The confidential enquiries into maternal deaths in the British Isles

On 7 December 2016, the most recent account of why mothers die in pregnancy, around and after delivery was launched at the Royal College of Obstetricians and Gynaecologists (Knight et al, 2016). Britain is unique in having investigated these deaths through in-depth enquiries for more than 50 years, looking for remediable factors that can be implemented to bring down the maternal mortality rate. Just after World War 2, the rate was 200 deaths per 100 000 maternities; now it is only 8.5.

The importance of surveillance

What has contributed to this remarkable progress? Overall, it has been the accretion of routine surveillance of pregnant women with protocol antenatal care, timely interventions, antibiotics, blood transfusions, expert obstetric care and availability of caesarean sections, improved anaesthesia and intensive care. The regular enquiries into maternal deaths still shed light on the opportunities to improve care further, but also note where improvements have been static or even reversed.

The confidential enquiry process is standardized. All maternal deaths in England, Wales, Scotland, Northern Ireland and (recently) Ireland are notified to the centre (currently Mothers and Babies: Reducing Risk through Audit and Confidential Enquiries across the UK; MBRRACE-UK), which is funded by the Healthcare Quality Improvement Partnership. Information comes from hospitals, Office for National Statistics death certificates and other sources.

Clinical data, medical notes and autopsy reports (80% of these deaths come to coronial or fiscal autopsy) are submitted to the centre and anonymised. The local clinicians are asked to complete a standard form with information. The assembled records are reviewed online by two pathologists with experience of maternal autopsies, and the cause of death confirmed or corrected as far as possible. The records are then reviewed by the appropriate experts – obstetrics, midwifery, medicine, anaesthesia, psychiatry, intensive care – to assess the case. A group meeting goes through all the cases within a scenario (e.g. post-partum haemorrhage or amniotic fluid embolism) and discuss whether the death was unavoidable or the chain of events could have been interrupted and perhaps the woman's life saved. Chapter writers are identified and the report is prepared.

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The confidential enquiry reports

Until 2008, these reports had a 3-year cycle, and a large report that covered all aspects of maternal mortality emerged triennially. It included the latest statistics on cause of death, noting trends up and down, and commentaries by individual specialities (including, for example, pathology which constantly bewailed the poor quality of maternal autopsies when performed by forensic pathologists). Now there are annual reports, with tables of overall statistics on causes and deaths and specific maternal mortality rates, but concentrating on only three or four specific scenarios in a rolling 3-year cycle.

The latest report categorises the 200 maternal deaths that occurred in 2012–14, and considers in depth those in the scenarios of cardiovascular disease, early pregnancy deaths and hypertensive disorders, along with an overview of critical care issues. With the change since 2008 in the periodicity of reviews, the opportunity was taken to review deaths from 2009–14, providing significantly larger numbers than a triennial review – and consequently more significant observations.

Key messages

Apart from the lowest maternal mortality rate yet (for 2003–5, the maternal mortality rate was 13.95), the key messages for this report include:

1. The continuing prominence of indirect maternal deaths (medical conditions that are worsened by pregnancy and delivery – two thirds of all deaths) over direct deaths (the condition only happens in pregnant women – one third)
2. An all-time low rate of death from hypertensive diseases, including eclampsia and HELLP (haemolysis elevated liver enzymes and low platelet count) syndrome, such that fewer than one woman in every million now dies from them. Increasingly stringent blood pressure and urine protein measurement, with timely interventions including delivery and better antihypertensive therapy, are key
3. Ectopic pregnancies continue to result in death, mainly through imperfect clinical examination and investigation of collapsed women; some did not receive a pregnancy test. Worryingly, consideration of possible pulmonary thromboembolism (and then thrombolysis) seems to take precedence over thinking about possible bleeding ectopics which are readily treated by urgent surgery
4. Early recognition of critical illness in hospital and authentic multidisciplinary team working enable the provision of high quality intensive care. Of concern is a persistent belief that altered conscious level is an 'early warning sign'. It is not, as young women have great physiological reserves: it is a 'red flag' that indicates established illness. Conversely, a worrying aspect of maternal collapses in the community is the ambulance service's current protocol of optimum stabilization before transfer to the emergency department. For many conditions, a 'scoop and run' protocol would be preferable; this would also enable earlier caesarean section for better resuscitation of the mother, and to potentially save the life of the fetus.

The impact of cardiovascular disease

A big message from this report is the continuing importance of death from cardiovascular disease – the commonest

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indirect maternal death category. This comprised a quarter of all the deaths – 22% of cardiovascular deaths were from ischaemic heart disease, 18% from cardiomyopathy, and 14% from aortic dissection. But the single largest group was sudden arrhythmic cardiac death with a morphologically normal heart – of which there were 47 deaths from 2009–14, representing 31% of all cardiovascular deaths, and currently more frequent than deaths from venous thromboembolism.

Sudden arrhythmic cardiac death with a morphologically normal heart had been heralded in previous triennial reports, but these large numbers provide better insight into what might be happening. It is a cardiac arrest where extensive investigations find no patho-morphological cause, and drug toxicity and acute anaphylaxis are excluded.

Sudden arrhythmic cardiac deaths appear to peak just after delivery, but are probably as common overall as in the non-pregnant female population of child-bearing age. In the latter, we know that 30–50% of cases can be attributed to an ion channelopathy, such as long QT syndrome, from screening relatives and examining the proband's DNA. In maternal cases, few have as yet been linked to an inherited cardiac condition, but this report includes the first known maternal death associated with long QT syndrome, so future research will be directed to identifying more such causes.

Interestingly, few other national maternal death surveys in rich countries even mention sudden arrhythmic cardiac death with a morphologically normal heart, let alone indicate significant numbers of them, suggesting that they are being misdiagnosed into other disease categories.

Conclusions

We have a situation where, in a rich country, obstetrics is very good overall, few women die of the historically numerous direct obstetric diseases, and the single commonest cause of maternal death (sudden arrhythmic cardiac death) appears to be unpreventable. But this must not distract us from the main messages, which do not change. Applying what we know works from the previous reports reduces the rate of mothers dying. Closer attention to mothers' previous medical histories (in the case of heart disease) and the application of standard good medicine (for cardiac disease, ectopic pregnancies and critical care) would reduce the number of deaths in future. **BJHM**

KEY POINTS

- Maternal deaths in the UK are now at an all-time low, with improved medical care reducing the number of direct maternal deaths such as the hypertensive syndromes.
- Indirect – medical disease – deaths continue to be the most numerous.
- Cardiac diseases are most common of these, with sudden arrhythmic cardiac deaths, likely caused by a channelopathy, as the cause in nearly one third of them.
- Better application of basic clinical observations and simple tests would prevent still more deaths.

Knight M, Nair M, Tufnell D, Kenyon S, Shakespeare J, Brocklehurst P, Kurinczuk JJ, eds on behalf of MBRRACE-UK (2016) *Saving Lives, Improving Mothers' Care – Surveillance of maternal deaths in the UK 2012–14 and lessons learned to inform maternity care from the UK and Ireland Confidential Enquiries into Maternal Deaths and Morbidity 2009–14.* National Perinatal Epidemiology Unit, University of Oxford, Oxford (www.npeu.ox.ac.uk/mbrrace-uk/reports)

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