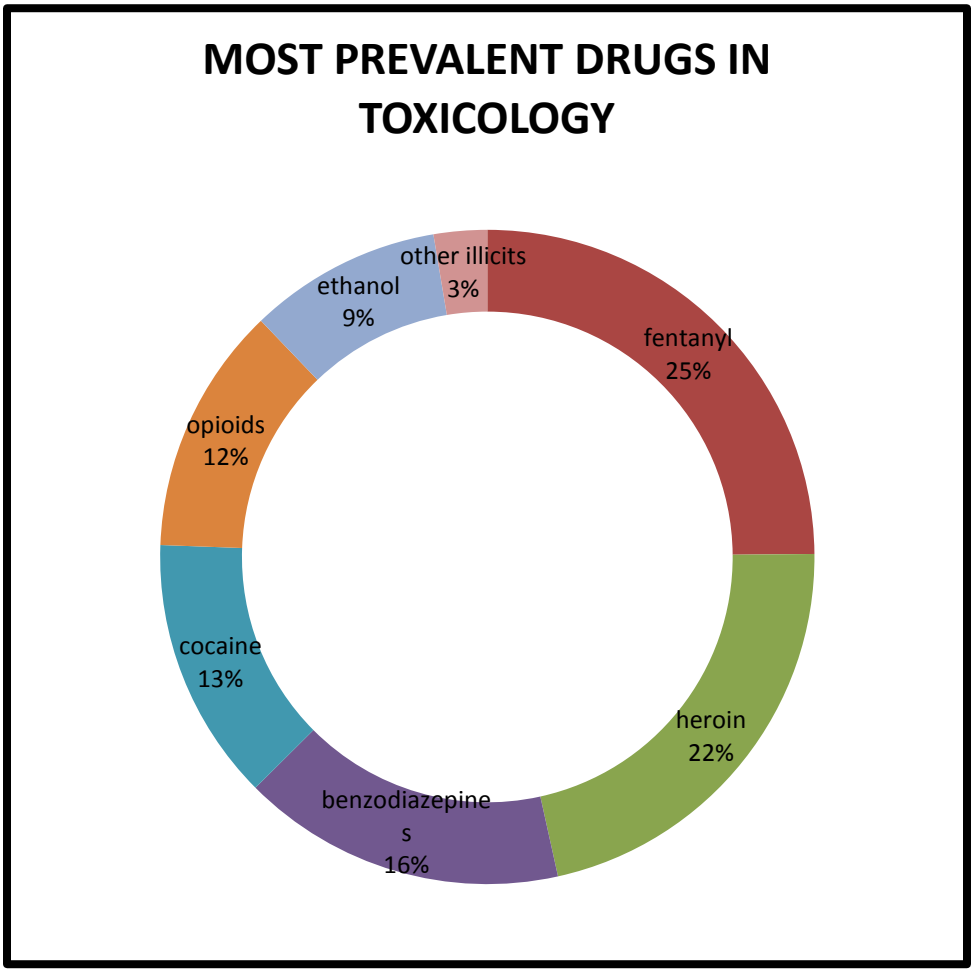
Zolpidem – A prescription medication used for the short-term treatment of insomnia; it is commonly known as Ambien.

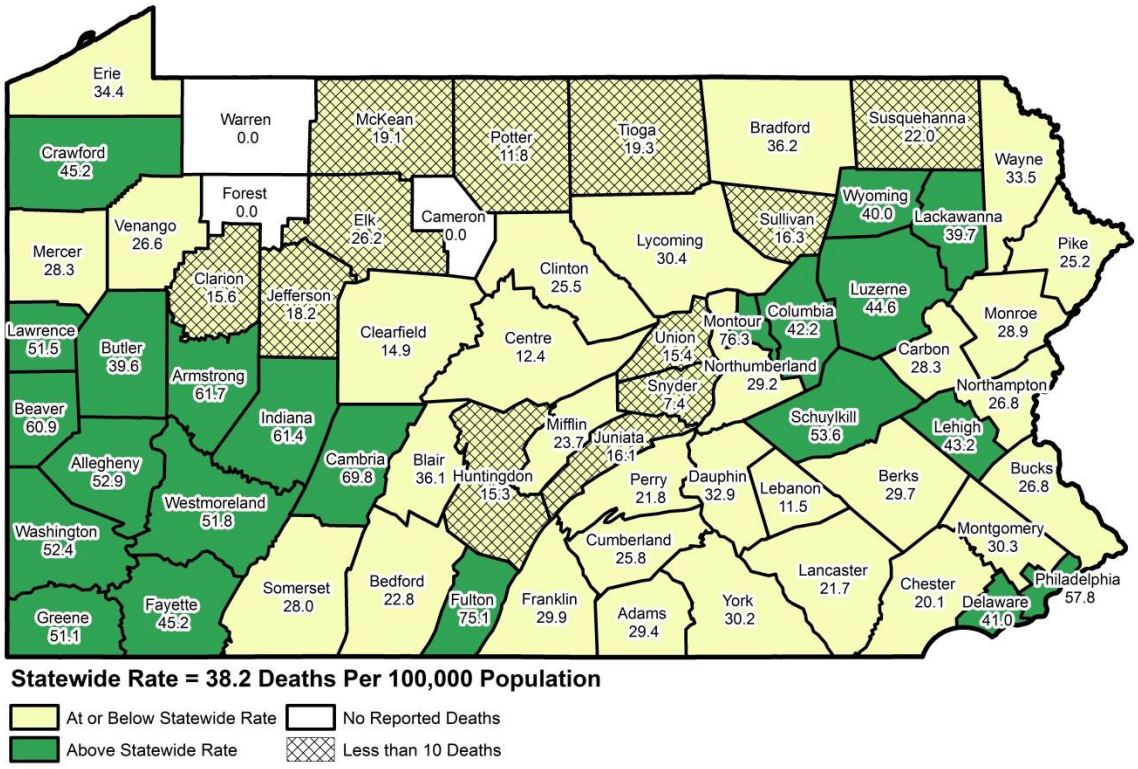
2016 Drug Related Deaths

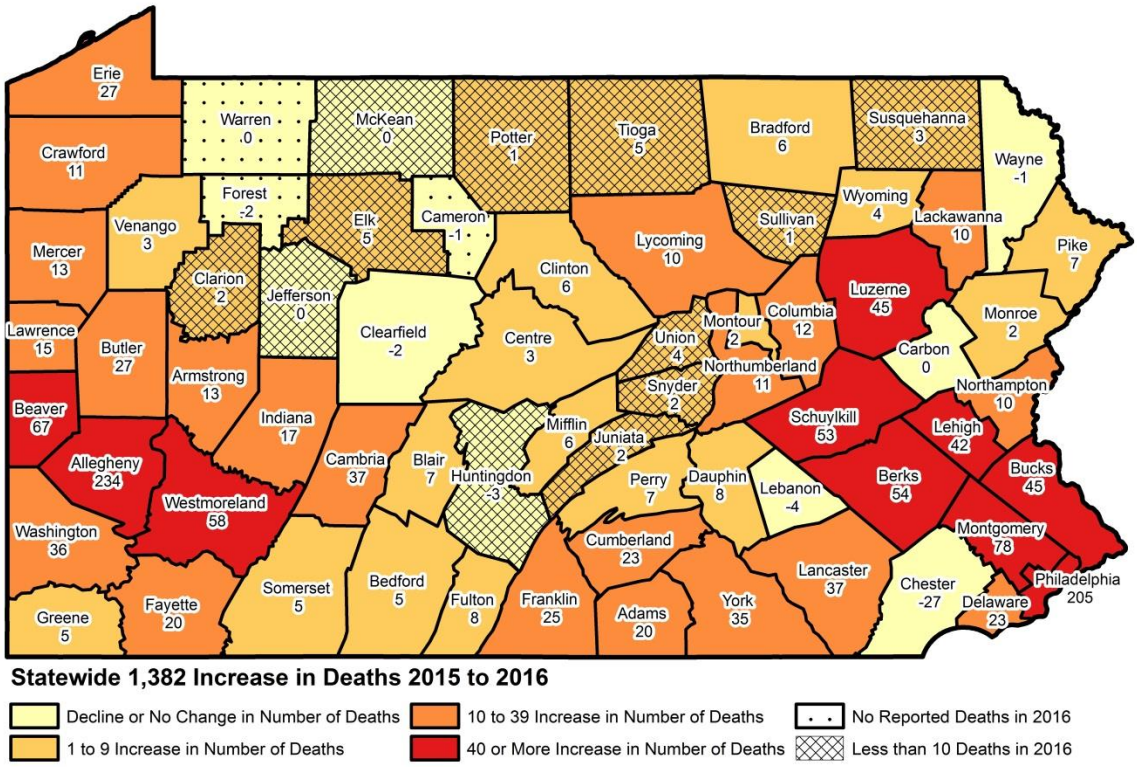


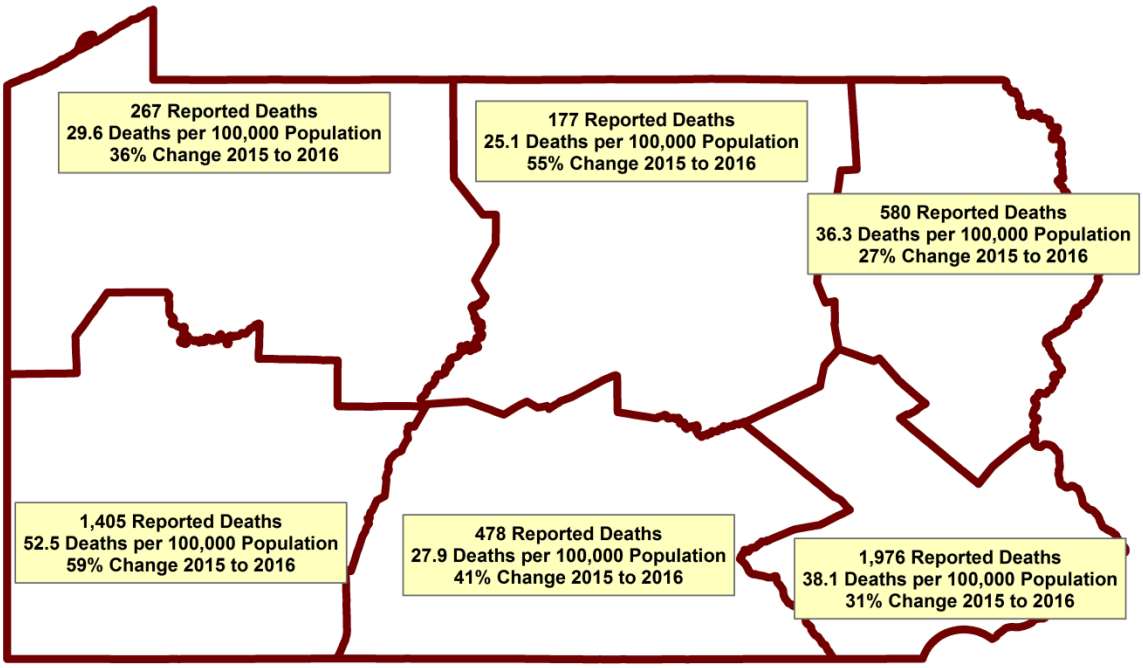
There are included a minor number of suicides through the means of overdosing and undetermined deaths for which the toxicology clearly showed the presence of drugs, but was not finally determinative of the manner of death

.

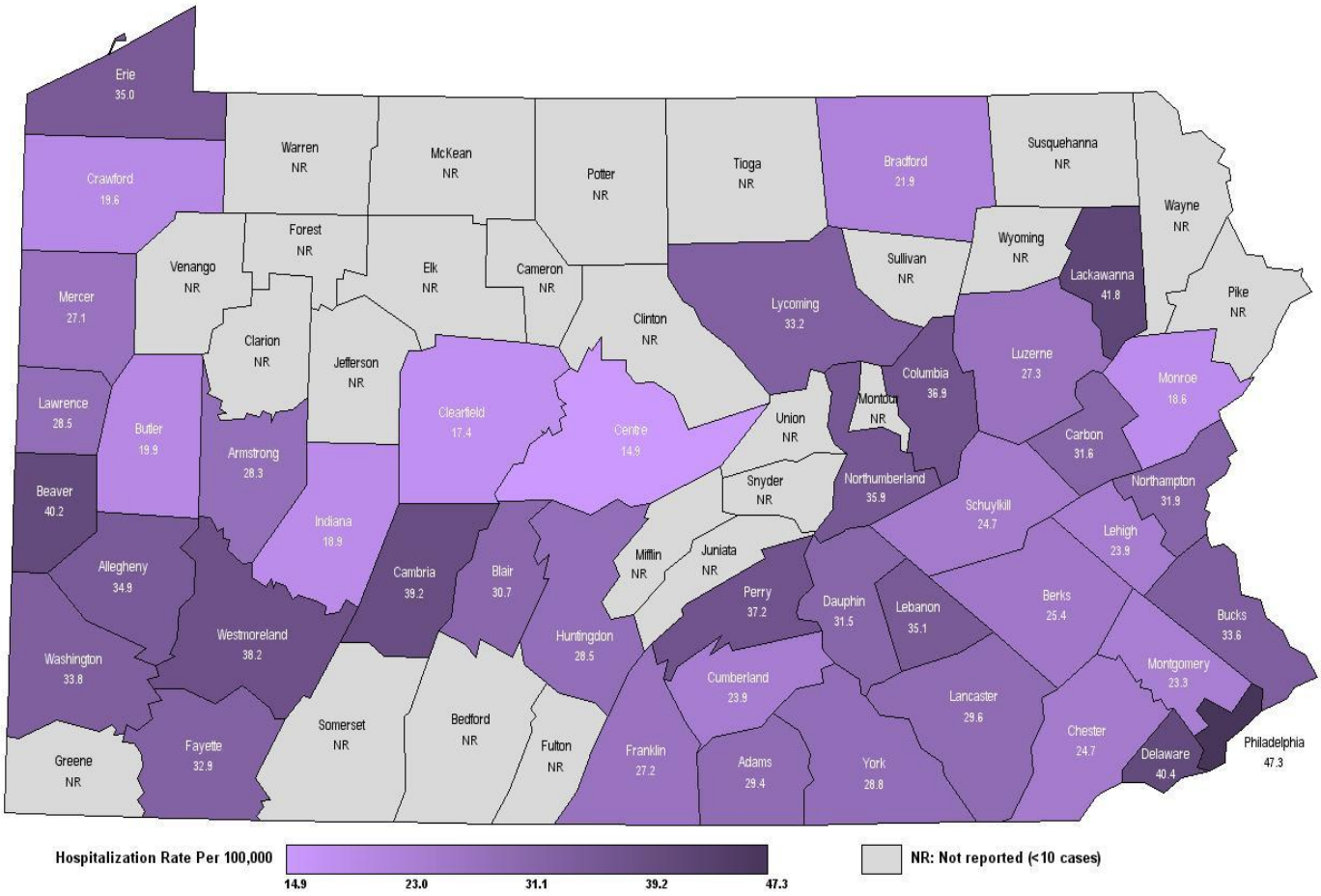

MOST PREVALENT DRUGS IN TOXICOLOGY
other illicits 3%
ethanol 9%
fentanyl 25%
opioids 12%
cocaine 13%
heroin 22%
benzodiazepines 16%


Erie 34.4
Warren 0.0
McKean 19.1
Potter 11.8
Tioga 19.3
Bradford 36.2
Susquehanna 22.0
Wayne 33.5
Crawford 45.2
Forest 0.0
Elk 26.2
Cameron 0.0
Wyoming 40.0
Lackawanna 39.7
Venango 26.6
Sullivan 16.3
Lycoming 30.4
Pike 25.2
Mercer 28.3
Clarion 15.6
Jefferson 18.2
Clinton 25.5
Luzerne 44.6
Lawrence 51.5
Clearfield 14.9
Centre 12.4
Montour 76.3
Columbia 42.2
Monroe 28.9
Butler 39.6
Union 15.4
Carbon 28.3
Armstrong 61.7
Northumberland 29.2
Beaver 60.9
Indiana 61.4
Snyder 7.4
Northampton 26.8
Schuylkill 53.6
Lehigh 43.2
Mifflin 23.7
Juniata 16.1
Allegheny 52.9
Cambria 69.8
Blair 36.1
Huntingdon 15.3
Perry 21.8
Dauphin 32.9
Lebanon 11.5
Berks 29.7
Bucks 26.8
Westmoreland 51.8
Washington 52.4
Cumberland 25.8
Montgomery 30.3
Lancaster 21.7
Chester 20.1
Philadelphia 57.8
Somerset 28.0
Bedford 22.8
Fulton 75.1
Franklin 29.9
Adams 29.4
York 30.2
Delaware 41.0
Greene 51.1
Fayette 45.2
Statewide Rate = 38.2 Deaths Per 100,000 Population
At or Below Statewide Rate
No Reported Deaths
Above Statewide Rate
Less than 10 Deaths


Erie 27
Warren 0
McKean 0
Potter 1
Tioga 5
Bradford 6
Susquehanna 3
Wayne -1
Crawford 11
Forest -2
Elk 5
Cameron -1
Wyoming 4
Lackawanna 10
Pike 7
Venango 3
Sullivan 1
Lycoming 10
Mercer 13
Clarion 2
Jefferson 0
Clinton 6
Luzerne 45
Monroe 2
Lawrence 15
Butler 27
Clearfield -2
Centre 3
Montour 2
Columbia 12
Union 4
Carbon 0
Armstrong 13
Northumberland 11
Snyder 2
Northampton 10
Beaver 67
Indiana 17
Mifflin 6
Juniata 2
Schuylkill 53
Lehigh 42
Allegheny 234
Cambria 37
Blair 7
Huntingdon -3
Perry 7
Dauphin 8
Lebanon -4
Berks 54
Bucks 45
Westmoreland 58
Washington 36
Cumberland 23
Montgomery 78
Lancaster 37
Chester -27
Philadelphia 205
Somerset 5
Bedford 5
Fayette 20
Fulton 8
Franklin 25
Adams 20
York 35
Delaware 23
Greene 5
Statewide 1,382 Increase in Deaths 2015 to 2016
Decline or No Change in Number of Deaths
1 to 9 Increase in Number of Deaths
10 to 39 Increase in Number of Deaths
40 or More Increase in Number of Deaths
No Reported Deaths in 2016
Less than 10 Deaths in 2016



NUMBER OF DEATHS PER 100,000 BY REGION



Source: Pennsylvania Health Care Cost Containment County (PHC4)

Number of Hospiltalizations for Opioid Overdoses per 100,000 Residents, 2016

Population-based Rates. Overall, there were 31.1 hospital admissions statewide for opioid overdose per 100,000 Pennsylvania residents (combining hospital admission rates for both heroin and pain medication overdose as shown in the map above). Higher rates for some counties might be dependent on larger numbers of residents with high risk characteristics (e.g., factors related to income, race/ethnicity and gender). County rates were not adjusted for these population differences so that important effects of these patient characteristics were not masked by such adjustment.

Heroin Overdose. Statewide, there were 14.4 admissions for heroin overdose per 100,000 residents. Lower income residents had a higher rate at 21.8. The rates for white (non-Hispanic), Hispanic, and black (non- Hispanic) residents were 14.6, 13.3 and 12.2, respectively. The rate was 20.8 for males and 8.3 for females.

Pain Medication Overdose. Statewide, there were 16.8 admissions for overdose of pain medication per 100,000 residents. Lower income residents had a higher rate at 22.8. The rates for black (non-Hispanic), white (non-Hispanic), and Hispanic residents were 19.8, 17.4 and 7.5, respectively. The rate was 15.5 for males and 17.9 for females.

Hospitalizations for Opioid Overdose by County, 2016

	Hospitalization Rate per 100,000 Residents*	**Total Number of Hospitalizations**	**Number of Hospitalizations for Heroin**	**Number of Hospitalizations for Pain Medicine**
Statewide	31.1	3,299	1,524	1,775
Adams	29.4	25	NR	NR
Allegheny	34.9	362	179	183
Armstrong	28.3	16	NR	NR
Beaver	40.2	57	36	21
Bedford	NR	NR	NR	NR
Berks	25.4	86	53	33
Blair	30.7	32	NR	NR
Bradford	21.9	11	NR	NR
Bucks	33.6	175	94	81
Butler	19.9	31	18	13
Cambria	39.2	45	17	28
Cameron	NR	NR	NR	NR
Carbon	31.6	17	NR	NR
Centre	14.9	21	NR	NR
Chester	24.7	103	48	55
Clarion	NR	NR	NR	NR
Clearfield	17.4	12	NR	NR
Clinton	NR	NR	NR	NR
Columbia	36.9	21	NR	NR
Crawford	19.6	14	NR	NR
Cumberland	23.9	49	19	30
Dauphin	31.5	70	36	34
Delaware	40.4	186	98	88
Elk	NR	NR	NR	NR
Erie	35.0	80	34	46
Fayette	32.9	37	14	23
Forest	NR	NR	NR	NR
Franklin	27.2	34	17	17
Fulton	NR	NR	NR	NR
Greene	NR	NR	NR	NR
Huntingdon	28.5	11	NR	NR
Indiana	18.9	14	NR	NR
Jefferson	NR	NR	NR	NR
Juniata	NR	NR	NR	NR
Lackawanna	41.8	74	13	61
Lancaster	29.6	127	61	66
Lawrence	28.5	21	10	11
Lebanon	35.1	39	19	20
Lehigh	23.9	70	34	36
Luzerne	27.3	73	32	41
Lycoming	33.2	32	10	22
McKean	NR	NR	NR	NR
Mercer	27.1	26	11	15
Mifflin	NR	NR	NR	NR
Monroe	18.6	26	11	15
Montgomery	23.3	157	81	76
Montour	NR	NR	NR	NR
Northampton	31.9	80	37	43
Northumberland	35.9	28	NR	NR

Perry	37.2	14	NR	NR
Philadelphia	47.3	603	297	306
Pike	NR	NR	NR	NR
Potter	NR	NR	NR	NR
Schuylkill	24.7	30	11	19
Snyder	NR	NR	NR	NR
Somerset	NR	NR	NR	NR
Sullivan	NR	NR	NR	NR
Susquehanna	NR	NR	NR	NR
Tioga	NR	NR	NR	NR
Union	NR	NR	NR	NR
Venango	NR	NR	NR	NR
Warren	NR	NR	NR	NR
Washington	33.8	59	35	24
Wayne	NR	NR	NR	NR
Westmoreland	38.2	116	46	70
Wyoming	NR	NR	NR	NR
York	28.8	104	56	48
Juniata	NR	NR	NR	NR
Lackawanna	41.8	74	13	61
Lancaster	29.6	127	61	66
Lawrence	28.5	21	10	11
Lebanon	35.1	39	19	20
Lehigh	23.9	70	34	36
Luzerne	27.3	73	32	41
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Wayne	NR	NR	NR	NR
Westmoreland	38.2	116	46	70
Wyoming	NR	NR	NR	NR
York	28.8	104	56	48

** Hospitalization rate per 100,000 residents is based on the total number of hospitalizations for heroin and pain medicine combined.*
NR: Not Reported. Fewer than 10 hospitalizations for heroin and pain medication individually or combined.

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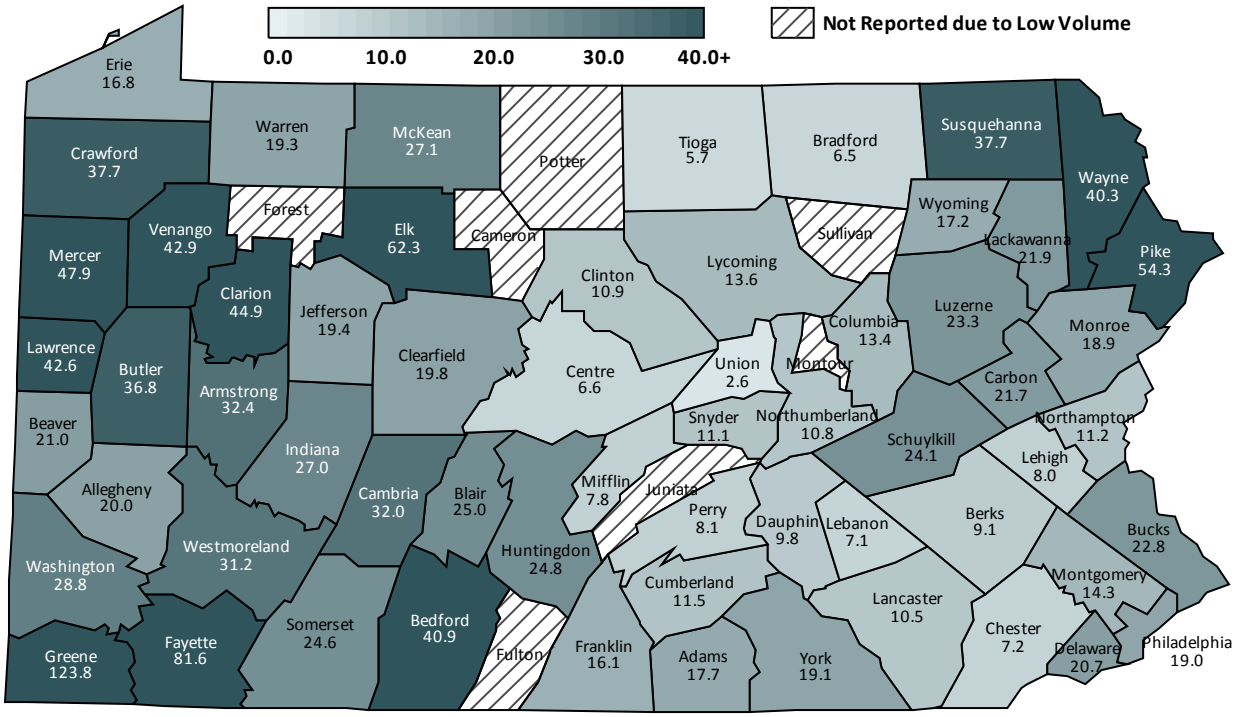
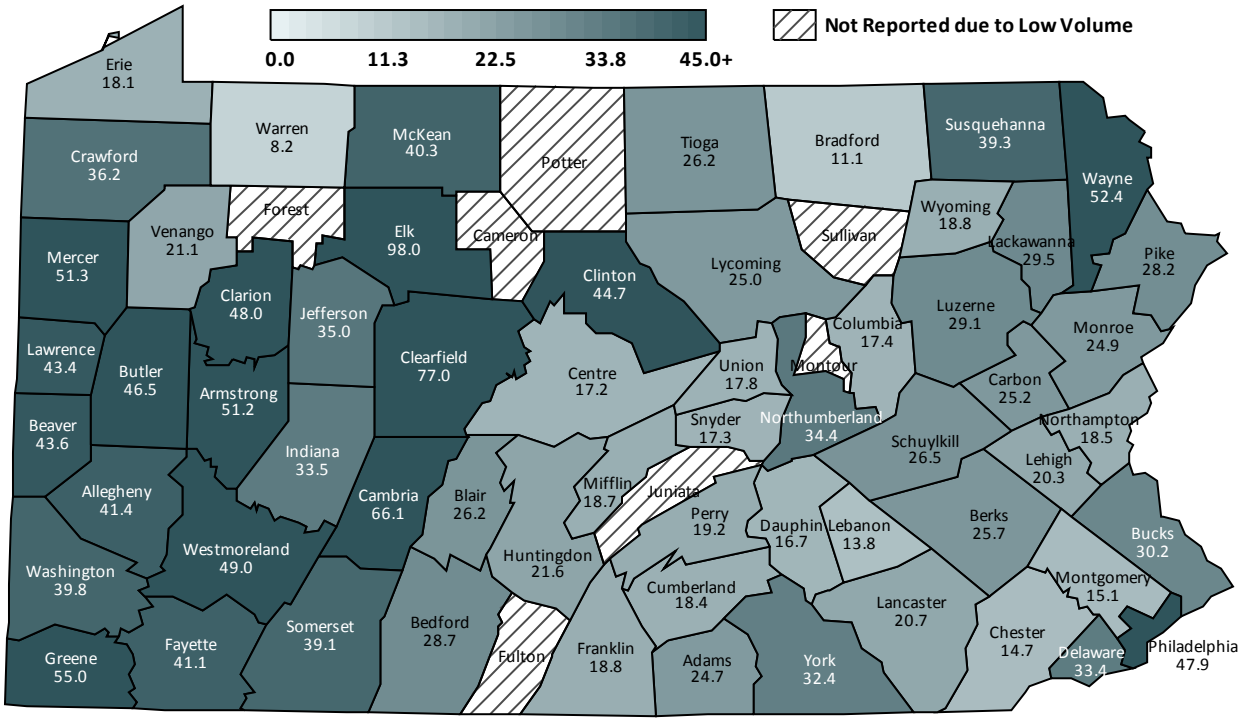
Substance-related Rate per 1,000 Neonatal Stays in FFY 2015



Source: Pennsylvania Health Care Cost Containment County (PHC4)

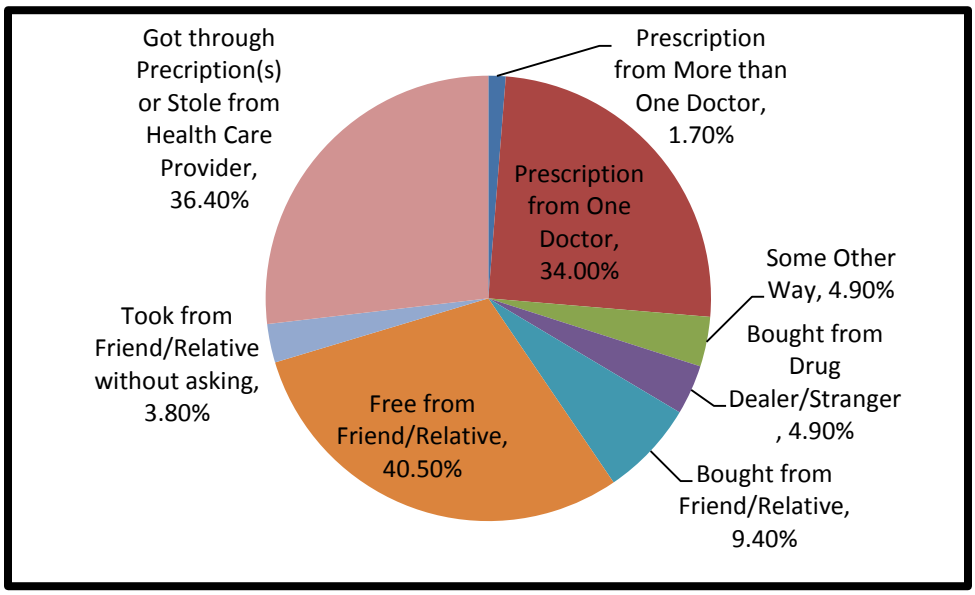
According to the PHC4 Research Brief "Neonatal and Maternal Hospitalizations Related to Substance Use" the rate of neonatal hospital stays related to substance use increased by 250%, from 5.6 to 19.5 per 1,000 neonatal stays. Neonatal drug withdrawal, or neonatal abstinence syndrome (NAS), was present in about 82.0% of the FFY 2015 neonatal drug-related stays. Between FFY 2000 and FFY 2015, the rate of NAS increased from 1.6 to 16.0 per 1,000 neonatal stays – an increase of 870%. These neonatal stays added to overall cost of care by an estimated $20.3 million for FFY 2015.

Substance-related Rate per 1,000 Maternal Stays in FFY 2015



Source: Pennsylvania Health Care Cost Containment County (PHC4)

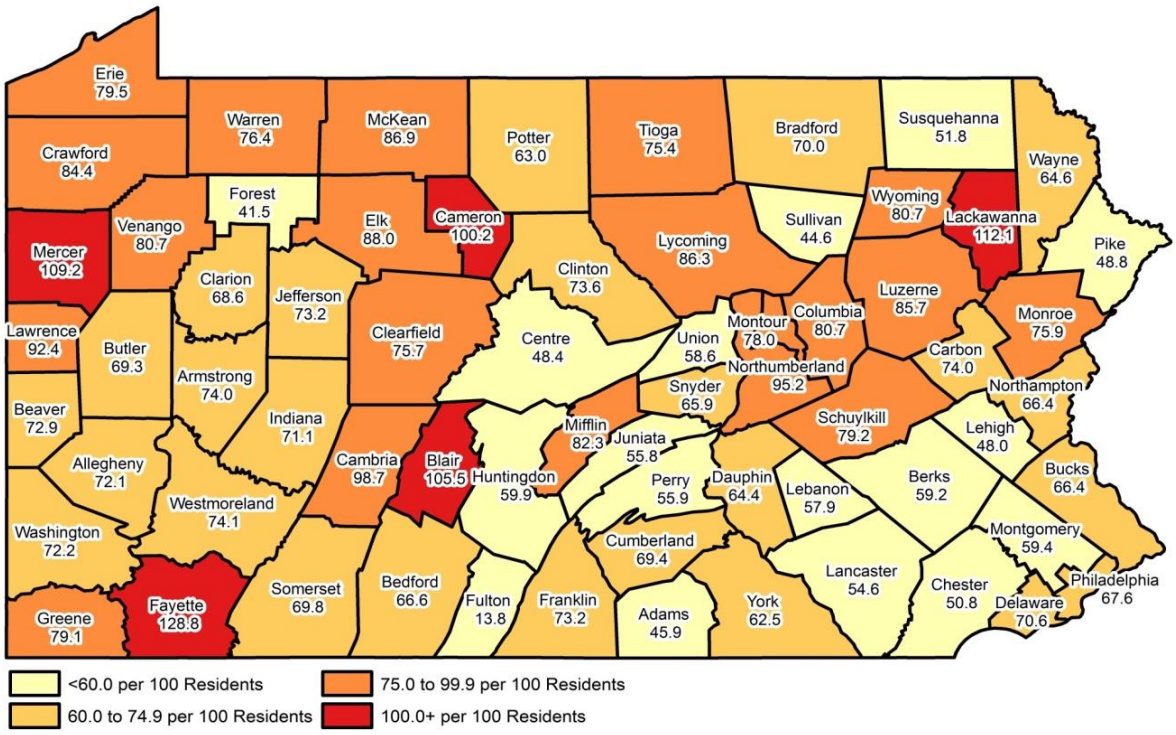
According to the PHC4 Research Brief "Neonatal and Maternal Hospitalizations Related to Substance Use" between FFY 2000 and FFY 2015 the rate of maternal hospital stays related to substance use by 119%, from 14.8 to 32.4 per 1,000 maternal stays. Of the maternal stays involving opioid drugs, e.g. heroin, between FFY 2000 and FFY 2015, these stays increased from 2.8 to 16.8 per 1,000 – an increase of 510%. Additional cost of care is estimated at $1.8 million.



Source Where Pain Relievers Were Obtained for Most Recent Misuse among People Aged 12 or Older Who Misused Prescription Pain Relievers in the Past Year: Percentages 2015

SAMHSA NSDUH Data Review September 2016

2016 Opioid Prescribing per 100 persons for Pennsylvania Counties



- Source: Centers for Disease Control and Prevention, National Center for Injury Prevention and Control, Division of Unintentional Injury Prevention
- Page last updated: July 31, 2017

More needs to be done. Drug deaths represent approximately 10 percent of the drug abuse issue. Until hospitals, EMS, poison control centers, 911 call centers, law enforcement and all who prescribe and administer Narcan report on drug overdoses where the person survives, and on the judicial results of those who sell drugs, we are doing nothing more than establishing a drug policy which deals with drug use **“one grave at a time.”**

Therefore this year, besides providing overall statistics on drug deaths by county, this report with permission is including data on number of prescritions written by county, number of emergency department visits for overdoses, and the number of cases involving babies born with NAS.

Make no mistake, the epidemic of drug overdoses that is killing is at a faster rate than the HIV epidemic at its peak. Until we start thinking of this as a mass disaster in society, we will continue to lose the war on drugs. We must disrupt or dismantle not only the supply of illegal drugs, but we must disrupt the supporting financial infrastructure of supplying illegal drugs.

“The world is a dangerous place to live; not because of the people who are evil, but because of the people who don't do anything about it.” Albert Einstein