Maternal Near-Miss Audit: Lessons to Be Learnt

Abstract
Mother and child constitute a large, vulnerable, and a priority group as the risk is involved with childbearing in women and of growth and development in children. For every woman who dies from pregnancy or childbirth-related causes, it is estimated that twenty more suffer from pregnancy-related illness or experience other severe complications. These women who nearly escape death are categorized under “near miss” which has been defined as “a woman who nearly died but survived a complication that occurred during pregnancy, childbirth or within 42 days of termination of pregnancy.” Maternal near-miss audits give us an opportunity to study the cases which were almost similar to those where maternal deaths happened; thus, their review may give concrete evidence of reasons/deficiencies in health care leading to severe complications and even grave consequences as maternal deaths. Near-miss audits will allow the care of critically ill women to be analyzed, deficiencies in the provision of care to be identified, and comparison within and between institutions and, ultimately, improve the quality of obstetric care and further reduce maternal morbidity and mortality.

Keywords: Audit, maternal, mortality, near-miss

Introduction
Mother and child is one of the highest priority groups for health care. In India, they constitute 57.5% of the total population, out of which women in the reproductive age group comprise 22.2% and children under 15 years of age 35.3% of the total population.[1] In 2013, globally, 289,000 maternal deaths occurred, majority of which were in Sub-Saharan Africa (62%) and Southern Asia (24%). At the country level, India (17%) and Nigeria (14%) accounted for one-third of these global deaths.[2] Maternal mortality ratio (MMR) in India has declined from 301 in 2001 and 212 in 2011 to 167 per lakh live births in 2014,[3,4] thus missing the target set by the Millennium Development Goal 5 (MDG; MMR < 150/lakh live births). Despite the progress made worldwide in reducing maternal mortality, the global MDG targets could not be achieved. Now, the unfinished task has been taken over by sustainable development goals: Goal 3 (Target 3.1) which has set a global target to reduce MMR to < 70/lakh live births by 2030.[5]

A maternal death is one of the most devastating complications in obstetrics, with wide-ranging implications for both the family and the staff involved. For every woman who dies from pregnancy or childbirth-related causes, it is estimated that twenty more suffer from pregnancy-related illness or experience other severe complications.[2] Those women who nearly escape death are categorized under near miss. Maternal near miss has been defined as – “a woman who nearly died but survived a complication that occurred during pregnancy, childbirth or within 42 days of termination of pregnancy.”[6] Women who survive life-threatening conditions arising from complications related to pregnancy and childbirth have many common aspects with those who die of such complications and this similarity led to the development of the near-miss concept in maternal health.

Advantages of Maternal Near-miss Reviews
There are several advantages of investigating near-miss events over events with the fatal outcome as near miss is more common than maternal deaths, and their review is likely to yield useful information on the same pathways that lead to severe morbidity and mortality.
World Health Organization Maternal Near-miss Classification

Until a few years back, there was no standard criterion for the classification of near miss leading to discrepancies in regional or international level comparisons. In 2008, the World Health Organization (WHO) adopted a maternal near-miss definition and established standard criteria for the identification of women presenting pregnancy-related life-threatening conditions. The WHO definition enables a common ground for the implementation of maternal near-miss assessments across countries and allows international comparisons to be carried out.[7]

The complete WHO near-miss approach is best implemented in three steps: (a) baseline assessment (or reassessment); (b) situation analysis; and (c) interventions for improving health care.[8]

Baseline assessment

The first step in implementing the near-miss approach is to systematically identify women with severe complications of pregnancy. Women who are pregnant, in labor, or who delivered or aborted up to 42 days ago arriving at the facility with any of the listed conditions or those who develop any of those conditions during their stay at the health-care facility would be eligible. The inclusion criteria for baseline assessment of quality of care are as follows:

i. Severe maternal complications which include severe postpartum hemorrhage, severe preeclampsia, eclampsia, sepsis or severe systemic infection, ruptured uterus, and severe complications of abortion
ii. Critical interventions or intensive care unit use includes admission to intensive care unit, interventional radiology, and laparotomy (includes hysterectomy, excludes cesarean section) and use of blood products
iii. Life-threatening conditions (near-miss criteria) may be subdivided into:
   a. Cardiovascular dysfunctions such as shock, cardiac arrest, use of continuous vasoactive drugs, cardiopulmonary resuscitation, and severe hypoperfusion
   b. Respiratory dysfunctions such as acute cyanosis, gasping, severe tachypnea (respiratory rate >40 breaths/min), severe bradypnea (respiratory rate <6 breaths/min), intubation and ventilation not related to anesthesia, and severe hypoxemia
   c. Renal dysfunction includes oliguria nonresponsive to fluids or diuretics, dialysis for acute renal failure, and severe acute azotemia
   d. Coagulation/hematological dysfunction including failure to form clots, massive transfusion of blood or red cells (≥5 units), and severe acute thrombocytopenia (<50,000 platelets/ml)
   e. Hepatic dysfunction like jaundice in the presence of preeclampsia, severe acute hyperbilirubinemia (bilirubin >100 μmol/l or > 6.0 mg/dl)
   f. Neurological dysfunction - prolonged unconsciousness (lasting ≥12 h)/coma, stroke, uncontrollable fits/status epilepticus, and total paralysis
   g. Uterine dysfunction - uterine hemorrhage or infection leading to hysterectomy

Situation analysis

Situation analysis involves the identification of opportunities (and obstacles) for improving care.

Intervention for improving care

Intervention for improving care includes audit and feedback, engagement of opinion leaders and early adopters, development and use of local protocols, prospective case identification, reminders and educational activities, and use of evidence-based checklists.

The primary unit for the implementation of the near-miss approach is the individual health-care facility. Ideally, it should be used as part of a comprehensive intervention for strengthening district health systems, specifically contributing to monitoring the quality of care, assessing the implementation of key interventions, informing the mechanisms of referral, and strengthening all levels of health-care services. The findings of the assessments, once discussed within the health facility, should be disseminated to policymakers and administrators. This can help promote policy actions and mobilize professional and civil societies to improve the quality of care for pregnant women.[8]

Data Collection and Data Management

Data for the near-miss criterion-based clinical audit are extracted from appropriate patient records. These records are usually kept by the facilities included in the audit. In case of doubt about individual cases, or incomplete data in the patient records, relevant facility staff should be contacted.

For each woman, data should be collected on the occurrence of selected severe pregnancy-related complications and severe maternal outcomes, use of critical/key interventions, and admission to intensive care unit. In addition, all relevant dates should be noted along with the referral process followed, condition of the woman on arrival at the facility, whether the woman had the complication before,
during, or after delivery, mode of delivery, pregnancy outcome, and underlying and contributing causes of severe maternal outcomes.

Data collected from each facility should include the total number of deliveries and a total number of live births at the facility during the data collection period. Descriptive data on the facility (e.g., level of care, information about the catchment area, essential information on available resources) should also be documented.

A database should be constituted. Freely available software solutions and electronic spreadsheets could be used to store and manage the collected data.

**Maternal Near-miss Indicators**

Certain maternal near-miss indicators have been suggested to evaluate the quality of care; namely, maternal near-miss ratio, which is the ratio of the number of maternal near-miss cases and live births. It is an estimation of the amount of care and resources that would be needed in an area or facility. Another important indicator is maternal near-miss mortality ratio which is the ratio of the number of maternal near miss and deaths; a higher ratio indicates better care.\(^9\)

Access to a good quality Emergency Obstetric care (EmOC) is another key strategy to improve the maternal outcome. Studies have shown the availability and access of EmOC to be below the target coverage levels, especially among the poor and less-educated women in poorly performing states.\(^9,10\) The state of Tamil Nadu has been successful in observing a significant decline in maternal mortality due to series of initiatives such as skilled birth attendance for all births and making EmOC services available and accessible. The key lesson learned from the success is to focus on specific evidence-based strategies to reduce maternal mortality.\(^11\)

**Conclusion**

While the review of maternal deaths and identification of avoidable contributing factors will undoubtedly continue to occur, incorporation of maternal near-miss analysis in assessing the process of obstetric care will be a valuable contribution in taking necessary action to improve the quality of care. The addition of near-miss audits will allow the care of critically ill women to be analyzed, deficiencies in the provision of care to be identified, and comparison within and between institutions and countries to be carried out overtime. This will, ultimately, improve the quality of obstetric care and further reduce the maternal morbidity and mortality. Thus, all near misses should be interpreted as free lessons and opportunities to improve the quality of service provision.

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**Conflicts of interest**

There are no conflicts of interest.

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