ECLAMPSIA – ARE WE DOING ENOUGH?

J J H Low, G S H Yeo

ABSTRACT

***Objectives** - This paper reviews the cases of eclampsia managed at the Kandang Kerbau Hospital with respect to incidence, management, maternal and perinatal outcome.*

***Method** - A retrospective analysis of eclampsia occurring over a 4-year period from January 1990 to December 1993.*

***Results** - There were 27 cases of eclampsia among 59,599 deliveries during the study period, giving an overall incidence of 45.3 per 100,000 deliveries. Sixteen patients were nulliparous and the mean age was 29 years. Two-thirds of the cohort were booked patients and more than half of the cohort (55.6%) had their first seizure despite being in hospital. The majority (86.2%) of all seizures recorded occurred in the antepartum and intrapartum period. Eleven of the patients (40.7%) were asymptomatic prior to the first fit while headache was the commonest symptom of impending eclampsia in the remainder. Fifteen patients (55.6%) had significant proteinuria and this was associated with significant neonatal morbidity. The mean gestational age was 35.9 weeks and the mean birth weight was 2,328g. Major areas of substandard management included failure to administer anticonvulsant prophylaxis and antihypertensive agents when indicated, failure to assess for proteinuria, and failure to closely monitor the hypertensive and proteinuric patient. Seven patients developed convulsions despite anticonvulsant prophylaxis. Twenty-four patients were delivered by Caesarean section. There were 26 live born infants (singletons) and one abortus. There was no perinatal mortality. Neonatal morbidity was frequent and attributable to prematurity (51.9%) and birth asphyxia (29.6%). The majority of infants were well neurologically on long term follow-up. There was no maternal mortality but significant morbidity was present in 8 patients (29.6%). High uric acid levels were associated with intrauterine death, prematurity and intrauterine growth retardation. Seven patients remained hypertensive on follow-up. Residual neurological deficits persisted in 3 patients.*

***Conclusions** - The incidence of eclampsia at Kandang Kerbau Hospital shows an unsteady decline over the past 4 years. It carries significant foetal mortality (3.7%) as well as neonatal (74.1%) and maternal (29.6%) morbidity. The observation that neither the occurrence of antenatal office visits nor hospitalisation prevents eclampsia, and that substandard management was identified in most of the cases (77.8%) shows that there is no room for complacency and that more needs to be done. Improvement in patient assessment, institution of appropriate preventive therapy, a high index of suspicion even in apparently low-risk patients coupled with a disease notification system and regular audit may be the key strategies to reduce the incidence of this dreaded obstetric complication.*

Keywords: *eclampsia, substandard management, anticonvulsant prophylaxis.*

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INTRODUCTION

Eclampsia is reported to occur in between 0.05% and 0.2% of all deliveries, but the incidence reaches 1.5% in twin deliveries. The maternal mortality is reported as 0 to 13% and perinatal mortality as 10% to 28%[1,2]. Abruptio placentae and prematurity are frequently incriminated as the cause of perinatal mortality.

Although mortality is frequently reviewed, morbidity (maternal and foetal) is rarely mentioned. This is unfortunate because even the surviving infants and mothers are in jeopardy of lifelong handicaps. Also unfortunate is the fact that the current local incidence of eclampsia, one of the most dreaded of obstetric complications, is not known. The last published local figures on eclampsia were in 1968[3] and in 1957[4]. Since then, there has not been any systematic collection of data and audit of eclampsia in an effort to reduce its incidence and improve management.

This report presents the observations from the recent cases of eclampsia that had been managed at the Kandang Kerbau Hospital. The authors' purpose is to review the patient profiles, management of eclampsia, maternal and perinatal outcome and to identify major areas of substandard care in the management of these patients.

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MATERIALS AND METHODS

From January 1990 to December 1993, 27 cases of eclampsia were treated at the Kandang Kerbau Hospital in Singapore. This is a restructured government hospital for obstetric and gynecological practice,with approximately 15,000 annual deliveries and tertiary neonatal facilities. All patients were managed by one or more specialists in the hospital. Patients who were diagnosed as having eclamptic convulsions and managed as such were included in the study. Conversely, all those patients with other forms of seizures not due to eclampsia eg epilepsy, were excluded from the study. The patients and their babies' case records were reviewed.

RESULTS

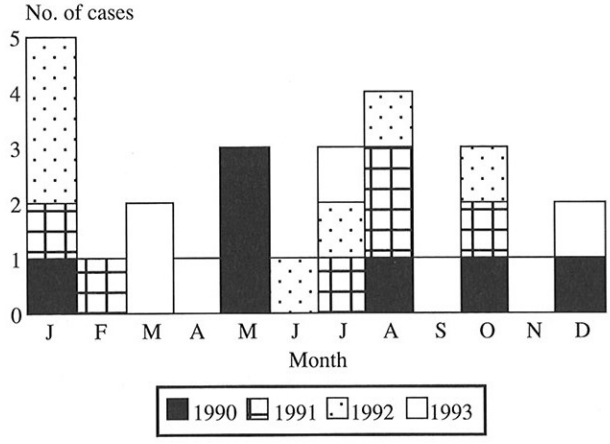
During the four-year study period, there were 27 cases of eclampsia among 59,599 deliveries - 1 per 2,207 deliveries or 45.3 per 100,000 deliveries. The highest incidence of 51 per 100,000 deliveries occurred in 1990 while the incidence of 40.7 per 100,000 deliveries in 1991 was the lowest. There appears to be a generally slow decline in the incidence of eclampsia through the past 4 years.

Table I - Incidence of eclampsia from 1990 to 1993

Year	1990	1991	1992	1993
No. of cases	7	6	7	7
No. of deliveries	13,714	14,730	15,364	15,791
Incidence/100,000 deliveries	51	40.7	45.6	44.3

Eclamptic seizures have been recorded in all months of the year. In the past 4 years, the greatest number of cases have been recorded in January (5 cases) and August (4 cases). The distribution however is not consistent since 3 cases occurred in January 1992 and 2 cases occurred in August 1991. It is therefore difficult to substantiate any claim that eclampsia has a seasonal predilection.

Fig 1 – Monthly incidence of eclampsia



Patient characteristics

Sixteen patients (59.3%) were nulliparous and one was remarried. Chinese constituted 44.4%(12) of the 27 patients while the Malays comprised 40.7%(11). The remaining 14.9% constituted 11.1% Indians (3 cases) and 3.7%(1) other races.

The mean age was 29 years (range 19 to 44 years). The median age was 27 years. Eight patients were less than 25 years of age while 5 patients were more than 35 years of age.

Eighteen patients (66.7%) received antenatal care at Kandang Kerbau Hospital while 9 patients (33.3%) were unbooked.

Four patients had a previous history of epileptic fits but were not reviewed neurologically during their pregnancy. One of these was an unbooked patient who presented with eclamptic fits and was referred urgently from a tertiary medical unit for delivery. Another patient had a past history of eclampsia in her previous pregnancy. Three patients had past obstetric histories of pre-eclampsia. Seven patients had history of hypertension in their current pregnancy.

Onset of seizures

Fifteen (55.6%) of the 27 patients experienced their first convulsion in the hospital; 14 of these were booked cases. The remaining 12 patients were admitted following a convulsion; 4 of these were booked cases.

Table II - Onset of seizures

	First fit outside the hospital (n=12)	First fit in the hospital (n=15)
Booked (n=18)	4	14
Unbooked (n=9)	8	1

Of all the fits that were recorded, 44.8% occurred in the antenatal period, 41.4% in the intrapartum period, and the remaining 14.8% occurred within the first 24 hours of the postpartum period. No eclamptic fits were recorded beyond this period.

Clinical findings

Eleven (40.7%) of the 27 patients were asymptomatic prior to the fit. Headache (33.3%) hyperreflexia (22.2%), edema (18.5%) and visual disturbances (14.8%) were the 4 most frequent premonitory signs and symptoms before convulsions. Other symptoms experienced included vomiting (11.1%), nausea (7.4%) and epigastric pain (7.4%). One patient was aphasic.

The mean systolic blood pressure and mean diastolic blood pressure recorded before the fits were 167 mmHg and 98 mmHg respectively. Systolic blood pressures recorded from the cohort ranged from 95 to 227 mmHg while diastolic pressures ranged from 58 to 133 mmHg. The scattergram shows the distribution of pre-seizure blood pressure readings. Of the cohort of 27 patients, 21 (77.8%) had pre-seizure diastolic blood pressures of less than 110 mmHg while 20 (74.1%) had pre-seizure systolic blood pressures of more than or equal to 140 mmHg.

Fig 2 – Distribution of pre-seizure blood pressure readings

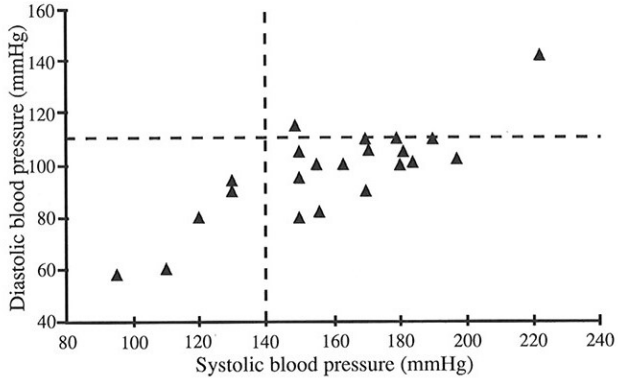


Table III - Degree of proteinuria by urine labstix before eclampsia

Proteinuria	Nil	1+	2+	3+	4+	Unknown/ not checked
No.	2	1	3	3	7	11
Percentage	7.4%	3.7%	11.1%	11.1%	25.9%	40.7%

Table III shows the degree of proteinuria found in the cohort. The presence of significant proteinuria (≥ 0.5g/24h or ≥ 2+ on urine labstix) was associated with low birth weight (37%), prematurity (37%), neonatal complications and intrauterine death (40.7%).

Gestational age and birth weight

The gestational age ranged from 26 to 41 weeks with a mean gestation of 35.9 weeks. Fourteen patients (51.9%) were less than 37 weeks pregnant and 5 of these pregnancies were between 28 and 34 weeks gestation.

A total of 26 infants and one abortus were delivered. The birth weights ranged between 905g and 4,380g with a mean birthweight of 2,328g. Ten of the infants (37%) weighed between 1,500g and 2,499g and 5 infants (18.5%) weighed below 1,500g.

Management

Intravenous diazepam was the main drug used to terminate eclamptic fits. Other drugs used for this purpose included midazolam and thiopentone. Drugs used in seizure prophylaxis included intravenous infusion of chlordiazepoxide (Librium), diazepam, midazolam, phenytoin and oral carbamazepine.

The most common areas of substandard management include:

1. Failure to promptly institute anticonvulsant prophylaxis in 11 patients.
2. Failure to assess for significant proteinuria in 7 patients.
3. Failure to assess patient thoroughly in the antenatal period when blood pressure was found to be raised in 5 patients.
4. Failure to institute antihypertensive treatment when diastolic blood pressure was greater than 100 mmHg in 3 patients.
5. Failure to monitor the blood pressure closely when this was initially found to be raised in 3 patients.
6. Failure to enquire for symptoms of impending eclampsia in one patient.
7. Failure to thoroughly assess a patient with significant proteinuria in the antenatal period.

Seizure prophylaxis when instituted failed to prevent the onset of seizure in 7 cases. Diazepam was used in 2 of these cases, librium in 2 cases, and midazolam, thiopentone and phenytoin in the other 3 cases. With regard to failure of diazepam prophylaxis, one of the 2 cases was a patient who had an eclamptic fit while in labour. This was aborted with intravenous diazepam 10 mg. An intravenous infusion of diazepam was started but she threw another fit 20 minutes later and was delivered by Caesarean section. The second case was unbooked and was admitted with a history of fits while at home. Diazepam infusion was started but the patient threw another fit on the operating table just before Caesarean section. These two cases represent the failure of valium prophylaxis since 1992 when it was officially advocated for use in the hospital.

Labour and delivery

Twenty-four patients (88.9%) were delivered by emergency Caesarean section for eclampsia. General anaesthesia was used for all Caesarean sections.

Two patients (7.4%) were delivered by normal vaginal delivery. One of them had a fit 1 minute after delivery of the baby just before the placenta was delivered. The other presented at 26 weeks with eclampsia and intrauterine death. The pregnancy was terminated by intravenous sulprostone (Nalador) and a 905g abortus was delivered vaginally.

One patient (3.7%) had an eclamptic fit in the second stage of labour and was delivered by forceps assisted delivery.

Perinatal outcome

There were 26 liveborn infants (singletons) and one abortus. No perinatal mortality was recorded.

Six infants (22.2%) had an Apgar score of 3 or less at 1 minute and one infant had an Apgar score of 3 at 5 minutes. Eight infants (29.6%) had an Apgar score of 4 to 7 at 1 minute while 6 patients (22.2%) had Apgar scores in this range at 5 minutes. Twelve infants (44.4%) had Apgar scores of 8 to 10 at 1 minute and 19 infants (70.4%) had scores in this range at 5 minutes.

Table IV – Apgar scores of liveborn infants

Apgar scores	0 to 3	4 to 7	8 to 10
At 1 minute	6	8	12
At 5 minutes	1	6	19

One third of infants(9) required admission to the neonatal intensive care unit while 40.7% (11) were admitted to the neonatal special care unit. Neonatal complications were frequent and are listed in Table V. Most of the complications were attributable to prematurity but some may have been aggravated by antepartum or intrapartum foetal hypoxia and/or acidosis.

Table V - Neonatal complications

Neonatal Complications	No.
Hyperbilirubinemia	15
Respiratory distress syndrome	14
Sepsis	6
Hypocalcaemia	5
Hypoglycaemia	4
Cardiac problems	3
Anaemia	3
Hypermagnesemia	2
Hypotension	2
Gentamicin toxicity	2
Pneumothorax	1
Thrombocytopenia	1
Acute renal failure	1
Hypernatremia	1
Hypokalemia	1

Eight infants suffered from birth asphyxia. Five were 34 weeks or less. Twelve infants had respiratory problems and 5 of these were more than 34 weeks gestation. Most of the infants were well on long term follow-up (up to two years in one case) except for one infant who was transferred to another hospital because of multiple cardiac abnormalities requiring surgery while another infant was followed up in Malaysia. One infant was diagnosed as having persistent mild ventriculomegaly at nine months of age but was otherwise neurologically well.

Maternal outcome

There was no maternal death but significant morbidity was present in 8 patients (29.6%). The summary of maternal complications is presented in Table VI.

Table VI - Maternal complications

Complications	No.
No significant complications	19
Thrombocytopenia	2
Abruptio placentae	1
Aspiration pneumonia	1
Myoclonic jerks	1
Left cerebrovascular accident, aphasia, nephrotic syndrome	1
Coma, pneumonia, congestive cardiac failure, gastritis, foreign body in radial artery	1
Cardiopulmonary arrest, disseminated intravascular coagulation, Caesarean hysterectomy, cerebrovascular accident, post-anoxic encephalopathy, depression, renal failure, pneumonia, urinary incontinence	1

Two patients had thrombocytopenia which subsequently resolved; one had placental abruption without coagulopathy; one had aspiration pneumonia while another had residual myoclonic jerks postnatally.

One patient had post-eclamptic sequelae of left cerebrovascular accident with global aphasia and nephrotic syndrome. She remained dysphasic and hypertensive on postnatal follow-up.

Patient No. 6 was in coma 3 after persistent fits in spite of chlordiazepoxide (librium) infusion and intravenous thiopentone. CT scan of the brain showed cerebral edema but no space-

occupying lesion. She also developed pulmonary edema secondary to fluid overload. She also required an exploration of the radial artery to locate a piece of the intra-arterial line which had been inadvertently cut during removal of the line. She was subsequently discharged well with neurological follow-up.

Patient No. 7 had disseminated intravascular coagulation and postpartum haemorrhage after a seizure in the second stage. She collapsed 2 hours later and was resuscitated. A postpartum hysterectomy was performed for uncontrolled haemorrhage per vaginum. Postoperatively, she had chest infection and acute renal failure which subsequently resolved. She also suffered from depression and displayed irrational behaviour thought to be secondary to post-anoxic encephalopathy. A CT scan showed a posterior infarction of the brain. She was also incontinent of urine when discharged from the hospital. In the postnatal period, she had persistent backache, impaired visual fields and problems with walking. She was followed up by the neurologist and was subsequently well when seen 2 months later at the postnatal clinic.

Serum uric acid levels were raised in 10 patients and this was associated with intrauterine death, prematurity (80% compared with 32.3%), and intrauterine growth retardation (20% compared with 16.7%) when matched for gestation. The highest level of 707 mmol/l was recorded in a 22-year-old primipara at 34 weeks' gestation who developed convulsion twice at home and a further 3 times in hospital. Her baby had Apgar scores of 2 and 7, was premature and suffered from birth asphyxia requiring surfactant therapy. Other neonatal complications included hypokalemia, hypocalcaemia, hypomagnesemia, neonatal jaundice and subluxation of the left hip joint. The long term neonatal outcome was good.

Seven patients (25.9%) remained hypertensive on postnatal follow-up. Residual neurological deficits were present in 3 patients who had a left CVA, visual field defects and myoclonic jerks respectively.

DISCUSSION

Together with haemorrhage, sepsis and obstructed labour, eclampsia is still one of the 4 major contributors to maternal and perinatal mortality and morbidity in both developing and developed countries[5]. Its incidence ranges from 200/100,000 in Bangkok[6], 56/100,000 in the US[7], 36/100,000 in Oxford, UK[8] to as low as 29/100,000 in Sweden[6]. Our hospital's incidence of 45.3/100,000 from 1990 to 1993 (1 in 2,207 deliveries) is thus not higher than those in some developed countries.

Due in large part to the pioneering work of great obstetricians like Sheares[4], Lean, Ratnam and Sivasamboo[3], we have come a long way since 1957 when the local incidence of eclampsia was 1 in 348[4] and in 1968 when it was 1 in 715 deliveries[3]. It is interesting to note that in the latter series the hospital had 64,389 deliveries over a 16-month period which is even more than the total number of deliveries covered in the 4-year period of the present series. Even though it is less common now, the annual incidence shows only a very slow decline over the past four years and there is need to further reduce its incidence.

Many anecdotal claims have been made that eclampsia has a seasonal occurrence, coinciding with festive periods, rainy season or even durian seasons. From this study we are unable to substantiate this claim to seasonal predilection except that shortage of staff during vacation periods may reduce the level of vigilance in antenatal care.

The mere occurrence of antenatal office visits does not constitute prophylaxis against pre-eclampsia. The study shows that two-thirds of the cohort were booked patients with antenatal follow-up. Of these 18 patients, 14 (77.8%) were already admitted in the hospital when they threw their first eclamptic fit. Hospitalisation itself therefore does not prevent the development of eclampsia as seen in 15 patients in this cohort (Table II). This finding concurs with that of Sibai[9], Provapikken[6] and Lopez[10]. Zuspan[11] believes that convulsions should not occur once a pre-eclamptic patient is hospitalised. This seems reasonable since obstetric care was found to be substandard in 12 of these patients.

The commonest areas of substandard care has been delineated above. In the Confidential Enquiries into Maternal Mortalities in the United Kingdom 1985 to 1987, the largest contributor to substandard care in eclampsia and pre-eclampsia was by the hospital obstetric team [12]. The two main defects were undue delay in making or implementing critical clinical decisions and inappropriate delegation of clinical responsibility. Failure to institute anticonvulsant prophylaxis was the most frequent contributor to seizures in our study. Certainly, the aetiology of eclamptic convulsions is far from elucidated, but it is clear that hypertension is not the prime cause. In our experience, 21 of the 27 women (77.8%) had a pre-ictal diastolic BP of less than 110 mmHg. However, 20 of them (74.1%) had systolic BP of more than or equal to 140 mmHg (Fig 2). Does this data imply that more attention should be paid to the systolic blood pressure reading rather than be reassured if the diastolic blood pressure is not unduly high? If the systolic blood pressure is more predictive of eclampsia, then seizure prophylaxis may be indicated in systolic hypertension even if the diastolic blood pressure is apparently normal.

Significant proteinuria and raised uric acid levels correlate with foetal mortality, neonatal morbidity and maternal morbidity. Even so, the simple dipstick assessment of urinary protein was not performed in 7 patients who were found to be hypertensive.

Although eclampsia is now a rare complication of pregnancy, yet the safety of the patient depends initially on how we as caregivers recognise and respond to this problem. It should be remembered also that it is not the convulsions themselves that make pre-eclampsia so dangerous. It is an oversimplification to consider eclampsia as the end-stage of pre-eclampsia. Convulsions are a marker for severe illness but not a reliable one. Some patients with pre-eclampsia are more dangerously ill than others with eclampsia. To assess the extent and severity of any pre-eclamptic process is as important as administering anticonvulsant treatment, so that those severely ill can be selected for urgent delivery. The chameleon-like nature of this extraordinary condition behoves all doctors to treat innocent complaints like headache and gastric pain with a great deal of respect, as the severity of the pre-eclamptic illness is never reliably shown by a single blood pressure measurement. There is increasing evidence for normotensive pre-eclampsia characterised by intrauterine growth retardation, disseminated intravascular coagulation and liver dysfunction[13,14].

It is therefore time that we take a new look at this major problem in our institution. Thus far there has been no systematic collection of data pertaining to eclampsia which would allow audit of the disease. Although uncommon, it carries significant mortality and morbidity. There is thus no room for complacency. The best way to understand the true scale of this problem and its sequelae is to create a confidential register of information pertaining to eclampsia in the institution. This may construct an essential foundation of knowledge upon which trials can be implemented[15].

CONCLUSIONS

This study is the most recent audit of eclampsia in Kandang Kerbau Hospital after almost 30 years. In our experience, the majority of eclampsia occurred in patients who had received antenatal care and those already admitted to the wards. Substandard care was present in many cases, in particular the

failure to institute anticonvulsant prophylaxis when indicated. There was significant maternal morbidity, foetal mortality as well as neonatal morbidity. Efforts must be made to formulate clear guidelines for the management of eclampsia. These must be made easily available, regularly updated and rehearsed by obstetric teams[16]. In particular, there should be meticulous assessment of every obstetric patient by well-trained staff, prompt institution of appropriate preventive therapy, coupled with a high index of suspicion even in apparently low-risk patients. In a wider context, notification of eclampsia and systematic data collection to facilitate audit may be the cornerstone in our efforts to reduce the incidence of this dreaded obstetric complication.

References

1. Villar MAL, Sibai BM. Eclampsia. Obstet Gynecol Clin North Am 1988; xv: 355-76.
2. Long PE, Oats GN. Preeclampsia in twin pregnancy - severity and pathogenesis. Aust NZ J Obstet Gynecol 1987;27:1.
3. Lean TH, Ratnam SS, Sivasamboo R. Use of benzodiazepines in the management of eclampsia. J Obstet Gynaec B Cwlth 1968; 75: 856-62.
4. Sheares BH. Combination of chlorpromazine, promethazine and pethidine in treatment of eclampsia. Br Med J 1957; 2:75.
5. Moller B, Lindmark G. Eclampsia in Sweden, 1976-1980. Acta Obstet Gynecol Scand 1986; 65: 307-14.
6. Poropakkham S. An epidemiologic study of eclampsia. Obstet Gynecol 1979; 54: 26.
7. Saftlas AS, Olson DR, Franks AL, Atrash HK, Pokras R. Epidemiology of preeclampsia and eclampsia in the United States, 1979-1986. Am J Obstet Gynecol 1990; 163: 460-5.
8. Redman CWG. Eclampsia still kills. Br Med J 1988; 296: 1209-8.
9. Sibai BM, McCubbin JH, Anderson GD, Lipshitz J, Dilts PV. Eclampsia. I. Observations from 67 recent cases. Obstet Gynecol 1981; 58: 609-13.
10. Lopez-Llera M. Eclampsia 1963-1966. Evaluation of the treatment of 107 cases. J Obstet Gynaecol Br Commonw 1967; 74: 374.
11. Zuspan FP. Problems encountered in the treatment of pregnancy-induced hypertension. Am J Obstet Gynecol 1978; 131: 591.
12. Department of Health and Social Security. Report on confidential enquiries into maternal deaths in the United Kingdom 1985-1987. London:HMSO, 1989.
13. Wallenberg HCS, Rotmans N. Enhanced reactivity of the platelet thromboxane pathway in normotensive and hypertensive pregnancies with insufficient fetal growth. Am J Obstet Gynecol 1982; 144: 523-8.
14. Schwartz ML, Brenner W. Toxaemia in a patient with none of the standard signs and symptoms of pre-eclampsia. Obstet Gynecol 1985; 66: 195-215.
15. Douglas KA, Redman CWG. Eclampsia in the United Kingdom. The "BEST" way forward. Br J Obstet Gynaecol 1992; 99: 355.
16. Royal College of Obstetricians and Gynaecologists Audit Committee. Hypertensive disorders of pregnancy. In: Deriving standards from the maternal mortality reports. London: RCOG 1994: 1-2.