A REPORT FROM THE

VIRGINIA MATERNAL MORTALITY REVIEW TEAM

Pregnancy Related Death in Virginia, 1999-2003

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VIRGINIA MATERNAL MORTALITY REVIEW TEAM

2010 REPORT

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Mission Statement

Virginia's Maternal Mortality Review Team is dedicated to the identification and review of all pregnancy-associated deaths in the Commonwealth and the development of interventions that reduce preventable deaths.

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Executive Summary

Within the five year period from 1999-2003, 210 Virginia residents died while they were pregnant or within one year of a pregnancy (pregnancy-associated death). After reviewing the circumstances of each of those deaths, 86 deaths were determined by the Maternal Mortality Review Team (MMRT) to be directly related to the pregnancy. This report provides an in-depth examination of those pregnancy related deaths and provides recommendations for the prevention of similar deaths. The recommendations from the Maternal Mortality Review Team are crafted to address gaps in services and highlight opportunities and methods for prevention and intervention that were identified through retrospective review of each case. Major findings from this review are presented below.

- Cardiovascular disorders were the leading cause of pregnancy related death.
- There were 19 violent deaths (deaths due to homicide, suicide, accidental overdoses, and motor vehicle accidents) that were determined to be related to the pregnancy.
- Victims of pregnancy related suicide died between 34 and 212 days after delivery of a live infant.
- Accidental overdose victims primarily overdosed on their own prescription medication.
- There were seven cases of pregnancy related homicide and the perpetrators were husbands, boyfriends, and ex-boyfriends of the victim.
- For women dying from natural causes which were pregnancy related, the maternal mortality ratio for women aged 30 and above was more than twice the ratio for women under 30 years old.
- The overall maternal mortality ratio for women dying from pregnancy related natural causes was 13.6/100,000 live births. For White and Black women, the ratio was 8.7/100,000 live births and 29.1/100,000 live births respectively.
- Almost half of the women dying from natural pregnancy related causes entered pregnancy with a chronic condition.
- Obstetric emergencies accounted for 35.8% of pregnancy related deaths.
- Delay in diagnosis or treatment was thought to contribute to obstetric emergency related deaths in about 42 percent of cases.

Half of all pregnancy related deaths were determined by the MMRT to be probably or definitely preventable through one or more 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. The Maternal Mortality Review Team offers recommendations to prevent similar deaths in the future on page 24 of this report in keeping with its public health mission.

I. Introduction

Between the years 1999 and 2003, 210 women in Virginia died while they were pregnant or within one year of being pregnant (termed pregnancy-associated death). This means that every 8.7 days in Virginia, one woman died a pregnancy-associated death.

The Maternal Mortality Review Team is dedicated to understanding the circumstances surrounding each of these deaths so that strategies can be developed to reduce the number of women whose lives are lost and the tragedy that befalls those who care for them. This is an ongoing collaborative effort led by the Virginia Department of Health's Office of Family Health Services and Office of the Chief Medical Examiner.

The Maternal Mortality Review Team convenes six times per year to examine the factors contributing to each death. The Team is multidisciplinary with representatives from organizations and agencies dedicated to serving women before, during, and after pregnancy. Team members are vested in improving policies, programs, and services to meet identified needs; filling gaps in services that are revealed through case review; and improving standards of care for all pregnant or recently pregnant women. The Team's full protocol is available at the Team's website: http://www.vdh.virginia.gov/medExam/MaternalMortality.htm.

This report marks the third report of findings and recommendations from the Virginia Maternal Mortality Review Team. The first report published in 2007 entitled, *Pregnancy-Associated Maternal Death in Virginia, 1999-2001* focused on psychosocial risk factors as contributors to maternal death as well as racial disparities which are found universally in maternal mortality reviews. The report featured recommendations directed toward prevention and intervention related to substance abuse, mental illness, and domestic violence as well as prevention of motor vehicle related deaths (the leading cause of death among all cases reviewed at the time). The Team's second report, *Obesity and Maternal Death in*

Virginia, 1999-2002, was published in 2009 and described the over-representation of overweight and obese women among those who died pregnancy-associated deaths from natural causes. Team recommendations were multifaceted and focused on primary prevention beginning in childhood. These reports are also available on the Team's website.

Having completed review of five years of cases, the Team now turns its attention to those deaths that were directly related to the pregnancy. A pregnancy related death is defined as 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.[1] The determination of whether a death was pregnancy related was made by the Team by consensus opinion after reviewing the facts of the case. Recommendations to address factors that contributed to these deaths were developed following examination of the cumulative evidence collected during review of each case. These recommendations can be found on page 24 in the final section of this report. Section II of this report provides a description of all pregnancy-associated deaths that have been reviewed and from which pregnancy related cases were identified. This is followed with the third section of the report which provides an aggregate, in-depth description of deaths directly attributable to the pregnancy with recommendations for prevention and intervention at the conclusion of the report.

[1] Berg C, Danel, I, Atrash H, Zane S, Bartlett L (Eds.). (2001) Strategies to reduce pregnancy-related deaths: From identification and review to action, (p.5). Atlanta: Centers for Disease Control and Prevention.

II. Overview of All Pregnancy-Associated Maternal Deaths in Virginia, 1999-2003

Cause and/or Manner of Pregnancy-Associated Deaths

Cardiac disorders (n=36) were the leading cause of death among all women who died within one year of pregnancy in Virginia during the five year period. Motor vehicle accidents and homicides were the second and third leading causes of death and claimed 31 and 30 lives each, respectively.

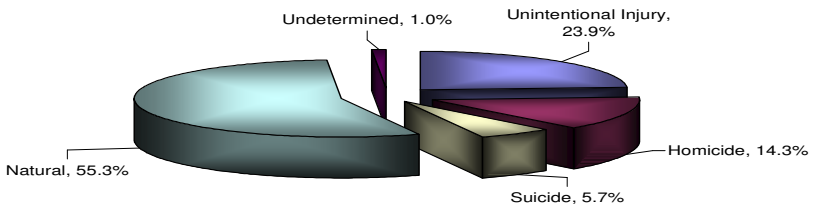
Table 1. Cause/Manner of Pregnancy-Associated Maternal Deaths in Virginia, 1999-2003 (N=210)

	No.	Percent
Cardiac Disorder/Cardiomyopathy	36	17.2
Motor Vehicle Accidents	31	14.8
Homicide	30	14.3
Cancer	20	9.5
Accidental Overdose	14	6.7
Suicide	12	5.7
Pulmonary Embolism	12	5.7
Disorders of Central Nervous System	8	3.8
Hemorrhage	8	3.8
Exacerbation of Chronic Disease	7	3.3
Other	6	2.9
Amniotic Fluid Embolism	5	2.4
Infection	5	2.4
Other Accident	5	2.4
Pregnancy Induced Hypertension/Eclampsia	4	1.9
AIDS related	3	1.4
Ectopic Pregnancy	2	1.0
Undetermined	2	1.0

The majority of pregnancy-associated deaths in Virginia (55.2%) were due to natural causes. Natural deaths are defined as those occurring as a result of a disease or illness process. Manners of death for violent deaths include

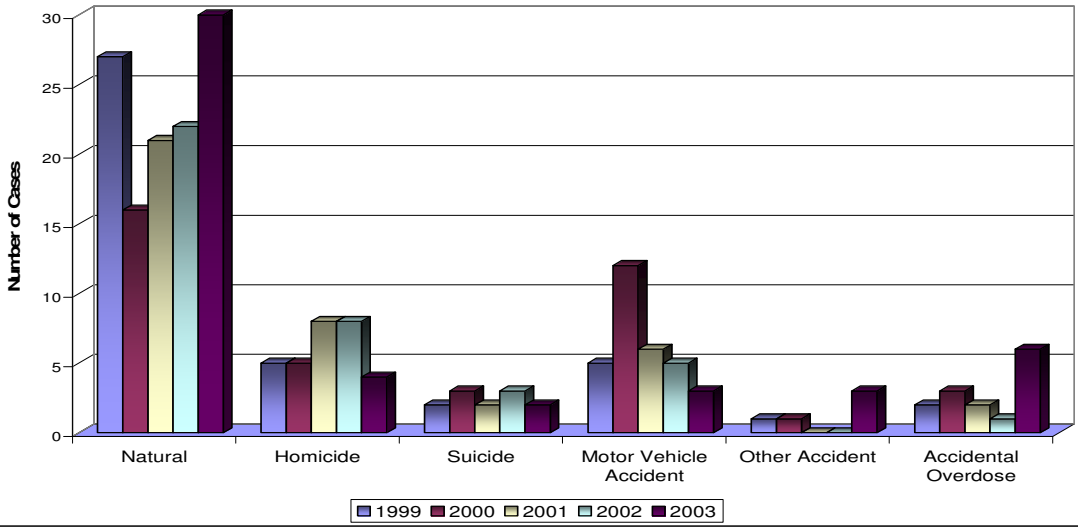
unintentional injury (23.9%), homicide (14.3%), and suicide (5.7%). The cause and manner of death were not determined in two cases (1.0%). See Figure 1.

Figure 1. Manner of Death for Pregnancy-Associated Maternal Deaths in Virginia, 1999-2003 (N=210)



The figure below portrays numbers of cases by manner and/or cause of death for each year of the five years reviewed.

Figure 2. Cause/Manner of Pregnancy-Associated Maternal Deaths by Year in Virginia, 1999-2003 (N=210)



Demographic Characteristics for Pregnancy-Associated Deaths

Ages of women dying from all causes in the year following a pregnancy ranged from 14 to 46 years old. The average age at time of death was 28.5 years. In terms of race and ethnicity, half (52.9%) of the women were White, 41.9% were Black, 2.4% were Asian, and 2.9% were of another race. Twelve of the women (5.7%) were of Hispanic origin. Nearly half (48.1%) of the women were high school graduates and an additional 31.0% had more than a high school education. Close to half of the women (49.5%) were married while 41.4% were never married.

Table 2. Demographic Characteristics for Pregnancy-Associated Maternal Deaths in Virginia, 1999-2003 (N=210)

	No.	Percent
Age at Death		
Under 20	25	11.9
20-24	44	21.0
25-29	49	23.3
30-34	51	24.3
35-39	32	15.2
40-44	8	3.8
45 and above	1	0.5
Average Age 28.5		
Race		
White	111	52.9
Black	88	41.9
Asian	5	2.4
Other	6	2.9
Hispanic	(12)	(5.7)
Education		
Less than high school	43	20.5
Completed high school	101	48.1
More than high school	65	31.0
Unknown	1	0.5
Marital Status		
Never married	87	41.4
Married	104	49.5
Widowed/Divorced	19	9.1

Pregnancy-Associated Maternal Mortality Ratio

The Maternal Mortality Ratio reflects the number of pregnancy-associated maternal deaths for every 100,000 live births. The overall pregnancy-associated maternal mortality ratio for the five year period was 42.6 deaths per 100,000 live births. Table 3 displays the pregnancy-associated maternal mortality ratios overall and for each of the five years.

Table 3. Pregnancy-Associated Maternal Mortality Ratios By Year in Virginia, 1999-2003 (N=210)

	1999	2000	2001	2002	2003	Overall
Maternal Mortality Ratio	45.2	40.4	40.5	39.3	47.7	**42.6**

III. Pregnancy Related Maternal Death in Virginia, 1999-2003

After reviewing the circumstances of each case, the Maternal Mortality Review Team determined whether each death was directly attributable to the pregnancy. A determination that a death was pregnancy related was made if the Team agreed by consensus opinion that the death was a result of 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 caused death.[2]

For the five-year period of the review, the Maternal Mortality Review Team determined that 80 (38.1%) of the 210 cases reviewed were pregnancy related with an additional six cases (2.8%) found to be possibly pregnancy

[2] Berg C, Danel, I, Atrash H, Zane S, Bartlett L (Eds.). (2001) Strategies to reduce pregnancy-related deaths: From identification and review to action, (p.5). Atlanta: Centers for Disease Control and Prevention.

related. Thus combined, 40.9% of all cases reviewed were at least possibly pregnancy related. These 86 cases are described below.

Cause and/or Manner of Pregnancy Related Death

The leading causes of pregnancy related death were cardiovascular disorders (15.1%) followed by pulmonary embolism (12.8%) and cardiomyopathy (12.8%), hemorrhage (9.3%), and homicide (8.1%). See Table 4. Homicides and other violent deaths are characterized as pregnancy related using the criteria that the chain of events initiated by the pregnancy led to death. This is usually demonstrated through review of case facts that reveal the perpetrator of a homicide knew of the pregnancy prior to the murder and was spurred to commit the homicide because of the pregnancy, or death investigation of a suicide reveals that the impetus for the suicide was the pregnancy through a note referencing the pregnancy or through interviews with persons close to the victim.

Table 4. Cause and/or Manner of Pregnancy Related Deaths in Virginia, 1999-2003 (N=86)

	No.	Percent
Cardiovascular Disorders	13	15.1
Pulmonary Embolism	11	12.8
Cardiomyopathy	11	12.8
Hemorrhage	8	9.3
Homicide	7	8.1
Suicide	6	7.0
Amniotic Fluid Embolism	5	5.8
Accidental Overdose	5	5.8
Pregnancy Induced Hypertension/Preeclampsia	4	4.6
Disorders of the Central Nervous System	3	3.5
Cancer	3	3.5
Infection	3	3.5
Other	2	2.3
Ectopic Pregnancy	2	2.3

Exacerbation of Chronic Condition	1	1.2
AIDS Related	1	1.2
Motor Vehicle Accident (Possibly pregnancy related)	1	1.2

Preventable Pregnancy Related Deaths

Half of all pregnancy related deaths in Virginia were determined by the Team to be probably or definitely preventable. See Table 5. A preventable pregnancy related death is defined as a death that may have been averted by one or more changes in clinical care, facility infrastructure, community and/or patient factors.[3] These determinations were made with the benefit of retrospective review and current clinical practice guidelines.

Table 5. Preventability of Pregnancy Related Deaths in Virginia, 1999-2003 (N=86)

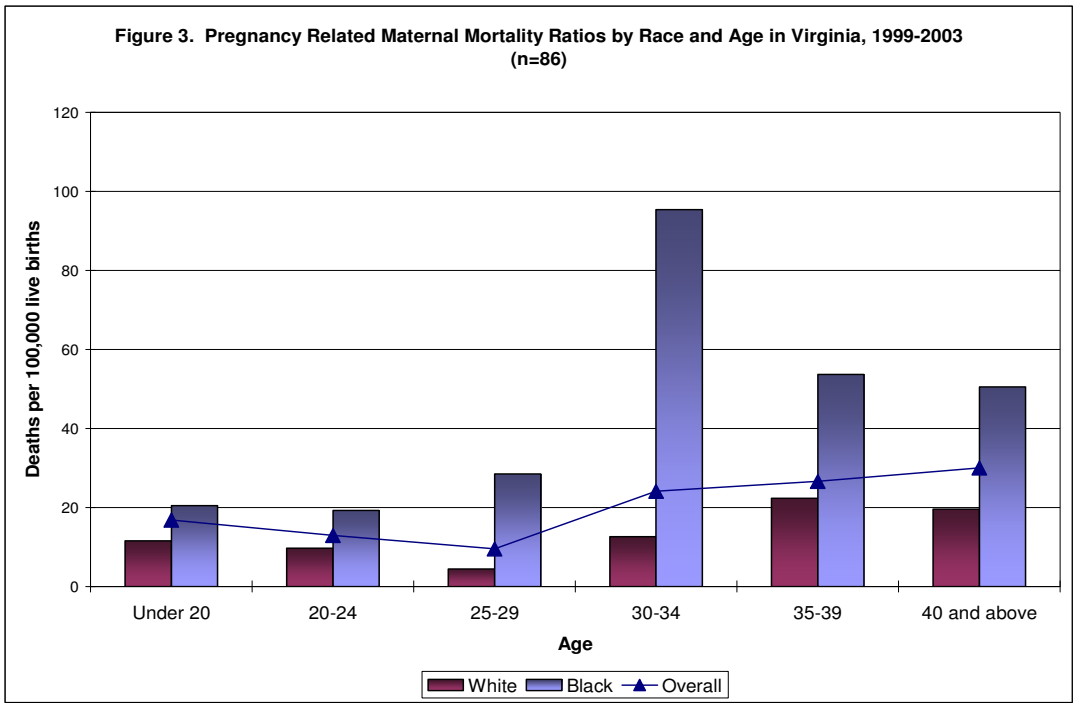
	No.	Percent
Definitely	17	19.8
Probably	29	33.7
Probably not	18	20.9
Not at all	15	17.4
Unsure/Unable to agree	7	8.1

Pregnancy Related Maternal Mortality Ratio

As previously stated, the maternal mortality ratio portrays the number of deaths per 100,000 live births. This ratio allows for comparisons among various groups. The overall pregnancy related maternal mortality ratio was 17.5. For White and Black women the ratios were 11.9 and 37.3, respectively.

[3] Berg C, Danel, I, Atrash H, Zane S, Bartlett L (Eds.). (2001) Strategies to reduce pregnancy-related deaths: From identification and review to action, (p.5). Atlanta: Centers for Disease Control and Prevention.

Examination of pregnancy related maternal mortality ratios by age (see Figure 3) reveals that overall, pregnancy related maternal mortality increased for every five year period after age 30 and was highest for women aged 40 and above. Examination of the pregnancy related maternal mortality ratio by race and age reveals that the greatest burden of pregnancy related maternal death lies with Black women of each age group when compared to White women of the same ages. The highest pregnancy related maternal mortality ratio was found for Black women between the ages of 30 and 34 years. For every 100,000 live births to Black women in that age group, 95 women died. The least likely racial and age group to experience pregnancy related death was White women between 25 and 29 years old.



Demographic Characteristics for All Pregnancy Related Deaths

In terms of numbers of deaths, more Black women (n=41, 47.7%) than White women (n=39, 45.3%) died from pregnancy related causes during the five

year period. As has already been shown, Black women are more vulnerable to pregnancy related death than White women.

Overall, more than half (54.7%) of the women who died were married and the largest group of deaths occurred to women between the ages of 30 and 34 years. Nearly half (45.3%) had completed high school and an additional 37.2% had more than a high school education. See Table 6.

Table 6. Demographic Characteristics for Pregnancy Related Deaths in Virginia, 1999-2003 (N=86)

	No.	Percent
Age at Death		
Under 20	8	9.3
20-24	15	17.4
25-29	12	14.0
30-34	30	34.9
35-39	17	19.8
40-44	3	3.5
45 and above	1	1.2
Race		
White	39	45.3
Black	41	47.7
Asian	4	4.7
Other	2	2.3
Marital Status		
Never Married	34	39.5
Married	47	54.7
Divorced	3	3.4
Widowed	2	2.3
Education		
Less than high school	14	16.3
Completed high school	39	45.3
More than high school	32	37.2

Overview of Pregnancy Related Deaths Due to Violent Causes and Manners (n=19)

There were a total of 19 violent deaths (deaths due to homicide, suicide, accidental overdoses, and motor vehicle accidents) that were determined to be

related to the pregnancy. All but one violent death was considered by the Maternal Mortality Review Team to be probably or definitely preventable.

Table 7. Cause/Manner of Pregnancy Related Violent Deaths in Virginia, 1999-2003 (n=19)		
	No.	**Percent**
Homicide	7	36.8
Suicide	6	31.6
Accidental Overdose	5	26.3
Motor Vehicle Accident	1	5.3

Ten (53%) of the victims of violent death were under 25 years old. Nine were White, nine were Black, and one victim was of another race. Slightly more than half (52.6%) were married when they died. Eighty-four percent had at least a high school education.

Table 8. Demographic Characteristics for Pregnancy Related Violent Deaths in Virginia, 1999-2003 (n=19)		
	No.	**Percent**
Age at Death		
Under 20	4	21.1
20-24	6	31.6
25-29	1	5.3
30-34	5	26.3
35-39	2	10.5
40-44	1	5.3
45 and above	0	0.0
Race		
White	9	47.4
Black	9	47.4
Asian	0	5.3
Other	1	0.0
Marital Status		
Never Married	8	42.1
Married	10	52.6
Divorced	1	5.3
Widowed	0	0.0
Education		

Less than high school	3	15.8
Completed high school	10	52.6
More than high school	6	31.6

Over half (57.9%) of the pregnancy related violent deaths occurred more than six weeks after the end of the pregnancy while slightly more than one-quarter (26.3%) of the women were pregnant when they died. In six of the 19 cases (31.5%) of violent death, the record indicated the pregnancy was unintended. Twelve of the 19 women (63.2%) delivered a live infant. Nearly half (47.4%) were covered by Medicaid for their prenatal care and/or delivery while 31.6% were covered by private insurance.

Sixty-three percent of the victims of violent death received care during the first trimester of their pregnancies. Documentation of screening in prenatal care records for substance use/abuse history was found in 84.2% of the records, mental health history in 63.2%, and domestic violence history in 47.4% of the records. Domestic violence was noted to be present in four cases, substance abuse in five cases, and mental health conditions were documented in three prenatal care records.

Suicide

For suicide victims, the length of time between delivery and death ranged from 34 to 212 days. All suicide victims delivered a live infant. Half of the suicides occurred between one and three months after delivery and half occurred between four and one-half months and seven months following delivery. Two suicide victims had been diagnosed with "postpartum depression" following the birth of the index child. In all but one incidence of suicide, there was documentation of concern by others over the sadness/depression of the victim prior to the suicide.

Accidental Overdose

Accidental overdose victims tended to have a mental health diagnosis such as depression, anxiety, and possible bipolar disorder. Three of the victims had chronic pain conditions such as back pain and migraine headaches. These victims were prescribed multiple medications for pain control by multiple providers. Four out of five victims overdosed on their own prescription medications.

Homicide

There were seven cases of pregnancy related homicide over the five year period. In all cases, the perpetrator was the husband, boyfriend, or ex-boyfriend of the victim. Three victims were living with the perpetrator at the time of death. The pregnancy was noted to be unintended in two cases.

Pregnancy Related Deaths Due to Natural Causes (n=67)

The major causes of natural pregnancy related deaths were cardiovascular disorders. These disorders included acute myocarditis, mitral valve prolapse, dissection of the aorta, and atherosclerosis/arteriosclerosis. The next leading causes of death were pulmonary embolism, cardiomyopathy, hemorrhage, and amniotic fluid embolism. Demographic characteristics of women dying from natural pregnancy related causes are shown in the table below.

Table 9. Demographic Characteristics for Natural Pregnancy Related Deaths in Virginia, 1999-2003 (n=67)

	No.	Percent
Age at Death		
Under 20	4	6.0
20-24	9	13.4
25-29	11	16.4
30-34	25	37.3
35-39	15	22.4
40-44	3	4.5
Race		
White	30	44.8
Black	32	47.8

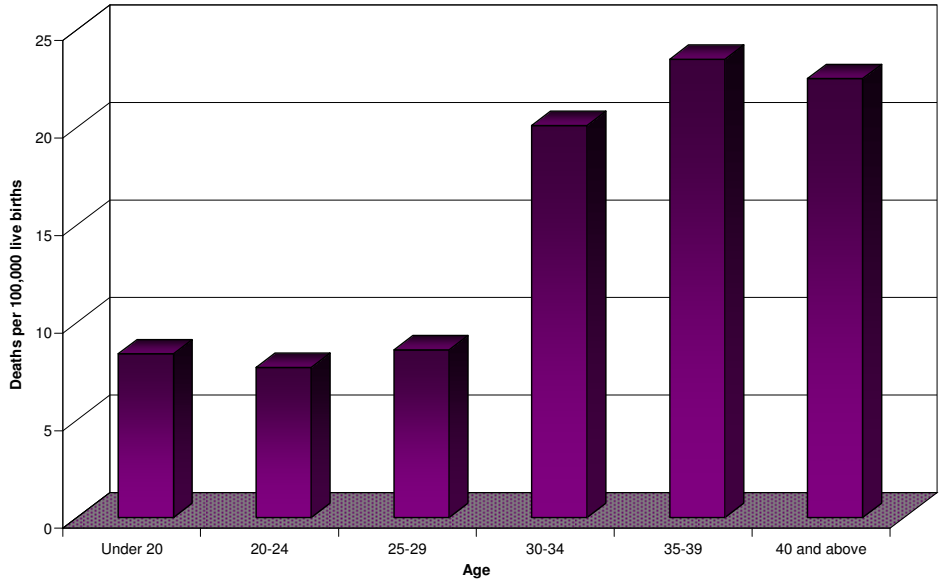
Other	5	7.5
Marital Status		
Never Married	26	38.8
Married	37	55.2
Divorced/Widowed	4	6.0
Education		
Less than high school	11	16.4
Completed high school	29	43.3
More than high school	26	38.8

The largest group of women dying natural pregnancy related deaths was between 30 and 34 years old. More than half of the women were married and almost 40% had more than a high school education.

Natural Pregnancy Related Maternal Mortality Ratio

The overall maternal mortality ratio for natural pregnancy related death over the five year period was 13.6 (8.7 for White women and 29.1 for Black women). Examination of the natural pregnancy related maternal mortality ratio by age reveals that the maternal mortality ratio for women over 30 years old was more than twice the ratio for women 29 years old and younger.

Figure 4. Natural Pregnancy Related Maternal Mortality Ratios by Age in Virginia, 1999-2003 (n=67)



Obstetrical History

Of the 67 women dying from natural causes, one-fourth had been pregnant five or more times (termed "grand multigravida"). Eight women (11.9%) had a history of gestational diabetes while almost half (47.7%, n=32), had a previous pregnancy complication such as miscarriage or stillbirth, pregnancy-induced hypertension, preeclampsia, preterm labor, hemorrhage, or anemia. One out of five of the pregnancies were known to be unintended pregnancies.

Elements of Prenatal Care

A large majority (76.1%) of women obtained prenatal care from an obstetrician while one received care from a general practitioner and four received care from a Nurse Practitioner or Certified Nurse Midwife. The average number of visits received was 10.4 with care beginning on average at 11.4 weeks estimated gestational age (EGA) of the pregnancy. This varied by race, however, with White women receiving an average of 12.3 visits and starting care at 10.7 weeks EGA. Black women received fewer visits on average (9.3) and started care later – 12.8 weeks EGA. Overall, 65.6% of the women received care that was considered at least adequate based on timing of entry into care and numbers of visits received.

Delivery, Outcome of the Pregnancy, and Interval between End of Pregnancy and Death

Three-fourths of the women delivered at least one live infant. Forty-one percent of the live born infants were delivered vaginally, 39.2% were primary Cesarean section deliveries, and 19.6% were repeat Cesarean sections. Nine women (13.4%) were pregnant when they died. Only 23.9% of the women who died from natural pregnancy related causes were still living six weeks after delivery. More than half (55.2%) of the women died within one week of delivery.

Cardiovascular Disorders and Chronic Conditions as Risk Factors

Cardiovascular disorders were the leading cause of pregnancy related natural deaths. Just over half (53.8%) of the women with cardiovascular disorders were between the ages of 30 and 34 years old with an additional 15.4% between 35 and 39 years old. Eight of the 13 women had a prior maternal complication such as recurrent miscarriages, hypertension, or hypotension. Nine women were overweight or obese. Most began prenatal care in the first trimester and 61.5% had care that was at least adequate in terms of timing of entry into care and numbers of visits received.

Nearly half (44.8%) of the 67 women dying from natural causes entered the index pregnancy with a chronic condition. Some of the more commonly identified chronic conditions included hypertension (n=10), heart disease (n=6), diabetes (n=4), sickle cell disease (n=4), and asthma (n=3). Forty percent of the women with chronic conditions were not covered under private health insurance plans. Seventy percent of the women with a chronic condition were overweight (n=7) or obese (n=14) compared to 48.5% of women without chronic conditions.

More than half (56.7%) of the deaths of women for which a chronic disease was identified were considered to be at least probably preventable compared to 28.6% of the natural pregnancy related deaths in which there was no identified chronic disease. The Team identified the following factors as contributing to the deaths of women with chronic diseases: lack of insurance coverage; lack of knowledge/education or a general denial or disregard for the risks associated with the pregnancy; delay in diagnosis, treatment or follow-up; and failure to refer or seek consultation/lack of continuity of care.

Obstetric Emergencies

Hemorrhage (n=7), pulmonary embolism (n=6), cardiac arrest (n=4), pregnancy induced hypertension/eclampsia (n=4), and amniotic fluid embolism (n=3) can all constitute obstetric emergencies. Deaths due to these causes in

which the death occurred in a hospital within seven days of delivery accounted for 35.8% of all natural pregnancy related deaths. Slightly more than half (54.2%) of these 24 deaths were determined to be preventable. Most (16 out of 24) of the women dying from these obstetric emergencies received at least adequate prenatal care based on numbers of visits received and timing of entry into care. Seventy percent began prenatal care in the first trimester. The majority (62.5%) were covered under private health insurance policies.

Approximately 58% of the women had prenatal BMIs in the overweight or obese category. Three-fourths of the women were 30 years old or over at the time of death. Estimated gestational age of the infant at the time of delivery ranged from 24 weeks to 41 weeks (mean=36.5). Eighteen of the 24 women delivered via cesarean section. The majority of the cesarean section deliveries were unscheduled, emergency c-sections performed to save the life of the mother or the infant. There were six vaginal deliveries. Two-thirds of the women (66.6%) died within one day of delivery.

Delay in diagnosis or treatment was determined to be a factor contributing to death in 41.7% of these cases. These devastating obstetric emergencies occurred suddenly and with little to no warning. Management requires prompt recognition and immediate action. Review of these cases by the Maternal Mortality Review Team suggests that better preparation for rapid action following improved recognition of the initial signs of potential problems may help prevent the devastating consequences of these emergencies.

Conclusion

The Virginia Maternal Mortality Review Team's focus on pregnancy related deaths in Virginia provides insight into maternal deaths along several dimensions. First, pregnancy may serve as a catalyst for violent death through several mechanisms. Intimate partner violence remains a significant problem and this review revealed insights into the relationship of homicide and its association with

pregnancy. Over a five year period in Virginia, seven women were killed by their intimate partners with the pregnancy being a catalyst to the murder.

In two cases of intimate partner violence homicide, it was documented that the victim did not intend to become pregnant when she did. There were 13 pregnancy related deaths from all causes (natural and violent) in which domestic violence was a contributor to death and in nearly half (46.2%) of these cases, the pregnancy was unintended. Women in violent relationships may have little control over their own reproductive experiences. The Team felt strongly that meeting contraception needs of women experiencing intimate partner violence represents a significant challenge and requires an understanding by providers of the range of behaviors associated with violence and sexual reproductive health.[4,5] Control of a woman's reproductive life may be a component of abuse.[6,7] Reproductive control can take the form of birth control sabotage in which the abuser actively interferes with contraceptive methods. Pregnancy coercion involves threats or acts of violence if the victim does not comply with the perpetrator's wishes regarding pregnancy. Victims of violence may be unable to negotiate contraception with their abusive partners. They may need access to methods of birth control that are not dependent on cooperation from partners or that can be used without partners' knowledge. In addition, it is imperative that healthcare providers recognize that signs of violence may include chronic pelvic pain, vaginitis, and "over protective" spouses who make it difficult

[4] How to integrate assessment for violence and reproductive coercion into clinical practice. Family Violence Prevention Fund, July 2008. Retrieved April 8, 2010 at http://www.knowmoresaymore.org/wp-content/uploads/2008/08/how-to-integrate-assessment-for-repr-coercion.pdf

[5] Williams CM, Larsen U, McCloskey LA. Intimate partner violence and women's contraceptive use. Violence Against Women 2008, Vol.14, No.12, 1382-1396.

[6] If you really care about intimate partner violence, you should care about reproductive justice. National Women's Law Center. Retrieved April 8, 2010 at ww.nwlc.org/pdf/PartnerViolenceReproJusticeOct09.pdf.

[7] Miller E, Decker MR, McCauley HL, Tancredi DJ, Levenson RR, Waldman J, Schoenwald P, Silverman JG. Pregnancy coercion, intimate partner violence and unintended pregnancy. Contraception 2010, Vol.81, No.4, 316-322.

for women to speak candidly to their physicians about potential problems within their relationships.

As the Team recommended in previous reports, recognition of intimate partner violence as a potential problem for every patient is necessary and requires incorporating intimate partner violence screening into daily practice. The Virginia Department of Health has responded to this need by offering Project RADAR (http://www.vahealth.org/Injury/projectradarva/index.htm), a provider-focused initiative to promote the assessment and prevention of intimate partner violence in the health care setting. Through the RADAR initiative, the Division of Injury & Violence Prevention at the Virginia Department of Health seeks to enable Virginia's health care providers to recognize and respond to intimate partner violence (IPV) by providing them access to "Best-Practice" policies, guidelines, and assessment tools; training programs and specialty-specific curricula; awareness and educational materials; and information on the latest research/data related to IPV.

Over the five year period of this review, there have been cases of pregnancy related death of Virginia residents who were members of the Armed Forces or who were victims of intimate partner abuse by a member of the Armed Forces. The Team recognized that men and women in military service are subject to a different justice system than the civilian justice system with regard to intimate partner violence.[8] In special consideration of the needs of victims of domestic and sexual violence among service men and women, the Maternal Mortality Review Team supports the passage of H.R. 840 (introduced 2/3/2009): Military Domestic and Sexual Violence Response Act. This Act is intended to reduce domestic violence involving members of the Armed Forces and their families and partners through enhanced programs of prevention and deterrence and enhanced programs for victim's services.

[8] http://www.womenslaw.org/laws_state_type.php?id=10864&state_code=US, accessed April 7, 2010.

Also, suicide is a serious and often preventable public health problem. Six women in Virginia committed suicide within seven months of delivery of a live infant over the five year period. These deaths were all considered to be preventable. Some of the women were diagnosed with depression and were undergoing treatment when they died. Others were not identified or referred for help even though someone was concerned about their sadness and/or depression prior to the suicide.

Almost all of the women whose manner of death was accidental overdose had a diagnosed mental illness. Chronic pain conditions were also documented. These women frequented emergency rooms and physician's offices to obtain pain medications. For the most part, they overused their own prescription medications. The Team was adamant that the need for education for healthcare providers on substance abuse and on appropriate pain management was an essential element of prevention of accidental overdose deaths. They further encouraged providers of care and dispensers of prescription drugs to make every effort to identify those instances in which multiple prescriptions are written and dispensed and to communicate concerns for the protection of the patient. In addition, the Team perceived a community-wide enabling drug culture as a challenge to prevention and intervention efforts, particularly in the Southwest Region of the State. The Virginia Maternal Mortality Review Team supports the work of Virginia's Prescription Monitoring Program and offers recommendations to strengthen its effectiveness for prevention of these tragic deaths.

Second, chronic conditions are associated with natural pregnancy related mortality. Nearly half of the women who died from a pregnancy related natural cause entered pregnancy with a chronic condition including obesity. About 40% of these women did not have private health insurance coverage. Overall, women are disproportionately affected by chronic disease mortality. In 2007, about 113,786 women had gestational diabetes, increasing their risk of developing type

2 diabetes by 20-50% in the 5 to 10 years following pregnancy.[9] Nine percent of women of childbearing age had high blood pressure and 20% had high cholesterol in 2009; 12% of women who recently gave birth had high blood pressure, pregnancy-induced hypertension or toxemia during pregnancy. Overall, 2% of women of childbearing age had diabetes and 3% of women who recently gave birth had problems with diabetes that started before pregnancy.[10] Further, analysis of inpatient hospital discharge data showed the prevalence of obstetric complications due to gestational diabetes almost doubled between 2000 and 2008 from 3.8% to 6.1%. The prevalence rates of obstetric complications due to hypertension increased from 3.1% to 3.4% from 2000 to 2008.[11] Hence, the identification and management of chronic conditions before pregnancy is critical.

The Team continued to voice concerns about the lack of comprehensive case management programs statewide to address problems associated with the care of pregnant and recently pregnant women dealing with chronic illnesses, substance abuse, mental illnesses, and intimate partner violence. Case review revealed that these families need intensive, collaborative services such as those provided by home visiting programs, to address multiple needs. Virginia has established a Home Visiting Consortium (HVC) which is part of Virginia's Plan for Smart Beginnings. The HVC is comprised of the 10 publicly supported home visiting programs in the State. All of the programs have goals which include increasing healthy behaviors and decreasing risky behaviors such as substance abuse, intimate partner violence, and behaviors associated with behavioral health conditions among pregnant women served by home visiting programs. The Consortium developed evidence based training programs for all Virginia early home visitors which include modules on mental health, substance abuse, and family violence. Agencies have joined together voluntarily to provide

[9] National Diabetes Education Program, April 2006 Fact Sheet. Virginia 2006 female population ages 15-44.
[10] Virginia Department of Health, Division of Vital Statistics, compiled by OFHS, 2010.
[11] Virginia Health Information.

collaborative expertise to this effort. The Maternal Mortality Review Team believes that regulatory support would solidify the commitment of resources needed to accomplish the goals established by the Consortium and recommends that the Virginia Department of Health be named as lead agency to coordinate the continued work of the Consortium.

The Maternal Mortality Review Team questioned the availability of health care before and after pregnancy for women with chronic diseases. Clearly, healthier mothers have healthier pregnancies. Without adequate and consistent care for these chronic conditions, pregnancy can increase risks to the health of the mother. The Team believes that efforts in healthcare reform should ensure that care is available for women with these high risk diagnoses of hypertension, diabetes, behavioral health conditions and cardiomyopathy.

The Team further advised that practitioners utilize the Institute of Medicine Guidelines for Weight Gain During Pregnancy (http://iom.edu/Reports/2009/Weight-Gain-During-Pregnancy-Reexamining-the-Guidelines.aspx) to address the care of overweight and obese women entering pregnancy. The Maternal Mortality Review Team continues to espouse their recommendations to address obesity which were originally presented in their March, 2009 report entitled, "Obesity and Maternal Death in Virginia, 1999-2003".[12] The Maternal Mortality Review Team recommends that:

- **all** care providers educate patients regarding the adverse physical effects of being overweight and obese especially during pregnancy;

- all Virginia employers provide a health improvement program to employees which includes these components: healthy nutrition, weight reduction and healthy weight management, and the importance of physical activity. All employers should educate employees about the availability and importance of the program and provide incentives for participation;

- the Virginia Department of Health develop a program to address the health risks for obese pregnant women to be included in its public

[12] The full report and recommendations are available at http://www.vdh.virginia.gov/medExam/documents/2009/pdfs/MMRT_obesity_final.pdf

health campaign. This should include a website listing community measures and treatment strategies;

- **all** schools in Virginia participate in the Governor's Nutrition and Physical Activity Scorecard. This program provides incentives to schools for implementing research-based best practices supporting proper nutrition and increased physical activity for K-12 students;

- all providers of pregnancy-related services promote the use of the Special Supplemental Nutrition Program for Women, Infants and Children (WIC) by disseminating a description of the program and eligibility requirements to all pregnant women and new mothers;

- the General Assembly may wish to consider legislation requiring all third-party payers to provide coverage for dietary counseling, education, and nutrition therapy for individuals with BMIs greater than 30.0.

Third, obstetric emergencies accounted for over one-third (35.8%) of the natural pregnancy related deaths. Obstetric emergencies are rare events which may make it difficult for care providers to recognize and respond immediately to impending crises. The MMR Team believes that training in simulated emergency scenarios is imperative for all providers so that skills can be developed prior to encountering real world crisis events. The Team further advocates for periodic drills within all facilities to reinforce skills learned through simulation but also to improve coordinated functioning among all disciplines within facilities and familiarity with processes and procedures to acquire necessary equipment and support to handle emergency situations.

Based on these findings, the Maternal Mortality Review Team offers the following recommendations for reducing the numbers of pregnancy related deaths among the citizens of the Commonwealth of Virginia. These recommendations are offered in the spirit of public health to the Governor, Members of the General Assembly, healthcare professionals, community service providers, and the citizens of the Commonwealth.

IV. Maternal Mortality Review Team Recommendations

The Honorable Bob McDonnell, Governor

1. The Governor is respectfully requested to address prevention of intimate partner violence, as well as screening and brief intervention strategies, in the Governor's Public Safety Plan.

The Executive Branch

1. All State agencies should display information regarding intimate partner violence and behavioral health in public areas.

2. Virginia Department of Health should develop Public Service Announcements to educate women about the risks of obesity.

3. Virginia Department of Health should partner with the Virginia Section of the American Congress of Obstetricians and Gynecologists and regional perinatal councils to provide to all healthcare providers information regarding the specialized level of care needed for obese pregnant patients. Emphasis should be placed on:

- preconception counseling for all women on the risks associated with obesity and pregnancy;
- identification of obesity as a diagnosis in and of itself requiring supplemental testing or consult for care; and
- the importance of including behavioral health in a team approach/treatment plan.

4. The Virginia Department of Health Profession's Prescription Monitoring Program should continue to provide ongoing training for all prescribers to increase awareness of Virginia's Prescription Monitoring Program.

5. The Virginia Department of Health Profession's Prescription Monitoring Program should work toward interoperability among neighboring states.

6. The Virginia Department of Health Profession's Prescription Monitoring Program should add a module addressing pain management for pregnant women to their existing pain management curriculum.

7. Training of hospital staff by the Virginia Department of Health, Office of the Chief Medical Examiner should include encouraging the performance of autopsies when pregnant or recently pregnant women die.

8. The Virginia Department of Health, Office of the Chief Medical Examiner should include training in the need for autopsies on pregnant and postpartum women in local medical examiner training programs.

9. The Virginia Department of Behavioral Health and Developmental Services should promote the use of gender specific screening tools and guidance documents for behavioral health and intimate partner violence.

10. The Virginia Departments of Behavioral Health and Developmental Services, Health, Social Services, Criminal Justice Services, and the Virginia Domestic and Sexual Violence Action Alliance should promote awareness of the State Family Violence and Sexual Assault Hotline number (1-800-838-8238) to all health care providers.

11. The Virginia Department of Behavioral Health and Developmental Services should identify a network of resources to guide healthcare professionals in management of chronic pain during pregnancy.

12. The Virginia Department of Medical Assistance Services and the Department of Behavioral Health and Developmental Services should work together to determine barriers to care and improve access to care for substance abusing pregnant women.

13. The Virginia Department of Medical Assistance Services should expand risk screening by integrating intimate partner violence and behavioral health into existing screening protocols such as BabyCare services.

Law Enforcement

1. Virginia's Click It or Ticket program should include images of pregnant women wearing properly placed seat belts in its media campaign. Correct use of the seat belt during pregnancy requires that the lap belt be placed snuggly across the upper thighs and under the abdomen, and that the shoulder belt be placed to the side of the uterus, between the breasts, and over the midportion of the clavicle.

Hospital Patient Safety Initiatives

1. Hospital patient safety initiatives should encourage interdisciplinary simulation training to identify and address catastrophic problems in labor and delivery.

2. Hospital patient safety initiatives should encourage interdisciplinary periodic drills in the management of obstetric emergencies within their facilities.

Healthcare Providers and Their Professional Organizations*

1. All health care providers should counsel women with chronic disease about the interaction of their disease and pregnancy.

2. All healthcare providers should conduct periodic intimate partner violence and behavioral health screening on all women of reproductive age.

3. Professional organizations serving practitioners providing prenatal care should encourage their members to register with the Department of Health Profession's Prescription Monitoring Program and access profiles on all newly pregnant patients to become aware of the patient's prescription history as part of the substance use screening process.

4. Healthcare professional organizations of practitioners providing care to pregnant or recently pregnant women should raise awareness of the need for autopsies when pregnant or recently pregnant women die.

The Home Visiting Consortium

1. The Home Visiting Consortium should include emphasis on risks associated with chronic diseases in pregnancy, behavioral health, and intimate partner violence in development of core training curriculum.

2. The Home Visiting Consortium should explore ways to expand home visiting services to all localities.

2-1-1 VIRGINIA

1. All agencies participating with 2-1-1 VIRGINIA (www.211Virginia.org) will assure up-to-date and accurate information is provided. Participating agencies will provide links to 2-1-1 VIRGINIA on their website.

*Including but not limited to: The Medical Society of Virginia; Virginia Section of the American Congress of Obstetricians and Gynecologists; Virginia Academy of Family Physicians; Virginia Chapter of the American College of Nurse Midwives.

Additional copies of this report are available at the following website:
http://www.vdh.virginia.gov/MedExam/maternalmortality.htm

Or through:

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