

CHAPTER 3

Pre-eclampsia and eclampsia

JAMES P NEILSON on behalf of the Editorial Board

Pre-eclampsia and eclampsia: key recommendations

Service provision

Guidelines and protocols

Clear, written, management protocols for severe pre-eclampsia should guide initial and ongoing treatment in hospital.

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.

The early involvement of consultant obstetricians in the management of women with suspected or proven pre-eclampsia and eclampsia is essential.

There should be early engagement of intensive care specialists in the care of women with severe pre-eclampsia.

Individual practitioners

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.

In women presenting with potentially severe pre-eclampsia (e.g. symptoms, sudden heavy proteinuria, markedly disordered liver function and/or haematological tests results) but with unexceptional blood pressure measurements, alarming rises in blood pressure should be anticipated. Consideration should be given to early administration of antihypertensive drugs.

Magnesium sulphate is the anticonvulsant drug of choice in the treatment of eclampsia.

To avoid the potentially serious consequences of fluid overload careful monitoring of fluid input and output, fluid restriction, and central monitoring is essential.

Fifty years ago...

The small number of deaths in the current triennium, 14, contrasts starkly with deaths in the early years of the Enquiry. There were 246 in 1952–54 due to pre-eclampsia, eclampsia or placental abruption associated with pre-eclampsia. There was a sharp decline in mortalities in the 1950s and 1960s followed by a steady decrease in deaths since the mid 1960s, as Figure 3.1 shows. Failures of antenatal care were highlighted as the major avoidable factors in early Reports, including a need (a continuing theme today) to make contact with women who fail to attend antenatal clinics.

The ability of phaeochromocytomas to mimic pre-eclampsia was described in the 1964–66 and 1967–69 Reports, which included, respectively, six and two deaths from this cause.

By the 1970s, the number of deaths had decreased substantially from 47 in 1970–72, 39 in 1973–75, and 29 in 1976–78.

The 1979–81 Report resonates with the main theme in this Report's chapter, by highlighting cerebral haemorrhage as the most common cause of death in women with pre-eclampsia and eclampsia and recommending more widespread use of anti-hypertensive drugs. The Report was far-sighted, at a time when subspecialisation in obstetrics and gynaecology was embryonic and written clinical guidelines virtually unknown, in recommending the establishment of regional centres to advise on management of severe pre-eclampsia and provide a lead on education and what we would now recognise as audit.

The 1985–87 Report recorded, with concern, a plateau in the number of deaths. Deaths due to acute respiratory distress syndrome (ARDS) were described for the first time – ascribed to longer survival in severely ill women but perhaps due to increasing recognition of this clinical condition. The dangers of excessive infusion were stressed. Diazepam was criticised as an anticonvulsant and, with prescience, a plea was made to re-evaluate

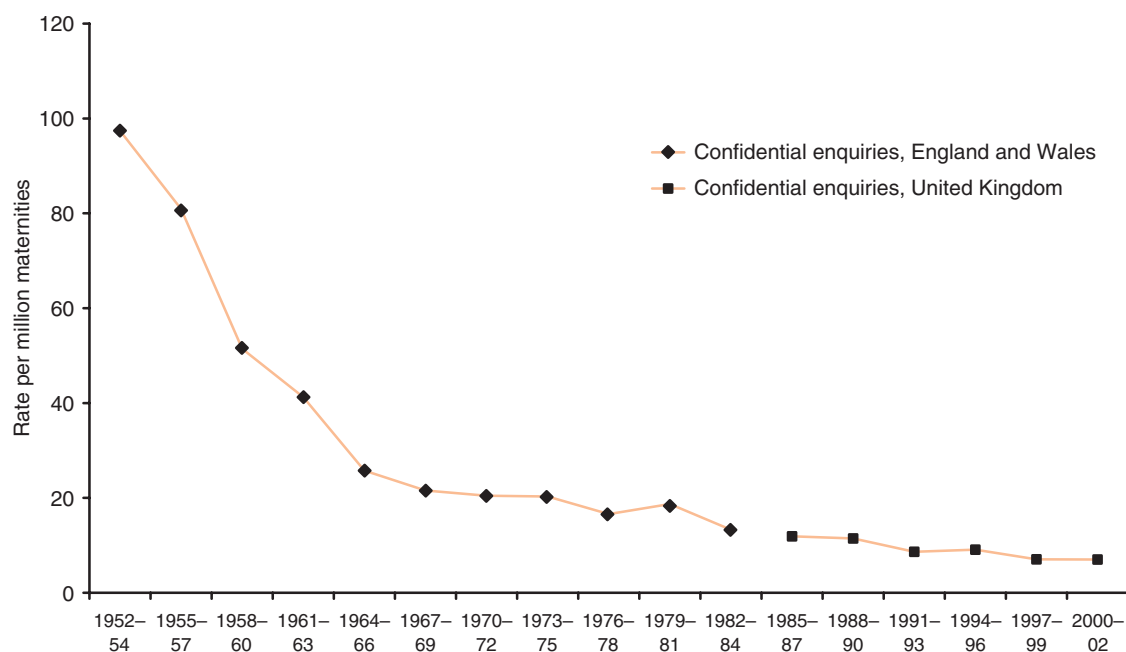


Figure 3.1 Maternal mortality from eclampsia and pre-eclampsia; England and Wales 1952–84; United Kingdom 1985–2002

scientifically the value of magnesium sulphate and phenytoin. Subsequent clinical trials], of course, demonstrated the superiority of magnesium sulphate in the treatment of eclampsia,^{1,2} and the Magpie Trial showed the value of magnesium sulphate in pre-eclampsia.³

The 1994–96 Report acknowledged that severe pre-eclampsia can develop within days of entirely normal observations at the antenatal clinic. In keeping with greater engagement of users of the health services, the Report stressed the need to educate women about symptoms associated with pre-eclampsia and recommended the educational material produced by the still active lay organisation APEC (Action on Pre-eclampsia).⁴

Summary of findings for 2000–02

Fourteen deaths from eclampsia or pre-eclampsia are counted in this chapter. Nine women died from intracranial haemorrhage, one from ARDS, two from multi-organ failure which included ARDS and two from severe disseminated intravascular dissemination (DIC). The causes of death are compared with figures from recent triennia in Table 3.1. The ages of the women ranged between 17 and 38 years. The gestational age ranged from 24 weeks to 40 weeks with a bimodal distribution, there being no deaths between 30 weeks and 34 weeks, inclusive. In all, seven deaths (50%) occurred before term (37 weeks), with five of these occurring before 30 weeks. Parity ranged from 0 to 6; seven women were primigravid. All the pregnancies were singleton. Six women had eclamptic fits, four antenatally. There was evidence of HELLP syndrome (haemolysis, elevated liver enzymes and low platelets) in eight women. Although there has been a steady trend towards fewer deaths, six of the 13 cases assessed (46%) showed clear features of substandard care and may have been avoidable deaths. Intracranial haemorrhage, as the single largest cause of death, indicates a failure of effective anti-hypertensive therapy. This must be the priority for improved clinical care.

Table 3.1 Number of deaths by cause due to eclampsia and pre-eclampsia; United Kingdom 1988–2002

Cause of death	Triennium				
	1988–90	1991–93	1994–96	1997–99	2000–02
Cerebral:					
Intracranial haemorrhage	10	5	3	7	9
Subarachnoid	2	0	1	0	0
Infarct	2	0	0	0	0
Oedema	0	0	3	0	0
Subtotal	14	5	7	7	9
Pulmonary:					
ARDS	9	8	6	2	1
Oedema	1	3	2	0	0
Subtotal	10	11	8	2	1
Hepatic:					
Rupture	0	0	2	2	0
Failure/necrosis	1	0	1	0	0
Other	2	4	2	5	4
Subtotal	3	4	5	7	4
Overall total	27	20	20	16	14

In some other cases, the course of the illness was so rapid that improving outcome would have been a very major challenge even under optimal circumstances.

All deaths that are recorded in this chapter occurred in hospital. There was some circumstantial evidence to suggest the possibility of eclampsia in a woman who was found dead at home but there was insufficient evidence to be certain, and this death has been classified as 'unascertained' and included in Chapter 12.

In one case, the first indication of clinical concern was the observation of fetal growth restriction, pre-dating signs of pre-eclampsia.

Women with pre-eclampsia whose deaths are discussed in other chapters and are not counted here, include a woman with ARDS and repeated episodes of sepsis who died in the intensive care unit several weeks after delivery and a woman with mild pre-eclampsia who died of subarachnoid haemorrhage a week after delivery. These cases are counted in Chapters 15 and 12, respectively.

Two women who died, and who had been treated with magnesium sulphate for presumed eclampsia, were subsequently diagnosed as having other pathology – primary cerebral haemorrhage and bacterial meningitis.

The single major failing in clinical care in the current triennium was inadequate treatment of hypertension, with subsequent intracranial haemorrhage. In most of these cases the consultant obstetrician was involved too late. An example vignette, representative of a number of the cases counted in this chapter, is given here:

A woman, whose blood pressure was 110/60 mm/Hg in early pregnancy, was admitted in late pregnancy with a diastolic pressure of 92 mm/Hg and proteinuria +++. Over the subsequent days, blood pressures of 155/95 mm/Hg and 145/100 mm/Hg were noted and a 24-hour urine collection showed greater than 4 g of protein. She was given dexamethasone and induction of labour was planned for the next day. This did not happen because a lack of special care baby unit cots; her blood pressure was 160/105 mm/Hg and there was proteinuria +++++. The following day, she complained of epigastric pain and a puffy face; her blood pressure was 170/105 mm/Hg. Attempts were made to induce labour despite an unfavourable cervix. After her blood pressure rose to 220/120 mm/Hg, antihypertensive treatment was started for the first time (intravenous labetalol); midazolam was also given. Her blood pressure remained elevated at 215/120 mm/Hg and she remained symptomatic. A caesarean section was performed. There was continuing poor control of her blood pressure after delivery. She developed twitching, slurred speech and mouth drooping, and was seen for the first time since admission by a consultant obstetrician. A computed tomography (CT) scan showed a massive intracranial haemorrhage. She was transferred to a neurosurgical unit but died despite craniotomy. Laboratory tests showed HELLP syndrome.

This is one of a number of cases in which there was insufficient weight placed on the rise in systolic blood pressure. In the distant past, obstetricians were often inappropriately fixated on diastolic blood pressure. Calculation of mean arterial pressure (as often required in modern severe pre-eclampsia management guidelines) was an advance, by incorporating both systolic and diastolic blood pressure. However, while diastolic blood pressure is one of a number of useful indices of severity of pre-eclampsia, it is thought to be

the pressure during systole which causes intracerebral haemorrhage. Recognition of this concept should be incorporated into clinical guidelines to try to ensure effective reduction of systolic pressure. **It is, therefore, recommended that clinical protocols identify a systolic blood pressure above which urgent and effective antihypertensive treatment is required.** Some would recommend 160 mmHg as a useful guide to treatment.

Two cases are discussed in Chapter 10 of women with essential hypertension in whom insufficient attention was also paid to the systolic pressure, with fatal results.

Consideration should also be made to starting early antihypertensive treatment when the blood pressure is not, in itself, alarming but where the severity of the pre-eclampsia makes a rapid increase in pressure likely.

It is also worth re-emphasising, as in the last Report, the observation that many automated blood pressure monitoring systems systematically underestimate systolic pressure in pre-eclampsia. Mercury sphygmomanometers should be used to establish baseline blood pressure as a reference for automated monitoring in hospital for women with pre-eclampsia, unless the automated system has been validated in pregnancy.⁵

Further substandard elements of care in some cases were inappropriate delay in delivery to allow marginal improvements in fetal outcome, as demonstrated by the following vignette:

A woman had ineffective treatment of hypertension after delivery. Her 'book-ing' blood pressure had been 100/50 mm/Hg. At her final antenatal clinic visit, her blood pressure was 120/85 mm/Hg and her urine was not checked for protein. She had a seizure at home several days later. On admission to hospital, her blood pressure was 150/100 mm/Hg and there was proteinuria +++. She was treated with hydralazine and magnesium sulphate and underwent caesarean section for fetal distress. After delivery, her hypertension was poorly controlled with a maximum pressure of 170/115 mm/Hg. She had a grossly elevated serum urate, raised ALT and lowered platelet count. Her blood pressure rose to 180/120 mm/Hg and, shortly afterwards, she became unresponsive. A CT scan showed an intracranial haemorrhage, from which she subsequently died.

In some cases, the rapidity of development of the features of pre-eclampsia may be such that blood pressure control remains difficult despite assiduous efforts. This is illustrated by the following case, which did not show substandard care:

An unbooked woman from out of the country presented to an accident and emergency department with abdominal pain during late second trimester. Her blood pressure was recorded as 155/70 mm/Hg but she had proteinuria +++. She was admitted to the maternity unit with a provisional diagnosis of urinary tract infection. Shortly after admission, she had eclamptic fits, at which time her blood pressure had risen to 170/120mm/Hg. She was treated with magnesium sulphate and labetalol. Liver function was grossly disordered and she had a coagulopathy. Her blood pressure proved difficult to control despite combined therapy with labetalol and hydralazine. Attempts made to induce labour with misoprostol (the fetus had died) but there was further clinical deterioration and she was transferred to the intensive care unit, where she died.

Although the major challenge is in blood pressure control, there were instances of inappropriate fluid management resulting in pulmonary insult with the development of ARDS:

A woman was admitted to hospital in late second trimester with pre-eclampsia. Her first pregnancy had been complicated by early severe pre-eclampsia; the second was normal. Her blood pressure was only modestly elevated but she had proteinuria +++++. A decision was made to deliver her the next day by caesarean section after administration of corticosteroids. That night, she had a placental abruption and she was delivered by caesarean section. Postoperatively, she received a massive intravenous fluid overload without any central monitoring. She subsequently died in the intensive care unit, from a combination of ARDS and pneumonia.

The fluid balance charts of another woman with pre-eclampsia (who is counted in Chapter 15 *Late deaths*) are missing but there is evidence to suggest fluid overload in her case as well. The need for careful monitoring of fluid input and output, fluid restriction, and central monitoring must be emphasised.

Pre-eclampsia and eclampsia: learning points

- Early onset pre-eclampsia poses serious threats to the mother as well as the fetus.
- The dangers of high systolic blood pressure leading to intracranial haemorrhage need greater recognition by clinicians and more ready response with antihypertensive treatment.
- The early involvement of consultant obstetricians in the management of women with suspected or proven pre-eclampsia and eclampsia is essential.
- Magnesium sulphate is the anticonvulsant of choice in the treatment of eclampsia and pre-eclampsia.
- To avoid the potentially serious consequences of fluid overload, careful monitoring of fluid input and output, fluid restriction and central monitoring is essential.
- Although most substandard care was seen in the hospital sector, there were examples in primary care of midwives failing to test urine for proteinuria in women who subsequently developed severe pre-eclampsia.

References

1. Duley L, Henderson-Smart DJ. Magnesium sulphate versus diazepam for eclampsia. *Cochrane Database Syst Rev* 2004(2).
2. Duley L, Henderson-Smart DJ. Magnesium sulphate versus phenytoin for eclampsia. *Cochrane Database Syst Rev* 2004(2).

3. Magpie Trial Collaborative Group. Do women with pre-eclampsia, and their babies, benefit from magnesium sulphate? The Magpie Trial: a randomised placebo-controlled trial. *Lancet* 2002;359:1877–90.
4. Action on Pre-eclampsia [www.apec.org.uk].
5. Golar M, Benedict A, Jones C, Randhawa M, Poston L, Shennan AH. Inflationary oscillometry provides accurate measurement of blood pressure in pre-eclampsia. *BJOG* 2002;109:1143–7.