

# Maternal self-harm deaths: an unrecognized and preventable outcome



Kimberly Mangla, MD; M. Camille Hoffman, MD, MSCS; Caroline Trumpff, PhD; Sinclair O'Grady, BA; Catherine Monk, PhD

**M**aternal mortality, death during pregnancy or the postpartum period, is a barometer of a population's health, with decreasing national rates correlating with advancing medical progress. In contrast to reductions in pregnancy and postpartum-associated deaths around the world, one recent study reported a 26% overall increase in maternal mortality across 48 US states between 2000 and 2014.<sup>1</sup>

The uptick in the US maternal mortality rate is explained by shifts in medical diseases and improved ascertainment. Yet across the United States, ascertainment approaches to maternal death typically do not count those associated with behavioral health problems such as suicide and overdose, two of the leading causes of death worldwide for women of child-bearing age.<sup>2</sup>

In the United States, there has been a consistent rise in opiate use, misuse, and death, including among pregnant and postpartum women.<sup>3</sup> This review covers the neglected topic of maternal death from self-harm, in particular suicide and overdose, specifically the following: (1) the challenges in obtaining reliable

Maternal mortality continues to be a public health priority in national and international communities. Maternal death rates secondary to medical illnesses such as cardiovascular disease, preeclampsia, and postpartum hemorrhage are well documented. The rates of maternal death secondary to self-harm, including suicide and overdose, have been omitted from published rates of maternal mortality, despite growing attention to the prevalence of perinatal mood disorders, estimated at up to 15% of pregnant and postpartum women in the United States. Underlying psychiatric disorder, including depression, is consistently identified as a risk factor in substance abuse and suicide. The rate of opioid-associated morbidity and mortality has recently been deemed a national crisis. Pregnancy does not protect against these risks, and the postpartum period has been identified as a particularly vulnerable time. The lack of consistent and inclusive data on self-harm deaths in the pregnancy-postpartum period is alarming. This review will identify barriers to reporting and ascertainment of maternal suicide and overdose deaths, summarize geographic-specific data available, address potential social and psychological biases that have led to neglect of the topic of maternal self-harm deaths, and suggest recommendations that incorporate the whole woman in prenatal care and thus prevention of this devastating outcome.

**Key words:** maternal morbidity, maternal mortality, maternal self-harm, maternal suicide, neonatal abstinence syndrome, postpartum suicide, pregnancy opiate prescriptions, pregnancy opiates, pregnancy substance abuse, pregnancy suicide

From the Departments of Psychiatry (Dr Mangla) and Obstetrics and Gynecology (Dr Monk and Ms O'Grady) and Division of Behavioral Medicine, Department of Psychiatry (Drs Trumpff and Monk), Columbia University Medical Center, New York, NY; Department of Obstetrics and Gynecology, University of Colorado School of Medicine/Denver Health and Hospital Authority, Denver, Colorado (Dr Hoffman); and New York State Psychiatric Institute, New York, NY (Dr Monk).

Received Dec. 17, 2018; revised Feb. 19, 2019; accepted Feb. 27, 2019.

The authors report no conflict of interest.

Corresponding author: Kimberly Mangla, MD. [Kam2319@cumc.columbia.edu](mailto:Kam2319@cumc.columbia.edu)

0002-9378/\$36.00

© 2019 Elsevier Inc. All rights reserved.

<https://doi.org/10.1016/j.ajog.2019.02.056>

epidemiological statistics on maternal mortality via self-harm; (2) current data on the rates of maternal self-harm deaths and their antecedents, including those associated with the US opioid epidemic; (3) speculation as to the factors rendering maternal mortality via self-harm a silenced public health issue; and (4) recommendations for improved prevention of self-harm maternal mortality.

## Epidemiology

The US maternal mortality rate secondary to overdose or suicide is unclear, with trends in rates over time even less so.<sup>4</sup> This is due to changes in reporting methodologies and differences in the inclusion criteria as well as accuracy and availability of data collection across states. Currently the Centers for Disease Control and Prevention (CDC) defines maternal mortality as the death of a woman while pregnant or within 1 year

of pregnancy termination, regardless of duration, from any cause related to or aggravated by pregnancy or its management, but not from accidental or incidental causes.<sup>5</sup>

This definition of maternal mortality has shifted over the years with respect to timing. Between 1979 and 1999, the *International Classification of Diseases* (ICD), ninth revision, included deaths during pregnancy and the puerperium, a term including only up to 42 days postpartum by which time a woman's physiology was believed to return to normal, an approach underscoring the dismissal of brain-behavior etiology in maternal mortality.<sup>6,7</sup>

A recent population-based report demonstrated the peak incidence of maternal self-harm-related death is between 9 and 12 months postpartum, supporting efforts to extend the time period inclusive of pregnancy-related deaths.<sup>8</sup> The CDC relied and continues

to rely on ICD codes listed in medical records to track maternal deaths. They also rely on information listed in the death certificate, which did not include a pregnancy status checkbox until 2003.<sup>9,10</sup> Submission of maternal-related death information from individual states to the CDC and adoption of the pregnancy checkbox is voluntary.<sup>5,11</sup>

Multiple studies indicate that the maternal mortality rate based on standard calculations dramatically underestimates the incidence of suicide.<sup>12,13</sup> When Wallace et al<sup>14</sup> used enhanced pregnancy mortality surveillance data from 2005 to 2010 to estimate the US pregnancy-related suicide rate, the pregnancy status was unknown in 30% of deaths identified. They concluded that the suicide rate was between 1.5 and 4.5 per 100,000 compared with the 2 per 100,000 previously reported.

In the United Kingdom, the Centre for Maternal and Child Enquiries found that maternal suicide was much more common than previously thought, indeed an overall leading cause of maternal death, and that rates based on a coroner's verdicts alone are underestimated.<sup>15</sup> The UK Office of National Statistics linked maternal deaths up to 1 year after delivery with recorded births, revealing that half of maternal suicides had not been correctly reported to the Enquiry.<sup>15</sup>

A recent US study showed that women who died by accidental or incidental means between 2001 and 2008 were not accurately identified as pregnant or postpartum in almost 50% of cases despite adoption of the pregnancy checkbox on the death certificate.<sup>9</sup> There was also a discrepancy in reporting by maternal age with underreporting of older women who died by accidental means.<sup>9</sup>

This is consistent with the findings of Davis et al<sup>16</sup> disputing the notion that the increase in maternal mortality ratio in the United States is secondary only to increased ascertainment and advancing maternal age, but there may be a disproportionate age-specific increase in maternal mortality in women older than 40 years. In contrast, 98% of pregnancy-associated deaths secondary to

nonaccidental causes such as cardiovascular and hypertensive disease are accurately identified. Substance abuse and incidence of overdose, which have recently increased the maternal self-harm death toll, are often not represented in these studies.

### Current rates of maternal self-harm deaths, including those associated with opioid use

In the United States, individual state-based data strongly support a higher-than-previously-reported maternal mortality rate stemming from suicide and other self-harm behaviors, with some possible hints of regional hot spots (see Figure 1).

The pregnancy checkbox was introduced to improve the ascertainment of pregnancy-associated deaths by indicating whether the decedent was or was not pregnant within 1 year of death, with a distinction between early and late maternal death. This information is vital for understanding maternal mortality trends, but the state-by-state adoption of the checklist was not uniform or timely, with only 44 states in adherence by 2014.

MacDorman et al<sup>1</sup> showed an increase in maternal mortality from 9.8 per 100,000 in 2000 to 21.5 per 100,000 in 2014, with an alarming doubling of maternal deaths in Texas between 2010 and 2011. Baeva et al<sup>17</sup> then examined data from Texas between 2011 and 2012. Maternal deaths were identified by linking women's deaths and birth records up to 1 year postpartum. Between 2011 and 2012, drug overdose was identified as the second leading cause of death (11.6%) after cardiovascular disease. Toxicology revealed illicit and prescription opiates as the most common substances involved. Suicide was the cause in 5.3% of maternal deaths.

Between 2004 and 2012 in the state of Colorado, suicide and accidental drug overdose combined as self-harm were the leading cause of pregnancy-related death.<sup>18</sup> The combined mortality ratio was 9.6 per 100,000 live births, almost 30% attributable to self-harm. There were 211 documented maternal deaths and 63 (29.9%) were attributable to

self-harm. Furthermore, the maternal suicide rate in this Colorado cohort (4.6 per 100,000 live births) was higher than the ratio reported nationally (1.6-4.5 per 100,000 live births).

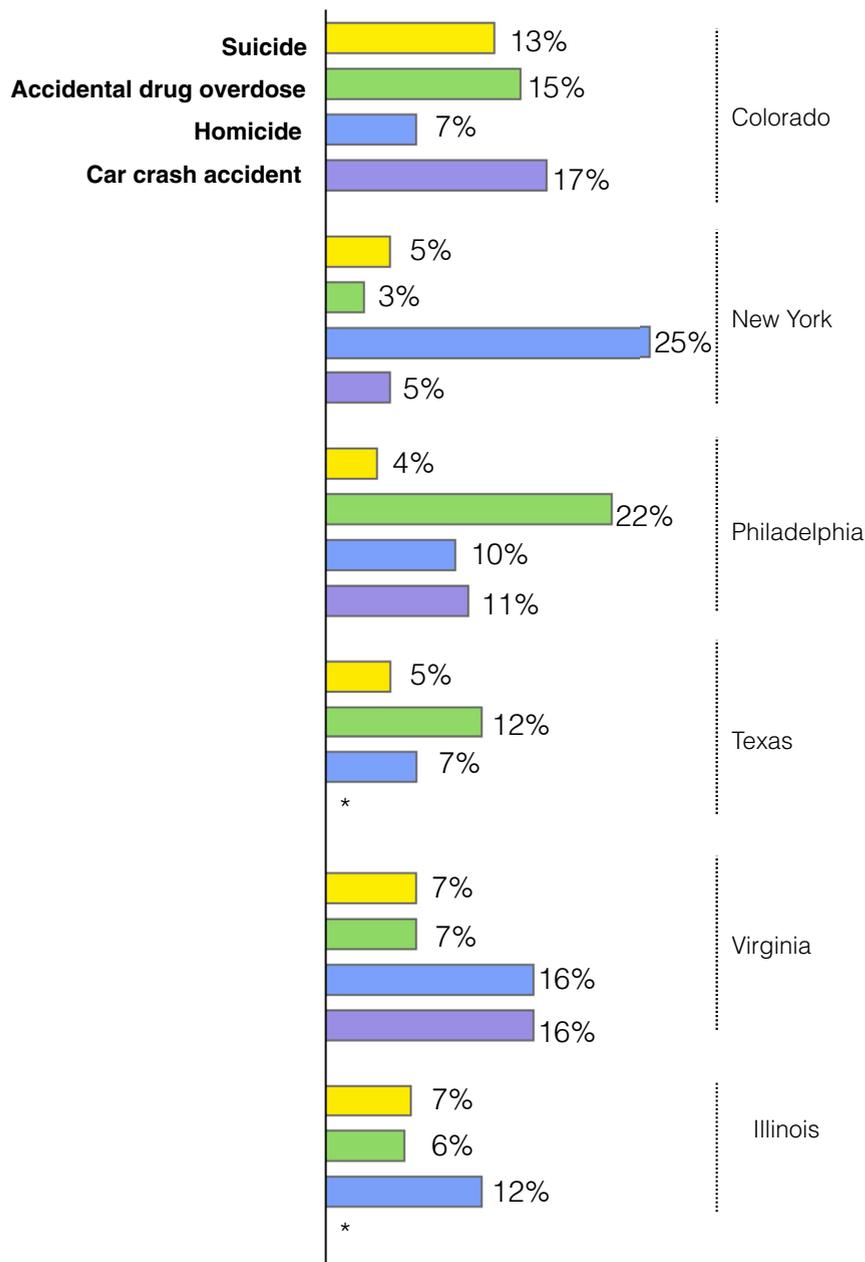
The majority of deaths were in the postpartum period, with less than 10% occurring during pregnancy. Of the 50 women with toxicology testing available, 14 were positive for illicit drugs including cocaine (n = 10) and heroin (n = 4), and 21 women tested positive for prescription opiates. Less common causes of maternal death were motor vehicle crashes, (17.1%), non-cardiovascular medical conditions (16.6%), and cardiovascular conditions (10.4%).

A case study of 309 pregnancy-associated deaths in Virginia from 1999 through 2005 compared natural causes of death, including cardiac disorders, cancer, pulmonary embolism, and central nervous system disorders with deaths from homicide, suicide, and accidental drug overdose.<sup>19</sup> Maternal suicide and accidental drug overdose accounted for 6.5% and 6.8% of deaths, respectively.<sup>19</sup>

A report from Philadelphia assessing cases of pregnancy-associated death from 2010 through 2014 found substance use was related to 46% of non-overdose deaths and drug overdose was the direct cause of 27% of deaths.<sup>20</sup> A study in the state of Washington included a cohort of postpartum women hospitalized for a suicide attempt between 1992 and 2001.<sup>21</sup> Eighty-eight percent of suicide attempts were via poisoning by medications. Another report from Illinois identified 742 maternal deaths from 2002 through 2013; 49 (6.6%) were secondary to suicide and 45 (6.1%) were secondary to substance abuse; 66% and 64% of suicide and substance abuse related deaths, respectively, occurred in the late postpartum period.<sup>22</sup>

In the United Kingdom, 10% of suicides were attributed to overdose; drug dependency was determined as the main psychiatric diagnosis for 31% of women who died from suicide, and accidental overdose and suicide were the leading causes of death, 29% and 26%,

**FIGURE 1**  
**Summary of state-based reports rate of maternal death**



Summary of state-based reports rate of maternal death linked to self-harm, homicide, or car accidents. Data were collected in the state of Colorado (n = 211) in 2004–2012,<sup>17</sup> New York (n = 293) in 1987–1991,<sup>56</sup> Philadelphia in 2010–2014 (n = 85),<sup>20</sup> Texas (n = 189) in 2011–2012,<sup>16</sup> Virginia (n = 309) in 1999–2005,<sup>18</sup> and Illinois (n = 742) in 2002–2013.<sup>21</sup> Asterisk indicates that data are not available.

Mangla. Maternal suicide and opiate overdose. *Am J Obstet Gynecol* 2019.

respectively, in women known to be substances misusers.<sup>15</sup>

In a retrospective cohort study, Schiff et al<sup>23</sup> estimated the timing and rates of fatal and nonfatal opiate overdoses in

Massachusetts from 2012 through 2014. A total of 242 overdose events were identified, 231 nonfatal and 11 fatal. Overdose events were defined as having a death certificate indicating opiate

overdose as the cause of death, a hospital encounter with an indication of opiate overdose based on the ICD-9 E-code, or an ambulance incident with an indication of opiate overdose. Opiate-related overdose rates were the lowest during the third trimester of pregnancy and highest 7–12 months postpartum.

These findings are consistent with other studies that found the late postpartum period to be particularly high risk for maternal death secondary to self-harm. The group proposes potential explanations for increased risk in the postpartum period including lack of availability or continuity of resources for opiate use after delivery, shame or stigma, difficulty in determining appropriate postpartum pharmacotherapy, and other psychosocial risk factors.

In a research letter to the Journal, Gemmill et al<sup>24</sup> reviewed trends in opiate-related deaths between 2007 and 2016 in the 22 states that had adopted the pregnancy checkbox. The group concluded the maternal mortality involving opiates doubled during this time period. By 2016, 70% of deaths involving opiates occurred during pregnancy and up to 42 days postpartum. Most of the opiate-related deaths in 2016 involved heroin and synthetic opiates. The majority of decedents in this report were white women.

The individual state-based data can provide only a snapshot of overdose-related deaths coming from these states on which researchers have been able to carry out studies. It is very difficult to differentiate with certainty suicide from an unintended overdose, even with input from death and birth records, prompt medical assessment, and information available from legal system and coroner reports. Furthermore, the information necessary to identify those who have died via self-harm deaths requires comprehensive and accessible medical histories, including psychiatric history and treatment. Shared information across health systems could improve reporting and identify those women with histories of major depressive disorder and substance use disorders and other pertinent psychiatric history and treatment.

### Risk factors for maternal mortality from self-harm

While studies have sought enhanced recognition of maternal death secondary to self-harm behaviors to prevent this outcome, identification of risk factors unique to the pregnancy and postpartum population must be identified.<sup>2,8,9,14,17-19,21,22,25,26</sup>

Not surprisingly, many risk factors for maternal suicide and overdose are similar to those across the population, yet some unique warning signs are evident. The most common risk factors identified in suicide and overdose are a psychiatric diagnosis of major depression<sup>2,8,18,21</sup> and/or substance use disorder<sup>21-23</sup> and intimate partner violence.<sup>20,23,27</sup>

The majority of studies presented report a higher proportion of older white and Native American women dying as a result of suicide and overdose. In the Colorado report, among those who died of self-harm, 35% were diagnosed with depression or anxiety and nearly half had discontinued antidepressant medications.<sup>18</sup> Importantly, less than 50% of women who died of self-harm attended a postpartum medical visit.<sup>18</sup>

In the study from Washington state including 355 postpartum women who were hospitalized for a suicide attempt, 26.7% were diagnosed with a psychiatric and/or substance use disorder during a hospitalization in the previous 5 years.<sup>21</sup> A prior hospitalization with a psychiatric disorder diagnosis was associated with a 27-fold increased risk of postpartum suicide attempt.<sup>21</sup> A study by Hardt et al<sup>28</sup> with 169 drug-positive, pregnancy-associated nonnatural deaths found that 54% of these deaths involved prescription drugs, 46% involved illicit drugs, and 41% involved alcohol with opioids constituting the majority of deaths associated with prescription drugs. Bagley et al<sup>29</sup> followed up 99 pregnant women in treatment for opioid use disorder, finding that 100% of women with an overdose in the past year and 84% of women with no overdose in the past year reported a major mental health diagnosis. From both studies, most women, both with and without a history of substance abuse, were white and had a psychiatric diagnosis.

Three reports rigorously investigated antecedents for maternal self-harm mortality, both in non-US samples. Using data from the UK National Confidential Inquiry into Suicides and Homicides by People with Mental Illness between 1997 and 2012, researchers compared risk factors for suicide between inside or outside the perinatal period.<sup>2</sup> The perinatal women were most often diagnosed with depression, less likely to be in active treatment, less likely to be prescribed psychotropic medication, and were younger and married.

A study in Ontario including perinatal and nonperinatal women who died by suicide over a similar time duration (1994–2008), extended the comparison to include living perinatal women.<sup>8</sup> Perinatal vs nonperinatal women who died by suicide were more likely to be diagnosed with a mood disorder other than psychosis, more likely to die by violent means, and were younger and married. In contrast, according to the Centre for Maternal and Child Enquiries in the United Kingdom, more than half of the perinatal women who died by suicide between 2006 and 2008 were white, married, employed, 30 years old or older, and living in comfortable socioeconomic circumstances.<sup>15</sup> However, the perinatal women who died by suicide associated with overdose or substance use were more likely to be young, single, and unemployed.

### Opiates as a particularly potent risk factor for women of child-bearing age

Opiates, both licit and illicit, currently pose a public health crisis in the United States. An estimated one third of opioid-dependent patients in the United States are women of child-bearing age.<sup>30</sup> Opiates are particularly dangerous for women.<sup>31</sup> Women are more likely to have chronic pain conditions<sup>32</sup> and are at greater risk of addiction because of higher rates of sexual and physical abuse<sup>33</sup> and comorbid mood disorders.<sup>34</sup>

For US women, there has been a 5-fold increase in opioid overdoses since 1999.<sup>35</sup> A recent report on opioid

utilization patterns in a cohort of pregnant commercial insurance beneficiaries showed almost 15% of the sample was prescribed opiates.<sup>36</sup> There was significant variation in the rate of prescriptions based on geographic location, with some southern states exceeding 20% and the northeast reported as a region with significantly more conservative opiate prescribing patterns.

In another report, based instead on a cohort of pregnant Medicaid-enrolled women, 20% were prescribed opiates during pregnancy.<sup>37</sup> A similar study sought to estimate the prevalence of opiate prescribing in a cohort of pregnant veterans and concluded 10% of pregnant veterans received a prescription for opiates.<sup>38</sup> Factors that increased the likelihood of opiate prescriptions included any psychiatric diagnosis. More than half of the pregnant women prescribed opiates had at least 1 psychiatric diagnosis. Risk factors for maternal suicide strongly overlap with those for overdose related deaths (see Figure 1).

These risks for the postpartum period as well, if not more so, given the pain associated with labor and birth complications, are relevant. Cesarean delivery is a common surgical procedure (32% of deliveries in the United States)<sup>39</sup> for which obstetricians prescribe opiates postoperatively.<sup>40</sup> According to Bateman et al,<sup>36</sup> psychiatric illness and substance use/abuse are among the predictors of chronic use in opiate naïve-patients after a cesarean delivery.

In contrast to available data on maternal suicide, the incidence of opiate misuse is higher among women between 15 and 25 years of age. Access to inpatient and outpatient treatment is scarce across the United States. According to the Substance Abuse and Mental Health Services Administration's most recent report, only 7% of inpatient treatment programs offer specialized programs for pregnant and postpartum women, and 44% of these programs offered detox services only.

This is not in accordance with current the American College of Obstetricians and Gynecologists' (ACOG) standard-of-care recommending opiate

replacement therapy. Specialized outpatient services comprise only 13% of programs in the United States. According to the Substance Abuse and Mental Health Services Administration, opiate use is more common in those living below the poverty level. The data presented are mixed with regard to the correlation between socioeconomic status and opiate-related death. According to the Guttmacher Institute, only 19 states have funding programs in place to treat pregnant women with opiate use disorder, with only 12 offering priority access for pregnant women.<sup>41</sup> Methadone, a cost-effective and well-studied opiate agonist agent recommended for pregnant women with opiate use disorder, is not a preferred drug for Medicaid beneficiaries in 20 states.<sup>42</sup>

### Maternal mortality by self-harm: why a silenced public health issue?

Despite increased public and medical awareness of depression during pregnancy and the postpartum period, women often do not acknowledge their distress. In a recent study, women with postpartum mood symptoms identified stigma as the most frequent barrier to self-disclosure and one amplified by the belief that disclosure may lead to removal of one's children.<sup>43</sup>

In contrast to allocation of public and private funding and media attention toward Zika virus and the obesity epidemic, there is relatively slow progress in advancing identification and prevention of maternal depression, let alone suicide and overdose. According to the Guttmacher Institute, 24 states and the District of Columbia classify prenatal drug use as child abuse, with some states committing pregnant women with positive drug screens to psychiatric facilities, a civil charge that can result in loss of parental rights.<sup>41</sup> Angelotta and Appelbaum<sup>44</sup> identified 24 cases between 1977 and 2015 involving 29 women who were convicted of criminal charges for using drugs during pregnancy. This climate clearly deters women from accessing mental health or substance abuse treatment.

The CDC's definition of maternal mortality that excludes suicide and

overdose, terming them incidental, reflects a division of physical and mental illnesses that has long existed in our lay and professional cultures. Isolating self-harm maternal deaths from others is a manifestation of what Kendler<sup>45</sup> terms Cartesian mind body dualism. This dualism implies that self-harm deaths are inherently different, not manifestations of biological processes as a medical condition, rather located in the mind and a reflection of character or moral failure, thereby less legitimate in terms of garnering public health attention and resources.

The acknowledgment that a pregnant or postpartum woman, a mother, dies from suicide or unintended overdose is counter to our deeply embedded societal idealization of mother to a new baby, and particularly pregnancy, as times of nearly uninterrupted joy and rewarding sacrifice.<sup>15</sup> Publications as recent as the 1980's state "the incidence of mental illness is substantially lower in pregnancy."<sup>46</sup> Elliott et al<sup>47</sup> similarly concluded that "without exception, the changes are in the direction of improved physical and psychological health after delivery."

We speculate that rooted in our universal status as being a child to a mother, a parent to a mother, and some of us being or wanting to become a mother, we are disinclined to accept that during pregnancy and the postpartum period, women can experience despair and/or psychotic symptoms with a force to propel them toward suicide or unintentional overdose.

### Improving the prevention of maternal mortality via self-harm

In the era of personalized medicine, more research is needed to identify risk factors for death by self-harm behaviors that may characterize women in the pregnancy/postpartum period vs other life stages. Existing data suggest depression, discontinuation or lack of psychopharmacological medication, a prior hospitalization for a psychiatric illness, and disengagement from postpartum medical treatment are emerging candidates.<sup>2,8,15,18,21</sup> In addition, the use of opioids during this period requires increased vigilance and an evidenced-based approach.<sup>35-37</sup>

Although risk factors for maternal overdose-related deaths strongly overlap with those from suicide, each have elements that independently confer risk.<sup>2,18</sup> As discussed, the lack of treatment centers for opiate abuse who treat pregnant patients (13% of centers) and lack of access to opiate replacement therapies are risk factors specific to maternal overdose-related deaths. Further risk factors (Figure 2) include the prevalence of chronic medical conditions, a family history of abuse, an opiate prescription after a cesarean delivery, delivery complications, and the ease of accessibility to illicit and prescription drugs.

Risk factors specific to suicide include a diagnosis of depression, psychiatric comorbidity (in particular with substance use disorder), receiving psychiatric care or lack of active treatment, number of previous hospitalizations, a history of self-harm, a recent illness onset, abrupt onset of symptoms, and younger age.

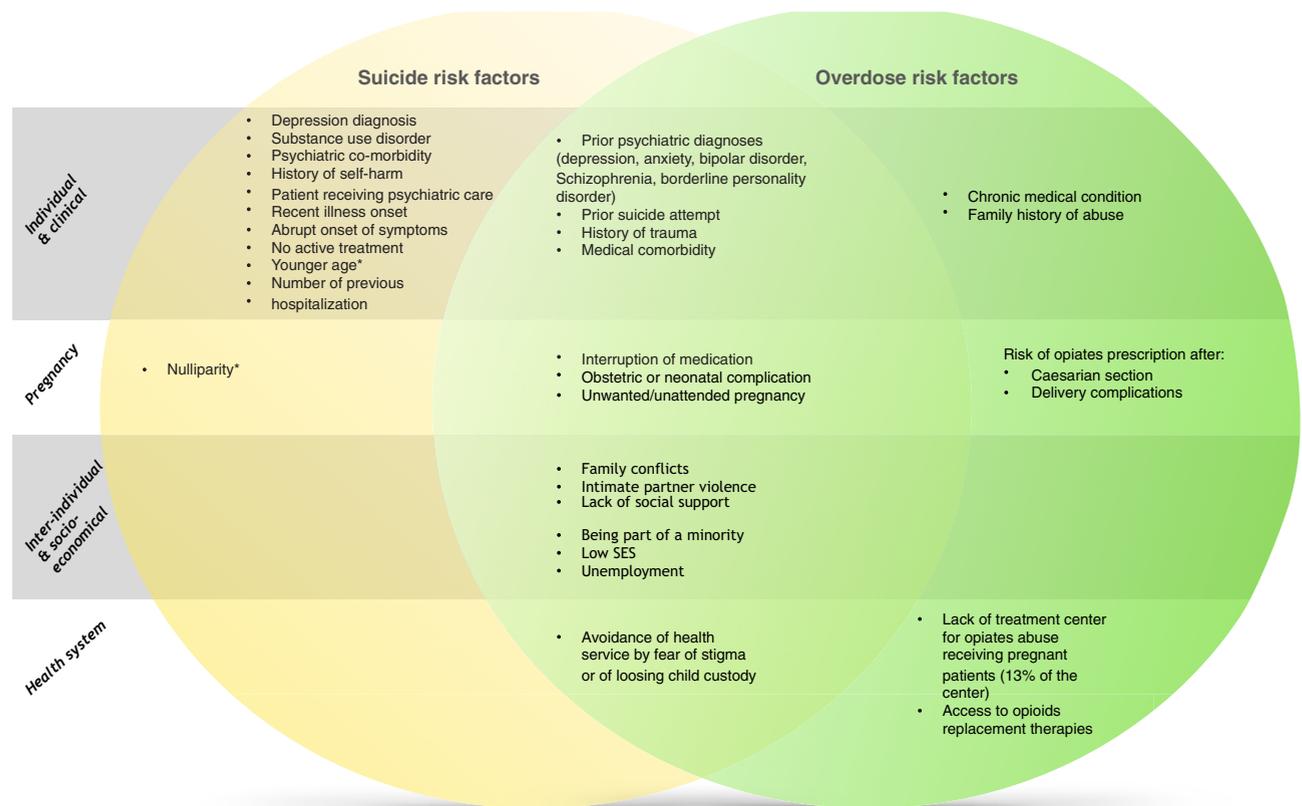
To implement targeted and effective preventions, it is important to consider overlapping risk factors yet also independent ones that heighten risk for death by self-harm behaviors. New screening initiatives for perinatal depression and integrated care models provide roadmaps for the prevention of maternal morbidity via self-harm behaviors.<sup>48,49</sup>

For a more thorough discussion of the logistics of implementing mental health intervention programs for maternal populations, please refer to a recent article in the *Journal of the American Medical Association* by the US Preventative Services Task Force, "Interventions to prevent perinatal depression: US Preventive Services Task Force recommendation statement"<sup>50</sup>; a recent paper in the *International Review of Psychiatry* by Byatt et al,<sup>51</sup> "Perinatal depression care pathway for obstetric settings"; and a recent report in the *American Academy of Pediatrics* by Rafferty et al,<sup>52</sup> "Incorporating recognition and management of perinatal depression into pediatric practice."

### Mental health screening during prenatal care

Many leading professional and government bodies now call for routine

**FIGURE 2**  
**Risk factors for maternal self-harm—related death (suicide and overdose)**



Risk factors for maternal suicide and overdose were derived from Metz et al.<sup>18</sup> and Khalifeh et al.<sup>2</sup>  
 Mangla. Maternal suicide and opiate overdose. *Am J Obstet Gynecol* 2019.

screening for mental health issues during the perinatal period.<sup>53,54</sup> In 2015, ACOG formally announced the new standard to screen all pregnant woman at least once for depression and anxiety using validated tools.<sup>53,54</sup> In 2016, the US Preventive Services Task Force specifically recommended screening for depression during pregnancy and the postpartum period.<sup>55</sup>

Findings from a systematic review published in *Journal of the American Medical Association* supporting the US Preventive Services Task Force recommendation in showing screening for depression in the prenatal/postpartum period with or without treatment was associated with higher rates of remission at 3–5 months of follow-up.<sup>55,56</sup> Cognitive behavioral therapy was associated with higher rates of remission than usual care.<sup>56</sup> Such screening also would help identify past psychiatric

hospitalizations as well as women who may have depressed mood as a consequence of medication discontinuation.

The Edinburgh Postnatal Depression Scale (EPDS) is validated, easy to use, and widely available, with sensitivity and specificity comparable with other scales used in primary care setting.<sup>57</sup> Wisner et al.<sup>57</sup> followed up a series of women who screened positive on the EPDS to determine the timing of onset of depression and thoughts of self-harm. Onset most frequently occurred in the postpartum period. All the women with the highest level of thoughts of self-harm (yes, quite often) were captured with the cutoff score of 10. Unipolar depression was the most frequent diagnosis, with 83% of these women meeting the criteria for comorbid anxiety disorder.<sup>58</sup>

This review highlights intimate partner violence as a consistent and

significant risk factor for suicide and overdose. Despite the support of medical bodies, including ACOG and the American Medical Association, universal intimate partner violence screening is not recommended by the US Preventive Services Task Force. Two screening tools with utility in perinatal population include the Abuse Assessment Screen and HARK (humiliation, afraid, rape, and kick screening tool).<sup>59</sup> Multiple studies have demonstrated the association between adverse childhood experiences (ACE) and an increased risk of mental health conditions in pregnancy.<sup>60</sup> Mahenge et al.<sup>61</sup> concluded that a history of physical/sexual adverse childhood experiences and/or physical/sexual intimate partner violence were associated with a significantly increased risk of postpartum depression.

## Pharmacotherapy in the perinatal period

A more thoughtful approach to opioid prescribing is urgently needed. As indicated, women are receiving more opioid prescriptions than a generation ago, while the self-harm data suggest that they also may be being advised to discontinue prescription psychiatric medications.<sup>18,35,36</sup> Research and subsequent provider education are needed regarding use of psychotropic and opioid medications during the perinatal period, clarifying risk/benefit ratios tailored to different patient health profiles.

In ACOG's Committee Opinion on Opioid use and Opioid Use Disorder in pregnancy, they recommend universal screening with validated screening tools, such as 4 Ps (parents, partner, past and present) and the National Institute on Drug Abuse Quick Screen Quick Screen, which aim to identify risk factors for prescription and illegal drug use.<sup>53,54</sup> For example, The 4 Ps (parents, partner, past and present) probes about a parent or partner's history of drug or alcohol misuse as well as the patient's personal past and present use or misuse. The National Institute on Drug Abuse Quick Screen uses a Likert scale to quantify patterns of alcohol, tobacco, prescription (not prescribed for medical reason), and illegal drug use in the past year. There are sequential levels of screening and education with positive responses.

## Time duration for added surveillance

The available data consistently show that the majority of maternal deaths secondary to self-harm occur in the late postpartum period, more than 42 days after delivery.<sup>6</sup> Until recently, the medical recommendation was 1 visit within 6 weeks postpartum.<sup>62</sup> A revised ACOG Committee Opinion released in 2018 now recommends a more personalized approach to postpartum care with a visit scheduled within 3 weeks to address acute issues that may arise and a second comprehensive evaluation within 12 weeks.<sup>63</sup>

This extended time frame, dubbed the fourth trimester, calls attention to the critical nature of this period, during

which new onset or exacerbation of mental health disorders can occur. Screening with the EPDS for depression and for substance use disorders should be a part of each postpartum visit, with attention to other relevant historical information about mental health including past trauma, diagnosis, and treatment. Obstetric providers must educate patients on the risks in the postpartum period and the importance of follow-up care. Surveillance of those who do not attend a postpartum visit must be vigilant.

The longer-term policy changes will hopefully mandate integration of care, possible telehealth access, and insurance reimbursement for additional visits. When implemented, this policy could identify, and help, women who have disengaged from postpartum medical care.

## Targeted interventions addressing maternal mental health

There have been initiatives in multiple states to address psychological and substance related illnesses in the pregnancy and postpartum period, but replicating and broadening access to these programs continues to be a challenge. The pregnant and postpartum period includes logistical challenges to attending added health care appointments typically uncoordinated with obstetric and pediatric care.<sup>64-67</sup> And yet pregnant and postpartum women have dramatically increased contact with primary care providers based on routine prenatal and pediatric visits. Barriers to access of mental health care and success of treatment include lack of accessible treatment.

In a 2010 study following up 51 perinatal women who were offered mental health referrals and their treatment engagement process, women cited provider unavailability (56%), cost/insurance mismatch (56%), poor match to need in patient/provider interactions (31%), and lack of time (25%) as the most common barriers to mental health engagement.<sup>68</sup> Models that integrate behavioral health services into routine perinatal and pediatric care leverage this

opportunity and are gaining attention and popularity for good reason.

Building on the success of Interpersonal Psychotherapy for prenatal depression, as well as collaborative care models that embed a depression care specialist into primary care settings and coordinate care across disciplines, Grote et al<sup>48</sup> have shown significant results with their program, MOMCare, treating depressed pregnant women who are socioeconomically disadvantaged.

The Massachusetts Child Psychiatry Access Program for Moms (MCPAP for Moms), directed by psychiatrist Nancy Byatt and obstetrician Tiffany Moore-Simas (<https://www.mcpapformoms.org/>), brings behavioral health services to health care personnel serving pregnant and postpartum women by providing the following: (1) trainings and toolkits on evidence-based guidelines for screening, assessment, and treatment of perinatal mental health and substance use disorders; (2) access to real-time telephonic psychiatric consultation; and (3) care coordination. Since its launch in July 2014, the Massachusetts Child Psychiatry Access Program for Moms has enrolled 134 obstetrics and gynecology practices, accounting for >80% of deliveries in the state, provided more than 3000 care coordination activities and more than 2000 phone consultations, serving more than 3000 perinatal women.<sup>49</sup>

## Conclusions

Maternal suicide and opiate overdose are major public health concerns and occur at higher rates than previously reported. This review includes many studies that have identified self-harm, via deemed suicide or opiate overdose as leading causes of death in the perinatal period. These self-harm deaths remain under the public radar, while parallel efforts to prevent death rates secondary to direct medical causes are being addressed. A recent commentary summarized the evolution of reporting of maternal deaths and highlighted the continuing need for universal definitions and shared information across states.<sup>69</sup>

The current classifications of maternal death, direct vs indirect, pregnancy associated vs pregnancy related, are not only ambiguous but also exclusive of a large proportion of mothers whose death could also have been prevented. Enhanced surveillance efforts presented in this paper have supported the need for linkage of death and birth certificates. Mental health diagnoses and treatments must be accessible via shared medical records, and an autopsy should be considered, if not mandated, in cases in which accidental or violent causes of death are suspected. Intimate partner violence is consistently cited as a risk factor for maternal mortality, and efforts to support universal screening must continue. Law enforcement records must also be reviewed in cases in which intimate partner violence is suspected.

Access to mental health and substance use disorder treatment continues to be a public health challenge. Policy changes and public and commercial insurance funding would increase access to services, such as opiate agonist therapies, that are known to prevent maternal death. Finally, the collaboration of obstetricians, gynecologists, and mental health professionals and mutual understanding of biopsychosocial risks of women in the perinatal period will lead to providing meaningful and comprehensive care.

Twenty-five years ago, in a study published in this Journal, Dannenberg et al<sup>70</sup> reported 39% of maternal deaths identified in New York City were attributable to self-harm behavior. Drug overdose and suicide accounted for 20% of these deaths. The report noted that “injury-related maternal death has received little attention” and advocated for the definition of maternal mortality to be standardized to include those resulting from self-harm behaviors. Their calls for action remain relevant today. ■

## REFERENCES

- MacDorman MF, Declercq E, Cabral H, Morton C. Recent increases in the US maternal mortality rate: disentangling trends from measurement issues. *Obstet Gynecol* 2016;128:447–55.
- Khalifeh H, Hunt IM, Appleby L, Howard LM. Suicide in perinatal and non-perinatal women in contact with psychiatric services: 15 year findings from a UK national inquiry. *Lancet Psychiatry* 2016;3:233–42.
- Smith K, Lipari R. Women of childbearing age and opioids. Rockville (MD: Substance Abuse and Mental Health Services Administration. Center for Behavioral Health Statistics and Quality; 2017.
- Lindahl V, Pearson JL, Colpe L. Prevalence of suicidality during pregnancy and the postpartum. *Arch Womens Mental Health* 2005;8:77–87.
- Pregnancy Mortality Surveillance System. Atlanta (GA): Centers for Disease Control and Prevention; 2017.
- Medicare. ICD-9-CM: International Classification Of Diseases, 9th revision, Clinical Modification. Salt Lake City (UT): Medicare; 1996.
- Hoyert DL. Maternal mortality and related concepts. *Vital Health Stat Series 3. Anal Epidemiol Stud* 2007;1–13.
- Grigoriadis S, Wilton AS, Kurdyak PA, et al. Perinatal suicide in Ontario, Canada: a 15-year population-based study. *Can Med Assoc J* 2017;189:E1085–92.
- Horon IL, Cheng D. Effectiveness of pregnancy check boxes on death certificates in identifying pregnancy-associated mortality. *Public Health Rep* 2011;126:195–200.
- MacKay AP, Rochat R, Smith JC, Berg CJ. The check box: determining pregnancy status to improve maternal mortality surveillance. *Am J Prev Med* 2000;19(Suppl 1):35–9.
- Zaharatos J, St Pierre A, Cornell A, Pasalic E, Goodman D. Building US capacity to review and prevent maternal deaths. *J Womens Health (Larchmt)* 2018;27:1–5.
- Esscher A, Högberg U, Haglund B, Essén B. Maternal mortality in Sweden, 1988–2007: more deaths than officially reported. *Acta Obstet Gynecol Scand* 2013;92:40–6.
- Palladino CL, Singh V, Campbell J, Flynn H, Gold K. Homicide and suicide during the perinatal period: findings from the National Violent Death Reporting System. *Obstet Gynecol* 2011;118:1056.
- Wallace ME, Hoyert D, Williams C, Mendola P. Pregnancy-associated homicide and suicide in 37 US states with enhanced pregnancy surveillance. *Am J Obstet Gynecol* 2016;215:364.e1–10.
- Cantwell R, Clutton-Brock T, Cooper G, et al. Saving mothers' lives: reviewing maternal deaths to make motherhood safer: 2006–2008. The Eighth Report of the Confidential Enquiries into Maternal Deaths in the United Kingdom. *BJOG* 2011;118(Suppl 1):1–203.
- Davis NL, Hoyert DL, Goodman DA, Hirai AH, Callaghan WM. Contribution of maternal age and pregnancy checkbox on maternal mortality ratios in the United States, 1978–2012. *Am J Obstet Gynecol* 2017;217:352.e1–7.
- Baeva S, Archer NP, Ruggiero K, et al. Maternal mortality in Texas. *Am J Perinatol* 2017;34:614–20.
- Metz TD, Rovner P, Hoffman MC, Allshouse AA, Beckwith KM, Binswanger IA. Maternal deaths from suicide and overdose in Colorado, 2004–2012. *Obstet Gynecol* 2016;128:1233–40.
- Bronson J, Reviere R. Pregnancy-associated deaths in Virginia due to homicides, suicides, and accidental overdoses compared with natural causes. *Violence Against Women* 2016;1077801216663658.
- Mehta PK, Bachhuber MA, Hoffman R, Srinivas SK. Deaths from unintentional injury, homicide, and suicide during or within 1 year of pregnancy in Philadelphia. *J Inform* 2016;106.
- Comtois KA, Schiff MA, Grossman DC. Psychiatric risk factors associated with postpartum suicide attempt in Washington State, 1992–2001. *Am J Obstet Gynecol* 2008;199:120.e1–5.
- Koch AR, Geller SE. Addressing maternal deaths due to violence: the Illinois experience. *Am J Obstet Gynecol* 2017;217:556.e1–6.
- Schiff DM, Nielsen T, Terplan M, et al. Fatal and nonfatal overdose among pregnant and postpartum women in Massachusetts. *Obstet Gynecol* 2018;132:466–74.
- Gemmill A, Kiang MV, Alexander MJ. Trends in pregnancy-associated mortality involving opioids in the United States, 2007–2016. *Am J Obstet Gynecol* 2019;220:115–6.
- Joseph K, Lisonkova S, Muraca GM, et al. Factors underlying the temporal increase in maternal mortality in the United States. *Obstet Gynecol* 2017;129:91–100.
- Zhong Q-Y, Gelaye B, Miller M, et al. Suicidal behavior-related hospitalizations among pregnant women in the USA, 2006–2012. *Arch Womens Mental Health* 2016;19:463–72.
- Golding JM. Intimate partner violence as a risk factor for mental disorders: a meta-analysis. *J Fam Violence* 1999;14:99–132.
- Hardt N, Wong TD, Burt MJ, Harrison R, Winter W, Roth J. Prevalence of prescription and illicit drugs in pregnancy-associated non-natural deaths of Florida mothers, 1999–2005. *J Forensic Sci* 2013;58:1536–41.
- Bagley SM, Cabral H, Saia K, et al. Frequency and associated risk factors of non-fatal overdose reported by pregnant women with opioid use disorder. *Addict Sci Clin Pract* 2018;13.
- Unger A, Jung E, Winklbaur B, Fischer G. Gender issues in the pharmacotherapy of opioid-addicted women: buprenorphine. *J Addict Dis* 2010;29:217–30.
- Terplan M. Women and the opioid crisis: historical context and public health solutions. *Fertil Steril* 2017;108:195–9.
- Fillingim RB, King CD, Ribeiro-Dasilva MC, Rahim-Williams B, Riley JL 3rd. Sex, gender, and pain: a review of recent clinical and experimental findings. *J Pain* 2009;10:447–85.
- Kilpatrick DG, Acierno R, Resnick HS, Saunders BE, Best CL. A 2-year longitudinal

analysis of the relationships between violent assault and substance use in women. *J Consult Clin Psychol* 1997;65:834–47.

**34.** Conway KP, Compton W, Stinson FS, Grant BF. Lifetime comorbidity of DSM-IV mood and anxiety disorders and specific drug use disorders: results from the National Epidemiologic Survey on Alcohol and Related Conditions. *J Clin Psychiatry* 2006;67:247–57.

**35.** McCarthy M. Opioid overdose deaths rose fivefold among US women in 10 years. *BMJ (Online)* 2013:347.

**36.** Bateman BT, Hernandez-Diaz S, Rathmell JP, et al. Patterns of opioid utilization in pregnancy in a large cohort of commercial insurance beneficiaries in the United States. *J Am Soc Anesthesiol* 2014;120:1216–24.

**37.** Desai RJ, Hernandez-Diaz S, Bateman BT, Huybrechts KF. Increase in prescription opioid use during pregnancy among Medicaid-enrolled women. *Obstet Gynecol* 2014;123:997.

**38.** Kroll-Desrosiers AR, Skanderson M, Bastian LA, et al. Receipt of prescription opioids in a national sample of pregnant veterans receiving Veterans Health Administration care. *Womens Health Issues* 2016;26:240–6.

**39.** Centers for Disease Control and Prevention NCHS. Births—method of delivery. Atlanta (GA): Centers for Disease Control and Prevention; 2017.

**40.** Bateman BT, Cole NM, Maeda A, et al. Patterns of opioid prescription and use after cesarean delivery. *Obstet Gynecol* 2017;130:29–35.

**41.** The Guttmacher Institute. Substance Abuse During Pregnancy. State Policies in Brief. Available at: <https://www.guttmacher.org/state-policy/explore/substance-use-during-pregnancy>. Accessed April 30, 2019.

**42.** Substance Abuse and Mental Health Services Administration, Medicaid Coverage and Financing of Medications to Treat Alcohol and Opioid Use Disorders. HHS Publication No. SMA-14-4854. Rockville (MD): Substance Abuse and Mental Health Services Administration 2014.

**43.** Prevatt B-S, Desmarais SL. Facilitators and barriers to disclosure of postpartum mood disorder symptoms to a healthcare provider. *Matern Child Health J* 2017;1–10.

**44.** Angelotta C, Appelbaum PS. Criminal charges for child harm from substance use in pregnancy. *J Am Acad Psychiatry Law* 2017;45:193–203.

**45.** Kendler KS. Toward a philosophical structure for psychiatry. *Am J Psychiatry* 2005;162:433–40.

**46.** Hamilton JA, Parry BL, Blumenthal SJ. The menstrual cycle in context, I: affective syndromes associated with reproductive hormonal changes. *J Clin Psychiatry* 1988;49:474–80.

**47.** Elliott SA, Rugg AJ, Watson JP, Brough DL. Mood changes during pregnancy and after the birth of a child. *Br J Clin Psychol* 1983;22:295–308.

**48.** Grote NK, Katon WJ, Russo JE, et al. Collaborative care for perinatal depression in socioeconomically disadvantaged women: a randomized trial. *Depress Anxiety* 2015;32:821–34.

**49.** Byatt N, Biebel K, Moore Simas TA, et al. Improving perinatal depression care: the Massachusetts Child Psychiatry Access Project for Moms. *Gen Hosp Psychiatry* 2016;40:12–7.

**50.** US Preventive Services Task Force, Curry SJ, Krist AH, et al. Interventions to prevent perinatal depression: US Preventive Services Task Force Recommendation Statement. *JAMA* 2019;321:580–7.

**51.** Byatt N, Xu W, Levin LL, Moore Simas TA. Perinatal depression care pathway for obstetric settings. *Int Rev Psychiatry* 2019;1–19.

**52.** Rafferty J, Mattson G, Earls MF, Yogman MW; Committee on Psychosocial Aspects of Child and Family Health. Incorporating recognition and management of perinatal depression into pediatric practice. *Pediatrics* 2019;143.

**53.** American College of Obstetricians and Gynecologists. Screening for depression during and after pregnancy. ACOG Committee opinion no. 453. *Obstet Gynecol* 2010;115:394–5.

**54.** American College of Obstetricians and Gynecologists. Screening for perinatal depression. ACOG Committee opinion no. 630. *Obstet Gynecol* 2015;5:1268–71.

**55.** Siu AL, Bibbins-Domingo K, Grossman DC, et al. Screening for depression in adults: US Preventive Services Task Force recommendation statement. *JAMA* 2016;315:380–7.

**56.** O'Connor E, Rossom RC, Henninger M, Groom HC, Burda BU. Primary care screening for and treatment of depression in pregnant and postpartum women: evidence report and systematic review for the US Preventive Services Task Force. *JAMA* 2016;315:388–406.

**57.** Cox JL, Holden JM, Sagovsky R. Detection of postnatal depression. Development of the 10-item Edinburgh Postnatal Depression Scale. *Br J Psychiatry* 1987;150:782–6.

**58.** Wisner KL, Sit DK, McShea MC, et al. Onset timing, thoughts of self-harm, and diagnoses in

postpartum women with screen-positive depression findings. *JAMA Psychiatry* 2013;70:490–8.

**59.** Chisholm CA, Bullock L, Ferguson JEJ 2nd. Intimate partner violence and pregnancy: screening and intervention. *Am J Obstet Gynecol* 2017;217:145–9.

**60.** Young-Wolff KC, Alabaster A, McCaw B, et al. Adverse childhood experiences and mental and behavioral health conditions during pregnancy: the role of resilience. *J Womens Health (Larchmt)* 2018;28:452–61.

**61.** Mahenge B, Stockl H, Mizinduko M, Mazalale J, Jahn A. Adverse childhood experiences and intimate partner violence during pregnancy and their association to postpartum depression. *J Affect Disord* 2018;229:159–63.

**62.** American College of Obstetricians and Gynecologists. ACOG Committee opinion no. 666: Optimizing Postpartum Care. *Obstet Gynecol* 2016;127(6):e187–92.

**63.** American College of Obstetricians and Gynecologists. ACOG Committee opinion no. 736. *Obstet Gynecol* 2018;131(5):e140–50.

**64.** Goodman JH. Women's attitudes, preferences, and perceived barriers to treatment for perinatal depression. *Birth* 2009;36:60–9.

**65.** Dennis CL, Chung-Lee L. Postpartum depression help-seeking barriers and maternal treatment preferences: a qualitative systematic review. *Birth* 2006;33:323–31.

**66.** Byatt N, Simas TA, Lundquist RS, Johnson JV, Ziedonis DM. Strategies for improving perinatal depression treatment in North American outpatient obstetric settings. *J Psychosom Obstet Gynaecol* 2012;33:143–61.

**67.** Werner EA, Gustafsson HC, Lee S, et al. PREPP: postpartum depression prevention through the mother-infant dyad. *Arch Womens Ment Health* 2016;19:229–42.

**68.** Kim JJ, La Porte LM, Corcoran M, Magasi S, Batza J, Silver RK. Barriers to mental health treatment among obstetric patients at risk for depression. *Am J Obstet Gynecol* 2010;202:312.e1–312.e5.

**69.** St Pierre A, Zaharatos J, Goodman D, Callaghan WM. Challenges and opportunities in identifying, reviewing, and preventing maternal deaths. *Obstet Gynecol* 2018;131:138–42.

**70.** Dannenberg AL, Carter DM, Lawson HW, Ashton DM, Dorfman SF, Graham EH. Homicide and other injuries as causes of maternal death in New York City, 1987 through 1991. *Am J Obstet Gynecol* 1995;172:1557–64.