

Executive Summary

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"I look forward to the great advances in knowledge that lie around the corner, but I do sometimes wonder whether the vast sums of money now being spent on research might not produce more rapid and spectacular improvement in health if devoted to the application of what is already known". Max Rosenheim, President, Royal College of Physicians, 1968.

Introduction

The eighth Report of the Confidential Enquiries into Maternal Deaths in the UK investigates the deaths of 261 women who died in the triennium 2006–08, from causes directly or indirectly related to pregnancy. The full Report is available for purchase or download from the Centre for Maternal and Child Enquiries (CMACE; www.cmace.org.uk). Although every maternal death is a tragedy, particularly where avoidable factors were identified by the Enquiry process, the overall picture is encouraging. The maternal death rate in the UK continues to decline despite increasing pressures on maternity services and a changing maternal population. For the first time there has been a reduction in the inequalities gap between women living in different socio-economic circumstances, and timely production of guidelines and tools appears to have helped clinical staff to deliver improved clinical care.

However, we cannot be complacent: substandard care is still too prevalent. Although some clinical causes of maternal death, particularly thrombosis, have fallen sharply, new problems are emerging as major contributors to maternal mortality: obesity, sepsis, and the emergent threat from influenza A (H1N1/2009).

The title of the seventh Report of the Confidential Enquiries into Maternal Deaths in the UK was changed to

Saving Mothers' Lives, with the aim of stimulating and promoting beneficial clinical action. It is significant that the best improvements in death rates have been in those areas where recommendations have been accompanied by guidelines and care plans to help NHS staff to deliver evidence-based care; literally saving mothers' lives. This contrasts starkly with the current paucity of guidance and tools to improve the delivery of care for those conditions where the maternal death rate is increasing, particularly sepsis.

To this end this report contains a new section: 'Back to Basics', which provides a series of checklists to improve the recognition of and action on the signs and symptoms of potentially life-threatening conditions. These could be usefully integrated into clinical notes as an aide-memoire for all those caring for women in pregnancy.

Reducing preventable harm is the *raison d'être* of this report, by identifying preventable factors and missed opportunities, which can inform national or local guidance and recommendations to influence commissioning of safer services and beneficial changes to service organisation. This report presents some reassuring findings that mothers' lives are being saved by this Enquiry and its methodology, and demonstrates where future efforts to further improve care need to be focused.

Summary of key findings (2006–08)

Maternal death rates

There has been a significant reduction in the overall UK maternal death rate from 13.95 per 100 000 maternities in the previous triennium to 11.39 per 100 000 maternities in this 2006–08 triennium ($P = 0.02$; For international comparison, the UK maternal mortality rate (calculated from

death certification only) is 6.69 (5.72–7.84) per 100 000 live births for 2006–08.

It is gratifying to see that this reduction has been particularly marked for women living in the most deprived population quintile. Although a gap remains between the death rates of women with unemployed husbands/partners who are six times more likely to die than those whose husbands/partners are employed, this has improved from the 12-fold and seven-fold differences seen in the last two triennial reports. Moreover, there has been a significant downward trend in the maternal mortality rate among black African women ($P = 0.003$) and also for women from white ethnic backgrounds ($P = 0.04$) over the last three triennia.

The clinical causes of mothers' deaths

Direct deaths (from medical conditions that can only be the result of pregnancy) significantly decreased from 6.24 per 100 000 maternities in the last triennium to 4.67 per 100 000 maternities in this triennium ($P = 0.02$). This equates to 25 fewer direct maternal deaths over the triennium, and this decline is predominantly the result of reductions in deaths from thromboembolism, and to a lesser extent, haemorrhage. The case fatality rate for ectopic pregnancy has almost halved from an estimated rate of 31.2 per 100 000 estimated ectopic pregnancies in 2003–05 to 16.9 in this triennium.

Although *Direct* maternal deaths have decreased overall there has been a dramatic increase in deaths related to genital tract sepsis, particularly from community-acquired Group A streptococcal disease. The overall rate has increased from 0.85 deaths per 100 000 maternities in 2003–05 to 1.13 deaths in this triennium. Sepsis is now the

commonest cause of *Direct* maternal deaths in the UK and this has prompted a Clinical Briefing from CMACE alerting health professionals to the risks.

Indirect maternal death rates have remained largely unchanged since the last report. Cardiac disease remains the most common cause of *Indirect* maternal death: many of these women also had lifestyle-related risk factors for cardiac disease: obesity, smoking and increased maternal age.

Underlying maternal health determinants

As in previous reports there was a marked increase in maternal death rates for women aged over 35 years: the death rate doubled from 9.2 to 18.8 per 100 000 maternities for women aged 30–34 and those aged 35–39 years. This increased further to 29.2 per 100 000 for women aged 40 and over. Thirteen deaths occurred in young women aged 19 and under, six of whom were known to social services and many of whom had complex social circumstances.

Obesity remains a significant contributor to maternal death in this triennium: the prevalence is increasing in both the general population and the pregnant population. Women with a high body mass index remain over-represented in maternal deaths. CMACE has recently produced a detailed report on the management of obesity in pregnancy, which is available to purchase or download (www.cmace.org.uk).

Smoking status was recorded in 87% of maternal deaths: 28% of women who died in this triennium were current smokers, with a further 6% recorded as having quit before the pregnancy.

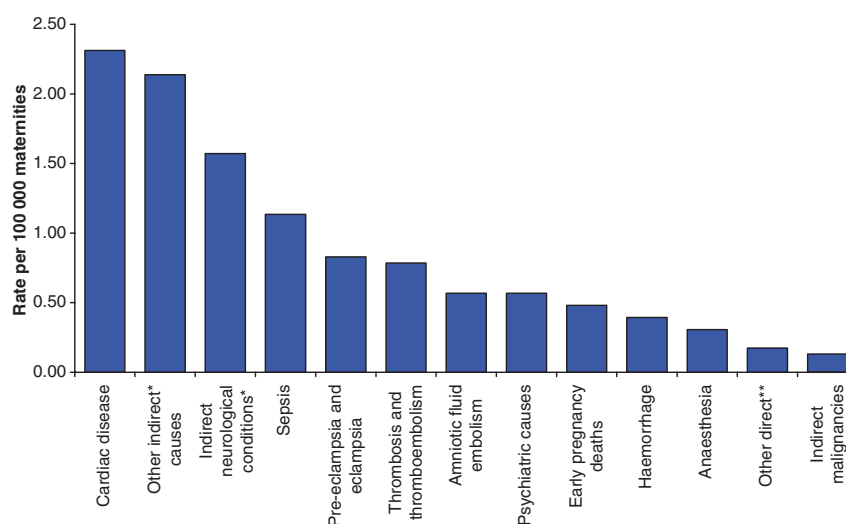


Figure 4.1. Leading causes of maternal death per 100 000 maternities: UK 2006–08.

*Other *Indirect* causes of death are separated into neurological and others; **Other *Direct* includes fatty liver and a direct cancer.

Table 1.4. Numbers and rates of leading causes of maternal deaths: UK 1985–2008

Cause of death	n								Rates per 100 000 maternities							
	1985–87	1988–90	1991–93	1994–96	1997–99	2000–02	2003–05	2006–08	1985–87	1988–90	1991–93	1994–96	1997–99	2000–02	2003–05	2006–08
Direct deaths																
Sepsis	9	17	15	16	18	13	18	26	0.40	0.72	0.65	0.73	0.85	0.65	0.85	1.13
Pre-eclampsia and eclampsia	27	27	20	20	16	14	18	19	1.19	1.14	0.86	0.91	0.75	0.70	0.85	0.83
Thrombosis and thromboembolism	32	33	35	48	35	30	41	18	1.41	1.40	1.51	2.18	1.65	1.50	1.94	0.79
Amniotic fluid embolism	9	11	10	17	8	5	17	13	0.40	0.47	0.43	0.77	0.38	0.25	0.80	0.57
Early pregnancy deaths*	16	24	17	15	17	15	14	11	0.71	1.02	0.73	0.68	0.80	0.75	0.66	0.48
Ectopic	11	15	9	12	13	11	10	6	0.48	0.64	0.39	0.55	0.61	0.55	0.47	0.26
Spontaneous miscarriage	4	6	3	2	2	1	1	5	0.18	0.25	0.13	0.09	0.09	0.05	0.05	0.22
Legal termination	1	3	5	1	2	3	2	0	0.04	0.13	0.22	0.05	0.09	0.15	0.09	0.00
Other	0	0	2	0	0	0	1	0	0.00	0.00	0.09	0.00	0.00	0.00	0.05	0.00
Haemorrhage	10	22	15	12	7	17	14	9	0.44	0.93	0.65	0.55	0.33	0.85	0.66	0.39
Anaesthesia	6	4	8	1	3	6	6	7	0.26	0.17	0.35	0.05	0.14	0.30	0.28	0.31
Other Direct	27	17	14	7	7	8	4	4	1.19	0.72	0.60	0.32	0.33	0.40	0.19	0.17
Genital tract trauma	6	3	4	5	2	1	3	0	0.26	0.13	0.17	0.23	0.09	0.05	0.14	0.00
Fatty liver	6	5	2	2	4	3	1	3	0.26	0.21	0.09	0.09	0.19	0.15	0.05	0.13
Other causes	15	9	8	0	1	4	0	1	0.66	0.38	0.35	0.00	0.05	0.20	0.00	0.04
All Direct	139	145	128	134	106	106	132	107	6.13	6.14	5.53	6.10	4.99	5.31	6.24	4.67
Indirect																
Cardiac disease	23	18	37	39	35	44	48	53	1.01	0.76	1.60	1.77	1.65	2.20	2.27	2.31
Indirect neurological conditions	19	30	25	47	34	40	37	36	0.84	1.27	1.08	2.14	1.60	2.00	1.75	1.57
Psychiatric causes	–	–	–	9	15	16	18	13	–	–	–	0.41	0.71	0.80	0.85	0.57
Indirect malignancies	–	–	–	–	11	5	10	3	–	–	–	–	0.52	0.25	0.47	0.13
Other Indirect causes	43	45	38	39	41	50	50	49	1.90	1.91	1.64	1.77	1.93	2.50	2.37	2.14
All Indirect	84	93	100	134	136	155	163	154	3.70	3.94	4.32	6.10	6.40	7.76	7.71	6.59
Coincidental	26	39	46	36	29	36	55	50	1.15	1.65	1.99	1.64	1.37	1.80	2.60	2.18
Late																
Direct	–	13	10	4	7	4	11	9								
Indirect	–	10	23	32	39	45	71	24								

*The Early Pregnancy deaths category includes only those women who died from the following *Direct* causes: ectopic pregnancy, miscarriage, termination of pregnancy or other rare *Direct* conditions before 24 completed weeks of pregnancy not counted elsewhere. Those women who died from other causes before 24 weeks of gestation are counted in the relevant chapters, e.g. Embolism, Sepsis, Indirect etc.

Overall, 42% of *Direct*, and 24% of *Indirect* maternal deaths, occurred in women of black and other ethnic minority (BME) groups. For *Direct* deaths, there was a significant difference ($P < 0.001$) between women from BME groups and those from white ethnic groups. Many of these deaths in women from BME groups occurred in recently arrived immigrants, refugees or asylum seekers. The records of 39 women who died in this triennium were found to have features of domestic abuse; 62 women were known to social services and/or child protection services. Of these women, 28% had irregular, absent or late antenatal care: this is an improvement on the previous report.

There was no appreciable increase in maternal death rates associated with assisted reproductive techniques.

Avoidable factors

Unfortunately substandard care (SSC) remains a problem and despite limitations of the case records, the assessors identified SSC for 70% of *Direct* deaths and 55% of *Indirect* deaths.

This is an increase compared with previous triennia and was particularly marked for pre-eclampsia, eclampsia and acute fatty liver of pregnancy where >90% of deaths were associated with SSC.

Many of the avoidable factors identified remain the same as in previous reports and more research is needed to identify methods, tools and training to reduce SSC by health professionals. The challenges identified in this report include:

1. Improving clinical knowledge and skills.
2. Identifying very sick women.
3. Improving the quality of serious incident/serious untoward incident (SUI) reports.
4. Improving senior support.
5. Better management of higher risk women.
6. Pre-pregnancy counselling.
7. Better referrals.
8. Improving communication or communication skills, including:
 - Poor or non-existent teamworking.
 - Inappropriate or overly short telephone consultations.
 - Poor sharing of information between health professionals, particularly the maternity care team and GPs.
 - Poor interpersonal skills.

Top ten recommendations

The overwhelming strength of successive Enquiry Reports has been the impact their findings have had on maternal and newborn health in the UK and further afield. Over the years there have been many impressive examples of how the implementation of their recommendations and guide-

lines have improved policies, procedures and practice and saved more mothers' and babies' lives. The encouraging results given in this Report, in particular the reduction in deaths from *Direct* causes, especially thromboembolism, as well as among some minority ethnic groups, suggest that previous recommendations have had a positive effect. Another example is the increasing number of women 'booking' for maternity care by 12 completed weeks of gestation, a key recommendation in earlier Reports that has been chosen as a cornerstone of maternity care provision in England. However, in other areas, improvements remain to be seen, and therefore some recommendations from the last Report are repeated here.

This Report, as with the last Report for 2003–05, contains a list of the 'Top Ten' recommendations, which all commissioners, providers, policy-makers, clinicians and other stakeholders involved in providing maternity services should plan to introduce, and audit, as soon as possible. By their overarching or cross-cutting nature, most of these recommendations are broad based and will require a multi-disciplinary approach rather than having relevance for the specific clinical practice of individual healthcare workers. On an individual and team basis, therefore, all healthcare professionals and teams providing maternity care should also read the individual clinical recommendations relating to specific clinical causes of death or their individual specialty as well as these overarching ones.

These overarching recommendations were drawn up following detailed discussions between all of the assessors involved in this Report. In some cases, they considered that insufficient progress had been made since the last Report and that a similar recommendation needed to be repeated here.

This list adds to, but does not replace, key recommendations made in earlier reports.

Whereas the 'Top Ten' recommendations are mainly of general importance, the individual Chapters in this Report contain more targeted recommendations for the identification and management of particular conditions for specific services or professional groups. These are no less important and should be addressed by any relevant national bodies as well as by local service commissioners, providers and individual healthcare staff.

Service provision

1. Pre-pregnancy counselling

1.1. Women of childbearing age with pre-existing medical illness, including psychiatric conditions, whose conditions may require a change of medication, worsen or otherwise impact on a pregnancy, should be informed of this at every opportunity. This is particularly important because 50% of pregnancies are not planned. They should be proactively offered advice about planning for pregnancy and the

need to seek pre-pregnancy counselling whenever possible. Before pregnancy, these women should be offered specific counselling and have a prospective plan for the management of their pregnancy developed by clinicians with knowledge of how their condition and pregnancy interact.

1.2. Pre-pregnancy counselling services, starting for women with pre-existing medical illnesses, but ideally for all women planning a pregnancy, are a key part of maternity services and should be routinely commissioned as an integral part of the local maternity services network. They could be provided by the GP practice, specialist midwives or other specialist clinicians or obstetricians, all of whom should be suitably trained and informed. GPs should refer all relevant women to the local services if they do not provide such counselling themselves.

Rationale

As in previous Reports, the findings of this triennium show that many of the women who died from pre-existing diseases or conditions that may seriously affect the outcome of their pregnancies, or may require different management or specialised services during pregnancy, did not receive any pre-pregnancy counselling or advice. As a result, their care was less than optimal as neither they nor their carers realised that closer surveillance or changes to medications were appropriate. Furthermore, unless women receive specific counselling that their drugs are safe in pregnancy, some will stop taking essential therapy because of their concerns about the risk to the fetus.

The more common conditions that require pre-pregnancy counselling and advice include:

- epilepsy
- diabetes
- asthma
- congenital or known acquired cardiac disease
- autoimmune disorders
- renal or liver disease
- obesity: a body mass index of 30 or more
- severe pre-existing or past mental illness
- HIV infection.

2. *Professional interpretation services*

Professional interpretation services should be provided for all pregnant women who do not speak English. These women require access to independent interpretation services because they continue to be ill-served by the use of close family members or members of their own local community as interpreters. The presence of relatives, or others with whom they interact socially, inhibits the free two-way passage of crucial but sensitive information, particularly about their past medical or reproductive health history, intimate concerns and domestic abuse.

Rationale

Although it is known that where there is a concentration of women from the same minority ethnic group their infor-

mation network concerning maternity care can be good, this does not obviate the need for professional interpreting services. A lack of availability of suitable interpreters is one of the key findings running throughout this Report. The use of family members, in some cases very young school-age children of both sexes, or members of their own, usually tight-knit community, as translators causes concern because:

- The woman may be too shy to seek help for intimate concerns.
- It is not appropriate for a child to translate intimate details about his or her mother and unfair on both the woman and child.
- It is not clear how much correct information is conveyed to the woman, as the person who is interpreting does not have a good grasp of the language, does not understand the specific medical terminology or may withhold information.
- Some women arrive in the UK late in their pregnancy, and the absence of an interpreter means that a comprehensive booking history cannot be obtained.
- In some cases, the translator is a perpetrator of domestic abuse against his partner, so not enabling her to ask for advice or help.
- Healthcare staff are unable to pass back their own clinical concerns in an appropriate manner.

Apart from the unsuitability of using family or community members to undertake this role, those used in this manner appeared to have had little knowledge of English themselves. Commissioners and providers of maternity services should therefore ensure that professional and independent interpretation services are available in both primary-care and secondary-care settings, to ensure that all women can be confident that they can speak freely and in confidence to their maternity care providers. Telephone-based services have proved very useful in similar situations.

3. *Communications and referrals*

3.1. Referrals to specialist services in pregnancy should be prioritised as urgent. In some specialties, routine referrals can take weeks or months, or even be rejected because of local commissioning rules. This is unacceptable for pregnant women. The referral must clearly state that the woman is pregnant, and its progress must be followed up. Trainee doctors and midwives should have a low threshold for referral 'upwards' and must receive an immediate response. Referral between specialties should be at a senior level. When rapid referral is required, the senior doctor should use the telephone.

3.2. Good communication among professionals is essential. This must be recognised by all members of the team looking after a pregnant woman, whether she is 'low risk' or 'high risk'. Her GP must be told that she is pregnant. If information is required from another member of the team,

it is not enough to send a routine request and hope for a reply. The recipient must respond promptly, and if not, the sender must follow it up. With a wide variety of communication methods now available, including e-mail, texting and fax, teams should be reminded that the telephone is not an obsolete instrument.

Rationale

There were a number of cases in this Report of women dying before they had seen the specialist to whom they had been referred because of medical problems. Some women received appointments weeks after the original referral despite clearly being very ill, but the progress of the referral was not followed up. One or two women were also refused specialist services because of local commissioning arrangements.

In many cases of substandard care assessed by this Enquiry, there were major failures of communication between healthcare workers that may have contributed to the woman's death in some cases. Notably, these included GPs not being asked for information or being consulted about further referral and, in some cases, the GP not being informed that the woman was pregnant. The converse was also true, with the GP not passing on information relevant to the woman's health and wellbeing.

It is also evident from some of these cases that junior trainees and midwives in the front line seeing women attending as emergencies did not have proper support and back up and need to have clear guidelines about when to seek senior help. They should not be expected to manage sick women alone, and if they ask for help and review, they should be supported. Trainees need to communicate the gravity and urgency of the situation clearly when discussing patients with consultants, who should ensure that they have asked enough questions to enable themselves to assess the situation fully and whether they need to attend in person. They should also adhere to the recent Royal College of Obstetricians and Gynaecologists guideline on the responsibility of the consultant on call, which gives a clear indication of the duties of a consultant obstetrician and when they should attend.

4. Women with potentially serious medical conditions require immediate and appropriate multidisciplinary specialist care

4.1. Women whose pregnancies are likely to be complicated by potentially serious underlying pre-existing medical or mental health conditions should be immediately referred to appropriate specialist centres of expertise where both care for their medical condition and their obstetric care can be optimised. Providers and commissioners should consider developing protocols to specify which medical conditions mandate at least a consultant review in early pregnancy. This agreement should take place via local maternity networks.

4.2. Women whose pregnancies become complicated by potentially serious medical or mental health conditions should have an immediate referral to the appropriate specialist centres of expertise as soon as their symptoms develop.

4.3. In such urgent cases, referral can take place by telephone contact with the consultant or their secretary (to make sure they are available or identify an alternative consultant if not), followed up by a fax if necessary.

4.4. Midwives and GPs should be able to refer women directly to both an obstetrician and a non-obstetric specialist—but must inform the obstetrician. The midwife should, wherever possible, discuss this with, or alert, the woman's GP.

Rationale

Medical care is advancing rapidly, as are changes in the way 'routine' maternity care is provided in the UK, and women must not be disadvantaged by this. It must be appreciated that not all maternity centres are able or equipped to care for pregnant women with major complications either preceding or developing in pregnancy. If women with underlying medical conditions are to share in the advances in medicine, more will require referral to tertiary or specialist medical centres for their care in pregnancy.

This triennium, the assessors have been struck by the lack of appropriate referral of potentially high-risk women, and lack of consultant involvement remains a problem in the care of women with serious medical problems. The reasons for failure to refer are likely to be multiple. It may be that the medical problem is beyond the resources of a secondary referral centre: for example complex liver disease in pregnancy. This may require hepatobiliary surgeons, hepatologists and haematologists skilled in the management of coagulopathy.

It may also be that, although the secondary referral centre has a 'specialist' centre, the clinicians there are insufficiently skilled in the management of pregnancy in women with the disease that they specialise in, for example heart disease. The local clinicians may be excellent at the management of ischaemic heart disease but not in caring for congenital heart disease or cardiomyopathy.

It is also possible that the secondary centre may be too small to develop sufficient expertise in the management of the disease in question or to set up the combined medical/obstetric clinics that have been recommended, for example to care for insulin-dependent diabetes in pregnancy.

Quality of care

5. Clinical skills and training

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

- The understanding, identification, initial management and referral for serious common medical and mental health conditions, including sepsis, which, although unrelated to pregnancy, may affect pregnant women or recently delivered mothers. These may include the conditions in recommendation 1, although the list is not exclusive.
- 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.

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. One of the commonest findings in this Report was the initial failure by many clinical staff, including GPs, Emergency Department staff, midwives and hospital doctors, to immediately recognise and act on the signs and symptoms of potentially life-threatening conditions. To help with this, the assessors have developed a short new section, 'Back to Basics', which is included in this Report for the first time. Although not exhaustive, nor designed to replace more in-depth clinical training, it does contain useful checklists to act as an aide memoire. Its contents may appear simplistic or self-evident to many readers, but it nevertheless reflects the fact that these basic signs and symptoms were too often overlooked and may have contributed to some maternal deaths this triennium.

As with the previous Report, even sick women who were admitted to specialist care were still failed by a lack of recognition of the severity of their illness or a failure to refer for another opinion (see also Recommendation 6).

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

6. Specialist clinical care: identifying and managing very sick women

6.1. There remains an urgent need for the routine use of a national modified early obstetric warning score (MEOWS) chart in all pregnant or postpartum women who become unwell and require either obstetric or gynaecology services. This will help in the more timely recognition, treatment and referral of women who have, or are developing, a critical illness during or after pregnancy. It is equally important that these charts are also used for pregnant or postpartum women who are unwell and are being cared for outside obstetric and gynaecology services, for example Emergency Departments. Abnormal scores should not just be recorded but should also trigger an appropriate response.

6.2. The management of pregnant or postpartum women who present with an acute severe illness, for example sepsis with circulatory failure, pre-eclampsia/eclampsia with severe arterial hypertension and major haemorrhage, requires a team approach. Trainees in obstetrics and gynaecology must request help early from senior medical staff, including advice and help from anaesthetic and critical-care services. In very acute situations telephoning an experienced colleague can be very helpful. The recent RCOG guideline of the duties and responsibilities of the consultant on call should be followed.

6.3. Pregnant or recently delivered women with unexplained pain severe enough to require opiate analgesia require urgent senior assessment/review.

Rationale

As mentioned in the 'Back to Basics' recommendation, 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 was not only the case when distinguishing the signs and symptoms of potentially serious disease from the commonplace symptoms of pregnancy in primary care or the Emergency Department but also once a woman was admitted to hospital. There were a number of healthcare professionals who either failed to identify that a woman was becoming seriously ill or who failed to manage emergency situations outside their immediate area of expertise, and did not call for advice and help.

In many cases in this Report, and relevant to the issues identified in the preceding paragraph, the early warning signs of impending maternal collapse went unrecognised. The early detection of severe illness in mothers remains a challenge to all involved in their care. The relative rarity of such events, combined with the normal changes in physiology associated with pregnancy and childbirth, compounds the problem. Modified early warning scoring systems have been successfully introduced into other areas of clinical practice, and the last Report gave an example of a Modified Early Obstetric Warning Score (MEOWS) chart. This is available on the CMACE website at www.cmace.org.uk. These charts should be introduced for all pregnant or postpartum women who become unwell and require further treatment, including following obstetric interventions and gynaecological surgery.

A small but important point is that a recurrent theme and recommendation throughout successive Reports, which has made no impact, is that women who have unexplained pain severe enough to require opiate analgesia have a severe problem and must be referred for specialist investigation and diagnosis. Cases of cardiac disease, impending aortic dissection and other causes of death were missed in this way.

The Clinical Negligence Scheme for Trusts (CNST) and similar schemes in other UK countries may wish to con-

sider whether the use of MEOWS charts should be part of the audit of notes carried out as part of the assessment process.

7. *Systolic hypertension requires treatment*

7.1. All pregnant women with pre-eclampsia and a systolic blood pressure of 150–160 mmHg or more require urgent and effective antihypertensive treatment in line with the recent guidelines from the National Institute for Health and Clinical Excellence (NICE). Consideration should also be given to initiating treatment at lower pressures if the overall clinical picture suggests rapid deterioration and where the development of severe hypertension can be anticipated. The target systolic blood pressure after treatment is 150 mmHg.

It is disappointing that in this triennium, as flagged up in the last, the single most serious failing in the clinical care provided for mothers with pre-eclampsia was the inadequate treatment of their systolic hypertension. In several cases, this resulted in a fatal intracranial haemorrhage. Systolic hypertension was also a key factor in most of the deaths from aortic dissection. The last Report suggested that clinical guidelines should identify a systolic pressure above which urgent and effective antihypertensive treatment is required. Since then, a recent NICE guideline has identified that threshold as 150–160 mmHg. The guideline also recommends that pregnant women with pre-eclampsia and a systolic blood pressure of 150 mmHg or more should be admitted to hospital for urgent treatment. Clinically, it is also important to recognise increases in, as well as the absolute values of, systolic blood pressure. In severe and rapidly worsening pre-eclampsia, early treatment at <150–160 mmHg is advisable if the trend suggests that severe hypertension is likely.

8. *Genital tract infection/sepsis*

8.1. All pregnant and recently delivered women need to be informed of the risks and signs and symptoms of genital tract infection and how to prevent its transmission. Advice to all women should include verbal and written information about its prevention, signs and symptoms and the need to seek advice early if concerned, as well as the importance of good personal hygiene. This includes avoiding contamination of the perineum by washing hands before and after using the lavatory or changing sanitary towels. It is especially necessary when the woman or her family or close contacts have a sore throat or upper respiratory tract infection.

8.2. All healthcare professionals who care for pregnant and recently delivered women should adhere to local infection control protocols and be aware of the signs and symptoms of sepsis in the women they care for and the need for urgent assessment and treatment. This is particularly the case for community midwives, who may be the first to pick up any potentially abnormal signs during their routine postnatal observations for all women, not just those who

have had a caesarean section. If puerperal infection is suspected, the woman must be referred back to the obstetric services as soon as possible.

8.3. High-dose intravenous broad-spectrum antibiotic therapy should be started as early as possible, as immediate antibiotic treatment may be life saving. It should be started within the first hour of recognition of septic shock and severe sepsis without septic shock, as each hour of delay in achieving administration of effective antibiotics is associated with a measurable increase in mortality.

8.4. There is an urgent need for a national clinical guideline to cover the identification and management of sepsis in pregnancy, labour and the postnatal period and beyond. This should be available to all health professionals, maternity units, Emergency Departments, GPs and community midwives. Until such time as a national guideline is developed, the principles for the management of acute sepsis as detailed in Chapter 15: Critical Care of this Report should be adopted. These are derived from those developed and updated by the Surviving Sepsis Campaign.

8.5. Consideration should be given to adopting a more rational system for classifying maternal deaths from sepsis, as suggested in Annex 7.2 in the full Report.

Rationale

Unlike many other causes of direct maternal mortality, deaths from genital tract sepsis have risen rather than declined this triennium. Indeed, genital tract sepsis has become the leading cause of *Direct* maternal death in the UK for the first time since these Confidential Enquiries into Maternal Deaths commenced in 1952. This is a real cause for concern, particularly as it has occurred against a background of an overall decrease in maternal mortality. Many of these deaths were from community-acquired Group A streptococcal disease, which mirrors the increased incidence of *streptococcus A* in the general population. Although for some women, despite excellent care, the outcome was unavoidable because of the rapid course and late presentation of their illness, in others, possible opportunities to save lives were missed. The number of maternal deaths from sepsis should be reduced still further.

Streptococcal sore throat is one of the most common bacterial infections of childhood. All of the mothers who died from Group A streptococcal sepsis either worked with, or had, young children. Several mothers had a history of recent sore throat or respiratory infection, and some of these women also had family members, especially children, with sore throats, suggesting that spread from family members is a further risk factor for developing life-threatening sepsis. Therefore, all pregnant or recently delivered women need to be advised of the signs and symptoms of infection and how to take steps to prevent its transmission. Women in these circumstances should also be encouraged to seek

urgent medical advice from their GP or maternity services if they feel at all ill.

As in previous Reports, delays in recognising sepsis, prescribing antibiotics and seeking consultant help were common. Antibiotics were sometimes prescribed in inadequate doses, were given orally rather than intravenously, were given too late or were discontinued too soon. Immediate aggressive treatment in the first 'golden hour' or so offers the best hope of recovery, as each hour of delay in achieving administration of effective antibiotics is associated with a measurable increase in mortality.

Sepsis is complex, incompletely understood, often difficult to recognise and manage, and presents a continuing challenge. Some deaths will always be unavoidable, but better training, a structured approach, good care in the community, and, in hospital, prompt investigation and treatment, particularly immediate intravenous antibiotic treatment, and early involvement of senior obstetricians, anaesthetists and critical-care consultants, may help in future to save lives.

9. *Serious incident reporting and maternal deaths*

All maternal deaths must be subject to a high-quality local review. In England and Wales the framework for such serious incidents (previously known as Serious Untoward Incidents/SUIs) is set out in the NPSA's *National Framework for Reporting and Learning from Serious Incidents Requiring Investigation* issued in March 2010. The results of such high-quality reviews must be disseminated and discussed with all maternity staff and their recommendations must be implemented and audited at regular intervals.

Rationale

The quality of the serious incident/SUI report forms relating to maternal deaths assessed for this report was highly variable, with many being of dubious or poor quality. These findings must be taken extremely seriously. For the unacceptable reports, there was little or no evidence of critical thinking or acceptance of shortcomings, little or no self-reflective discussion and no evidence that obvious lessons had been identified, let alone learnt. In these cases, little or no action was taken on any results, and, in many cases, staff were not involved in the process or the follow up of any of the lessons learnt. This was a common finding throughout all the Chapters in this Report and one which all assessors agree represents unacceptable practice that must be corrected as soon as possible. The evaluation of such reports is recommended to be a CNST, or similar, requirement in future.

Disappointingly, a similar recommendation was made in the last Report, but little if any improvement has been seen in the cases assessed this triennium; the impression is rather the reverse.

The recommendation drew attention to the need to highlight who was involved in such reviews—they needed to include clinicians from relevant disciplines (including

anaesthetics) and must include clinicians who were not involved with the death. Considering unbiased expert review might assist real learning from individual deaths.

10. *Pathology*

The standard of the maternal autopsy must be improved. The numbers of locations where they are performed should reduce, with specialist pathologists taking them on as part of agreed job plans. More clinical discretion over reporting maternal deaths to coroners is required, and there should be a complementary major input by clinicians into obtaining more consented hospital autopsies.

Rationale

Autopsy diagnoses are fundamental in the categorisation of maternal deaths and their subsequent reviews, locally and nationally, but, as evidenced by the findings in this Report, this was often difficult to achieve. With the changing legislation (*Coroner and Justice Act 2009*) and the introduction of Medical Examiners to scrutinise all proffered death certificates, there will be a reduction in the number of coronial autopsies in England and Wales. When coroners do authorise maternal death autopsies, there will be no legal bar to transferring the autopsy away to another area where pathological expertise is recognised.

Maternal death autopsies are often complex and challenging and require more expertise than the average autopsy. They should also be performed according to an all-embracing protocol, such as that adapted from the recent guidance from the Royal College of Pathologists, which is annexed to Chapter 17 in the full Report.

National guidelines and research

As discussed above, national guidelines are urgently required for:

- the identification and management of sepsis in pregnant and recently delivered women
- how to undertake and act on the results of serious incident reviews in maternity services.

Some key research questions also emerged during the assessment of the women who died this triennium. These include the following.

- What effect, if any, is the reduced number of routine postnatal visits and clinical observations having on maternal health?
- What are the social, service and clinical factors that contribute to maternal mortality rates remaining higher in mothers from certain minority ethnic groups in the UK?
- What are the barriers that hinder prompt and rapid communications, referrals and urgent appointments between health providers and maternity or specialist units or health professionals that are required for sick pregnant women or recently delivered mothers, and how can these be overcome? How can maternity ser-

vices, especially those providing new models of care, ensure that working systems for immediate referral are in place and implemented?

- To better determine how to reduce the number of *Indirect* causes of maternal deaths, how can the better denominator data required to undertake the necessary studies regarding the incidence of medical problems in pregnancy, such as sepsis, asthma, epilepsy and stroke, be obtained or collected?
- Why has the incidence of sepsis and Sudden Unexpected Adult/Arrhythmic deaths (SADS) in pregnancy increased? Is it the result of chance or improved case ascertainment or is it a real increase?

Back to basics

Key overall Good Practice points have been brought together in a new section of the full report, 'Back to Basics'. This aide memoire does not cover every eventuality and should be taken as a signpost to help identify and exclude the commoner disorders of pregnancy. The lessons fall into the following main categories:

1. *Improving basic medical and midwifery practice, such as taking a history, undertaking basic observations and understanding normality:*

All maternity care providers, and in particular midwives and GPs, must recognise the crucial importance of:

- Taking a comprehensive history and making a correct risk assessment at booking.
- Referring the woman to the obstetrician or other specialist as necessary.
- Following up these referrals to ensure that appropriate action has been taken.
- Making, recording and acting upon basic observations.
- Re-assessing the woman's risk status throughout her pregnancy and in the postnatal period.

2. *Attributing signs and symptoms of emerging serious illness to commonplace symptoms in pregnancy:*

- Antibiotic prescribing for sore throats
- Unexplained physical symptoms, particularly where language difficulties present communication problems

- 'Red flag' signs and symptoms, prompting urgent referral for hospital assessment in:
 - sepsis
 - abdominal pain or diarrhoea and vomiting (ectopic pregnancy, pre-eclampsia/eclampsia/HELLP syndrome, placental abruption, sepsis)
 - breathlessness
 - headache (headaches can be so nonspecific that clinical judgement should be the main guide to further referral to the neurological services and investigation. The index of suspicion should be high in pregnant women, and all serious causes should be considered before dismissing headache as benign)
 - features of persistent psychiatric illness.
3. *Improving communication and referrals.*
- Midwives should notify GPs that a woman is pregnant.
 - Midwives should seek additional information from the GP if risk factors are identified.
 - GPs should inform midwives about prior medical and mental health problems.
 - There should be auditable robust local systems in place to enable two-way flow of information throughout pregnancy and the postnatal period.
 - Midwives should explain the importance of keeping the appointment and always check that the consultation has taken place.
 - A senior clinician should be contacted by telephone if an urgent response is required, always backed up in writing with copies to all clinicians.

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