

# Beyond maternal death: improving the quality of maternal care through national studies of 'near-miss' maternal morbidity

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## Scientific summary

### Improving maternal care through 'near-miss' morbidity studies

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# Scientific summary

## Background

Studies of maternal mortality have been shown to result in important improvements to women's health and maternal death rates are an important national indicator of the quality of maternity care. A comprehensive programme of study of maternal deaths has been undertaken in the UK for > 50 years, including confidential expert review. This has contributed to major improvements in the quality of maternity care and a dramatic reduction in the maternal mortality rate, such that maternal deaths are now very rare. This does not mean that pregnancy can be regarded as 'safe'. It is now increasingly being recognised that in countries such as the UK, where maternal deaths are rare, study of near-miss severe maternal morbidity provides additional important information to aid disease prevention, treatment and service provision.

This programme used mixed methodologies to provide a national picture of the near-miss maternal morbidities underlying the leading direct causes of maternal death with the specific aim of generating evidence-based recommendations for practice and service provision, and to improve the quality of care and, hence, outcomes of these conditions for women, their babies and families.

## Objectives

1. To determine the incidence of the specific morbidities most commonly leading to maternal death in the UK.
2. To assess the contribution of existing risk factors to disease incidence and identify steps which may be taken in clinical practice to address these factors to reduce incidence.
3. To describe how the conditions are managed and describe any variations in management, exploring the impact that different management strategies or interventions have on outcomes and costs, in order to make recommendations for best practice to improve outcomes for all women.
4. To describe the outcomes of the conditions for mother and infant and identify any groups in which outcomes differ.
5. To investigate which factors influence the risk of death and how these might be addressed to prevent death.
6. To explore whether an external confidential enquiry or a local review approach can be used to investigate and improve the quality of care for affected women.
7. To assess the longer-term impacts of near-miss maternal morbidity for women, their babies and families.

## Methods

The programme comprised six interrelated workstreams:

Workstream 1: this workstream used the national collaboration of clinicians contributing to the UK Obstetric Surveillance System (UKOSS) and employed primary data collection to conduct descriptive and case-control studies to establish the incidence; risk factors; management and outcomes of uterine rupture; placenta accreta; haemolysis, elevated liver enzymes and low platelets (HELLP) syndrome; severe sepsis; and amniotic fluid embolism (AFE).

Workstream 2: over two separate time periods (2003–8 and 2009–12) this workstream compared data from the national Confidential Enquiries into Maternal Deaths with data on women who survived near-miss morbidity collected through UKOSS. The analyses used logistic regression techniques in order to identify factors associated with progression from severe morbidity to death.

Workstream 3: inequalities in rates of near-miss maternal morbidity were explored in different population groups. Secondary analyses of UKOSS data were used to explore associations between severe maternal morbidity and ethnicity and socioeconomic status. Primary data collection was used to investigate the outcomes of pregnancy at advanced maternal age ( $\geq 48$  years at completion of pregnancy).

Workstream 4: this workstream explored methods to improve local learning from adverse events. The project identified the approaches currently in use locally to examine the care of women with severe maternal morbidity, through a detailed examination of the guidelines for local incident review using the Appraisal of Guidelines for Research and Evaluation tool. In addition, 'trigger checklists' were examined to determine which conditions are currently being reviewed. A comparison between local peer review and external case review (confidential enquiry) was then undertaken in six centres selected by stratified random sampling. Lessons for care identified by local and external review were identified and compared.

Workstream 5: an economic evaluation of four different secondary managements for postpartum haemorrhage (PPH) was undertaken using national observational data from UKOSS as well as a literature review and primary cost data collection. The use of uterine compression sutures, interventional radiology, pelvic vessel ligation and factor VIIa were compared.

Workstream 6: this workstream comprised three component projects to explore women's experiences of near-miss maternal morbidity and long-term outcomes.

Study 6A: women who had experienced a near-miss maternal morbidity were invited with their partners to undertake a qualitative interview study to describe their experiences. This study used the well-established methodology of the Health Experiences Research Group. Women were purposively sampled to represent a range of groups, conditions and time periods since their illness. Semistructured interviews were conducted by a single researcher and all interviews were video- or audio-recorded for analysis. Analysis used the thematic approach and was used to develop a patient and clinician education site.

Study 6B: this surveyed the experiences of women who had a peripartum hysterectomy to control severe peripartum haemorrhage and their matched controls through a postal questionnaire. The questionnaire sought information about the women's general health, using the Short Form questionnaire-12 items, information about health-care usage, questions on fertility wishes prior to their hysterectomy and issues raised by the qualitative interview study.

Study 6C: this investigated the use of the 'experience-led commissioning' (ELC) model, informed by data from study 6A to commission maternity services. The 'intervention' group was a health economy receiving a facilitated ELC programme. The 'control' was a health community who redesigned services without the ELC process. The evaluation used a case study approach, using predominantly qualitative methods, to investigate in what ways the addition of ELC programme facilitation affected the commissioning process and how commissioned models of maternity care differed with and without the ELC approach.

## Findings and recommendations

### *The incidence of the specific morbidities most commonly leading to maternal death in the UK*

The incidences of these conditions ranged from 2 to 47 per 100,000 maternities. Clinicians should be aware of the frequency of these rare but severe complications and ensure that facilities and training are in place to manage women with these conditions when they occur. Uterine rupture in women with a previous caesarean section planning vaginal delivery is less common than previously estimated and women should be advised of this when discussing their planned mode of delivery; increased risk associated with induction or augmentation of labour should also be considered. Women who have placenta praevia and have had a previous caesarean delivery are at a high risk of placenta accreta/increta/percreta and delivery should be managed in accordance with this risk.

### *The contribution of existing risk factors to disease incidence and steps that may be taken in clinical practice to address these factors to reduce incidence*

Older maternal age is associated with severe maternal morbidities and women should be aware of this if they are planning to delay childbearing. Caesarean section delivery is associated with severe maternal morbidity in both current and future pregnancies. These risks, together with planned family size, need to be taken into account when planning mode of delivery.

Primary and secondary care practitioners should remain aware that pregnant or recently pregnant women with suspected infection need closer attention than women who are not pregnant; antibiotic prescription does not necessarily prevent progression to severe sepsis and women should be followed up to ensure recovery. The rapid progression to severe sepsis highlights the importance of early administration of high-dose intravenous antibiotics for anyone with suspected sepsis. Signs of severe sepsis, particularly with confirmed or suspected group A streptococcal infection, should be regarded as an obstetric emergency and should be routinely included in obstetric emergency training courses. Vigilant infection control at vaginal delivery should be maintained.

### *The impact of different management strategies or interventions on outcomes and costs, and recommendations for best practice to improve outcomes*

Delay in delivery, of up to 48 hours, may be safely undertaken in women with HELLP syndrome in whom there is no fetal compromise and may assist in the delivery of antenatal steroids where these are indicated. The number of previous caesarean sections and the time interval between the last delivery and conception should be taken into account when counselling women with previous caesarean deliveries about their mode of delivery in this pregnancy and risk of uterine rupture. Uterine compression sutures are a more cost-effective second-line therapy for PPH than interventional radiology and guidelines should reflect this. Earlier treatments, including correction of coagulopathy, may reverse the cascade of deterioration that seems to be present with AFE, and so improve survival in the most serious cases.

Experience-led commissioning may be used as a way to commission maternity services. The commissioned strategy appears more patient-focused and the process led to beneficial engagement of both user and health professional groups in commissioning services.

### *Variation in outcomes between groups*

Maternity services need to be responsive to women of different ethnic and social groups, to ensure optimal utilisation of care. ELC may provide a route to fully engaging different social and ethnic groups in the commissioning of appropriate maternity services. Older women are at a considerably higher risk of pregnancy complications and this should be considered when counselling and managing women of very advanced maternal age, particularly in the context of assisted reproduction. There may be a place for considering early fetal reduction in women of very advanced age with multiple pregnancies. Recommendations regarding assisted conception including egg donation in older mothers, as well as single embryo transfer,

should take into account the high risks of adverse pregnancy outcomes in older women with multiple pregnancies and who have undergone assisted reproduction.

### ***Factors that influence the risk of maternal death and how these might be addressed***

Health professionals should be aware of the associated risk of dying from severe obstetric morbidity in women with medical and mental health comorbidities, hence women with medical and mental health comorbidities need to be identified and fully assessed for their risks in pregnancy. Inadequate uptake of antenatal care, substance misuse, hypertensive disorders of pregnancy, previous pregnancy problems and minority ethnicity are also associated with maternal death from direct pregnancy complications. The adverse consequences of these conditions can potentially be minimised through access to appropriate services, extra vigilance and proactive multidisciplinary management.

### ***Comparison of an external confidential enquiry or local review approach to investigate and improve the quality of care for affected women***

Substantial variation exists in the local review of severe maternal morbidities in terms of the definition and scope of incidents that trigger a review, the guidelines for conducting a review and the outputs and conclusions of reviews. Maternal sepsis was omitted in one-third of trigger checklists; maternal sepsis should be added to both Royal College of Obstetricians and Gynaecologists and local checklists of cases, which should stimulate a local review. Trigger checklists need to be responsive at both a local and national level to emerging conditions of public health and/or patient safety concern; processes should exist for ongoing review and revision to respond to such concerns. The implementation of recommendations from local reviews of the care of women with severe maternal morbidity should be audited to ensure that change has led to the desired improvement in outcomes.

Local reviews should be multidisciplinary, including – as a minimum – obstetricians, midwives and anaesthetists, together with other professional groups such as physicians, general practitioners (GPs) and health visitors, as appropriate. At a local level, individual disciplinary procedures/recommendations should be separated from the incident review processes.

### ***Longer-term impacts of near-miss maternal morbidity for women, their babies and families***

When a woman has had a severe maternal morbidity, community midwives as well as her GP need to be made aware of this when she is discharged from hospital. Follow-up appointments with hospital obstetric and/or midwifery staff are helpful for women with severe maternal morbidities. However, women reported that they felt they needed these at varying times after the event; flexibility beyond the standard timing of 6 weeks post delivery would be helpful. There should be a clear pathway for access to counselling services for women with severe maternal morbidities. GPs should remain alert to the possibility of ongoing mental health problems in women who have had a severe pregnancy complication, as well as being aware that the experience may impact on the mental health of the woman's partner.

## **Implications for future research**

### ***Pre-pregnancy***

It is unclear how and by whom pre-pregnancy care is best delivered to access women with the wide spectrum of medical and mental health disorders that are associated with morbidity. Allied to this, further research is needed to fully identify the pathways through which minority ethnicity is associated with severe maternal morbidity. This may include pre-pregnancy educational, cultural and social factors that provide a focus for further research into possible pathways of prevention of severe maternal morbidity.

### ***During pregnancy***

Obstetric interventions, such as induction of labour and caesarean delivery, are associated with a number of severe morbidities and research investigating methods to reduce intervention rates without increasing other adverse outcomes is important as a route to prevention of near-miss morbidity. Further investigation is needed to establish the role of prophylactic antibiotics for the prevention of infection following operative vaginal delivery. Some women found intensive care outreach services helpful and further studies are needed as to how this can be optimally provided to the maternity population to improve outcomes. This programme demonstrated that robust observational data can be used to conduct a cost–utility analysis and further studies of interventions for severe maternal morbidities could include similar approaches.

### ***Following pregnancy***

There has been little research on the long-term impact of traumatic birth and how best to help women. There is inconclusive evidence on the impact of debriefing programmes and this needs to be robustly evaluated. Many of the women we interviewed reported symptoms associated with post-traumatic stress disorder (PTSD). Further investigation of the role severe pregnancy complications play as precipitating factors for PTSD is needed, alongside investigation of possible therapies to prevent traumatic flashbacks.

### ***Serious incident reviews***

Further evaluation is needed to establish whether or not there is added value to including an external perspective to local reviews once high-quality multidisciplinary local review processes are fully implemented. The balance of cost/complexity versus benefit of local versus external reviews of the care of women with severe pregnancy morbidity needs to be fully established in a prospective study including audit of change in practice and outcomes.

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