

Confidential Enquiry into Maternal and Child Health

Improving care for mothers, babies and children

Why Mothers Die 2000–2002

Executive Summary and Key Findings

The Sixth Report
of the Confidential Enquiries into Maternal
Deaths in the United Kingdom

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INTRODUCTION

This booklet summarises the key findings and recommendations made in the Sixth Report of the Confidential Enquiries into Maternal Deaths in the United Kingdom 2000–02. This is the first of these Reports to have been published by the Confidential Enquiries into Maternal and Child Health (CEMACH).⁽ⁱ⁾

A separate summary has also been specifically prepared for midwives, which focuses on the findings and recommendations as they relate to midwifery care, copies of which can be downloaded from the CEMACH website at www.cemach.org.uk.

This executive summary is being circulated widely throughout the NHS, as the key messages it contains are of relevance to all involved in planning and providing maternity care for women during or after their pregnancy. Health professionals involved include public health specialists, general practitioners, midwives, obstetricians, staff in accident and emergency departments, psychiatrists, anaesthetists and pathologists. Healthcare commissioners and service managers will also wish to ensure that the results and recommendations are incorporated into future service delivery plans and local audit procedures. This is particularly relevant in light of the recently published National Service Framework for Children and Maternity Services in England.

Summary of key findings for 2000–02

The Enquiry considers all deaths of women that are directly related to pregnancy (*Direct*), those due to pre-existing maternal disease aggravated by pregnancy (*Indirect*), those in which the cause was unrelated to pregnancy (*Coincidental*) and those occurring between six weeks and one year following delivery (*Late*).

During this triennium, 391 maternal deaths were reported to the Enquiry. Of these deaths, 106 were classified as *Direct* and 155 as *Indirect*, representing 27% and 40% of reported cases, respectively. Thirty-six (9%) deaths were classified as *Coincidental* and 94 (24%) as *Late*. The total number of *Direct* and *Indirect* maternal deaths reported to the Enquiry, 261, is slightly higher than the 242 reported in the previous triennium. As also seen in the last Report, the number of *Indirect* deaths exceeds the number of *Direct* deaths, pointing to the importance of providing coordinated multidisciplinary care for women with intercurrent medical or psychiatric conditions.

The overall maternal mortality rate for the United Kingdom for this triennium from deaths due to both *Direct* and *Indirect* causes is 13.1 maternal deaths per 100,000 maternities. This represents a slight increase on the rate for the last triennium but is not statistically significant.

The most common cause of *Direct* deaths was again thromboembolism, the rates for which remain largely unchanged since 1997–99. There have been increases in the mortality rates from haemorrhage and those associated with anaesthesia and no significant decreases in deaths from other causes.

⁽ⁱ⁾ CEMACH took over the responsibility for the overall management of the existing UK Enquiry on 1 April 2003. Its remit includes the improvement of maternal and child health as well as mortality reviews and it covers babies and children in addition to mothers. www.cemach.org.uk

The most common cause of *Indirect* deaths, and the largest cause of maternal deaths overall, was psychiatric illness, although not all of these deaths were reported to the Enquiry and many were identified from linkage with the Office for National Statistics (ONS).

Risk factors for maternal deaths

For the first time, the last Report was able to evaluate more fully all the factors which may have played a part in the woman's death. The findings were stark and led to pressure for changes in service delivery. This analysis has been expanded for the current Report and the findings serve to reinforce the importance of ensuring maternity services are designed to meet the needs of all women, particularly those who are socially disadvantaged, excluded or vulnerable for any reason. In summary:

- **Social disadvantage:** Women living in families where both partners were unemployed, many of whom had features of social exclusion, were up to 20 times more likely to die than women from the more advantaged groups. In addition, single mothers were three times more likely to die than those in stable relationships.
- **Poor communities:** Women living in the most deprived areas of England had a 45% higher death rate compared to women living in more affluent areas.
- **Minority ethnic groups:** Women from ethnic groups other than White were, on average, three times more likely to die.
- **Black African women:** especially including asylum seekers and newly arrived refugees had a mortality rate seven times higher than White women and had major problems in accessing maternal health care.
- **Late booking or poor attendance:** 20% of the women who died from *Direct* or *Indirect* causes booked for maternity care after 22 weeks of gestation or had missed over four routine antenatal visits.
- **Obesity:** 35% of the all women who died were obese; 50% more than in the general population.
- **Domestic violence:** 14% of all the women who died self-declared that they were subject to violence in the home.
- **Substance abuse:** 8% of all the women who died were substance misusers.

Overall findings and recommendations

1. Planning local maternity services

Many women who died, particularly the vulnerable and socially excluded, found it difficult to access or maintain access with the services, and follow-up for those who failed to attend was poor. Inadequate translation services for those who could not speak English were also a recurring feature.

Some women known to be at higher risk of complications were delivered in isolated maternity units without access to blood banks, intensive care, advanced imaging, or

skilled anaesthetic backup. A very few women died because of administrative delays while waiting for therapeutic terminations of pregnancy that might have saved their lives.

The provision of specialist psychiatric services and multidisciplinary care for women with complex mental health or social problems including problem substance misuse and domestic violence was, in many cases, poor, as was interagency working with social and other services for women and children at risk.

- Maternity services should be designed to be approachable and flexible enough to meet the needs of all women, including the vulnerable and hard to reach. Asylum seekers and refugees are a particularly vulnerable group and services need to respond to their needs.
- The importance of seeking antenatal care early in pregnancy should be part of health education and promotion materials prepared for all groups in society. Maternity services should be such that all women are then motivated to re-attend throughout their pregnancy.
- Professional interpreters should be provided for women who do not speak English. The use of family members, including children, should be avoided if at all possible.
- Coordinated multidisciplinary or multi-agency care should be available for all women with medical, mental health or social problems, including substance abuse and domestic violence, who may require specialist advice or support in pregnancy. They should not be managed in isolation but by maternity services that are part of a wider multidisciplinary or multi-agency network, and those who receive care from a number of specialists or agencies should receive the support and advocacy of a known midwife throughout their pregnancy.
- Women known to be at risk of developing clinical problems should not be delivered in isolated maternity units. This needs to be addressed both in terms developing an overall strategy for maternity services provision as well as developing local protocols for the referral of women with problems, or potential problems, in pregnancy and childbirth.
- Dedicated obstetric anaesthesia services should be available in all consultant obstetric units. These services should be capable of taking responsibility for epidural analgesia, anaesthesia, recovery from anaesthesia and management of mothers requiring high-dependency care.
- A specialist perinatal mental health team with the knowledge, skills and experience to provide care for women at risk or, or suffering from, serious postpartum mental illness should be available to every woman. Women who require psychiatric admission following childbirth should be admitted to a specialist mother and baby unit, together with their infant. In areas where this service is not available then admission to the nearest unit should take place.
- Women who have had complex pregnancies or problems with mental illness, violence or substance misuse, and their babies, require close multidisciplinary follow-up in the postnatal period.
- Information about local sources of help and emergency help lines for women experiencing violence, such as provided by Women's Aid, should be displayed in suitable

places in antenatal clinic, for example in the women's toilets or printed as a routine at the bottom of hand held maternity notes or cooperation cards.

- Termination of pregnancy services should be readily available and accessible for women with medical conditions precluding safe pregnancy. Women referred for a termination of pregnancy, who have a potentially life-threatening condition, should be given an appointment as quickly as possible and certainly no longer than 3 weeks.
- Further research is needed to identify the barriers that prevent women from seeking care or maintaining contact with the maternity services in order to help plan more appropriate service provision.

2. Clinical care

Some maternal deaths are still unavoidable, and there were instances in this triennium of outstanding medical and midwifery care provided in the face of overwhelming complications. However, more than half of the women who died had some aspect of substandard clinical care. Some died because their condition was not diagnosed or they received ineffective care or the wrong treatment. Not all care was consistent with current national clinical guidelines or provided by experienced staff. Cardiac arrests are rare in maternity units but they can and do happen and their management was, in some cases, suboptimal.

In general, the causes of substandard care are as in previous Reports; i.e. failures in diagnoses, failures of treatment or failure to refer to a senior colleague, and lack of communication and teamwork both within the obstetric and midwifery teams and in multidisciplinary teamworking.

There were a number of cases in which crucial clinical information, which may have affected the outcome, was not passed from the general practitioner to the midwifery or obstetric services at booking or shared between consultants in other specialties, including staff in accident and emergency departments, and the obstetric team.

Some staff in accident and emergency departments misdiagnosed pregnant women with severe complications, underestimated the degree of urgency of the situation, did not liaise with maternity colleagues or discharged sick pregnant women without referral.

A new area of concern is the apparent failure of some staff to recognise and act on the common signs of critical illness not necessarily related to obstetric practice such as pyrexia and/or a rapid pulse. Further, some critically ill women were initially diagnosed as having a psychiatric condition, such as anxiety, despite clear physical signs.

- Each Trust should implement, audit and regularly update multidisciplinary guidelines for the management of women at risk of, or who develop, complications in pregnancy. Where possible, these must be based on any relevant guidelines from the National Institute for Clinical Excellence (NICE) or other country equivalents. Where national guidelines do not exist, there may be evidence-based guidelines from the relevant Royal Colleges.
- As a minimum, and based upon the most up-to-date authoritative clinical evidence, protocols and local referral pathways, including transport in emergencies, should be developed and audited for:

- the multidisciplinary management of women with pre-existing medical conditions, including cardiac disease, epilepsy and diabetes
 - the management of women who are at risk of a relapse or recurrence of a serious mental illness
 - the management and local support strategies for women who use drugs and/or alcohol or who disclose domestic violence
 - the management of pregnant women who attend accident and emergency departments
 - the management of sepsis, pre-eclampsia and eclampsia, obstetric haemorrhage, and of women who decline blood products
 - the use of thromboprophylaxis.
- All accident and emergency departments should develop a local protocol for the management of pregnant women. Pregnant women attending accident and emergency departments with anything other than minor complaints must be seen quickly and in conjunction with an obstetrician or senior midwife. If they are not available on site then arrangements should be made to discuss their care with the local maternity unit.
 - Emergency drills for maternal resuscitation should be regularly practised in clinical areas in all maternity units and all medical and nursing staff should be trained to a nationally recognised level as appropriate. These drills should include the identification of the equipment required and appropriate methods for ensuring that cardiac arrest teams arrive promptly.
 - A multidisciplinary massive haemorrhage protocol must be available in all units and should be updated and rehearsed regularly in conjunction with the blood bank. All grades of staff should participate in these 'fire drills'.
 - Where possible, an autopsy should be performed for all maternal deaths. If the autopsy cannot be performed by a pathologist with a special interest in these deaths, then help and advice should be sought from a pathologist with expertise in this area.

3. The booking visit

The booking visit is crucial in helping assess the specific needs of newly pregnant women, identifying any significant current or past medical, psychiatric or social problems and helping them to plan and make choices for their maternity care and where to give birth. This opportunity was lost to many of the women who died. A recurrent theme in this Report is that highly relevant information was not passed on from the GP to the maternity staff in the referral letter.

Booking also offers an ideal opportunity for maternity staff to identify any current or potential problems that may require more specialist advice or investigation. For the women who died, this does not appear to have been done in a systematic way and in some cases vital information was not ascertained or recorded.

At booking, a risk and needs assessment should take place to ensure every woman will be offered the type of care that most suits her own particular requirements. Some women in this Report were offered midwifery-led care that did not meet their more complex needs.

- Clear, relevant and complete information, which accurately details any past current or past medical, psychiatric, social or family history, must be passed from the GP to the antenatal care team at booking.
- A standard national 'booking referral letter' should be developed that contains a checklist of medical, social factors and family history, which needs to be included to enable the most appropriate care plan for each woman to be developed.
- The systematic enquiries should include:
 - a complete social history
 - any personal or family medical history, including thromboembolism, cardiac disease or malignancies
 - any personal or family psychiatric history, its severity and management
 - the use of drugs, prescribed and non-prescribed, legal and illegal, and tobacco and alcohol.
- Pregnant women with known medical or mental health problems, including complex social problems, substance misuse and domestic violence, should be offered shared multidisciplinary and, if appropriate, multi-agency care in a supportive environment. If they choose midwifery-led care, the midwife should receive support and advice from an experienced superior.
- A national guideline for a booking clinic 'risk assessment' chart should be developed to identify those pregnant women for whom midwifery-led antenatal care and birth can be advised, and those for whom specialist or joint care is more appropriate.
- Systematic enquiries about previous psychiatric history, its severity, care received and clinical presentation should be routinely made at the antenatal booking visit. The term 'postnatal depression' or 'PND' should not be used as a generic term for all types of psychiatric disorder. Details of previous illness should be sought and recorded.
- Women who have a past history of serious psychiatric disorder, postpartum or non-postpartum, should be referred for an assessment by a psychiatrist in the antenatal period and should be counselled about the possible recurrence of that illness following further pregnancies.
- Once local multi-agency support services are in place, routine enquiries should be made about domestic violence, either when taking a social history at booking or at another opportune point in the antenatal period. Where possible, all women should be seen alone at least once during the antenatal period to enable disclosure more easily if they wish.
- Women with a body mass index of 35 or more are at higher risk of developing problems and, in the opinion of this Enquiry, should be referred for care shared with an obstetrician and advised to deliver in a consultant led obstetric unit.

4. Complex pregnancies

Some women who died who had known obstetric or other complications did not have integrated care. Some had serious medical problems managed by physicians or cardiologists without referral to their obstetrician. In other cases, liaison between general practitioners, accident and emergency and oncology services, mental health and substance misuse services and obstetric services was also poor. Some women with significant symptoms or severe pain were not adequately investigated or referred for a medical or surgical opinion.

- All pregnant women with medical or psychiatric conditions requiring treatment or care by other specialists should have an integrated care plan developed and agreed between all specialties involved. For some more common medical conditions such as cardiac disease, diabetes and epilepsy, joint clinics should be provided.
- Regular communication between specialties is crucial and this should be monitored and ensured by the woman's lead maternity care provider, which will usually be her midwife.
- A management plan for women who have a past history of serious psychiatric disorder, postpartum or non-postpartum, and who face a high risk of recurrence following delivery, should be agreed with the woman and her family, her maternity and psychiatric team and GP and placed in her handheld records.

5. Birth

Women with known or anticipated problems that might have affected their delivery were not always delivered in a consultant-led unit. Even when this did occur, some units lacked the appropriate facilities or experienced staff to provide a full range of emergency services required.

- Women known to be at higher risk of developing problems during labour or birth should be advised to deliver in a consultant obstetrician-led unit.
- Women known to be at high risk of bleeding should be delivered in centres with facilities for blood transfusion, intensive care and other interventions, and plans made in advance for their management.
- When presented with problems requiring special skills or investigations, midwives, obstetricians and obstetric anaesthetists should have the authority and should not hesitate to call for assistance from senior colleagues in their own or other disciplines.

6. Health professionals

There were instances where, in the compiling of the reports for this Enquiry, unwitting staff prejudices were revealed that may have had an effect on the care they provided.

An unexpected maternal death is devastating for the staff who cared for her. Some staff, doctors and midwives appeared to blame themselves inappropriately when a mother for whom they had been caring died. These staff appeared to have been left to shoulder the guilt they felt alone and were not offered counselling or support. A few left their profession as a result.

The Report also identified a number of areas in which all health and other professions caring for pregnant women could benefit from regular and updated training.

- Health professionals who work with disadvantaged clients need to be able to understand a woman's social and cultural background, act as an advocate for women with other colleagues and address their own personal and social prejudices and practice in a reflective manner.
- All healthcare professionals should consider whether there are unrecognised but inherent racial prejudices within their own organisations, in terms of providing an equal service to all women.
- Trusts must make provision for the prompt offer of support and/or counselling for all staff who have cared for a woman who has died, individually and as the whole team who cared for the mother.
- All health professionals should receive regular and updated training on the signs and symptoms of critical illness, from both obstetric and non-obstetric causes, and in basic life support.
- All health professionals should receive regular and updated training on the impact of domestic violence, mental illness and substance misuse on the lives and health of pregnant women, their babies and families. This should also include the identification, management and local service provision for these women. Such training is essential before any routine enquiries are commenced.
- Obstetricians and midwives should be aware of the laws and issues that relate to child protection and when and to whom to refer if they are concerned.

Specific causes of death and recommendations

This section summarises the main findings for some of the leading causes of maternal death, and some of the specific recommendations relating to these. Many of the recommendations made in each chapter of the Report apply across the board and have already been included in the preceding list of major recommendations. A complete list of all recommendations, references and guidelines can be found in each chapter of the Report itself.

Venous thrombosis and thromboembolism

Although venous thrombosis and thromboembolism (VTE) remains the leading cause of *Direct* death, the maternal death rate from thromboembolism continues to decline. The fall during this triennium is due to a reduction in deaths from pulmonary embolism in the antenatal period. Nearly 80% of the women who died from pulmonary embolism had known specific risk factors for thromboembolism. Substandard care took the form of a failure to recognise risk factors, failure to appreciate the significance of signs and symptoms in the light of background risk factors, failure to act promptly enough in implementing either prophylaxis or treatment and inadequate dosage of thromboprophylaxis.

- All women should undergo an assessment of risk factors for VTE in early pregnancy. This assessment should be repeated if the woman is admitted to hospital or develops other intercurrent problems.
- Pregnant women with a past history of thromboembolism should be tested for thrombophilia, to more accurately define their risk of recurrence and guide thromboprophylaxis.
- Acute symptoms suggestive of thromboembolism in known high-risk women are an emergency and anticoagulation may be indicated before the diagnosis is clear; when VTE has been identified treatment must be begun without delay.
- The RCOG guidelines on thromboprophylaxis, during pregnancy and labour and after normal vaginal delivery and caesarean section, which are reprinted in the chapter in the main Report, should be used as a basis for local protocols.

Hypertensive disease of pregnancy

The mortality rate for deaths from eclampsia and pre-eclampsia remains unchanged from the last Report. The single major failing in clinical care in this triennium was inadequate treatment of hypertension, with subsequent intracranial haemorrhage. In most of these cases, the consultant obstetrician was involved too late. Although most substandard care occurred in hospitals, there were examples in the community of midwives or general practitioners failing to test urine for proteinuria in women who subsequently developed severe pre-eclampsia.

- Pregnant women with a headache of sufficient severity to seek medical advice, or with new epigastric pain, should have their blood pressure measured and urine tested for protein, as a minimum.
- Automated blood pressure recording systems can systematically underestimate blood pressure in pre-eclampsia, to a serious degree. Blood pressure values should be compared, at the beginning of treatment, with those obtained by conventional sphygmomanometers.
- The early involvement of consultant obstetricians in the management of women with suspected or proven pre-eclampsia and eclampsia is essential and there should be early engagement of intensive care specialists in the care of women with severe pre-eclampsia.
- Severe, life-threatening, hypertension must be treated effectively. Management protocols should recognise the need to avoid very high systolic blood pressures associated with the risk of intracerebral haemorrhage. It is recommended that clinical protocols identify a systolic blood pressure, above which, urgent and effective antihypertensive treatment is required.
- In women presenting with potentially severe pre-eclampsia but with unexceptional blood pressure measurements, alarming rises in blood pressure should be anticipated. Consideration should be given to early administration of antihypertensive drugs.

Haemorrhage

Catastrophic obstetric haemorrhage is a continuing problem and the mortality rate per million maternities has more than doubled since the last Report. There were 17 deaths from haemorrhage during 2000–02 compared with seven in the previous Report. While the numbers of deaths due to placental abruption and placenta praevia remain unchanged from the previous triennium there has been a striking increase in the numbers of deaths from postpartum haemorrhage (PPH). However, four of the women who died from PPH either had no contact with the health services or declined blood transfusions that would probably have saved their lives. Without these cases, the mortality rate would have been broadly similar to that over the last decade.

Other findings show that women at known high risk of haemorrhage are still being delivered in isolated units or facilities ill equipped to manage sudden, life-threatening emergencies. These units may be without immediate access to specialist consultant care, blood products or intensive care.

All of the women who died from placenta praevia had previous caesarean sections. The Report recommends that further research be undertaken in this area.

- Women known to be at high risk of bleeding should be delivered in centres with facilities for blood transfusion, intensive care and other interventions, and plans should be made in advance for their management.
- Placenta praevia, particularly in women with a previous uterine scar, may be associated with uncontrollable uterine haemorrhage at delivery and caesarean hysterectomy may be necessary. A consultant must be in attendance.
- Consultant haematologists should be involved in the care of women with coagulopathy.
- Women who decline blood products should be treated with respect and a management plan in case of haemorrhage agreed with them before delivery is anticipated. An example of such a plan is contained within the main Report.
- Further research is recommended to investigate the incidence of PPH in relation to previous caesarean section.

Amniotic fluid embolism

Amniotic fluid embolism (AFE) is rare, and the number of maternal deaths due to it has fallen significantly over the last three triennia. It remains unpredictable, unpreventable and is rapidly progressive but not now universally fatal. Women with symptoms suspicious of AFE should be transferred to the intensive care unit as soon as possible, as these women may have a better chance of survival.

Significant premonitory signs and symptoms, i.e. respiratory distress, cyanosis, restlessness and altered behaviour, may give the first clue to diagnosis before collapse and haemorrhage occur. The early recognition of the possibility of AFE should lead to the earlier involvement of the resuscitation team, as well as consultant input in obstetrics, anaesthetics, intensive care and haematology.

- All staff should be aware that a sudden change in a woman's behaviour may be an early feature of the onset of hypoxia and a toxic confusional state. The early

involvement of senior staff and, in particular, anaesthetists and intensivists, once these or other warning symptoms of AFE develop is important, as it is with any case of maternal collapse.

- Fetal elements should be searched for in the pulmonary vasculature at autopsy in anyone who dies following sudden collapse. If the diagnosis of AFE is suspected clinically, all attempts should be made to confirm this at autopsy. AFE should only be diagnosed on clinical grounds in the absence of an autopsy or an inadequately investigated autopsy.

Early pregnancy

The mortality rate for deaths from ectopic pregnancies has not declined since the last Report, and is still an increase on the rates described 10 years ago. Sixty-six percent of the women who died from ectopic pregnancies were assessed as having some form of substandard care.

All pregnant women presenting with abdominal pain to an accident and emergency department should be reviewed by staff from the obstetrics and gynaecology department.

- Clinicians in primary care and accident and emergency departments, in particular, need to be aware of atypical clinical presentations of ectopic pregnancy and especially of the way in which it may mimic gastrointestinal disease. This needs to be taught to undergraduate medical and nursing students and highlighted in textbooks.
- Dipstick testing for human chorionic gonadotrophin (hCG) should be considered in any woman of reproductive age with unexplained abdominal pain. The test is now quick, easy, and sensitive.
- The presentation and management of ectopic pregnancy, especially the atypical symptoms, needs to be taught to undergraduate medical and nursing students and highlighted in textbooks, and reinforced in medical postgraduate education. Cornual pregnancies are rare but dangerous types of ectopic pregnancy and clinicians should be aware of the difficulties with both clinical and ultrasound diagnosis.

Genital tract sepsis

Although there has been a small decrease in the number of deaths due to genital tract sepsis, infection remains a significant cause of maternal death. The risk of sepsis is increased after prolonged rupture of membranes, emergency caesarean section or if products of conception are retained after miscarriage, termination of pregnancy or delivery. Delivery in water may carry a risk of infection for mother and baby due to faecal contamination of the perineum and genital tract.

The onset of life-threatening sepsis in pregnancy or the puerperium can be insidious with rapid clinical deterioration. Pyrexia may be absent in some cases of severe sepsis. Regular training for doctors, midwives and medical students about the risk factors, symptoms, signs, investigation and treatment of sepsis and the recognition of critical illness is recommended as in some cases vital warning signs were overlooked or misinterpreted.

The importance of prompt aggressive treatment of suspected sepsis with adequate intravenous doses of appropriate broad-spectrum antibiotics must be re-emphasised as early

intervention may prevent the situation becoming irreversible. In some of the cases there was delay in starting appropriate antibiotic treatment and/or imprecise prescribing by medical staff.

- When there is strong clinical suspicion of sepsis parenteral broad-spectrum antibiotics should be started immediately, without waiting for microbiology results, even if the presence of diarrhoea suggests gastroenteritis as a possible diagnosis. Advice from a microbiologist must be sought early to ensure appropriate antibiotic therapy.
- Any problems which may lead to sepsis, such as prolonged rupture of membranes, a retained placenta or ragged membranes, should be reported to the woman's community carers at the time she is discharged so that appropriate follow-up visits may be arranged and the significance of developing symptoms recognised. This is particularly important in early postpartum discharge from hospital, which is an increasingly common practice.

Anaesthesia and intensive care

There were six *Direct* deaths (plus one *Late Direct* death) due to anaesthesia, representing an increase from the three deaths directly attributable to anaesthesia in the last Report. All the deaths were associated with general anaesthesia, the majority of which were given by junior anaesthetists with inadequate supervision.

Another recurring issue in a significant number of women referred to intensive care was an apparent delay in the recognition of the severity of their illness. Young, previously fit pregnant women have significant physiological reserves, which can mask the severity of important life-threatening illnesses such as haemorrhage or infection. Despite this, there were a number of cases in which readily recognisable signs of significant physiological abnormality were either missed or ignored.

- Isolated consultant obstetric units present major difficulties in terms of immediate availability of additional skilled anaesthetic backup and assistance from other specialties, including critical care. When presented with problem cases requiring special skills or investigations, obstetric anaesthetists should not hesitate to call on the assistance of anaesthetic colleagues in other subspecialties, as well as colleagues in other disciplines.
- Anaesthesia training must ensure competence in airway management, especially the recognition and management of oesophageal intubation.
- Further research is needed to estimate more robustly what, if any, is the degree of increased risk of maternal deaths associated with caesarean section, particularly for those undertaken without a clinical indication.
- Intensive care should start as soon as it is needed and does not need to wait for admission to an intensive care unit. It is possible to provide the majority of immediate intensive care in an obstetric theatre. Where available, outreach staff should be used.
- Early warning scores for severe or impending critical illness should be used more often on obstetric wards; they may need modifying for pregnant patients.
- Intensive care consultants should be part of the multidisciplinary team planning care for pregnant patients with serious co-morbidity.

Indirect deaths

The number of women dying from diseases or conditions aggravated by pregnancy is larger than for those dying of complications due directly to pregnancy or childbirth. Deaths from psychiatric causes are the leading cause of maternal mortality overall, followed by cardiac disease. These are both classified as *Indirect* causes, and there are a number of other causes which regularly feature in this category, including deaths from subarachnoid haemorrhage, epilepsy, diabetes and hormone-dependent malignancies.

A feature of many of the *Indirect* deaths was the lack of coordinated multidisciplinary care, which has been highlighted both in previous Reports and also earlier in this executive summary. Many of the recommendations that arise from cases of *Indirect* death have already been included in the more general recommendations but more specific ones include:

- Pregnant women with complications must be seen early in pregnancy by consultant obstetricians. If the complications are outside the experience of the local obstetrician they should be referred to tertiary centres for a further opinion. This would not necessarily entail delivery at the tertiary centre.
- Pregnancy is not a contraindication for radiological investigations for women with severe and unremitting pain or vomiting, including back, chest or epigastric pain, particularly if the pain is so severe that it requires management by major or epidural analgesia or prevents the woman from walking.
- Prepregnancy counselling for women living with, or at risk of developing, significant illness needs to include a discussion concerning the increased risk of death or severe morbidity.
- All pregnant and recently delivered women with congenital heart disease should be supervised by a consultant cardiologist or physician with an interest and expertise in the care of adult congenital heart disease in pregnancy, both during and after pregnancy. Their care should be provided in close conjunction with a consultant obstetrician, preferably at a joint clinic.
- If women die from a genetic or inheritable condition (e.g. Marfan's syndrome) or potentially inheritable disease such as sudden adult death syndrome (SADS), their family members should be counselled and offered screening.
- Pregnant women undergoing intercurrent treatment or investigation for medical or surgical conditions should be reviewed by a consultant obstetrician even though they may appear to be obstetrically well.

Reference

1. Department of Health. *The National Service Framework for Children, Young People and Maternity Services*. London: DoH; 2004. [www.dh.gov.uk/PolicyAndGuidance/HealthAndSocialCareTopics/ChildrenServices/fs/en].

