## VIRGINIA MATERNAL MORTALITY REVIEW TEAM
## DEFINITIONS

**PREGNANCY-ASSOCIATED DEATH:** Death of a woman while pregnant or within one year of pregnancy regardless of the outcome of the pregnancy or the cause of death.

**PREVENTABLE DEATH**: A death that may have been averted by one or more reasonable changes in clinical care, facility infrastructure, community and/or patient factors. These determinations were made with the benefit of retrospective review and current clinical practice guidelines.

**PREGNANCY-RELATED DEATH:** a pregnancy-associated death resulting from one or more of the following:

1. complications of the pregnancy itself;
2. the chain of events initiated by the pregnancy that led to death; or
3. aggravation of an unrelated condition by physiological effects of the pregnancy that subsequently causes death.

**POSSIBLY PREGNANCY-RELATED:** a death that could not be conclusively classified as either related or not related to the pregnancy.

**CESAREAN SECTION IS CONSIDERED TO BE INDICATED** when a physician, exercising prudent clinical judgment, would perform this type of delivery and it is:

1. In accordance with the generally accepted standards of medical practice.
2. Clinically appropriate and considered effective for the patient's condition.
3. Not primarily for the convenience of the patient or physician.

"Generally accepted standards of medical practice" means:

- Standards that are based on credible scientific evidence generally recognized by the relevant medical community.
- Professional society recommendations.
- Views of physicians practicing in the relevant clinical area.
- Any other relevant factors.

**CESAREAN RELATED MORTALITY:** a pregnancy-associated death resulting from one or more of the following:

1. complications of the surgery itself;
2. the chain of events initiated by the surgery that led to death, i.e. anesthesia;
3. aggravation of an unrelated condition by the effects of the surgery that subsequently causes death.

**LEVELS OF CONSENSUS:**

- I can give an unqualified yes to the decision. I am all for it.
- I can live with the decision; I find it acceptable.
- I can live with the decision; I am not especially enthusiastic about it.
- I do not fully agree with the decision. However, I do not choose to block the decision. I am willing to support the decision because I trust the wisdom of the group.
- I do not fully agree with the decision and feel the need to stand in the way of this decision being accepted. I choose to block the decision.
- I feel that we have no clear sense of unity in the group. We need to do more work before consensus can be reached.

# OFFICE OF THE CHIEF MEDICAL EXAMINER
# MATERNAL MORTALITY REVIEW TEAM
## CONTRIBUTORS TO MORTALITY

**Case #_____** **Date of review_____**

| **1. COMMUNITY FACTORS** | **Check if Yes** |
|---|---|
| a. Services unavailable (specify needed services such as case management, care coordination, transportation): | |
| b. Services inaccessible (due to. . .) | |
| c. Inadequate community subsidy of care | |
| d. Inadequate law enforcement response | |
| e. Inadequate community outreach | |
| f. Other (specify) | |
| **2. PATIENT FACTORS** | **Check if Yes** |
| a. Delay or failure to seek care | |
| b. Noncompliance | |
| c. Lack of knowledge regarding importance of event | |
| d. Lack of knowledge of treatment or follow-up | |
| e. Environmental hazards (specify) | |
| f. Intimate partner violence | |
| g. Mental illness | |
| h. (a) Substance use – Alcohol, illicit drugs, prescription abuse | |
| (b) Substance use - Tobacco | |
| i. Mental retardation/cognitive impairment | |
| j. Chronic medical condition | |
| k. Obesity | |
| l. Childhood sexual abuse | |
| m. Childhood trauma | |
| n. Other history of violence | |
| o. Uninsured | |
| p. Lack of financial resources | |
| q. Unstable housing | |
| r. Isolation: Lack of family/friend support system | |
| s. Cultural/ Religious barriers (specify) | |
| t. Multiple stressors (specify) | |
| u. Multiple risk factors (specify) | |
| v. Other (specify) | |

| **3. HEALTHCARE FACILITY FACTORS** | **Check if Yes** |
|---|---|
| a. Inadequately trained personnel ***(including translation services)*** | |
| b. Inadequate or unavailable equipment/technology | |
| c. Policies contributed to delay or inadequate treatment | |
| d. Unavailable facilities | |
| e. Poor communications | |
| f. Unavailable or inadequate response by EMS | |
| g. Lack of continuity of care | |
| h. Inadequate or unavailable personnel or services (specify) | |
| i. Other (specify) | |

| **4. HEALTHCARE PROFESSIONAL FACTORS** | **Check if Yes** |
|---|---|
| a. Delay in or lack of diagnosis, treatment, or follow-up | |
| b. Use of ineffective treatment | |
| c. Misdiagnosis | |
| d. Failure to refer or seek consultation | |
| e. Lack of continuity of care | |
| f. Inadequate patient education | |
| g. Lack of communication between providers | |
| h. Inadequate preconception counseling | |
| i. Failure to screen for risk | |
| j. Inadequate assessment of risk | |
| k. Other (specify) | |

**5. Was death preventable?** (circle one**)**

**1 Not at all**
**2 Probably not**
**3 Probably**
**4 Definitely**
**5 Unsure**

**6. Pregnancy Related?** **No Yes Possibly Unsure**

**7a. Was Cesarean indicated?** **No Yes Not enough information Unsure**

**7b. Was Death Related to Cesarean?**

**1 Not at all**
**2 Probably not**
**3 Probably**
**4 Definitely**
**5 Unsure/not enough information**

**8. Does Team Agree With Cause Listed on Death Cert.?**
**If not, list COD:** **No Yes**

**9. Does Team Agree With Manner?**
**If not, list manner:** **No Yes**

| List service delivery or community resource issues and gaps. List intervention and prevention strategies relevant to case issues: |
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Maternal Mortality Review Team
Case #0002

I. This is a 28 year-old, white woman who died by acute intoxication by heroin with underlying intravenous drug use three days after delivery.

II. Past Medical History
- Chronic back pain (from car accident in 2010)
- Human Papilloma Virus

III. Past Psychiatric History
- Anxiety
- Depression

IV. Family History
- Breast cancer

V. Nutrition
- Height: 5'1"; Prepregnancy weight: 156; Prepregnancy BMI: 29.5 (overweight). She gained 10lbs during this pregnancy.

VI. Social History
- Single
- Completed 10th grade
- Unemployed
- History of substance abuse (marijuana and alcohol since a teenager). She denied current use of alcohol and street drugs.
- She smoked a pack of cigarettes a day
- Her grandmother had custody of her first child.
- History of domestic violence with previous partners
- Reported difficulty in obtaining transportation to prenatal care appointments

VII. Services Received
- Medicaid
- WIC

VIII. Obstetrical History – G2P2A0

10/2008 Male infant delivered via C-Section.

01/29/2015 First of 2 prenatal care visits at 20w5d EGA. Her last missed period was unknown and her EDD was 6/11/2015. She had no complaints with the exception of pain rated 2/10. She reported taking Tylenol with Codeine for her

chronic back pain. Her primary care physician managed her back pain. She denied current use of alcohol and street drugs. Her lab values were unremarkable. She was to follow up in 4 weeks and provide a urine drug screen.

03/31/2015 Prenatal care visit. She had no complaints. She was noted to be doing well in the pregnancy. She denied taking any pain medication but refused to give a urine sample for a drug screen stating that she was unable to void. A drug screen was to be ordered during the next visit. She was counseled on the importance of prenatal care and encouraged to attend her appointments as scheduled.

04/22/2015 No show to prenatal visit. A phone call was made and a letter sent to her home with no response.

IX. Events of Labor, Delivery and Death

5/23/2015 She presented to the ED at 37w EGA with complaints of contractions every two minutes since the previous night. She was found to be in labor and was admitted to Labor and Delivery. She declined a vaginal birth after C-section. She was given an epidural and a repeat C-section was performed. A female infant with Apgars 8 and 8 was delivered with no complications. Urine drug screens for both mother and infant were positive for cocaine, opiates and THC. A social services consult was requested.

05/24/2015 Social work consult. She admitted to using cocaine and marijuana right before the delivery as she was worried about the delivery. She also reported that the her boyfriend (and father of the child) did not know that she had used drugs prior to delivery and only knew about her drug use from a long time ago. The decedent was informed that CPS was notified of the case and would be arriving within the next 24 -48 hours to complete an assessment. She was encouraged to tell her boyfriend the truth about her drug use and informed about programs in the community that may help her with her drug use after discharge.

She had complaints of uncontrolled pain and requested Morphine and Dilaudid. Anesthesia was consulted for pain control. She was given IV Dialudid.

05/25/2015 She reported feeling hot but was noted to be afebrile. Nursing staff also noted that she was talking fast, appeared anxious and repeatedly requested pain medication prior to the appropriate time. She rated her pain at a 10/10. She stated that the Dilaudid was not working and requested Morphine. She also complained that she was repeatedly coughing up green mucus which made her stomach hurt. She was noted to start coughing and gagging when nurses would enter the room. She was found to be tachycardic and had scattered wheezing, rhonchi in her lungs. She also had +1 edema. She was continued on Dilaudid and prescribed Albuterol, as needed.

Later the same afternoon, she was noted to have no coughing and rated her pain at a 6/10. Documentation showed that she had multiple visitors and no respiratory distress since the morning.

05/26/2015 She was noted to be agitated with tachycardia with desaturations late the previous night. She was placed on a non-rebreather mask with some improvement. She was then taken for a chest x-ray and CT scan to rule out pulmonary embolism. After the chest x-ray she asked if she could use the bathroom prior to the CT scan. While in the restroom she arrested. It was assumed that she self-administered unknown medications through her heparin lock. She was coded by the ED for one hour with Narcan and multiple rounds of ACLS medications without success. She was pronounced dead at 2:15am.

X. Death Certificate

| **Section XI: DEATH CERTIFICATE and CAUSE OF DEATH** | | | |
|---|---|---|---|
| ***Date of Death***: | | | |
| ***28. Part I.*** Enter the diseases, injuries, or complications that caused the death. Do not enter the mode of dying, such as cardiac or respiratory arrest, shock, or heart failure. List only one cause on each line. | | | |
| Immediate Cause | | | Interval Between Onset and Death |
| (A) Acute intoxication by Heroin<br>Due to (or as a consequence of) | | | |
| (B) I V drug use<br>Due to (or as a consequence of) | | | |
| (C) | | | |
| ***Part II.*** Other significant conditions contributing to death but not resulting in the underlying cause given in Part I. | | | ***28.a.*** Autopsy? ☒ Yes ☐ No<br>Authorized by: |
| ***28.b.*** If female, was there a pregnancy in past 365 days?<br>☒ Yes<br>☐ No<br>☐ Unknown | ***28.c.*** If external cause, it was:<br>☒ Primary<br>☐ or Contributing to cause of death | ***28.d.*** Describe how injury relating to death occurred.<br>Overdosed on heroin | |
| ***28.e.*** Time of injury (mo.) (day) (year)<br>☐ A.M. ☐ P.M. | ***28.f.*** Injury occurred<br>☐ While at work<br>☒ Not while at work | ***28.g.*** Place of Injury (home, farm, factory, street, office building, etc.)<br>Hospital | ***28.h.*** (city or town, county, state)<br>Norfolk, VA |
| ***28.i.*** Probable Manner of Death: | | | |
| Natural Causes ☐ Accident ☒ Suicide ☐ Homicide ☐ Undetermined ☐ | | Time of Death: | ☐ A.M. ☐ P.M. |

XI. Pathological Findings:

- Acute and chronic IV use

    i. IV herparin lock left hand
    ii. Old pin point scars noted left foot, between toes
- Acute intoxication by Oxycodone
- Pulmonary intravascular and perivascular foreign bodies
    i. Acute pulmonary edema
    ii. Bilateral pleural effusions
    iii. Left lung hypoperfusion, collapse
    iv. Lung tissue red brown, dark parenchyma
- Primary low transverse C-Section
    i. Stapled wound of lower incision
    ii. Sutured incised lower uterine segment
    iii. Hemoperitoneum 200ml
- Rib fractures: noted $4^{th}$, $5^{th}$ on left side chest. Old healed fracture $4^{th}$ rib on right side.

XII. Toxicology:

- Cannaboids 2 mg/L
- Oxycodone 91 mcg/L
- Morphine (free) 1.9 mg/L
- Cocaine metabolite (QNS)

Maternal Mortality Review Team
Case #0001

XIII. This is a 30-year-old, Black-Haitian woman who died approximately 6 weeks after the index birth.

XIV. Past Medical History

- Asthma (after 2005 delivery)
- Heart Failure (after 2005 delivery)
- Human Papilloma Virus

XV. Past Psychiatric History

- None

XVI. Family History

- Congestive heart failure

XVII. Nutrition

- Height: 5'4"; Prepregnancy weight: 193; Prepregnancy BMI: 33.1 (obese). She gained 15 pounds during this pregnancy.

XVIII. Social History

- Homemaker
- Separated
- Completed high school
- She primarily spoke Creole/French with limited English
- She smoked cigarettes including during the pregnancy
- She denied drinking alcohol and abusing drugs
- She reported history of domestic violence with the father of the index baby. There was a restraining order in place during the time of her pregnancy.
- She requested that her sister adopt the baby just before the delivery. Her sister had custody of her other children, as well.

XIX. Services Received

- Medicaid

XX. Obstetrical History – G5P4A1

2005 Male infant delivered vaginally at 35w EGA
2007 Male infant delivered vaginally at 36w EGA
2008 Female infant delivered vaginally at 37w EGA
2009 Female infant delivered vaginally at 37w EGA
2010 Elective abortion

02/20/2014 First of 4 prenatal care visits at 35w EGA. The date of her last missed period was unknown. EDC was 03/22/2014. Documented prenatal risks included late entry into prenatal care, history of preterm labor/delivery and language barrier. She was also noted to have a history of asthma and heart failure following a previous delivery. She was not currently on any medication for asthma or heart failure. She had no complaints. Her BP was 124/80. Prenatal labs were unremarkable. She reported only taking prenatal vitamins regularly. She was counseled to stop smoking.

03/04/2014 Prenatal care visit at 38w EGA. She reported a pain rating of 1-2. She was found to have +1 edema. She had no other complaints.

03/07/2014 Prenatal care visit at 38w3d EGA. Her BP was 116/80. She had +1 edema but no complaints of shortness of breath, vaginal bleeding or headache. She was found to be dilated and sent to labor and delivery for induction of labor.

XXI. Events of Labor and Delivery

03/07/2014 On admission to Labor and Delivery, she was noted to be at low risk for hemorrhage and deep venous thromboses. She had Pitocin induction for advanced dilatation with early labor and was given an epidural. A male infant with Apgars 9 and 9 was delivered vaginally. The decedent had late decelerations and oxygen desaturation during labor. This was resolved with an oxygen face mask.

03/08/2014 She had complaints of a dry cough. A chest x-ray was requested due to her history of asthma and heart failure following a previous delivery. The x-ray was negative.

Social Work consult. A consult was requested to discuss adoption of the decedent's baby. The decedent wanted her sister to have custody of the baby because of her health issues and her fear of the father of her children (all children shared the same father). The decedent was informed of the process that would have to take place for the father to sign over his rights. She stated that she would take the baby home and explore other options after discharge. She was cleared and discharged home with the baby on 3/9/2014.

03/28/2014 Postpartum visit. She reported that she was still very tired and had complaints of pain. There were no other complaints. Her BP was 110/80, heartrate 98 and respirations 18. Her abdomen was non-tender. She was noted to have edema in her extremities, minimal lochia and be afebrile. She was instructed to continue taking Motrin every 6 hours and to call the OB office if the pain did not go away.

XXII. Events of Death

03/30/2014 ED visit. She had complaints of right-sided chest pain radiating down her right arm and shortness of breath lasting two hours. Her BP was 121/76, heartrate 109 and respirations 16. Her oxygen saturation was 96% on room air. She reported that the pain was 10/10 and increased with deep breaths. She was

noted to have +1 edema and appeared “distressed.” A CT scan was negative for pulmonary embolus. She was given Vicodin and then Morphine IV after she vomited. A chest x-ray was significant for cardiomegaly which was considered “normal for her postpartum state.” There is no indication in the record that an OB was consulted. She was given Prednisone and an Albuterol treatment for her respiratory distress. Approximately three hours after her arrival she requested to go home stating that she felt better. She was diagnosed with reactive airway disease and discharged home. She was instructed to follow-up with her primary care physician for any issues.

04/19/2014 ED visit. She presented with complaints of shortness of breath, cough, congestion, and chest pain rated a 10/10 with nausea and vomiting. She reported having these symptoms for three weeks. She stated that she had been seen at another ED the week prior for the same symptoms with no improvement (No records were found at the facility stated). She stated that she could not lie down to sleep and would cough all night. Her BP was 84/64, heartrate 94 and respirations 26. Her oxygen saturation was 98% on a non-rebreather mask. Physical examination showed a systolic murmur with regular rate and rhythm and a few crackles at the bilateral lung bases. She was also noted to have +3 edema in both lower extremities. Pulmonary embolism workup was negative. A transthoracic ECHO showed left ventricle normal wall thickness and ejection fraction 20-30%, right ventricle dilated and hypokinetic, Bi-atrial enlargement with 4+ mitral regurgitation and 4+ tricuspid regurgitation. Abnormal lab values included: BNP 4943, CPK 366, CK-MB 55 and Troponin 0.63. She was diagnosed with postpartum cardiomyopathy/congestive heart failure. She was transferred to ICU for stabilization and consideration of transfer to tertiary care center for cardiac catheterization.

She was noted to have intermittent runs of ventricular tachycardia. She was diagnosed with NSTEMI (non ST elevation myocardial infarction) probably due to embolic origin. She was to be transferred to a facility that could provide a higher level of care due to new onset cardiogenic shock state. She was to be evaluated for cardiac transplant. She was started on Protonix, Lasix, Decadron, Coreg, Lovenox 40mg, Lisinopril 2.5mg, Aspirin 325mg, and Heparin prior to transfer.

04/20/2014 Transfer hospital. Cardiac catheterization was performed and she was evaluated for a transplant. Her treatment options were considered limited due to small common femoral arteries compromising her distal circulation, history of ventricular tachycardia and concerns for her overall long-term ability for compliance with medical therapy due to her history of noncompliance and issues with the father of her children. She was noted to have temperature, color, and pulse differences between her extremities. Abnormal lab values were as follows: CK = 816, MB = 119 and troponin = 2.72. Her medications were continued as previously ordered.

04/21/2014 She was noted to have continued to have temperature, color, and pulse differences in her extremities. A right groin ultrasound was negative for pseudo-

aneurysm, DVT, arteriovenous fistula and hematoma. She denied having any pain. Her medications were changed to Tylenol 650mg, Ipratropium 0.5mg inhalation and Heparin, as needed. She was also started on Aspirin 81mg daily and Nipride 100mg 10-300mcg/min continuous IV.

04/22/2014 An intra-aortic balloon pump was placed. A carotid duplex limited right sided study showed abnormal waveforms due to the heart pump machine and left sided stenosis of 0-19%. Her hemoglobin was noted to drop to 9. An abdomen and pelvis CT were completed due to the hemoglobin drop and no blood was found in the pelvis or lungs. Her lungs did show multifocal pneumonia. Her medication list was as follows: Fentanyl 25-50mcg IV, Lorazepam 0.5mg IV, Calcium Gluconate 1g, Tylenol 650mg, Zosyn 3.375mg IV, Vancomycin 1g IV, Ipratropium 0.5mg, Nitrogylcerin 100mg 5-200mcg/min IV continuous, Heparin IV, Nomogram, Aspirin 81mg and Nipride 10-300mc/min.

04/25/2014 She continued to be in critical status. She was on a nasal cannula at 3 liters with oxygen saturations of 91% at rest. Her medications were continued as previously ordered and she was also given Ativan 2mg IV and Sublimaze 50mcg IV, as needed.

04/26/2014 She was noted to go into respiratory failure. She was emergently intubated. Her status did not improve and she was pronounced dead. (No records are available regarding the sequence of events leading up to the pronouncement of death.)

XXIII. Death Certificate

| **Section XI: DEATH CERTIFICATE and CAUSE OF DEATH** | | |
|---|---|---|
| ***Date of Death***: April 26, 2014 | | |
| ***28. Part I.*** Enter the diseases, injuries, or complications that caused the death. Do not enter the mode of dying, such as cardiac or respiratory arrest, shock, or heart failure. List only one cause on each line. | | |
| Immediate Cause | | Interval Between Onset and Death |
| (C) Cardiogenic Shock<br>Due to (or as a consequence of) | | |
| (B) Peripartum Cardiomyopathy due to NSTEMI<br>Due to (or as a consequence of) | | |
| (C) | | |
| ***Part II.*** Other significant conditions contributing to death but not resulting in the underlying cause given in Part I. | | ***28.a.*** Autopsy? ☐ Yes ☒ No<br>Authorized by: |
| ***28.b***. If female, was there a pregnancy in past 365 days?<br>☒ Yes<br>☐ No<br>☐ Unknown | ***28.c***. If external cause, it was:<br>☐ Primary<br>☐ or Contributing to cause of death | ***28.d.*** Describe how injury relating to death occurred. |

| ***28.e.*** Time of injury (mo.) (day) (year)<br><br>☐ A.M. ☐ P.M. | ***28.f.*** Injury occurred<br>☐ While at work<br>☐ Not while at work | ***28.g.*** Place of Injury (home, farm, factory, street, office building, etc.) | ***28.h.*** (city or town, county, state) |
|---|---|---|---|
| ***28.i.*** Probable Manner of Death: | | | |
| Natural Causes ☒ Accident ☐ Suicide ☐ Homicide ☐ Undetermined ☐ | | Time of Death: 12:30 ☒ A.M. ☐ P.M. | |

XXIV. Pathological Findings – No autopsy was performed.