OBSTETRICS

Beyond the numbers: classifying contributory factors and potentially avoidable maternal deaths in New Zealand, 2006–2009

Cynthia Farquhar, MBChB, MD, MPH, FRANZCOG; Lynn Sadler, MBChB, MPH; Vicki Masson, RN, RM, DipPH; Gillian Bohm, RN; Alastair Haslam, MBChB, FRANZCOG

OBJECTIVE: We sought to describe a new classification system for contributory factors in, and potential avoidability of, maternal deaths and to determine the contributory factors and potential avoidability among 4 years of maternal deaths in New Zealand.

STUDY DESIGN: A new classification system for reporting contributory factors in all maternal deaths was developed from previous tools and applied to all maternal deaths in New Zealand from 2006 through 2009.

RESULTS: There were 49 deaths and the maternal mortality ratio was 19.2/100,000 maternities. Contributory factors were identified in 55% of cases. An expert panel identified 35% of maternal deaths as potentially avoidable. In cases where potential avoidability was determined, there were nearly always 2 or 3 domains where contributory factors were identified.

CONCLUSION: Almost one third of maternal deaths in New Zealand can be considered to be potentially avoidable. This methodology has the potential to identify areas for improvement in the quality of maternity care.

Key words: maternal death, mortality review, potentially avoidable factors, quality improvement

Cite this article as: Farquhar C, Sadler L, Masson V, et al. Beyond the numbers: classifying contributory factors and potentially avoidable maternal deaths in New Zealand, 2006–2009. Am J Obstet Gynecol 2011;205:331.e1-8.

Maternal deaths are devastating events for families. The number of maternal deaths each year in New Zealand varies from 9-15 (Perinatal and Maternal Mortality Review Committee [PMMRC] 2008).[1] In 2005, the New Zealand Minister of Health established the PMMRC for the purpose of reviewing both perinatal and maternal deaths. The strength of mortality review is the ability to review deaths both individually and as aggregated data. From the single examination of cases by experts comes information that might otherwise have been overlooked. From the aggregated data come broader themes and trends that can be identified and monitored and with appropriate policy changes and interventions might lead to improvements in outcomes.[2]

Mortality review should not only focus on definitions and causation of disease but also needs to focus on modifiable features in health systems and the quality of clinical care.[2] With this in mind, the PMMRC sought to report not only clinical data but also contributory factors and potential avoidability. For example, a woman with preeclampsia dies at 38 weeks from a cerebral hemorrhage and on review of the case the management of hypertension was found to be outside standard practice. This death would be classified as a direct maternal death from hypertension with contributory factors that might include inadequate protocols or guidelines, failure to follow standard practice, and failure to appreciate the seriousness of the condition. The death can therefore be considered potentially avoidable.

It has been suggested that even in the developed world 50% of all maternal deaths are potentially avoidable.[3] A number of models of reporting contributory factors have already been developed.[4-9] None of these systems adequately met our requirements for identifying potential avoidability. Some failed to provide adequate documentation of the process. For example, we were unable to find a definition of substandard care or the methodology used by Centre for Maternal and Child Enquiries (CMACE).[3,8] Other models covered some dimensions well but were not comprehensive.[6,7] For example, we sought to report on barriers to accessing or engaging with care and yet none of the classification systems encompassed this dimension. In the case of root cause analysis, it was thought that this only addressed system issues and did not consider the contribution of clinical competence.[9] The aim of this report is to, first, describe a new classification system for contributory factors incorporating the best of these approaches and, second, to

From the Perinatal and Maternal Mortality Review Committee (Ms Farquhar, Dr Sadler and Ms Masson), Ministry of Health (Ms Bohm), Wellington; the Department of Obstetrics and Gynaecology, University of Auckland (Dr Farquhar and Ms Masson), and Department of Obstetrics and Gynaecology, National Women's Health, Auckland District Health Board (Dr Sadler), Auckland; and Department of Obstetrics and Gynaecology, Waikato Hospital, Hamilton (Dr Haslam), New Zealand.

Received Feb. 18, 2011; revised June 22, 2011; accepted July 27, 2011.

The authors report no conflict of interest.

Reprints not available from the authors.

0002-9378/$36.00

doi: 10.1016/j.ajog.2011.07.044

See related editorial, page 293

TABLE 1
Perinatal and Maternal Mortality Review Committee Contributory Factors form

Have any organizational and/or management factors been identified?
Poor organizational arrangements of staff
Inadequate education and training
Lack of policies, protocols, or guidelines
Inadequate numbers of staff
Poor access to senior clinical staff
Failure or delay in emergency response
Delay in procedure, eg, cesarean section
Inadequate systems/process for sharing of clinical information between services
Delayed access to test results or inaccurate results
Other reason
Have factors relating to personnel been identified?
Knowledge and skills of staff were lacking (includes failure to maintain competence)
Delayed emergency response by staff
Failure of communication between staff
Failure to seek help/supervision
Failure to offer or follow recommended best practice
Lack of recognition of complexity or seriousness of condition
Other reason
Have factors relating to technology and equipment been identified?
Essential equipment not available
Lack of maintenance of equipment
Malfunction/failure of equipment
Failure/lack of information technology
Other reason
Have factors relating to environment been identified?
Geography, eg, long-distance transfer
Building and design functionality limited clinical response
Other reason
Have barriers to accessing/engaging with care (eg, no, infrequent, or late booking for antenatal care; woman declined treatment/advice) been identified?
Substance use
Lack of recognition of complexity or seriousness of condition (by either woman or her family)
Maternal mental illness
Cultural barriers
Language barriers
Not eligible to access free care
Family violence
Other reason

Farquhar. Potential avoidability in maternal deaths in New Zealand 2006 through 2009. Am J Obstet Gynecol 2011.

determine the contributory factors and potential avoidability among 4 years of maternal deaths in New Zealand.

Materials and Methods

The Maternal Mortality Review Working Group (MMRWG) of the PMMRC is responsible for reviewing all maternal deaths in New Zealand. The members of the working group include obstetricians, midwives, an anesthetist, a psychiatrist, a health care manager, and a pathologist.

Definitions

In New Zealand, a maternal death is defined as the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes.

The maternal mortality ratio is calculated per 100,000 maternities and follows this CMACE approach.[3] Maternities are defined as all live births and fetal deaths at ≥20 weeks or weighing ≥400 g if gestation unknown. Pregnancies ending <20 weeks are not included in this working definition because the absolute number of pregnancies ending before this time is unknown.

The definitions adopted by the MMRWG are based on the World Health Organization definitions from the *International Statistical Classification of Diseases, 10th Revision* and the cause of each death is subclassified, using the CMACE system[3]:

- **Direct maternal deaths**: those resulting from obstetric complications of the pregnant state (pregnancy, labor, or puerperium); from interventions, omissions, incorrect treatment; or from a chain of events resulting from the above.
- **Indirect maternal deaths**: those resulting from previous existing disease or disease that developed during pregnancy and not due to direct obstetric causes, but aggravated by the physiologic effects of pregnancy.
- **Coincidental maternal deaths**: those resulting from unrelated causes that happen to occur in pregnancy or the puerperium.