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COMMENTARY

Putting the "M" Back in the Maternal and Child Health Bureau: Reducing Maternal Mortality and Morbidity

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Abstract Maternal mortality and severe morbidity are on the rise in the United States. A significant proportion of these events are preventable. The Maternal Health Initiative (MHI), coordinated by the Maternal and Child Health Bureau at the Health Resources and Services Administration, is intensifying efforts to reduce maternal mortality and severe morbidity in the U.S. Through a public–private partnership, MHI is taking a comprehensive approach to improving maternal health focusing on five priority areas: improving women's health before, during and beyond pregnancy; improving the quality and safety of maternity care; improving systems of maternity care including both clinical and public health systems; improving public awareness and education; and improving surveillance and research.

Keywords Maternal mortality · Maternal morbidity · Women's health · Maternal health

Introduction

Improvements in the health of mothers and babies have been hailed as one of the "Ten Great Public Health Achievements" of the twentieth century in the United States. From 1990 to 1999, infant mortality decreased by 90 %, and maternal mortality decreased by 99 % [1]. However, most of the reduction in maternal mortality occurred during the first 80 years of the twentieth century where the ratio dropped from 608 deaths per 100,000 live births in 1915 to 9.2 in 1980 [2]. The decline plateaued in the early 1980s and maternal mortality increased steadily starting in 1987; between 1987 and 2009, the maternal mortality ratio increased 2.5-fold from 7.2 to 17.8 deaths per 100,000 live births [3]. Moreover, there continues to be a large and persistent racial gap in maternal mortality. A three- to fourfold increase in maternal deaths among African American women compared to white women has been observed since race-specific data collection started in 1915 [2, 3]. Through a public–private partnership, the Maternal and Child Health Bureau (MCHB) at the Health Resources and Services Administration (HRSA) is coordinating efforts to reduce maternal mortality and severe morbidity in the U.S.

Causes of Increased Maternal Morbidity and Mortality

The recent increase in maternal mortality rates could be attributed in part to better surveillance and improved detection of maternal deaths. Many states have implemented computerized data links and adopted the ICD-10 in 1999 and added a pregnancy check-box on death certificates in 2003 to identify women who were pregnant during the months before their death [4]. However, it is also possible that the increase is real. Maternal mortality is directly related to maternal morbidity and represents the most severe complications of pregnancy—"the tip of the iceberg". Recent data from the Centers for Disease Control and Prevention (CDC) indicate that there has been a significant increase in severe maternal morbidity in the United States [5].

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The CDC refers to maternal morbidity as the "physical and psychological conditions that result from or are aggravated by pregnancy and have an adverse effect on a woman's health" [4]. Severe maternal morbidity are "serious complications that are potentially life threatening if not identified, monitored or treated efficiently and appropriately" (such as hemorrhage, embolism, acute renal failure, stroke, acute myocardial infarctions among others) [5]. For the years 1998 to 2011, the CDC estimates that severe maternal morbidity affected over 60,000 women in the United States every year, and this burden has been steadily increasing in recent years [4]. The CDC also reported clinically and statistically significant increases in overall severe maternal morbidity rates between 1998–1999 and 2010–2011 [4]. For 2010–2011, Creanga et al. [4, 5] reported that there were 163 delivery hospitalizations with at least one severe maternal morbidity for every 10,000 delivery hospitalizations compared with a rate of 73.8 in 1998–1999, a 123 % increase. Similarly, between the periods 1998–1999 and 2008–2009, Callaghan et al. [5] reported a 114 % increase in the rates of severe morbidity for postpartum hospitalizations.

The increase in severe maternal morbidity may be attributed to many factors such as advanced medical technology and the changing demographics of childbearing. Assisted reproductive technology allows more women of advanced maternal age to conceive; and advances in medicine make it possible for women with serious medical conditions to consider pregnancy. In addition, more women are now entering pregnancy with behavioral risk factors like tobacco or alcohol use, and with more chronic conditions like hypertension, diabetes and obesity [6, 7]. Thus, a higher proportion of women enter pregnancy with factors that place them at risk of severe maternal morbidity or mortality.

Reports from the CDC using data from the Pregnancy Risk Assessment Monitoring System indicate that in 2004, and during the months prior to their pregnancy, of all women who recently gave birth to a live born baby, 23.2 % used tobacco, 50.1 % used alcohol, only 35.1 % used multivitamins at least four times a week, 53.1 % were not using contraception although they were not trying to get pregnant, only 30.3 % received pre-pregnancy health counseling, 3.6 % experienced physical abuse, and 18.5 % experienced at least four stressors before pregnancy. When asked about their health during the preconception period, 13.2 % reported being underweight, 13.1 % reported being overweight, and 21.9 % reported being obese. The prevalence of chronic health problems included: diabetes 1.8 %, asthma 6.9 %, hypertension 2.2 %, heart problems 1.2 %, and anemia 10.2 % [6].

More recently, Xaverius and Salas analyzed data from the Behavioral Risk Factor Surveillance System for 2003–2010 and examined preconception indicators before 2006 and after 2006 for women 18–44 years old [7]. The authors concluded that there was a significant improvement in preconception risk behaviors. In 2007–2010, women were 10 % less likely to drink any alcohol, 9 % less likely to be heavy alcohol drinkers, 19 % less likely to smoke, 6 % more likely to eat five or more daily fruit and vegetable servings, 6 % more likely to report moderate or vigorous activity, 6 % more likely to report having social and emotional support, and 66 % more likely to have had an influenza shot. Still, in 2007–2010, of all 18–44 year old non-pregnant women, 4.7 % reported heavy drinking, 18.8 % smoked, 19 % reported having no social and emotional support, only 67.2 % had an annual routine checkup, and only 27.5 % had an influenza shot [7]. Moreover, Xaverius and Salas reported that, in 2007–2010, only 89 % of women reported being in excellent, very good, or good general health, 14 % were more likely to report a chronic medical condition (i.e., diabetes, high blood pressure, asthma, or obesity), and 39 % reported having any medical condition [7].

Response and Action

Following the remarkable success achieved during the twentieth century in reducing maternal mortality, the Maternal and Child Health community became complacent; some even spoke of the "irreducible minimum" and proposed that there could be no further reduction in maternal mortality. The wakeup call came in the mid-1980s and early 1990s when the CDC initiated its national surveillance efforts of maternal mortality and analyzed national data highlighting the under-counting of maternal deaths and the high proportion of maternal complications [8, 9]. At the same time and at the global level, Alan Rosenfield posed the question "Where is the M in MCH", calling for renewed attention to maternal health [10]. The alarm bells continue with new calls to action and new data and evidence being published regularly, but now with renewed emphasis on a broader approach to improving maternal health including a focus on preconception health and a life-course approach to improving perinatal outcomes [4, 5, 11, 12]. Many groups responded to these calls at the local, state and national levels by intensifying ongoing efforts and/or initiating new programs to improve maternal health. This includes global efforts in support of the Millennium Development Goals, CDC's intensified surveillance and data analysis activities, and the American Congress of Obstetrics and Gynecology/Society for Maternal-Fetal Medicine (ACOG/SMFM) Council on Patient Safety. For example, the ACOG/SMFM Patient Safety Council recently developed three Maternal Safety

Bundles to address obstetric hemorrhage, severe hypertension in pregnancy, and venous thromboembolism prevention in pregnancy. Merck for Mothers launched programs in five priority countries to accelerate women's access to life-saving solutions; Brazil, India, Uganda, United States and Zambia. The Association of Women's Health, Obstetric and Neonatal Nurses (AWHONN) launched the Postpartum Hemorrhage Project to reduce clinician errors associated with obstetric hemorrhage mortality and morbidity by improving clinician's recognition of, readiness for, and response to a postpartum hemorrhage event. Many public and private organizations have been engaged in preconception health and health care activities at the national and state levels, among others.

The Maternal Health Initiative—A Public–Private Partnership

The mission of the HRSA's Bureau of Maternal and Child Health (MCHB) is to improve the health of all of America's mothers and children. Through a strong partnership with States, MCHB administers the (Title V) Maternal and Child Health Block Grant, which supports public health programs and systems for MCH populations in all 59 states and jurisdictions. MCHB is working closely with partners in the public and private sectors to promote and support activities to improve maternal health through the Maternal Health Initiative, a comprehensive national initiative to promote, protect and improve maternal health.

The Maternal Health Initiative (MHI) overarching goal is to reduce maternal morbidity and mortality by improving women's health across the life course, and by assuring the quality and safety of maternity care. This will be accomplished through coordination and collaboration within HRSA, across agencies of the Department of Health and Human Services, and with other public and private partners. Since 2012, MCHB has reached out to groups and organizations currently engaged in maternal health activities at the national and regional levels to identify priorities and strategies for a national strategy on maternal mortality and severe morbidity.

What MCHB heard from experts was that, to improve maternal health in America, five main areas need to be addressed:

1. Improving women's health before, during and beyond pregnancy. Reducing maternal mortality and morbidity requires improving maternal health and health care not only during pregnancy, but before, between and beyond pregnancy and across the life course. The risk of pregnancy complications increases when women are not at their optimal health at the time of conception. There has been a growing awareness of the importance of preconception and interconception health for improving maternal and infant pregnancy outcomes. The Centers for Disease Control and Prevention and the Agency for Toxic Substance and Disease Registry (CDC/ATSDR) released recommendations for improving preconception health that will promote changes in consumer awareness, clinical practice, public health interventions, health coverage, and research and data [12]. The interconception period provides a window of opportunity to change health behaviors associated with adverse perinatal and birth outcomes [13, 14]. Interconception care for healthy mothers offers an opportunity for wellness promotion between pregnancies. For high-risk mothers, interconception care provides strategies for risk reduction before their next pregnancy. Interconception care represents longitudinal continuity of maternal care and inter-generational continuity of care, promoting the importance of both the mother's and child's health outcomes.
2. Improving the quality and safety of maternal health care. Improvements in the quality of care that pregnant women receive can make a real difference in reducing maternal mortality and severe morbidity. Six areas have been identified where there is "low-hanging fruit" for reducing maternal mortality and morbidity through quality improvement. These include: hypertension; pulmonary embolism; hemorrhage; diagnosis and management of placenta percreta; management of cardiac patients; and management of obese patients [11]. Improving quality and safety of maternal health care may be achieved through supporting efforts at the local level to implement protocols and checklists, conduct simulations and drills, develop rapid response teams to obstetrical emergencies, and give provider feedback on outcomes such as cesarean delivery rates. Progress can also be achieved by supporting states to develop systems to monitor and improve quality and safety of perinatal health care, and supporting regional quality collaboratives like the ones being piloted in California and Ohio [15].
3. Improving systems of maternity care, including clinical and public health systems. Key to making the system work smarter is integration—vertical, horizontal, and longitudinal. Vertical integration refers to appropriate levels of care. Horizontal integration refers to care coordination and systems integration not only within health care but across systems, such as Women, Infants and Children (WIC) programs, social services, and public health. And longitudinal integration refers to the continuum of care and support for women's health across the life course.
4. Improving public awareness and education. There is a need to educate the public about the burden of

maternal mortality and morbidity. The public may not be fully aware that 600–800 women die each year from pregnancy and childbirth here in the United States; [4] that another 50,000 to 60,000 women experience severe morbidities often resulting in disabilities and long term problems; [5] that nearly one in three pregnancies are complicated by either a preexisting condition or an obstetrical complication; or that many of these complications can be prevented. And,

5. Improving surveillance and research. The National Institute of Child Health and Human Development (NICHD) and SMFM along with other organizations, have identified several critical research gaps and priorities for action: developing standardized methods for national surveillance; defining significant maternal morbidity; prediction of "patients" risk of maternal mortality and severe morbidity; determining optimal timing of delivery; conducting economic analyses to show benefit of maternal care, including inter-pregnancy and post-delivery care; assessing the effectiveness of various approaches to improve training in maternal medicine; and, monitoring the impact of adverse pregnancy outcomes on long-term maternal health [11].

The HRSA working with other federal and private partners, has begun to take actions to address these areas of needs to reduce maternal morbidity and mortality in the United States. For example, in 2013, HRSA supported the development of "maternal safety bundles" by a coalition of more than 20 professional organizations led by the American College of Obstetricians and Gynecologists (ACOG). The bundles contain consensus guidelines, protocols, toolkits, triggers, and other tools to help clinicians and hospitals address three of the major causes of maternal mortality and severe morbidities—hemorrhage, preeclampsia, and thromboembolism. In England following the publication of thromboprophylaxis guidelines by the Royal College of Obstetrics and Gynecology in 2004, maternal deaths due to thrombosis and thromboembolism decreased by 60 % in 3 years [16].

In September 2014, HRSA in partnership with ACOG and other partners launched a national campaign to save 100,000 women from preventable deaths or severe morbidities in the next 4 years by (1) promoting preconception and inter-conception health and health care, (2) reducing low-risk, primary cesarean deliveries, and (3) improving the quality and safety of maternity care by implementing maternal safety bundles in every birthing hospital in the U.S.

As part of the campaign, HRSA is working collaboratively with ACOG, the National Partnership for Maternal Safety and partners at the state and national levels to launch a national provider campaign and provide support and technical assistance to implement maternal safety bundles focused on obstetric hemorrhage, preeclampsia/hypertension, venous thromboembolism, the safe reduction of primary cesarean sections, and the promotion of inter-conception care and well women preventive health services. State teams composed of local representatives from partnering organizations, local patient advocacy groups, hospital systems, and community health leaders will be convened to promote and assist with the integration of the bundles into birthing facilities. To support the rapidly expanding initiatives in maternity care quality improvement, the National Partnership for Maternal Safety will conduct a concurrent national rollout of the bundles, providing expert virtual support and encouraging and documenting adoption of the bundles by individual birth facilities and hospital systems. Data on implementation and outcome will be readily available for both states and facilities to assess progress for rapid cycle quality improvement.

The MHI serves as a national platform to coordinate existing efforts, identify gaps in the field, and leverage opportunities for collaboration by building consensus on the strategic direction for improving the health of women and mothers in the United States. This campaign is an example of how public and private partners are working collaboratively and collectively to improve women's health across the life course and improve the quality and safety of maternity care. To move the needle in reducing maternal morbidity and mortality in the United States, it is a necessity to have organizations from different sectors commit to addressing specific issues using a common agenda, align their efforts, and use common measures of success. One organization cannot effectively and efficiently implement nor sustain a comprehensive cross-sector approach which is needed to promote and protect maternal and women's health.

Nearly thirty years ago, Dr. Allen Rosenfield raised the question, "Where is the M in MCH?" calling for greater attention to global maternal mortality [10]. It is time for all of us to work together and act on Dr. Rosenfield's call and vision and re-focus our attention to the increasing burden of maternal morbidity and mortality here at home.

Conflict of interest The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Health Resources and Services Administration.

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