Maternal mortality in the developed world: lessons from the UK confidential enquiry

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Summary: The UK confidential maternal mortality enquiry shows that not only has maternal mortality decreased since 1952, the year of the first enquiry, but also the pattern of maternal mortality has changed markedly. Major surgical causes of death, such as post-partum haemorrhage and ruptured uterus, are no longer as important as medical causes such as heart disease. The 'Top Ten' recommendations in the current report for the years 2003–2005 emphasise the need for health care practitioners to be aware of the risks that medical conditions, both pre-existing and those arising *de novo* in pregnancy, impose on the expectant and newly delivered mother. Training and further education programmes should emphasise the importance of medical problems in pregnancy without omitting the knowledge and skills in basic obstetrics that have made such an impact on maternal mortality in the past.

Keywords: Maternal mortality, medical complications of pregnancy, heart disease, thromboembolism

INTRODUCTION

The confidential enquiries into maternal deaths first started in 1952 in England and Wales. Each publication reviewed maternal mortality over a three-year period and made recommendations in order to improve maternal care. Similar systems were introduced in Northern Ireland in 1956 and in Scotland in 1965. Since 1985 the data for all four countries in the United Kingdom have been pooled. The most recent report covers the years 2003–2005 and was published in 2007.¹ The enquiry is the longest running example of national self-evaluation in medicine in the world.

In 1952–1954, there were over 1400 maternal deaths in England and Wales alone and the most common causes of death were haemorrhage (234 deaths) and what was called 'tox-aemia,' i.e. complications of pre-eclampsia and eclampsia (200 deaths). In 2003–2005, there were 295 deaths in the whole UK and the most common causes of death were heart disease (48 deaths) and thromboembolism (41 deaths). There were just 14 deaths from haemorrhage and 18 from pre-eclampsia and eclampsia. Furthermore, since 1997–1999 there have been more indirect deaths than direct deaths. Indirect deaths are those resulting from previous existing disease or from disease (usually medical) that arise in pregnancy not directly due to obstetric causes but which are made worse by pregnancy. So not only has there been a marked reduction in maternal mortality since 1952, but there has also been a change in emphasis regarding conditions that give concern. These are no longer so much the traditional obstetric problems of postpartum haemorrhage, obstructed labour and eclampsia as the medical problems of heart disease and pulmonary embolus. All these comments apply only to the developed world. In the

developing world, the picture is similar to that in England and Wales in 1952, or worse because of lack of education, resources and the presence of HIV/AIDS (see accompanying article by Lewis G).

The seventh report into maternal deaths in the UK (2003–2005) for the first time published a list of the top 10 recommendations – all of which could be audited. Those recommendations that are relevant to obstetric medicine (the majority) are discussed below with examples taken from the seventh report.

RECOMMENDATION 1

'Pre-conception counselling and support, both opportunistic and planned, should be provided for women of child-bearing age with pre-existing serious medical or mental health conditions which may be aggravated by pregnancy. This includes obesity. This recommendation especially applies to women prior to having assisted reproduction and other fertility treatments.'

The report identified that many of the women who died from both direct and indirect causes had conditions that were affected by pregnancy and that the majority appeared to have had no counselling about the interaction between pregnancy and their diseases. Conditions that require pre-pregnancy counselling include epilepsy, diabetes, heart disease, autoimmune disease such as systemic lupus erythematosus, previous venous thromboembolism, severe obesity, and current or previous mental illness. Assisted reproduction is now helping some women to get pregnant who would not have done so in the past, at least in part because of their medical conditions.

'A woman had chronic active hepatitis, which had caused acquired antithrombin deficiency, which in turn had

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increased her thromboembolic risk sufficient to have caused a previous pulmonary embolus. She also had oesophageal varices, ulcerative colitis and had several previous miscarriages. She sought *in vitro* fertilization and became pregnant again, which resulted in an unexpected vaginal breech delivery. She had a postpartum haemorrhage and was thought to have had a pulmonary embolus for which she was given thrombolysis. This caused massive vaginal and generalized haemorrhage from which she died. The autopsy confirmed pulmonary hypertension with characteristic changes in the heart and lung vasculature. There was no acute pulmonary embolus, but it was thought that the pulmonary hypertension was consequent to previous pulmonary thromboembolic disease.'

This woman would not have become pregnant without assisted reproduction. It is difficult to believe that she received adequate pre-pregnancy counselling granted the very high risk to her life that pregnancy posed because of her past medical history of pulmonary embolism, antithrombin deficiency and oesophageal varices.

Previous thromboembolism (VTE) is another condition where the clinicians looking after women with their index thrombosis do not consider what pregnancy might entail. But to do so they must know what are the relationships between pregnancy and previous VTE, and what can be done with regard to thromboprophylaxis. They must know that women with thrombophilia can die from pulmonary embolus within the first trimester. Women do not often book until the beginning of the second trimester. Therefore, to rely on the obstetric services to instigate thromboprophylaxis is inadequate. These women with previous VTE may die before they first meet the obstetric services. Many physicians responsible for the acute medical care of women with VTE are not confident with regard to obstetric medicine. Therefore, for this recommendation of improved pre-pregnancy counselling to be effective, the knowledge of obstetric medicine of all doctors caring for medical problems in women of child-bearing age must be improved.

RECOMMENDATIONS 2 AND 3

'Maternity service providers should ensure that antenatal services are accessible and welcoming so that all women, including those who currently find it difficult to access maternity care, can reach them easily and earlier in their pregnancy. Women should also have had their first full booking visit and hand held maternity record completed by 12 completed weeks of pregnancy.

Pregnant women who, on referral to maternity services, are already 12 or more weeks pregnant should be seen within two weeks of the referral.'

We have already considered the need for active management of certain medical conditions; such as previous VTE, in the first trimester. These recommendations emphasize that some women with certain medical problems must be seen early in pregnancy. They emphasize that for maternity services to be seen as welcoming, women should be seen as early in pregnancy as practical; the previous concept that it was a waste of time seeing women in the first trimester because some would miscarry, is not tenable.

'A woman died from SUDEP (sudden unexplained death in epilepsy) in mid-pregnancy. She had had epilepsy for many years but seizure control was unsatisfactory and she had stopped taking anticonvulsants. Although she attended the antenatal clinic at her general practitioner's (GP) surgery very early in pregnancy she was not able to be fully 'booked' until four weeks later because the midwives were too busy. Although she was referred to a neurologist she did not attend her appointment because she did not receive the appointment letter. As she was having regular fits, she was referred again to the neurologist, but the repeat appointment was delayed by more than one month and she died before she could attend.'

This case illustrates the need for women with complicated medical problems to be seen early in pregnancy not only for the reasons given above but also because it may take time to obtain further specialist opinions. In addition, clinics in all hospital specialities should make particular efforts to see referred pregnant women as a matter of urgency given the potential impact of pregnancy on their disease and vice versa.

RECOMMENDATION 4

'All pregnant mothers from countries where women may experience poorer overall general health, and who have not previously had a full medical examination in the UK, should have a medical history taken and clinical assessment made of their overall health, including a cardiovascular examination at booking, or as soon as possible thereafter. This should be performed by an appropriately trained doctor, who could be their usual GP.'

'A previously well, young immigrant woman, with little English, was booked for midwifery led care and only ever saw her midwife or her GP. She was admitted to an emergency department (ED) with cough, breathlessness and chest pain. She was hypoxic and markedly tachycardic and, not unreasonably, the diagnosis was assumed to be a pulmonary embolus. Her chest was clear and no murmur was heard. The electrocardiogram showed P mitrale, suggesting an enlarged left atrium, but this was missed. The echocardiogram was suggestive of only mild mitral stenosis, but she had significant pulmonary hypertension (pulmonary artery pressure 55 mmHg), which should have raised concerns that the mitral stenosis was more severe, as was diagnosed at autopsy. She died the following day.'

Rheumatic heart disease is very rare in those born in the developed world, but it is still common in the developing world. It is very uncommon to diagnose heart disease *de novo* in those who have lived in the UK all their lives. However, the UK receives many young women from the developing world and they may well have rheumatic or other heart disease. The case above illustrates the need to take a history and examine the cardiovascular system in all new migrant women early in pregnancy. Once women become sick and develop tachycardia, it is far more difficult to detect significant heart murmurs; and in any case, women with heart disease require special care in pregnancy to prevent them becoming sick.

RECOMMENDATION 5

All pregnant women with a systolic blood pressure of 160 mmHg or more require antihypertensive treatment. Consideration should also be given to initiating treatment at lower pressures if the overall clinical picture suggests rapid deterioration and/or where the development of severe hypertension can be anticipated.

Traditional teaching, particularly in obstetrics has been that it is the diastolic blood pressure that matters, not the systolic. It is not clear why the minimum blood pressure was counted rather than the maximum or the mean. However, women have died when the systolic blood pressure has been ignored. For example,

‘A woman who had a cerebral haemorrhage due to an aneurysm in mid-pregnancy had a coil inserted as a closed procedure to block the feeder vessels and to prevent further bleeding. Following an elective caesarean section, her blood pressure rose to 190 mmHg systolic but she was allowed home. Shortly after she was re-admitted with a further, fatal, intracerebral haemorrhage.’

Failure to treat systolic hypertension must have contributed to this woman's death. Systolic hypertension has also been ignored in direct deaths from pre-eclampsia with fatal consequences.

RECOMMENDATIONS 8 AND 9

All clinical staff must undertake regular, written, documented and audited training for:

- The identification, initial management and referral for serious medical and mental health conditions which, although unrelated to pregnancy, may affect pregnant women or recently delivered mothers;
- The early recognition and management of severely ill pregnant women and impending maternal collapse;
- The improvement of basic, immediate and advanced life-support skills. A number of courses provide additional training for staff caring for pregnant women and newborn babies.

There is also a need for staff to recognize their limitations and to know when, how and whom to call for assistance.

Rationale

A lack of clinical knowledge and skills among some doctors, midwives and other health professionals, senior or junior, was one of the leading causes of potentially avoidable mortality. This triennium, the assessors were particularly struck by the number of health-care professionals who failed to identify and manage common medical conditions or potential emergencies

outside their immediate area of expertise. Resuscitation skills were also considered poor in an unacceptably high number of cases.

Early warning scoring system. There is an urgent need for the routine use of a national obstetric early warning chart, similar to those in use in other areas of clinical practice, which can be used for all obstetric women which will help in the more timely recognition, treatment and referral of women who have, or are developing, a critical illness. In the meantime, all Trusts should adopt one of the existing modified early obstetric warning scoring systems of the type described in the Chapter on Critical Care, which will help in the more timely recognition of woman who have, or are developing, a critical illness. It is important these charts are also used for pregnant women being cared for outside the obstetric setting for example in gynaecology, EDs and in Critical Care.

These recommendations centre around the need for midwifery and obstetric clinicians to appreciate the significance of medical, i.e. non-obstetric, problems that can catastrophically affect the outcome of pregnancy both for women and for their babies. They also highlight the need for these clinicians to recognize acute illness; not only from overt obstetric causes, such as postpartum haemorrhage when blood is pouring onto the floor but also from medical causes such as heart failure. And having recognized acute illness, clinicians must have the necessary life-support skills to be able to treat it.

‘A woman who spoke little English was admitted with breathlessness in late pregnancy. Despite clear documentation from the midwife on admission that she was ‘unable to lie down for abdominal palpation’, both the obstetric and medical registrars, and a locum consultant obstetrician, missed the symptoms and signs of heart failure. Her ‘wheezing’ was taken to be asthma or possibly due to pulmonary embolism. She was left on the antenatal ward, tachypnoeic and tachycardic, and the severity of her illness was not appreciated. The diagnosis of peripartum cardiomyopathy was not made until she was on the Critical Care unit after having sustained a cardiac arrest and a perimortem caesarean section.’

Skills in clinical medicine were lacking in this and many other cases. Breathlessness so severe that the patient cannot lie down is a classical symptom of heart failure.

CONCLUSION

We have considered seven of the 10 key recommendations from ‘*Saving Mothers’ Lives. The Confidential Enquiries into Maternal Deaths 2003–2005*’. They highlight the need for all those caring for pregnant women to appreciate the medical aspects of maternity care. Huge advances have been made in reducing maternal mortality from traditional obstetric causes. It is now time to pay more attention to the medical problems of pregnancy. Although the situation will be improved by training more physicians (internists) in the medical problems

of pregnancy, there will never be enough of these physicians to provide all the medical care that is needed. Those responsible for the obstetric care of pregnant women, (midwives, GPs and obstetricians) must be more aware of (and receive training in) the significance of medical conditions; both to treat sick pregnant women with a medical problem and to recognize when they should be referred to a physician.

REFERENCE

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