REVIEW

Education and training approaches for reducing maternal deaths in Japan

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Maternal mortality rates in Japan declined steadily until around 2007, after which they plateaued, with current numbers residing at 2.7–4.8/100,000 total births. A more accurate grasp on the number of maternal deaths and suicide cases among pregnant women and those within 1 year postpartum is needed. These data must be analyzed in order to provide countermeasures and knowledge on emergency life-saving measures. To this end, the entire medical team should attend training so that the various problems may be resolved among multidisciplinary professionals and better treatment and management may be provided, facilitating a proper response to any situation. Establishing cooperative relationships with higher level medical institutions to which patients may need to be transferred is also important. Sharing case histories and courses in regular case conferences and debriefing sessions would also be beneficial.

Introduction

Over the past several decades, rapid progress and advancements in perinatal care in Japan have occurred. Maternal, perinatal, and neonatal mortality rates have all decreased markedly, showing continuous improvements. While persistent efforts and ongoing commitment among senior obstetricians and gynecologists represent the main driving force for these reductions, such improvements are the result of integrated efforts by dedicated doctors, medical facilities, and health administrations. These include the introduction of updated medical techniques, improvements in medical care level, and the development of perinatal centers. Notably, the maternal mortality rate in Japan decreased steadily until 2007 (3.1/100,000 total births), but then showed repeated fluctuations thereafter, remaining at 2.7/100,000 total births in 2014 and 3.4/100,000 total births in 2016. This plateau could be explained by a number of factors observed in the past 20 years pertaining to the changing environment surrounding women, such as the tendency to marry later, higher age at pregnancy, increased numbers of high-risk

pregnancies, changes in social situation, progress in fertility treatment, obstetrician shortages, and changes in medical care status.

This review will describe education focusing on maternal emergency life-saving strategies, as addressed by academic societies in Japan, that aim to further reduce maternal mortality rates, improve outcomes for both mother and child, and implement best perinatal care practices. The current status of perinatal care in countries outside of Japan will also be discussed, as well as future challenges and prospects.

Current issues surrounding maternal deaths in Japan

The number of maternal deaths (death while pregnant or within 42 days of termination of pregnancy) according to national vital statistics is registered and calculated from death and postmortem certificates. The decline in maternal mortality rate in Japan came to a halt at around 2007, plateaued thereafter, and is currently at 2.7–4.8/100,000 total births. The ratio of direct obstetric deaths to indirect

obstetric deaths is 3:1, showing a predominance of direct obstetric deaths, a distribution pattern that differs from that in Europe and North America. The maternal mortality rate in the UK was 9.0/100,000 maternities in 2011–2013, which was higher than that in Japan. However, direct obstetric deaths showed a distinct decrease while indirect obstetric deaths plateaued, such that direct obstetric deaths were outnumbered by indirect obstetric deaths, at a ratio of 1:2.¹⁾ In the UK, the late maternal mortality rate covering deaths occurring from 42 days to less than 1 year postpartum, an index not fully available in Japan, is 14.1/100,000 maternities, which is higher than the maternal mortality rate. The most common cause of late maternal death is malignant tumor (28%), followed by mental health-related disease (23%); 14% of the latter are due to suicide.¹⁾ Therefore, the development of measures against suicide is cited as one of the most important ways to combat issues contributing to puerperal death in the UK.

In the maternal death report program managed by the Japan Association of Obstetricians and Gynecologists (JAOG), which studies and analyzes the causes of maternal death, cases are accumulated independently, and the causes of death and treatments that had been given are analyzed to provide countermeasures. Major causes of maternal death were obstetric critical bleeding, intracranial bleeding, amniotic fluid embolism, aortic vascular disease, respiratory disease, and infectious disease, in descending order of frequency. The most frequent reason for obstetric critical bleeding was uterine-type amniotic fluid embolism (with cardinal signs of disseminated intravascular coagulation [DIC]), followed by uterine rupture, atonic bleeding, premature separation of placenta, and uterine inversion. Inconsistent numbers for maternal deaths are reported between these two sources of statistics in that the national statistics show lower reported numbers. Similarly, in addition to maternal deaths, the actual number of late maternal deaths (from 42 days to less than 1 year postpartum) is extremely low, indicating the relative inaccuracy of the number in Japan compared to the numbers in Europe and North America. These could be explained by the fact that when deaths occur or postmortem examinations are performed in departments other than obstetrics and gynecology, these cases are not regarded as pregnancy-related, indirect obstetric deaths, and therefore do not reflect the actual status, unless the time of pregnancy or puerperium is specified in the death or postmortem certificate.

In addition, the total number of suicides committed by patients with mental diseases is available, but even if the number of gestational weeks or puerperal days is recorded on the postmortem certificate by the examiner, the involvement (or not) of perinatal mental health in the death is not clear. Therefore, measures taken in

these cases are left unrecorded and are unavailable for statistical evaluation.

Against this backdrop, our Juntendo obstetric group studied abnormal deaths among pregnant women in the 23 wards of Tokyo in collaboration with the Tokyo Metropolitan Medical Examiner's Office to examine the actual status of suicides among pregnant and postpartum women across a 10-year time period (2005 to 2014).²⁾ This examination identified 89 women with abnormal deaths during pregnancy or less than 1 year postpartum. The interim report revealed 63 suicides during the 10-year period. In comparison with the suicide rates of pregnant or postpartum women in the UK (3.1/100,000 maternities)¹⁾ and Sweden (3.7/100,000 live births),³⁾ the suicide rate in the 23 wards of Tokyo is extremely high, at 8.7/100,000 births, indicating an urgent need for countermeasures.²⁾

Therefore, we requested that the government revise death and postmortem certificates by including items to indicate a death during pregnancy or within less than 1 year postpartum, so that we may gain a more accurate understanding of maternal suicide.²⁾ We also requested the government to instruct physicians to investigate whether a case of death would be during pregnancy or postpartum or not, and if so, to describe the pregnancy or postpartum stage in the death or postmortem certificate. We recommend depression screening to begin at 1 month postpartum⁴⁾ and are working with physicians and local administrators to set up the new maternal health check-up system with perinatal staff members, psychiatrists, health nurses, and administrative staff members in each locality.

Education on maternal emergency life-saving

In the field of perinatal practice, neonatal lives as well as maternal lives may be in jeopardy. Therefore, learning emergency life-saving measures is indispensable for obstetric and gynecological specialists. The project to promote neonatal cardiopulmonary resuscitation (NCPR), initiated by the Japan Society of Perinatal and Neonatal Medicine (JSPNM) in 2007, has now spread throughout the nation, with favorable results. Accreditation as a specialist in internal medicine requires acquisition of basic cardiopulmonary resuscitation techniques such as Basic Life Support (BLS) and Advanced Cardiovascular Life Support (ACLS).

That said, from educational and clinical perspectives, it is unwise for obstetricians and gynecologists who face emergency maternal life-saving crises in clinical settings to do so without first obtaining training on basic cardiopulmonary resuscitation techniques and obstetric emergency management. Ideally, physicians with sufficient knowledge and support skills will apply

Table 1. Education tools and training for maternal emergency in Japan**Education tools: its organization**

- Guideline for obstetrical practice in Japan 2017: JAOG/JSOG
- Japanese clinical practice guide for critical obstetrical hemorrhage 2017: JAOG/JSOG/JSPNM/JSA/JSTMCT
- Best practice guide 2015 for care and treatment of hypertension in pregnancy: JSSHP
- Interventional radiology for critical hemorrhage in obstetrics: Japanese Society of Interventional Radiology (JSIR)
- The consensus guide for perinatal mental health 2017: Japanese Society of Perinatal Mental Health
- “Recommendations for saving mothers’ lives in Japan” Vol. 1–7: JAOG/Maternal Death Exploratory Committee (MDEC)

Maternal emergency life-saving training: its organization

- Basic training course and Advance training course: the Japan Council for Implementation of Maternal Emergency Life-Saving System (J-CIMELS)
- Advanced Life Support in Obstetrics (ALSO-Japan) training course: Organization for the Advancement of Pregnancy, Perinatal and Infant Care (OPPIC)

JAOG, the Japan Association of Obstetricians and Gynecologists

JSOG, the Japan Society of Obstetrics and Gynecology

JSPNM, the Japan Society of Perinatal and Neonatal Medicine

JSA, the Japanese Society of Anesthesiologists

JSTMCT, the Japan Society of Transfusion Medicine and Cell Therapy

these in clinical settings, as these would improve mother and child outcomes. Basic life-saving techniques and emergency treatments, which can be learned through training using models, should be practiced regularly to allow proper performance based on instant decision-making; “on the job training” does not suffice for these techniques. Obstetric emergencies are characterized by abrupt onset or change, and require prompt treatment and management. Therefore, it is necessary for the entire team of physicians, midwives, nurses, and paramedical personnel to share their knowledge of disorders associated with obstetric emergencies and to fully understand their management. Implementation of training and realistic simulations on a routine basis in actual clinical settings are extremely important for ensuring prompt and appropriate responses to emergency cases.

Efforts of academic societies and specialist associations and the development of guidelines

“Recommendations for saving mothers’ lives in Japan” were prepared in January 2010 by analyzing the results of the maternal mortality report project initiated by the JAOG and maternal death exploratory committee (MDEC), based on a Ministry of Health, Labour and Welfare Grant-in-Aid for Scientific Research (Principal Investigator: Tomoaki Ikeda), and have yielded positive results.⁵⁾ The Perinatal Committee of the Japan Society of Obstetrics and Gynecology (JSOG) has continued the activities of “the subcommittee for reduction of maternal and fetal deaths” as a subcommittee project. In parallel with the activities of the JAOG, the JSOG should report their results of the further analysis and recommend

measures aimed to achieve best practice care in the future.

Various guidelines and guiding principles have been developed in Japan to reduce maternal deaths and late maternal deaths, as well as to implement better practices. Such guidelines include the Guideline for Obstetrical Practice in Japan 2014,⁶⁾ Clinical Practice Guide for Critical Obstetrical Hemorrhage 2017,⁷⁾ Best Practice Guide 2015 for Care and Treatment of Hypertension in Pregnancy,⁸⁾ and Interventional Radiology for Critical Hemorrhage in Obstetrics.⁹⁾ If left untreated, perinatal depression and mental illness can pose problems for others aside from just the patients. These disorders can decrease one’s ability to raise children, resulting in major social issues such as impaired development of the child, mental retardation, neglect, or child abuse. Therefore, three organizations—the Japanese Society of Perinatal Mental Health (JSPMH), the JAOG, and the JSOG—set up a joint conference to discuss various issues relevant to the mental health of pregnant and parturient women. At present, the conference also discusses overseas activities carried out by the National Institute for Health and Care Excellence (NICE) and other organizations, and enlightenment activities are promoted through the consensus guide prepared under JSPMH leadership⁴⁾ (Table 1).

Maternal emergency life-saving training

Six organizations including the JSOG, the JSPNM, the Japanese Society of Anesthesiologists (JSA), the Japanese Society for Emergency Medicine (JSEM), Study Group for Clinical Emergencies in Obstetrics and Gynecology, Kyoto, and the Maternal Death

Exploratory Committee, JSOG established the Japan Council for the Implementation of Maternal Emergency Life-Saving System (J-CIMELS) in 2015 to promote dissemination of the maternal emergency life-saving system and further reduce maternal deaths, with full-scale activities launched in 2016.¹⁰⁾ This council aims to facilitate the spread of life-saving techniques among healthcare providers involved in obstetric care and to enhance the development and practice of a higher quality maternal emergency life-saving system, in cooperation with midwives, nurses, obstetricians, and gynecologists, as well as emergency physicians and anesthesiologists. Through these activities, pregnant and parturient women would benefit from medical science and medical care offered at a higher level, and this in turn would contribute to social welfare and maternal and fetal safety by reducing maternal mortality rates and improving perinatal care. The Organization for the Advancement of Pregnancy, Perinatal and Infant Care (OPPIC) provides an advanced life support in obstetrics (ALSO-Japan) training course for primary care physicians and obstetric residents¹¹⁾ (Table 1).

In the UK, Practical Obstetric Multi-Professional Training (PROMPT) is available and recommended by the Royal College of Midwives, the Royal College of Obstetricians and Gynaecologists (RCOG), and the Obstetric Anaesthetists' Association to ensure safe pregnancy, delivery, and birth, and to decrease maternal, neonatal, and infant deaths. The PROMPT program was developed under the concept that good teamwork is possible among multidisciplinary professionals with appropriate knowledge and techniques, and that leadership is essential for care of the mother and child and useful for improving perinatal outcomes. The courses for this program are provided in the UK as well as in developing countries in Africa and Asia, and favorable results have been reported. Attending the obstetric emergency care training has been shown to effectively reduce frequencies of low Apgar score at 5 min and hypoxia-ischemia encephalopathy, highlighting the importance of these educational training programs.¹²⁾ It has also been reported that training for shoulder dystocia decreases the frequency of injury to the child.¹³⁾ In addition, the RCOG Operative Birth Stimulation Training (ROBuST), a technical training program provided by the RCOG for physicians aiming to become specialists, is also available. This training program addresses techniques of internal examination, vacuum extraction, and forceps delivery, cesarean section in cervix dilation, and anesthetic procedures. These all reflect the stance of the RCOG, which is to aim for best practice care and provide the highest quality of care.

Future tasks and prospects in a late childbearing environment

The age at first marriage in Japan has increased by 5 years, to 29.4 years, over the past two decades, along with an increasing tendency toward late marriage and reduced birthrates. In addition, along with advances in assisted reproductive technologies, the preservation of unfertilized eggs and egg donation in countries outside of Japan have become feasible, resulting in occasional pregnancies and deliveries in women 50 years of age or older. The higher frequency of pregnancy among advanced age mothers has yielded higher incidence rates of pregnancy with myoma, pregnancy after myomectomy, pregnancy after fertility treatment, pregnancy induced hypertension, and complications, such as placenta previa and premature separation of normally implanted placenta. As a result, the rate of cesarean section has increased, and cesarean scar pregnancy and placenta accreta have become more common.

Under the current circumstances in which the maternal mortality rate has plateaued, it is important to analyze this issue in a way that allows us to manage patients more rapidly and appropriately at the scene of an obstetric emergency. It is critical that the entire medical team attends training to share in tackling problems among multidisciplinary professionals and to provide better treatment and management, facilitating a proper response to any situation. As a form of practice, it is necessary to run routine simulation training in the clinical setting, prepare equipment, and form a network within the institution that is linked to blood transfusion centers. It is also important to establish a cooperative relationship with higher level medical institutions to which patients may have to be transferred, by sharing case histories and courses in regular case conferences and debriefing sessions.

We believe that the goal of “zero maternal deaths” can be achieved in the future if all perinatal care providers join hands in tackling these tasks and steadily take measures to address these challenges.

Conflict of interest

None.

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