



Complete Summary

GUIDELINE TITLE

The management of severe pre-eclampsia/eclampsia.

BIBLIOGRAPHIC SOURCE(S)

Tuffnell DJ, Shennan AH, Waugh JJ, Walker JJ. The management of severe pre-eclampsia/eclampsia. London (UK): Royal College of Obstetricians and Gynaecologists; 2006 Mar. 11 p. (Guideline; no. 10(A)). [52 references]

GUIDELINE STATUS

This is the current release of the guideline.

COMPLETE SUMMARY CONTENT

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SCOPE

DISEASE/CONDITION(S)

- Severe pre-eclampsia
- Eclampsia

GUIDELINE CATEGORY

Evaluation
Management
Treatment

CLINICAL SPECIALTY

Anesthesiology
Family Practice
Internal Medicine
Obstetrics and Gynecology

INTENDED USERS

Advanced Practice Nurses
Nurses
Physician Assistants
Physicians

GUIDELINE OBJECTIVE(S)

To standardize the management approach of severe pre-eclampsia and eclampsia in the immediate pre- and post- delivery period in order to improve patient and newborn outcome

TARGET POPULATION

- Women with severe pre-eclampsia
- Women with eclampsia

Note: Mild pre-eclampsia is not covered in this guideline.

INTERVENTIONS AND PRACTICES CONSIDERED

Assessment and Diagnosis

Assessment of the Woman

1. Blood pressure measurement (automated blood pressure device vs. mercury sphygmomanometers)
2. Urine dipstick testing
3. Protein/creatinine ratio
4. 24-hour urine collection
5. Full blood count
6. Liver function testing
7. Renal function testing
8. Clotting studies
9. Monitoring and charting of fluid balance

Assessment of the Fetus

1. Cardiotocography
2. Continuous electronic fetal monitoring
3. Ultrasound measurement of fetal size
4. Umbilical artery Doppler
5. Serial estimation of liquid volume

Management/Treatment

Management of the Woman

1. Antihypertensive treatment (labetolol, nifedipine, hydralazine, methyldopa)
2. Avoidance of atenolol, angiotensin converting enzyme (ACE) inhibitors, angiotensin receptor-blocking drugs (ARB), and diuretics
3. Magnesium sulphate
4. Oxygen administration
5. Pulse oximetry
6. Diazepam, phenytoin, and thiopentone (only as second-line treatment)
7. Fluid restriction
8. Planning mode of delivery
9. Syntocinon for third-stage labor management
10. Use of corticosteroids
11. Conservative management of delivery
12. Continuation of antihypertensives following delivery
13. Formal postnatal follow-up and review
14. Preconceptual counseling

MAJOR OUTCOMES CONSIDERED

- Predictive value of diagnostic tests
- Risk for and incidence of eclamptic seizures
- Maternal and fetal fatality rates
- Rate of maternal and fetal complications

METHODOLOGY

METHODS USED TO COLLECT/SELECT EVIDENCE

Hand-searches of Published Literature (Primary Sources)
Searches of Electronic Databases

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

The Cochrane Library and the Cochrane Register of Controlled Trials were searched for relevant randomized controlled trials, systematic reviews and meta-analyses. Recent consensus documents were also studied, including an Royal College of Obstetricians and Gynaecologists (RCOG) Study Group proceedings. A search of MEDLINE and PUBMED (electronic databases) from 1966 to 2005 was also carried out. Search words included: 'pregnancy', 'hypertension', 'pre-eclampsia', 'eclampsia' and 'toxaemia'.

NUMBER OF SOURCE DOCUMENTS

Not stated

METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Weighting According to a Rating Scheme (Scheme Given)

RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

Levels of Evidence

Ia: Evidence obtained from meta-analysis of randomized controlled trials.

Ib: Evidence obtained from at least one randomized controlled trial.

IIa: Evidence obtained from at least one well-designed controlled study without randomization.

IIb: Evidence obtained from at least one other type of well-designed quasi-experimental study.

III: Evidence obtained from well-designed non-experimental descriptive studies, such as comparative studies, correlation studies and case studies.

IV: Evidence obtained from expert committee reports or opinions and/or clinical experience of respected authorities.

METHODS USED TO ANALYZE THE EVIDENCE

Review of Published Meta-Analyses
Systematic Review with Evidence Tables

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

Not stated

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Expert Consensus

DESCRIPTION OF METHODS USED TO FORMULATE THE RECOMMENDATIONS

Not stated

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Grading of Recommendations

Grade A - Requires at least one randomized controlled trial as part of a body of literature of overall good quality and consistency addressing the specific recommendation. (Evidence levels Ia, Ib)

Grade B - Requires the availability of well controlled clinical studies but no randomized clinical trials on the topic of recommendations. (Evidence levels IIa, IIb, III)

Grade C - Requires evidence obtained from expert committee reports or opinions and/or clinical experiences of respected authorities. Indicates an absence of directly applicable clinical studies of good quality. (Evidence level IV)

COST ANALYSIS

A formal cost analysis was not performed and published cost analyses were not reviewed.

METHOD OF GUIDELINE VALIDATION

External Peer Review

Internal Peer Review

DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

Following discussion in the Guidelines and Audit Committee, each green-top guideline is formally peer reviewed. At the same time the draft guideline is published on the Royal College of Obstetricians and Gynaecologists (RCOG) website for further peer discussion before final publication.

The names of author(s) and nominated peer reviewers are included in the original guideline document.

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

In addition to these evidence-based recommendations, the guideline development group also identifies points of best clinical practice in the original guideline document.

Grading of recommendations (A-C) and levels of evidence (Ia-IV) are defined at the end of the "Major Recommendations" field.

Assessment and Diagnosis

C - Although the classification of severity is primarily based on the level of blood pressure and the presence of proteinuria, clinicians should be aware of the potential involvement of other organs when assessing maternal risk, including placental disease with fetal manifestations.

Some women will present with convulsions, abdominal pain or general malaise. In these cases, pre-eclampsia should always be considered and the blood pressure taken and the urine analyzed. Clinical symptoms are important components of worsening disease, particularly headache and abdominal pain. However, increasing edema is not in itself a sign that should determine management. Maternal tendon reflexes, although useful to assess magnesium toxicity, are not of value in assessing the risk of convulsion, although the presence of clonus may

be. Continuous oxygen saturation monitoring with a pulse oximeter is valuable, as it will often give early signs of pulmonary edema. [Evidence level IV]

A - When taking blood pressure, the woman should be rested and sitting at a 45-degree angle. The blood pressure cuff should be of the appropriate size and should be placed at the level of the heart. Multiple readings should be used to confirm the diagnosis. Korotkoff phase 5 is the appropriate measurement of diastolic blood pressure. The method used should be consistent and documented.

B - Automated blood pressure methods need to be used with caution, as they may give inaccurate blood pressure readings in pre-eclampsia.

C - The usual screening test for proteinuria is visual dipstick assessment. A two plus dipstick measurement can be taken as evidence of proteinuria but ideally a more accurate test (either a spot protein creatinine ratio or ideally a 24-hour urine collection) is required to confirm this.

In view of the high false positive rates with dipsticks, laboratory testing, usually by 24-hour urine collection, is recommended to confirm significant proteinuria, unless the clinical urgency dictates immediate delivery. [Evidence level IV]

B - In the acute setting, an initial assessment of the fetus with cardiotocography should be undertaken. This gives information about fetal wellbeing at that time but does not give any predictive information.

B - Women in labor with severe pre-eclampsia should have continuous electronic fetal monitoring.

A - If conservative management is planned then further assessment of the fetus with ultrasound measurements of fetal size, umbilical artery Doppler and liquor volume should be undertaken. Serial assessment will allow timing of delivery to be optimised.

C - The value of Doppler in other fetal vessels has yet to be clarified.

Cardiotocography (non-stress test) is the mainstay of fetal monitoring in most units. It can be repeated regularly and easily without need of expensive equipment or highly skilled personnel. It gives information concerning fetal wellbeing at that time but has little predictive value. If the woman is in labor then continuous electronic fetal monitoring is appropriate. [Evidence level III]

The main pathology affecting the fetus, apart from prematurity, is placental insufficiency leading to intrauterine growth restriction (IUGR). IUGR occurs in around 30% of pre-eclamptic pregnancies. Ultrasound assessment of fetal size, at the time of the initial presentation with hypertension, is a valuable one-off measurement to assess fetal growth. Growth restriction is usually asymmetrical so measurement of the abdominal circumference is the best method of assessment. Reduced liquor volume is also associated with placental insufficiency and fetal growth restriction. Serial estimations of liquor volume can detect fetal compromise. [Evidence level Ia]

Management of Severe Pre-eclampsia

C - Antihypertensive treatment should be started in women with a systolic blood pressure over 160 mmHg or a diastolic blood pressure over 110 mmHg. In women with other markers of potentially severe disease, treatment can be considered at lower degrees of hypertension.

A - Labetalol, given orally or intravenously, nifedipine given orally or intravenous hydralazine can be used for the acute management of severe hypertension.

C - In moderate hypertension, treatment may assist prolongation of the pregnancy. Clinicians should use agents with which they are familiar.

B - Atenolol, angiotensin converting enzyme (ACE) inhibitors, angiotensin receptor-blocking drugs (ARB) and diuretics should be avoided.

There has been a general consensus that blood pressure greater than 170/110 mmHg requires treatment in the maternal interest, although this is not supported by randomized trials. There is, however, a clear rationale supported by the desire to prevent the known risk of vascular damage due to uncontrolled hypertension.

There is also a consensus that, if the blood pressure is below 160/100 mmHg, there is no immediate need for anti-hypertensive therapy. An exception may be if there are markers of potentially more severe disease, such as heavy proteinuria or disordered liver or hematological test results. Since, in this situation, alarming rises in blood pressure may be anticipated, anti-hypertensive treatment at lower blood pressure levels may be justified. There is continuing debate concerning women with a blood pressure between 100 mmHg and 110 mmHg diastolic. Maternal treatment is associated with a reduction of severe hypertensive crises and a reduction in the need for further anti-hypertensive therapy; however, there appears to be a small reduction in infant birth weight. With treatment a prolongation of pregnancy of an average of 15 days is possible as long as there is no other reason to deliver. [Level Ia, but small trials of mixed quality]

A - Magnesium sulphate should be considered for seizure prevention in women with pre-eclampsia for whom there is concern about the risk of eclampsia. This is usually in the context of severe pre-eclampsia once a delivery decision has been made and in the immediate postpartum period. In women with less severe disease the decision is less clear and will depend on individual case assessment.

If magnesium sulphate is given, it should be continued for 24 hours following delivery or 24 hours after the last seizure, whichever is the later, unless there is a clinical reason to continue. When magnesium sulphate is given, regular assessment of the urine output, maternal reflexes, respiratory rate and oxygen saturation is important. [Evidence level Ia]

C - The principles of seizure management should follow the basic principles of airway, breathing and circulation.

A - Magnesium sulphate is the therapy of choice to control seizures. A loading dose of 4 g should be given by infusion pump over 5 to 10 minutes, followed by a further infusion of 1 g/hour maintained for 24 hours after the last seizure.

A - Recurrent seizures should be treated with either a further bolus of 2 g magnesium sulphate or an increase in the infusion rate to 1.5 g or 2.0 g/hour.

Do not leave the woman alone but call for help, including appropriate personnel such as the anesthetist and senior obstetrician. Ensure that it is safe to approach the woman and aim to prevent maternal injury during the convulsion. Place the woman in the left lateral position and administer oxygen. Assess the airway and breathing and check pulse and blood pressure. Pulse oximetry is helpful. Once stabilized, plans should be made to deliver the woman but there is no particular hurry and a delay of several hours to make sure the correct care is in hand is acceptable, assuming there is no acute fetal concern such as a fetal bradycardia. The woman's condition will always take priority over the fetal condition. [Evidence level IV]

Magnesium toxicity is unlikely with these regimens and levels do not need to be routinely measured. Magnesium sulphate is mostly excreted in the urine. Urine output should be closely observed and if it becomes reduced below 20 ml/hour the magnesium infusion should be halted. Magnesium toxicity can be assessed by clinical assessment as it causes a loss of deep tendon reflexes and respiratory depression. If there is loss of deep tendon reflexes, the magnesium sulphate infusion should be halted. Calcium gluconate 1 g (10 ml) over 10 minutes can be given if there is concern over respiratory depression. [Evidence level Ia]

In the collaborative eclampsia trial, a further bolus of 2 g magnesium sulphate was administered for recurrent seizures. An alternative is to increase the rate of infusion of magnesium sulphate to 1.5 g or 2.0 g/hour. If there are repeated seizures then alternative agents such as diazepam or thiopentone may be used, but only as single doses, since prolonged use of diazepam is associated with an increase in maternal death. If convulsions persist, intubation is likely to be necessary to protect the airway and maintain oxygenation. Transfer to intensive care facilities with intermittent positive pressure ventilation is appropriate in these circumstances. [Evidence level Ib]

C - Fluid restriction is advisable to reduce the risk of fluid overload in the intrapartum and postpartum periods. In usual circumstances, total fluids should be limited to 80 ml/hour or 1 ml/kg/hour.

Over the last 20 years, pulmonary edema has been a significant cause of maternal death. This has often been associated with inappropriate fluid management. There is no evidence of the benefit of fluid expansion and a fluid restriction regimen is associated with good maternal outcome. There is no evidence that maintenance of a specific urine output is important to prevent renal failure, which is rare. The regime of fluid restriction should be maintained until there is a postpartum diuresis, as oliguria is common with severe pre-eclampsia. If there is associated maternal haemorrhage, fluid balance is more difficult and fluid restriction is inappropriate.

C - The decision to deliver the fetus should be made once the woman is stable and with appropriate senior personnel present.

A - If the fetus is less than 34 weeks of gestation and delivery can be deferred, corticosteroids should be given, although after 24 hours the benefits of conservative management should be reassessed.

A - Conservative management at very early gestations may improve the perinatal outcome but must be carefully balanced with maternal wellbeing.

C - The mode of delivery should be determined after considering the presentation of the fetus and the fetal condition, together with the likelihood of success of induction of labor after assessment of the cervix.

The delivery should be well-planned, done on the best day, performed in the best place, by the best route and with the best support team. A few hours' delay in delivery may be helpful if it allows the neonatal unit to be more organized or to transfer a mother to a place where a cot is available. This assumes the mother is stable before delivery and prior to transfer. [Evidence level IV]

If the gestation is greater than 34 weeks, delivery after stabilization is recommended. If less than 34 weeks and the pregnancy can be prolonged in excess of 24 hours, steroids help to reduce fetal respiratory mortality. There is probable benefit from steroid therapy even if delivery is less than 24 hours after administration. [Evidence level Ia]

Prolonging the pregnancy at very early gestations may improve the outcome for the premature infant but can only be considered if the mother remains stable. [Evidence level Ib and level III]

In all situations, a carefully planned delivery suiting all professionals is appropriate. Vaginal delivery is generally preferable but, if gestation is below 32 weeks, caesarean section is more likely as the success of induction is reduced. After 34 weeks with a cephalic presentation, vaginal delivery should be considered. The consultant obstetrician should discuss the mode of delivery with the mother. Vaginal prostaglandins will increase the chance of success. Anti-hypertensive treatment should be continued throughout assessment and labor. [Evidence level IV]

C - Clinicians should be aware of the risk of late seizures following delivery, and ensure that women have a careful review before discharge from hospital.

C - Anti-hypertensive medication should be continued after delivery as dictated, by the blood pressure. It may be necessary to maintain treatment for up to 3 months, although most women can have treatment stopped before this.

C - Women with persisting hypertension and proteinuria at 6 weeks may have renal disease and should be considered for further investigation.

Severe pre-eclampsia or eclampsia can occur in the postpartum period. Up to 44% of eclampsia has been reported to occur postnatally, especially in women

presenting at term. Women who develop hypertension or symptoms of pre-eclampsia postnatally (headaches, visual disturbances, nausea and vomiting or epigastric pain) should be referred for a specialist opinion and investigation to exclude pre-eclampsia. Women who deliver with severe pre-eclampsia (or eclampsia) should have continued close observation postnatally. As eclampsia has been reported up to 4 weeks postnatally, the optimum length of inpatient postnatal stay is unclear but the incidence of eclampsia and severe pre-eclampsia falls after the fourth postpartum day. The decision about discharge from hospital needs to take account of the risk of late seizures. Most women with severe pre-eclampsia or eclampsia will need inpatient care for 4 days or more following delivery. Careful review to ensure improving clinical signs is needed before discharge. [Evidence level III]

Anti-hypertensive therapy should be continued after delivery. Although, initially, blood pressure may fall, it usually rises again at around 24 hours postpartum. A reduction in anti-hypertensive therapy should be made in a stepwise fashion. There is no reason why the woman cannot go home on treatment, to be weaned off therapy as an outpatient. After pre-eclampsia, blood pressure can take up to 3 months to return to normal. During this time, blood pressure should not be allowed to exceed 160/110 mmHg. Currently, there is insufficient evidence to recommend any particular anti-hypertensive. However, it is good practice to avoid the use of alpha methyl dopa in the postnatal period because of its adverse effect profile, particularly depression. In breastfeeding women, labetalol, atenolol, nifedipine and enalapril are currently in use, either singly or in combination. [Evidence level III]

Definitions:

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Levels of Evidence

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IIb; Evidence obtained from at least one other type of well-designed quasi-experimental study.

III: Evidence obtained from well-designed non-experimental descriptive studies, such as comparative studies, correlation studies and case studies.

IV: Evidence obtained from expert committee reports or opinions and/or clinical experience of respected authorities.

CLINICAL ALGORITHM(S)

None provided

EVIDENCE SUPPORTING THE RECOMMENDATIONS

TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

The type of supporting evidence is identified and graded for most recommendations (see "Major Recommendations" field).

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

POTENTIAL BENEFITS

- Appropriate and successful treatment of severe pre-eclampsia with minimal adverse effects on the mother or fetus
- Reduction in intrauterine growth restriction (IUGR)
- Reduction in fetal prematurity
- Reduction of post-partum eclampsia

POTENTIAL HARMS

- Adverse effects of pharmacological and medical interventions to the mother and fetus
- Automated methods of blood pressure measurement should be used with caution, as they may give inaccurate blood pressure readings in pre-eclampsia.

CONTRAINDICATIONS

CONTRAINDICATIONS

Labetalol should be avoided in women with known asthma.

QUALIFYING STATEMENTS

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- These recommendations are not intended to dictate an exclusive course of management or treatment. They must be evaluated with reference to individual patient needs, resources and limitations unique to the institution and variations in local populations. It is hoped that this process of local ownership will help to incorporate these guidelines into routine practice. Attention is drawn to areas of clinical uncertainty where further research may be indicated.
- Ultimately, as many clinical criteria are subjective, women should be managed according to a careful clinical assessment rather than relying on overly precise criteria. Each unit or region may wish to produce a locally adapted approach to implementation of the guideline addressing blood pressure monitoring, including the use of mean arterial pressure, thresholds for the use of magnesium sulphate and preferred first- and second-line anti hypertensive agents.

IMPLEMENTATION OF THE GUIDELINE

DESCRIPTION OF IMPLEMENTATION STRATEGY

An implementation strategy was not provided.

IMPLEMENTATION TOOLS

Audit Criteria/Indicators

For information about [availability](#), see the "Availability of Companion Documents" and "Patient Resources" fields below.

INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

IOM CARE NEED

Getting Better

IOM DOMAIN

Effectiveness
Patient-centeredness
Timeliness

IDENTIFYING INFORMATION AND AVAILABILITY

BIBLIOGRAPHIC SOURCE(S)

Tuffnell DJ, Shennan AH, Waugh JJ, Walker JJ. The management of severe pre-eclampsia/eclampsia. London (UK): Royal College of Obstetricians and Gynaecologists; 2006 Mar. 11 p. (Guideline; no. 10(A)). [52 references]

ADAPTATION

Not applicable: The guideline was not adapted from another source.

DATE RELEASED

2006 Mar

GUIDELINE DEVELOPER(S)

Royal College of Obstetricians and Gynaecologists - Medical Specialty Society

SOURCE(S) OF FUNDING

Royal College of Obstetricians and Gynaecologists

GUIDELINE COMMITTEE

Guidelines and Audit Committee

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FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

Guideline authors are required to complete a "declaration of interests" form.

GUIDELINE STATUS

This is the current release of the guideline.

GUIDELINE AVAILABILITY

Electronic copies: Available in Portable Document Format (PDF) from the [Royal College of Obstetricians and Gynaecologists \(RCOG\) Web site](#).

Print copies: Available from the Royal College of Obstetricians and Gynaecologists (RCOG) Bookshop, 27 Sussex Place, Regent's Park, London NW1 4RG; Telephone: +44 020 7772 6276; Fax, +44 020 7772 5991; e-mail: bookshop@rcog.org.uk. A listing and order form are available from the [RCOG Web site](#).

AVAILABILITY OF COMPANION DOCUMENTS

The following are available:

- Guidance for the development of RCOG green-top guidelines. Clinical Governance Advice No 1. 2000 Jan. Available from the [Royal College of Obstetricians and Gynaecologists \(RCOG\) Web site](#).
- Searching for evidence. Clinical Governance Advice No 3. 2001 Oct. Available from the [Royal College of Obstetricians and Gynaecologists \(RCOG\) Web site](#).

PATIENT RESOURCES

None available

NGC STATUS

This NGC summary was completed by ECRI on July 6, 2006. The information was verified by the guideline developer on August 16, 2006.

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