Drug related and suicide deaths: pregnancy related criteria

Montana MMRC

Marcela Smid
Maternal Fetal Medicine
Addiction Medicine
DISCLOSURE

• Medical advisory committee for Gilead Science Inc. for hepatitis C treatment for pregnant and postpartum women

• Funded by the NIH K12 Women’s Reproductive Health Research grant 2018-2020
OBJECTIVES

• Celebrate Montana’s FIRST MMRC MEETING

• Proposed pregnancy-related versus pregnancy-associated drug-related deaths and suicides
CONGRATULATIONS

OMG, CONGRATULATIONS
CONGRATULATIONS
PREGNANCY AND OPIOID USE DISORDER

- Rates of pregnancy complicated by opioid use disorder **quadrupled** 1999-2014 (Haight et al 2018)

**FIGURE 1. National prevalence of opioid use disorder per 1,000 delivery hospitalizations**

**Opioid Use Disorder Documented at Delivery Hospitalization — United States, 1999–2014**

Sarah C. Haight, MPH¹,²; Jean Y. Ko, PhD¹,³; Van T. Tong, MPH¹; Michele K. Bohm, MPH⁴; William M. Callaghan, MD¹
PREGNANCY AND METHAMPHETAMINE


• 0.2% of deliveries between 2004-2015 were affected by amphetamine use
• Rural counties
  – 1% deliveries in rural West complicated by amphetamines use
  – 5.2% in highest use areas

Note. The sample size was n = 47,164,263. All data are survey-weighted and represented as rate per 1000 delivery hospitalizations. Whiskers indicate 95% confidence intervals.
OPIOID AND METHAMPHETAMINE RELATED OVERDOSE EPIDEMIC

Overdose Death Rates Involving Opioids, by Type, United States, 1999-2019

Rise in Meth-Related Deaths

Nationwide, methamphetamine-related overdose deaths are skyrocketing. Although opioid-involved overdoses kill far more people, meth-related deaths are increasing much faster than opioids did at the start of the opioid epidemic.

Note: Overdose deaths do not include cocaine-related deaths but do include a fraction of deaths involving other psychostimulants (such as MDMA, dextroamphetamine, levodopa, ritalin and caffeine).

Sources: National Vital Statistics System, Mortality File, CDC WONDER
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Drug overdose deaths by region

Methamphetamine was the top drug involved in overdose deaths in most of the western half of the U.S. while fentanyl pervaded the eastern half.
OPIOID AND METHAMPHETAMINE RELATED OVERDOSE EPIDEMIC

https://rockinst.org/blog/the-second-wave-of-the-methamphetamine-epidemic/
METHAMPHETAMINE RELATED OVERDOSE

• 2015 → 2019 methamphetamine related deaths increased 180%
  – 5526 → 15489 deaths (p value test of trend)
• Methamphetamine use disorder
  – tripled among heterosexual women (0.24% → 0.74%, p<0.01)
  – 10x’s among Black individuals (0.06% → 0.64%, p = 0..07)
METHAMPHETAMINE RELATED OVERDOSE

• Highest rates among Native Americans

• Accelerating rates for Native American women from 2015-2018

• Steady increase for Native American men 2011-2018
OPIOID AND METHAMPHETAMINE RELATED OVERDOSE EPIDEMIC

• Fentanyl contamination
  – 67% increase in methamphetamine tested positive for fentanyl
  – Cocaine deaths almost entirely fentanyl related; methamphetamine overdoses with no opioid involved also increasing

• Combination of opioid use disorder and methamphetamine use disorder
  – Idea that methamphetamine prevents overdose
  – Substitute methamphetamine when opioids harder to obtain
  – Synergistic high
  – ”Help me function”

• Combination enhances toxicity and lethality by exacerbating cardiovascular and pulmonary effects

Joseph Friedman, MPH, and Samir Akre, BS

FIGURE 1— Monthly Overdose Deaths From January 2014 to July 2020: United States

Note: Overdose deaths in the United States are shown by month, from January 2014 to July 2020. For values in 2020, 95% prediction intervals are shown, recovered using the algorithm described in this analysis. This figure reveals that May 2020 was the deadliest month for overdose death in the United States in recent history, elevated above May 2019 by about 60%.
SUICIDE EPIDEMIC

AGE-ADJUSTED U.S. SUICIDE RATE
1907-2017
PER 100,000 PEOPLE

Source: U.S. Centers for Disease Control and Prevention. Created with Datawrapper.
## Suicide Facts & Figures: United States 2021

**Research suggests suicide is a leading cause of maternal death in the 1st year following childbirth.**

1. 

**Maternal suicide deaths are more common than maternal deaths caused by postpartum hemorrhage or hypertensive disorders.**

2. 

**Suicide accounts for up to 20% of postpartum deaths.**

3/4

**Maternal suicide is most frequently completed between 6 to 12 months postpartum.**

5.

**The severity and rapidly evolving nature of postpartum psychosis increases the risk of maternal suicide.**

6.

**Depression during pregnancy greatly increases thoughts about suicide while pregnant.**

4.

Learn more and find citation information at: 2020mom.org/maternal-suicide

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**2020moms 2020Mom.org**

https://www.2020mom.org/maternal-suicide
SUICIDE EPIDEMIC


Leading causes of pregnancy-related death among deaths determined to be preventable in 14 US states, 2008–17

- Cardiomyopathy
- Embolism
- Preeclampsia and eclampsia
- Infection
- Cardiovascular and coronary conditions
- Hemorrhage
- Mental health conditions
POSTPARTUM DEATHS

• California hospital and death data
• 300 postpartum women (up to one year) died between 2010-2012
• Drug-related and suicides nearly 1:5 deaths
  – 74% had at least one emergency room or hospital visit between delivery and death

<table>
<thead>
<tr>
<th>Underlying cause</th>
<th>Deaths, n</th>
<th>Incidence rate (per 100,000 person-years)</th>
<th>95% CI around incidence rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obstetric complications/disease</td>
<td>69</td>
<td>6.52</td>
<td>5.15–8.25</td>
</tr>
<tr>
<td>Drug related</td>
<td>39</td>
<td>3.68</td>
<td>2.69–5.04</td>
</tr>
<tr>
<td>Circulatory system disease</td>
<td>36</td>
<td>3.40</td>
<td>2.45–4.71</td>
</tr>
<tr>
<td>Cancer</td>
<td>34</td>
<td>3.21</td>
<td>2.29–4.49</td>
</tr>
<tr>
<td>Other unintentional injuries</td>
<td>33</td>
<td>3.12</td>
<td>2.22–4.38</td>
</tr>
<tr>
<td>Homicide</td>
<td>17</td>
<td>1.61</td>
<td>1.00–2.58</td>
</tr>
<tr>
<td>Suicide</td>
<td>15</td>
<td>1.42</td>
<td>0.85–2.35</td>
</tr>
<tr>
<td>All other causes</td>
<td>57</td>
<td>5.38</td>
<td>4.15–6.98</td>
</tr>
</tbody>
</table>


OBSTETRICS

Maternal drug-related death and suicide are leading causes of postpartum death in California

Sidra Goldman-Mellor, PhD; Claire E. Margerison, PhD
SOURCES OF DATA FOR MATERNAL DEATH

- National Vital Statistics Systems
- Pregnancy Mortality Surveillance System
- Maternal Mortality Review Committees
DEFINITIONS

**Pregnancy-Associated Death**
A death during or within one year of pregnancy, regardless of the cause. These deaths make up the universe of maternal mortality; within that universe are pregnancy-related deaths and pregnancy-associated, but not related deaths.

**Pregnancy-Related Death**
A death during or within one year of pregnancy, from a pregnancy complication, a chain of events initiated by pregnancy, or the aggravation of an unrelated condition by the physiologic effects of pregnancy.

**Pregnancy-Associated, but Not Related Death**
A death during or within one year of pregnancy, from a cause that is not related to pregnancy.

**Pregnancy-Related Mortality Ratio**
The number of pregnancy-related deaths (using the above definition) per 100,000 live births.

**Preventability**
A death is considered preventable if there was at least some chance of the death being prevented by one or more reasonable changes to patient, family, provider, facility, system, and/or community factors. This definition is used by MMRCs to determine if a death they review is preventable.

**Maternal Death**
The death of a woman while pregnant or within 42 days of termination of pregnancy, regardless of the duration and the site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental causes. This definition is used by the National Center for Health Statistics and the World Health Organization.

**Maternal Mortality Ratio**
The number of maternal deaths (using the above definition) per 100,000 live births. The maternal mortality ratio is also colloquially called the maternal mortality rate.

**Maternal Mortality**
This site uses the term maternal mortality to encompass the topic of deaths during pregnancy, childbirth, and the postpartum period up to 365 days from the end of pregnancy.
PREGNANCY AND DRUG INDUCED DEATHS

Maternal Morbidity and Mortality: Original Research

Pregnancy-Associated Death in Utah
Contribution of Drug-Induced Deaths

Marcela C. Smid, MD, Nicole M. Stone, MPH, Laurie Baksh, MPH, Michelle P. Debbink, MD, PhD, Brett D. Einerson, MD, Michael W. Varner, MD, Adam J. Gordon, MD, and Erin A. S. Clark, MD

Pregnancy Associated Deaths

26%
Of all deaths were drug-related
### PREGNANCY AND DRUG INDUCED DEATHS

- **Polysubstance use 83%**
- **66% had 3 or more substances**

<table>
<thead>
<tr>
<th>Substance</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opioids</td>
<td>27</td>
<td>77%</td>
</tr>
<tr>
<td>Benzodiazepines</td>
<td>12</td>
<td>34%</td>
</tr>
<tr>
<td>Other</td>
<td>12</td>
<td>34%</td>
</tr>
<tr>
<td>Antidepressants</td>
<td>11</td>
<td>31%</td>
</tr>
<tr>
<td>Amphetamines</td>
<td>9</td>
<td>25%</td>
</tr>
<tr>
<td>Muscle relaxants</td>
<td>7</td>
<td>20%</td>
</tr>
<tr>
<td>Alcohol</td>
<td>5</td>
<td>14%</td>
</tr>
<tr>
<td>Acetaminophen</td>
<td>5</td>
<td>14%</td>
</tr>
<tr>
<td>Sedative/hypnotics</td>
<td>4</td>
<td>11%</td>
</tr>
<tr>
<td>Cocaine</td>
<td>3</td>
<td>9%</td>
</tr>
<tr>
<td>Cannabinoids</td>
<td>1</td>
<td>3%</td>
</tr>
</tbody>
</table>

*Maternal Morbidity and Mortality: Original Research*

**Pregnancy-Associated Death in Utah**

*Contribution of Drug-Induced Deaths*

*Marcela C. Savid, mse, Nicole M. Stone, mse, Laurie Balleh, mse, Michelle P. DeMers, mse, roc, Brett B. Kinross, mse, Michael W. Verme, mse, Adam J. Louden, mse, and Erin J. S. Clark, mse*
PREGNANCY AND DRUG RELATED DEATHS

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Total (n=35)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (y)</td>
<td></td>
</tr>
<tr>
<td>15–19</td>
<td>2 (5.7)</td>
</tr>
<tr>
<td>20–34</td>
<td>28 (80.0)</td>
</tr>
<tr>
<td>35 or more</td>
<td>5 (14.3)</td>
</tr>
<tr>
<td>Married</td>
<td>17 (48.6)</td>
</tr>
<tr>
<td>Medicaid at delivery</td>
<td>16 (45.7)</td>
</tr>
<tr>
<td>Drug misuse or substance use disorder</td>
<td>19 (54.2)</td>
</tr>
<tr>
<td>Chronic pain</td>
<td>15 (42.9)</td>
</tr>
<tr>
<td>Obesity</td>
<td>13 (37.1)</td>
</tr>
<tr>
<td>Mental health diagnosis</td>
<td>27 (77.1)</td>
</tr>
<tr>
<td>Depression</td>
<td>24 (69)</td>
</tr>
<tr>
<td>Anxiety</td>
<td>19 (54.2)</td>
</tr>
<tr>
<td>Schizophrenia</td>
<td>1 (2.9)</td>
</tr>
<tr>
<td>Bipolar</td>
<td>2 (5.7)</td>
</tr>
<tr>
<td>Prior suicide attempt</td>
<td>8 (22.9)</td>
</tr>
<tr>
<td>Prior overdose</td>
<td>9 (25.7)</td>
</tr>
<tr>
<td>Prior mental health hospitalization</td>
<td>6 (17.1)</td>
</tr>
<tr>
<td>History of lifetime abuse (emotional, mental, physical, sexual)</td>
<td>9 (25.7)</td>
</tr>
<tr>
<td>Intimate partner violence</td>
<td>6 (17.1)</td>
</tr>
<tr>
<td>Mental health services documented</td>
<td>9 (25.7)</td>
</tr>
<tr>
<td>Social work referral documented</td>
<td>14 (40.0)</td>
</tr>
<tr>
<td>Prenatal care record</td>
<td>n=26</td>
</tr>
<tr>
<td>Drug-related concern in prenatal chart</td>
<td>21 (60.0)</td>
</tr>
<tr>
<td>Delivery care record</td>
<td>n=24</td>
</tr>
<tr>
<td>Drug-related concern in delivery record (n=24)</td>
<td>18 (75.0)</td>
</tr>
<tr>
<td>No. of infants</td>
<td>31</td>
</tr>
<tr>
<td>Department of Child and Family Services involvement</td>
<td>7 (22.5)</td>
</tr>
</tbody>
</table>
PREGNANCY AND DRUG RELATED DEATHS

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Fig. 1. Proportion of pregnancy-associated, drug-induced deaths vs all pregnancy-associated deaths 2005–2014 (N=136).
WHAT HAPPENED IN UTAH IN 2015?

- 2013: 11.8 (6 Pregnancy-Related, 6 Pregnancy-Associated)
- 2014: 15.6 (8 Pregnancy-Related, 7 Pregnancy-Associated)
- 2015: 25.6 (13 Pregnancy-Related, 12 Pregnancy-Associated)
- 2016: 25.7 (13 Pregnancy-Related, 12 Pregnancy-Associated)

Legend:
- Pregnancy-Associated, But Not Related, Deaths
- Pregnancy-Related Deaths
Original Research

Standardized Criteria for Review of Perinatal Suicides and Accidental Drug-Related Deaths

Marcela C. Smid, MD, MS, Jewel Maeda, CNM, MPH, Nicole M. Stone, MPH, Heidi Sylvester, CPM, Laurie Baksh, MPH, Michelle P. Debbink, MD, PhD, Michael W. Varner, MD, and Torri D. Metz, MD, MS

Identification of potential pregnancy-associated cases

Relevant documentation obtained

Abstraction of relevant details

Presentation at multidisciplinary perinatal mortality review committee

“If she had not been pregnant or postpartum, would she have died?”

No

Pregnancy related

• Do we agree with the assigned cause of death?
• Was the death preventable?
• What were the contributing factors to the death?
• What are the recommendations and actions that address these contributing factors?
• What is the anticipated impact of those actions if implemented?

Yes

Pregnancy associated

Fig. 1. Flow diagram of Utah’s Perinatal Mortality Review Committee process.
Table 1. Standardized Criteria Applied to Accidental Drug-Related Deaths and Suicides

<table>
<thead>
<tr>
<th>Standardized Criteria for Accidental Drug-Related Deaths and Suicides</th>
<th>Case Examples</th>
<th>No. of Times Identified in Accidental Drug-Related Death</th>
<th>No. of Times Identified in Suicide</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Pregnancy complication</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Increased pain directly attributable to pregnancy or postpartum events leading to self-harm or drug use that is implicated in suicide or accidental death</td>
<td>Back pain, pelvic pain, kidney stones, cesarean incision, or perineal tear pain</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>b. Traumatic event in pregnancy or postpartum with a temporal relationship between the event leading to self-harm or increased drug use and subsequent death</td>
<td>Stillbirth, preterm delivery, diagnosis of fetal anomaly, traumatic delivery experience, relationship destabilization due to pregnancy, removal of child(ren) from custody</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>c. Pregnancy-related complication likely exacerbated by drug use leading to subsequent death</td>
<td>Placental abruption or preeclampsia in setting of drug use</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
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</thead>
<tbody>
<tr>
<td>2. Chain of events initiated by pregnancy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Cessation or attempted taper of medications for pregnancy-related concerns (neonatal or fetal risk or fear of Child Protective Service involvement) leading to maternal destabilization or drug use and subsequent death</td>
<td>Substance use pharmacotherapy (methadone or buprenorphine), psychiatric medications, pain medications</td>
<td>9</td>
<td>3</td>
</tr>
<tr>
<td>b. Inability to access inpatient or outpatient drug or mental health treatment due to pregnancy</td>
<td>Health care professionals uncomfortable with treating pregnant women, facilities not available that accept pregnant women</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>c. Perinatal depression, anxiety, or psychosis resulting in maternal destabilization or drug use and subsequent death</td>
<td>Depression diagnosed in pregnancy or postpartum resulting in suicide</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>d. Recovery or stabilization of substance use disorder achieved during pregnancy or postpartum with clear statement in records that pregnancy was motivating factor with subsequent relapse and subsequent death</td>
<td>Relapse leading to overdose due to decreased tolerance or polysubstance use</td>
<td>5</td>
<td>0</td>
</tr>
</tbody>
</table>

**Drug-Related Deaths**

Marecla C. Smith, un, un, Jael Maeda, cmu, un, Nicole M. Stone, un, Heidi Sylvester, cmu, Laurie Balish, un, Michelle P. Dalbink, un, ncu, Michael W. Verwey, un, and Terri D. Metz, un, un
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<table>
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<tr>
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<th>No. of Times Identified in Accidental Drug-Related Death</th>
<th>No. of Times Identified in Suicide</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. Aggravation of underlying condition by pregnancy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Worsening of underlying depression, anxiety, or other psychiatric condition in pregnancy or the postpartum period with documentation that mental illness led to drug use or self-harm and subsequent death</td>
<td>Pre-existing depression exacerbated in the postpartum period leading to suicide</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>b. Exacerbation, undertreatment, or delayed treatment of pre-existing condition in pregnancy or postpartum leading to use of prescribed or illicit drugs resulting in death, or suicide</td>
<td>Undertreatment of chronic pain leading to misuse of medications or use of illicit drugs, resulting in death</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>c. Medical conditions secondary to drug use in setting of pregnancy or postpartum that may be attributable to pregnancy-related physiology and increased risk of complications leading to death</td>
<td>Stroke or cardiovascular arrest due to stimulant use</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
PREGNANCY RELATED DEATHS

- Pregnancy complication
- Chain of events
- Aggravation of underlying condition

- Accidental drug-related death
- Suicide

Number of times cited
PREGNANCY RELATED DEATHS

- Accidental Overdose
- Suicide
- Other pregnancy-related causes

Percentage of deaths by pregnancy-related cause and timing of death:

- **Pregnancy**: 10% Accidental Overdose, 14% Suicide, 11% Other pregnancy-related causes
- **0-6 days postpartum**: 0% Accidental Overdose, 10% Suicide, 55% Other pregnancy-related causes
- **7-42 days postpartum**: 0% Accidental Overdose, 10% Suicide, 22% Other pregnancy-related causes
- **43-365 days postpartum**: 70% Accidental Overdose, 11% Suicide, 86% Other pregnancy-related causes
WHAT HAPPENED IN UTAH IN 2015?

Pregnancy-Related Mortality Ratio

- 2013: 11.8
  - Pregnancy-Associated, But Not Related, Deaths: 6
  - Pregnancy-Related Deaths: 5
- 2014: 15.6
  - Pregnancy-Associated, But Not Related, Deaths: 8
  - Pregnancy-Related Deaths: 7
- 2015: 25.6
  - Pregnancy-Associated, But Not Related, Deaths: 13
  - Pregnancy-Related Deaths: 12
- 2016: 25.7
  - Pregnancy-Associated, But Not Related, Deaths: 13
  - Pregnancy-Related Deaths: 12
PREGNANCY RELATED VERSUS ASSOCIATED

Accidental drug-related
Suicide
Infection
Hemorrhage
Pulmonary conditions
Preeclampsia
Embolism
Cardiovascular and coronary conditions
Amniotic fluid embolism

DELPHI METHOD FOR PREGNANCY RELATED CRITERIA

- National consensus
- Representative from each state and other experts (over 50 participants)
- Currently in Round 3
WHAT NEXT?

- Suicides and drug-related deaths are increasingly prevalent in the US
  - Preventability is hinged on identification and treatment.

- Pregnancy-related-ness is KEY question for pregnancy and suicide deaths.
  - Understanding pregnancy and its role in these deaths will help with identification and treatment.
WHAT NEXT?

Additional Questions?

Marcela.Smid@hsc.utah.edu
WHAT NEXT?

GOOD LUCK!

WISH YOU GREAT SUCCESS!