Maternal Mortality and Morbidity Review in Massachusetts
A Bulletin for Health Care Professionals

Substance Use among Pregnancy-Associated Deaths — Massachusetts, 2005–2014

Massachusetts Department of Public Health **SPRING 2018**

Dear Healthcare Provider or Public Health Professional,

The Massachusetts Maternal Mortality & Morbidity Review Committee has observed an increase in the number of women who have died during or within a year of the end of pregnancy because of substance use. This bulletin presents data collected by the committee in an effort to call attention to this disturbing trend and facilitate conversation about what can be done to prevent these deaths.

Please direct correspondence to Hafsatou.Diop@State.MA.US

Hafsatou Diop, MD, MPH
Director, Office of Data Translation,
State Maternal and Child Health Epidemiologist

Purpose:

The purpose of this bulletin is to present Massachusetts-specific data related to substance use among women who died while pregnant or within a year of the end of pregnancy during 2005–2014, and to highlight the effect of the national opioid epidemic on women in our state.

Background:

The Massachusetts Maternal Mortality and Morbidity Review Committee (MMMRC) reviews the deaths of all women who die while pregnant or within one year of the end of pregnancy, irrespective of cause. The committee was appointed in 1997 by the Commissioner of the Massachusetts Department of Public Health (MDPH) to review maternal deaths, study the incidence of pregnancy complications, and make recommendations to improve maternal outcomes and prevent mortality. The work of the committee is protected under M.G.L. c. 111, section 24A and 24B, which assures the confidentiality of all records and proceedings. The committee consists of a wide variety of health professions, including maternal fetal medicine, obstetrics, nurse midwifery, anesthesiology, pathology, and substance use counseling, among others.

Massachusetts and much of the nation is in the midst of an opioid use and overdose epidemic. The total number of opioid overdose deaths in the Commonwealth has increased five-fold in the last 20 years, with a particularly sharp rate of increase between 2013 and 2014.[1] A recent MDPH report found that more than a third (38.3%) of deaths among women delivering a live birth between 2011 and 2015 were fatal opioid-related overdoses.[1] In 2016 the MMMRC became alarmed at an increase in the number of reviewed deaths that were directly or indirectly associated with substance use. This bulletin is an attempt to alert health care providers to trends in pregnancy-associated deaths involving substances, and to make recommendations to reverse them.

Maternal Death Definitions Used in this Bulletin:

Pregnancy-associated death: The death of a woman while pregnant or within one year of the end of pregnancy for any reason, irrespective of cause.

[1] Massachusetts Department of Public Health. Legislative Report: Chapter 55 – An Assessment of Fatal and Non-fatal Overdoses in Massachusetts (2011-2015). Available at: https://www.mass.gov/files/documents/2017/08/31/legislativereport-chapter-55-aug-2017.pdf. Accessed October 18, 2017.

Substance use-related death: A pregnancy-associated death in which acute or chronic substance use contributed directly to the death as indicated on the death certificate. This definition is not limited to opioid use or overdose deaths.

Methods:
Pregnancy-associated deaths occurring in Massachusetts during 2005–2014 were identified through linkage of birth certificates and fetal death records to death certificates of reproductive-age women, automated and manual review of death certificates, and mandatory facility reporting to the MDPH Division of Health Care Safety and Quality.

Deaths confirmed to have occurred during pregnancy or within a year of the end of pregnancy are entered into the maternal mortality database, which is housed at MDPH. The database contains information on pregnancy-associated deaths from patient records, including prenatal, delivery, medical examiner, and death certificate records, as well as the case-specific recommendations from the MMMRC's review. For this analysis, cause of death and associated conditions listed on the death certificate were abstracted from the database for all identified pregnancy-associated deaths during 2005–2014. After review of all death certificate information by a medical doctor, a case definition of substance use-related maternal mortality was created (Table 1). This definition included both specific (cocaine, heroin, fentanyl, etc.) and general (opiate, substance abuse, drug overdose) drug references. An indication of substance use in any field of the death certificate was considered to meet the case definition for this study (i.e. not limited to overdose deaths). An additional definition of opioids was also included for further investigation (Table 1).

Table 1. Case definition text elements for substance use-related deaths and opioid substance categorization from death certificate text fields.

Substance use-related death	Any mention of: Cocaine, opiate(s)/opioid(s), chronic/acute/poly substance abuse, benzodiazepine(s), heroin, hydrocodone, methadone, propoxyphene, fentanyl, drug overdose, morphine, oxycodone, methylphenidate, ritalinic acid, alprazolam, fluoxetine, ingestion of pills, ingestion of excessive amount of drug, codeine, alcohol
Opioids	Any mention of: heroin, fentanyl, morphine, codeine, hydrocodone, methadone, propoxyphene, oxycodone, opioids, opiates

Substance use-related deaths were described by frequency and percent. Analysis of trends over the study period were assessed by using Cochran Armitage tests; significance was assessed at $p<0.05$. Substance use-related deaths were further examined by type of substance, drug category, and timing of death relative to pregnancy.

Results:
Increasing trend of substance use-related deaths
There were 199 pregnancy-associated deaths identified in Massachusetts from 2005–2014. Approximately one in five pregnancy-associated deaths (20.6%; n=41) was related to substance use. An increasing trend in the proportion of substance use-related deaths was observed over the study period, from 8.7% in 2005 to 41.4% in 2014 (p-value for trend=0.008) (Figure 1). This trend is consistent with the increase in opioid overdose deaths in Massachusetts overall during the same time period.[2]

Types of substances identified among pregnancy-associated deaths
Opioids (heroin, fentanyl, morphine, codeine, hydrocodone, methadone, propoxyphene, oxycodone, opiates) were identified in the majority of substance use-related deaths (65.9%) and 13.6% of pregnancy-associated deaths over the

[2] Massachusetts Department of Public Health. Legislative Report: Chapter 55 – An Assessment of Fatal and Non-fatal Overdoses in Massachusetts (2011-2015). Available at: https://www.mass.gov/files/documents/2017/08/31/legislativereport-chapter-55-aug-2017.pdf. Accessed October 18, 2017.

study period (Table 2). Examining specific opioids, heroin and morphine were present in 19.5% of substance use-related deaths (n=8) and fentanyl in 17.1% (n=7) (Table 3). Among substance use-related deaths, two or more specific drug types were indicated in 22.0% (n=9).

Timing of substance use-related deaths

A majority (90.2%) of the substance use-related deaths occurred in the postpartum period, between 42–<365 days postpartum (Figure 2).

Table 2. Frequency and proportions of drug categories among substance use-related and pregnancy-associated deaths — Massachusetts 2005–2014

Drug Category	Frequency[1]	% of Substance use-Related Deaths (N=41)	% of Pregnancy-Associated Deaths (N=199)
Opioids	27	65.9%	13.6%
Cocaine	7	17.1%	3.5%
Methamphetamine (methylphenidate, ritalinic acid)	1	2.4%	0.5%
Benzodiazepines (benzodiazepine, alprazolam, clonazepam)	5	12.2%	2.5%
Alcohol (ethanol)	2	4.9%	1.0%
General/Unspecified (chronic substance abuse, polysubstance abuse, drug overdose)	10	24.4%	5.0%

[1] Multiple specific drug categories could be recorded; if no specific drugs were mentioned, variable was categorized as general/unspecified

Table 3. Frequency of specific opioid categories among substance use-related deaths — Massachusetts, 2005–2014

Drug Category	Frequency[1]	% of Substance use-Related Deaths[1] (N=41)
Heroin and morphine[2]	8	19.5%
Fentanyl	7	17.1%
Prescription (codeine, hydrocodone, propoxyphene, oxycodone)	6	14.6%
Methadone	6	14.6%
General/unspecified (opioids, opiates)	6	14.6%

[1] Multiple opioid categories could be recorded; if no specific opiate was mentioned, variable was categorized as general/unspecified. There were 27 records with opiate-indicated deaths; 2 deaths indicated 2 opiates; 2 deaths indicated 3 opiates.

[2] There is no toxicology test specifically for heroin. Heroin metabolizes into 6-monoacetylmorphine (6-MAM), which in turn is rapidly metabolized to morphine. Recent evidence from Massachusetts indicates that a majority of morphine-positive toxicology test results are due to heroin metabolism. http://www.mass.gov/eohhs/gov/departments/dph/stop-addiction/chapter-55-overdose-assessment.html

Figure 1. Proportion of pregnancy associated deaths related to substance use by year of death — Massachusetts 2005–2014.

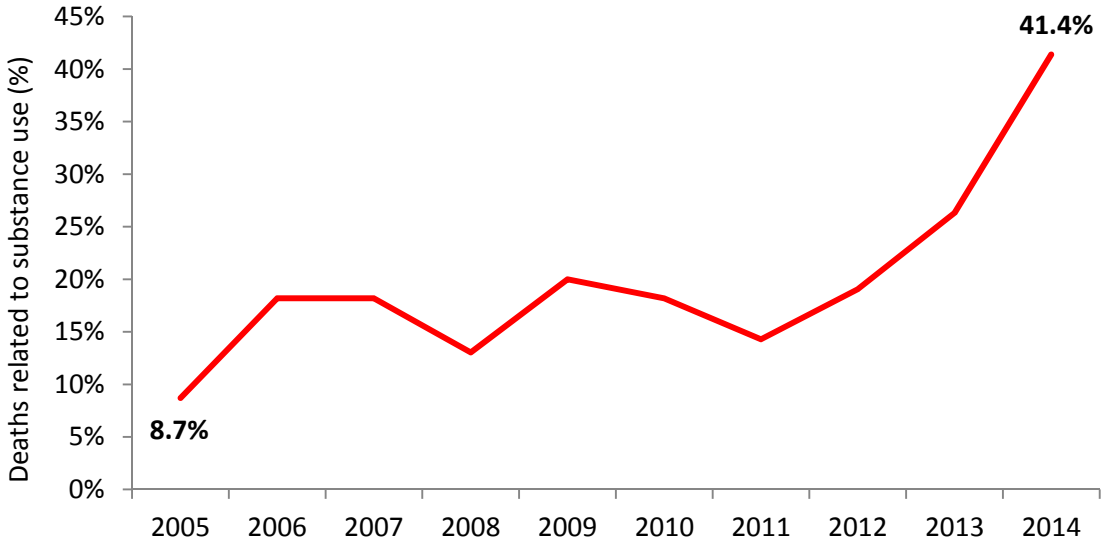
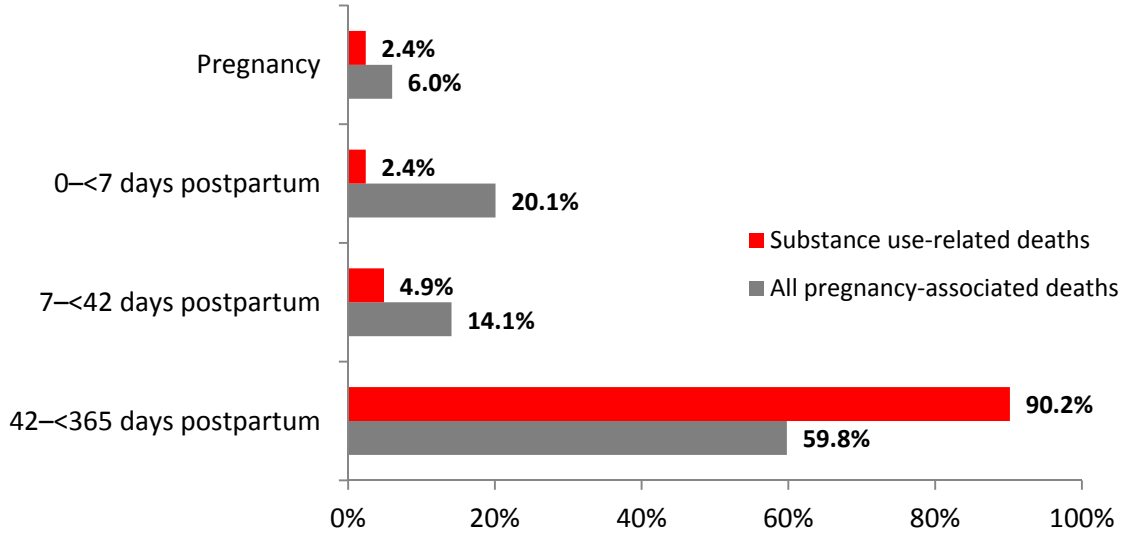


Figure 2: Timing of substance use-related vs. all pregnancy-associated deaths —Massachusetts, 2005–2014.



Addressing substance use before, during, and after pregnancy:

A coordinated response is required to reverse the increasing trend of substance use-related deaths during or within one year of the end of pregnancy. MDPH recommends screening all pregnant women through interviews using a standard tool at the beginning of pregnancy, as well as at 28 weeks and at the time the woman presents for delivery. Women identified through screening should be connected with treatment that is appropriate to their needs. The Massachusetts Perinatal Quality Collaborative (MPQC) has published an online toolkit to support maternal health clinicians in using best practices to prevent, identify, and treat substance use disorder among pregnant women. See the perinatal substance use resources table below for links to the toolkit and other resources.

Numerous projects are ongoing across Massachusetts to address substance use in pregnancy. For example, the Boston Medical Center (RESPECT clinic) and the University of Massachusetts Medical Center in Worcester provide prenatal care services designed specifically to care for women with substance use disorder (SUD). The Institute for Health and Recovery has initiated various interventions at six sites to improve medically assisted treatment by providing care coordination and peer support through the "Moms do Care" project. While primarily focused on postpartum depression, The MA Child Psychiatry Access Project (MCPAP) for Moms is currently extending its capacity (including materials and training) to support patients with SUD. In addition to these programs, many communities have hospital-based collaboratives to address substance use, such as those at Baystate Medical Center and Melrose-Wakefield Hospital.

In addition to providing appropriate treatment during pregnancy, new mothers need to be supported in the postpartum period to encourage treatment adherence and long term recovery. The postpartum period can be an extremely stressful time for all mothers and for mothers with substance use disorders in particular; the majority of pregnancy-associated deaths involving substance use occurred between 6 weeks and 1 year after delivery. Coordination between SUD treatment and obstetric providers following delivery is crucial, as well as warm handoffs to on-going treatment and supportive services, such as Early Intervention, Home Visiting, substance use and mental health treatment providers, and Parenting Classes. Future research to better understand the factors that affect treatment engagement and overdose during the postpartum period would also be extremely beneficial.

Implications for the MMMRC:
The rise in substance use among pregnancy-associated deaths presents a challenge to the MMMRC that has necessitated review of the scope and methods used in the case review process. Prenatal care records are an invaluable source of information for conditions such as opioid use disorder. Current Massachusetts law limits the MMMRC in obtaining complete sets of prenatal care records for women whose care was at a facility other than the one in which they delivered.

Finally, MDPH is in the process of updating its maternal mortality data system to the Maternal Mortality Review Information Application (MMRIA), a standardized data system developed by the Centers for Disease Control with input from state maternal mortality review committees. The new system will standardize MMMRC case data collection to strengthen epidemiologic analysis and public health recommendations born out of the review process.

Conclusions:
Almost half of all deaths of women during or within a year of the end of pregnancy in 2014 were related to substance use, a much larger proportion than the preceding nine years. The majority of substance use-related deaths reviewed by the Massachusetts Maternal Mortality & Morbidity Review Committee involved opioids. The vast majority of these deaths occurred after the six week postpartum period. A coordinated response is needed to address perinatal substance use that supports improved uptake of patients into treatment during pregnancy and an effective transition for mothers from pregnancy care to long term substance use treatment.

Perinatal Substance Use Resources:

MPQC Opioid and Pregnancy Toolkit	http://www.healthrecovery.org/maternal-opioid-use/
MA Perinatal-Neonatal Quality Improvement Network – substance use projects	http://www.mapnqin.org/substance-use-projects/

DPH Community Standard for Maternal and Newborn Screening for Alcohol/Substance Use	http://www.mass.gov/eohhs/docs/dph/quality/hcq-circular-letters/2013/dhcq-1305586-sen-guidelines.pdf
MA Substance Use Helpline Call Center and Website	http://helpline-online.com/ Helpline: (800) 327-5050
BSAS – Substance Use and Addictions Training & Workforce Development	http://www.mass.gov/eohhs/gov/departments/dph/programs/substance-abuse/providers/substance-abuse-training.html
MCPAP for Moms	https://www.mcpapformoms.org/ Contact number for providers: (855) 666-6272
Massachusetts Health Promotion Clearinghouse – materials related to treatment of pregnant women	https://massclearinghouse.ehs.state.ma.us/category/BSASPREG.html
Massachusetts Responds to the Opioid Epidemic – Current Statistics and Reports	https://www.mass.gov/opioidresponse
ACOG Committee Opinion – Opioid Abuse, Dependence, and Addiction in Pregnancy	https://www.acog.org/Resources-And-Publications/Committee-Opinions/Committee-on-Health-Care-for-Underserved-Women/Opioid-Abuse-Dependence-and-Addiction-in-Pregnancy
SAMHSA – A Collaborative Approach to the Treatment of Pregnant Women with Opioid Use Disorders	https://ncsacw.samhsa.gov/files/Collaborative_Approach_508.pdf