FEDERAL MINISTRY OF HEALTH
ABUJA, NIGERIA

Training MANUAL
TRAINEE'S VERSION

ON THE USE OF

MAGNESIUM SULPHATE

IN THE MANAGEMENT OF SEVERE

PRE-ECLAMPSIA AND ECLAMPSIA

Population Council

MACARTHUR
The John D and Catherine T. MacArthur Foundation

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TRAINING MANUAL

[TRAINEE VERSION]

ON THE USE OF MAGNESIUM SULPHATE

IN THE MANAGEMENT OF SEVERE PRE-ECLAMPSIA AND ECLAMPSIA

CONTENTS

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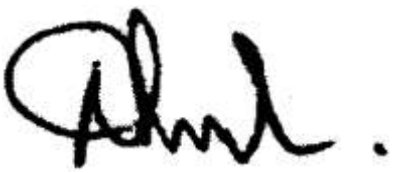


Dr. P. N. Momah

Head, Family Health Department.
February, 2010

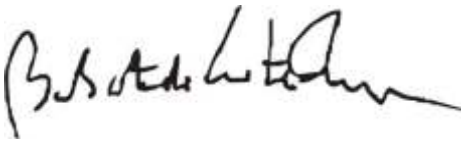
FOREWORD

Though maternal and neonatal health has attracted both national and global attention, the tragedy still lies in the fact that most of the causes of these deaths are not only treatable but largely preventable. As part of our response at the Federal Ministry of Health (FMOH), we have developed the Integrated Maternal Newborn and Child Health Strategy (IMNCH), as a national platform for all the concerted efforts towards the rapid attainment of the Millennium Development Goals 4 and 5 by 2015.

The development of these training manuals (trainer and trainee's versions) is in line with the strategic objectives 1 and 2 of the IMNCH Strategy. This will provide hands-on, detailed, descriptive and practical instructions and tips necessary to respond to obstetric emergencies (severe pre-eclampsia and eclampsia) that needlessly kill our women and children. These documents are integral part of the collaborative efforts between FMOH and the MacArthur Foundation to scale up the use of Magnesium sulphate in the management of severe pre-eclampsia and eclampsia in health facilities in Nigeria. It is a two-year project involving all the 36 states and FCT.

Magnesium sulphate since the Collaborative Eclampsia Trial and the Magpie Trial has been established as the gold standard in the management of severe pre-eclampsia and eclampsia but lack of knowledge and necessary skill have been identified as some of the factors responsible for its limited use in Nigeria. Thus with this manual the quality of health care delivery at the facilities will be greatly improved because it will fill the critical knowledge gap both in training and practice with respect to the management of severe pre-eclampsia and eclampsia.

It is my sincere hope and expectation that the drug and the standard care with the help of this manual are made available to all the appropriate health facilities, training institutions and other stakeholders throughout Nigeria to reduce the morbidity and mortality associated with preeclampsia/eclampsia.



Prof. Babatunde Osotimehin,
OON Honourable Minister of Health
November, 2009

LIST OF ABBREVIATIONS

ALT	Alanine Transaminase
ANC	Ante Natal Care
AST	Aspartate Transaminase
ARDS	Adult Respiratory Distress Syndrome
BP	Blood Pressure
FHR	Fetal Heart Rate
FMOH	Federal Ministry Of Health
HELLPS	Hamolysis, elevated liver enzymes, low platelets
IM	Intra Muscular
IUFD	Intra-Uterine Foetal Death
IUGR	Intra-Uterine Growth Restriction
IV	Intravenous
MgSo4	Magnesium Sulphate
NHDS	National Health and Demographic survey
SOGON	Society of gynaecology and obstetrics of Nigeria
WHO	World Health Organization

MODULE 1

INTRODUCTION TO PRE-ECLAMPSIA/ECLAMPSIA

SESSION	OBJECTIVES	METHODOLOGY/ ACTIVITY	RESOURCE	DURATION (TIME)
(1) Definition & Classification of Hypertensive Disorders of Pregnancy	1. Define the various types of Hypertensive disorders in Pregnancy 2. Classify the hypertensive Disorders of pregnancy	? Lectures ? Discussions	? Obstetric text books ? Multi-media projectors ? Flip chart & markers ? Posters ? WHO educational materials	30 minutes
(2) Epidemiology & the impact of eclampsia on maternal mortality in Nigeria	1. Discuss the prevalence and distribution of pre-eclampsia/eclampsi-a in Nigeria 2. Know the contributory factors to pre-eclampsia/eclampsi-a in Nigeria 3. Know the contribution of pre-eclampsia/Eclampsi-a to maternal and perinatal mortality	? Lectures ? Discussions ? Group work	? Fact sheets ? Flip chart & markers ? FMoH maternal mortality final report ? SOGON report on Maternal mortality ? Obstetrics text books ? Multi-media projector	30 minutes

SESSION ONE:

Definition & Classification of Hypertensive Disorders of Pregnancy

OBJECTIVES
At the end of this session participants will be able to:

1. Define the various types of hypertensive disorders of pregnancy
2. Classify hypertensive disorders of pregnancy

METHODOLOGY
- Lectures
- Discussions
- Brainstorming

RESOURCES
- Obstetrics text books
- Flip charts & markers
- Posters
- WHO educational materials

DURATION
30 minutes

CONTENT

A. DEFINITIONS

1. Hypertension in pregnancy can be defined as a blood pressure of ≥140/90 mmHg measured on 2 separate occasions more than 6 hours apart OR a single reading at any stage of pregnancy of systolic of ≥160mmHg or a diastolic of ≥110mmHg

2. Hypertension in pregnancy is also defined as an increase of at least 30mmHg systolic or 15mmHg diastolic over the booking blood pressure in the first half of pregnancy

* In our environment where majority of women register for antenatal care in the second half of pregnancy, definition (1) is more practicable and therefore should be considered as the thumb rule.

B. CLASSIFICATION

No.	Hypertensive Disorder of Pregnancy
1.	Pregnancy-induced Hypertension (Gestational hypertension)
2.	Pre-eclampsia I. Mild pre-eclmapsia II. Severe Pre-eclampsia
3.	Chronic Hypertension in pregnancy
4.	Chronic hypertension with super-imposed pre-eclampsia

- Pregnancy-induced hypertension (Gestational hypertension)
  Pregnancy-induced hypertension is defined as hypertension as hypertension in the second half of pregnancy (20 weeks and above) without proteinuria

1. Pre-eclampsia

Pre-eclampsia defined as hypertension in the second half of pregnancy (20 weeks and above) associated with proteinuria (≥300mg/dL) in a patient not previously hypertensive or proteinuric. There may or may not be pedal oedema.

2. Mild Pre-eclampsia

Mild pre-eclamspsia is when systolic blood pressure is between 140-160mmHg and a diastolic blood pressure of between 90-100mmHg with proteinuria of +2 or less.

3. Severe Pre-eclampsia

Severe pre-eclampsia is when the systolic blood pressure is greater than 160 and a diastolic BP of 100mmHg with proteinuria of 3+ (5g/24 hr urine). There are also neurological or biochemical changes that can suggest severe disease. The appearance of symptoms like headache, blurring of vision, vomiting or epigastric pain also suggest severe pre-eclampsia.

Chronic Hypertension

- Chronic hypertension is pre-existing hypertension or hypertension diagnosed in the first half of pregnancy.

Chronic Hypertension with super-imposed pre-eclampsia

If pre-existing hypertension or hypertension diagnosed in the first half of pregnancy is associated with proteinuria and other features of pre-eclampsia in the second half of pregnancy, the condition is termed chronic hypertension with super-imposed pre-eclampsia

- Eclampsia

Eclampsia is the occurrence of generalised tonic-clonic convulsions in a patient with pre-eclampsia in the absence of a neurological disease. It can be ante-partum eclampsia, intra-partum eclampsia or post-partum eclampsia. The intra-partum type is the most common in Nigeria.

SESSION 2

EPIDEMIOLOGY & IMPACT OF PRE-CLAMPSIA/ECLAMPSIA ON MATERNAL MORTALITY IN NIGERIA

OBJECTIVES
At the end of this session participants will be:

1. Know the predisposing to pre-eclampsia/eclmapsia
2. Know the contribution of pre-eclampsia/eclampsia to maternal mortality
3. Discuss the socio-cultural and health system factors contributing to the high case fatality rates in pre-eclampsia and eclampsia in Nigeria

METHODOLOGY
- Brainstorming
- Assignment or group activity
- Lectures/discussions

RESOURCE
- Flip charts
- Fact sheets
- Centre for reproductive right
- Report on broken promise
- FMoH maternal mortality final report
- SOGON report on maternal mortality

DURATION

30 minutes

CONTENT

A. INCIDENCE

Hypertensive disorders complicate 15% of pregnancies. Pre-eclampsia/eclampsia is the most important type of hypertensive disorders in pregnancy in terms of incidence, morbidity and mortality. While the incidence of pre-eclampsia is relatively constant world wide, the incidence of eclampsia is higher in developing countries. The incidence of eclampsia in developing countries varies from 10 to 50 per 1,000 deliveries (1-5%).

B. EPIDEMIOLOGY

Pre-eclampsia/Eclampsia as observed world-wide is largely a disease of primigravidity. In Nigeria, over 80% of patients with eclampsia are primigravidae. In northern Nigeria, probably because of the culture of early marriage. Majority of these primigravidae are teenagers (<19years).

Other predisposing factors include lack of poor access to antenatal care, past history of pregnancy-induced hypertension, positive family history of hypertension, multiple pregnancy, molar pregnancy, diabetes mellitus and renal diseases

C. MATERNAL MORTALITY

Both pre-eclampsia and eclampsia cause maternal deaths. In developed countries, severe pre-eclampsia accounts for 1-2% of maternal deaths. In developing countries, severe pre-eclampsia/eclampsia account for >10% of maternal mortality. In some areas of sub-Saharan Africa for example Northern Nigeria, eclampsia account for up to 40% of maternal deaths. Contributing factors to the high maternal mortality include lack of ante-natal care, late presentation and weak health system leading to poor quality emergency obstetric care.

Social contributory factors to maternal death include poverty, poor reproductive health care-seeking behaviour, cultural perception of eclampsia and lack of access to quality maternal services including intra-partum care.

MODULE 2
DIAGNOSIS OF PRE-ECLAMPSIA/ECLAMPSIA

SESSION	OBJECTIVES	METHODOLOGY/ ACTIVITY	RESOURCE	DURATION (TIME)
(1) DIAGNOSIS OF PRE-ECLAMPSIA	1. Know how to diagnose pre-eclampsia 2. Know symptoms and signs of severe pre-eclampsia 3. Know the preventive measures of pre-eclampsia	• Lecture • Group work • Brainstorming • Bedside Teaching • Practical demonstration	• Flip chart • Dip sticks • Sphygmomanometers/ stethoscope • Power point projector • Text books • Instructional	45 minutes
(2) DIAGNOSIS OF ECLAMPSIA	1. Know how to diagnose eclampsia 2. Know the differential diagnosis of eclampsia 3. Identify complications of eclampsia 4 Know preventive measures for eclampsia	• Lecture • Group work • Brainstorming • Practical demonstration	• Flip chart • Dip sticks • Sphygmomanometers/ stethoscope • Power point projector • Text books • Instructional	45 minutes

(3) TREATMENT OF PRE-ECLAMPSIA	1. know the principles of treatment of pre-eclampsia 2. know the antihypertensive and anticonvulsants used in the treatment of pre-eclampsia 3. Know the methods of delivery for women with pre-eclampsia	• Lecture • Group work • Brainstorming • Practical demonstration	• Flip chart • Dip sticks • Sphygmomanometers/ stethoscope • Power point projector • Text books • Instructional materials	45 minutes
(4) TREATMENT OF ECLAMPSIA	1. Know the principles of treatment of eclampsia 2. Describe the resuscitative measures used in the treatment of eclampsia 3. Know the anti-hypertensive and anticonvulsant agents used in the treatment of eclampsia 4. Know the methods of delivery for women with eclampsia 5. Know the post partum care of eclampsia	• Lecture • Group work • Brainstorming • Practical demonstration	• Flip chart • Dip sticks • Sphygmomanometers/ stethoscope • Power point projector • Text books • Instructional materials	45 minutes

SESSION 1

DIAGNOSIS OF PRE-ECLAMPSIA

OBJECTIVES
At the end of this session participants will be:

1. Know how to pre-eclampsia
2. Know the symptoms and signs of pre-eclampsia
3. Know the preventive measures for pre-eclampsia

METHODOLOGY
- Lecture
- Discussions
- Brainstorming
- Practical demonstration

RESOURCE
- Flip chart/stand and markers
- Sphygmomanometer/stethoscopes
- Power point projector
- Text books
  Instructional materials

DURATION
45 minutes

Trainee's Notes:
If we have ten women with mild pre-eclampsia, how many of them would present with symptoms?

CONTENT

DEFINITION / Diagnosis

Pre-eclampsia is defined as elevated or high blood pressure in pregnancy after 20weeks of gestation measured on two occasions at least four hours apart with proteinuria.

Hypertension is defined as a rise in blood pressure of 140/90mmHg or more in a previously normotensive woman.

Proteinuria is the occurrence of at least 300 milligrams of protein per litre of urine in at least two random clean catch specimens at least 6 hours apart (the urine should be clean catch midstream specimen to avoid contamination by vaginal secretions).

Pre eclampsia is usually without any symptoms until the condition deteriorates. The insidious nature of the disease makes it life threatening. Often mild pre-eclampsia can progress to severe pre-eclampsia or even eclampsia without warning. Pre eclampsia is best detected in its earliest forms by regular measuring of the blood pressure of pregnant women. This is possible if women regularly attend antenatal care. Development of the symptoms signifies that the disease has progressed to the severe form, previously called imminent eclampsia. These symptoms include headache, epigastric or right hypochondriac pain, nausea, vomiting and visual disturbance If pre-eclampsia is not treated, it can progress to eclampsia.

Pre-eclampsia can be classified into mild or severe forms. All cases that were previously termed imminent eclampsia are now put under severe pre-eclmapsia.

Feature	Mild pre-eclampsia	Severe pre-eclampsia
Diastolic Blood Pressure	90-109 mmHg	>110mmHg and above
Symptoms	Little or none	Development of symptoms
Proteinuria	2+ or less	3+ or more

Symptoms of severe pre-eclampsia (previously known as imminent eclampsia) are as follows:

- Headache
- Visual disturbances
- Epigastric or right hypochondrial pain
- Nausea and vomiting

Other features of severe pre-eclampsia are as follows:

- Oligouria: <400mls of urine in 24 hours
- Intrauterine growth retardation
- Deranged liver function tests
- High serum uric acid and creatinine

- HELLP syndrome: Haemolysis, elevated liver enzymes and low platelets
- Thrombocytopenia <50,000/ml
- Hypereflexia
- Generalized oedema
- Pulmonary oedema

Prevention of pre-eclampsia

The exact aetiology of pre-eclampsia is not known, thus it has been difficult to develop interventions that can provide absolute prevention. There are many interventions in literature, but the ones that have shown some promise are:

1. Low-dose Aspirin

75mg is given daily to the woman with risk factors for developing pre-eclampsia as early as 12 weeks gestation and is continued until 36 weeks gestation. It has the best evidence so far amongst the options available.

2. Calcium supplement

2gm daily of supplemental calcium has been used for women at risk of pre-eclampsia at gestational age of 13-21 weeks with beneficial outcomes.

Trainees' Notes:

GROUP WORK

Trainees to be distributed into two groups of group A and B

i. GROUP A: Demonstrate how to take the blood pressure of a pregnant woman using the sphygmomanometer.

ii. GROUP B: Demonstrate how to check for proteinuria in the urine of a pregnant woman, using the urine test strip and the sample provided.

[1] Hoffmeyr GJ, Atallah AN, Duly, 2006

[2] Villar et al 2006

SESSION 2:

DIAGNOSIS OF ECLAMPSIA

OBJECTIVES
At the end of this session participants will be:

1. Know how to diagnose eclampsia
2. Know the differential diagnosis of eclampsia
3. Identify complications of eclampsia
4. Know how to prevent eclampsia

METHODOLOGY
- ? Lecture
- ? Group work
- ? Brainstorming
- ? Practical demonstration

RESOURCE
- ? Flip chart/markers
- ? Sphygmpmanometer/stethoscopes
- ? Power point projector
- ? Text books
- ? Instructional materials

DURATION
45 minutes

CONTENT

DEFINITION/DIAGNOSIS

Eclampsia is the occurrence of generalized convulsions (fits) in a pregnant woman with pre-eclampsia.

The convulsions may occur in pregnancy after 20 weeks of gestation, during labour or pueperium commonly within the first 48 hours. It usually complicates pre-eclampsia but can occur in some cases without prior clinically detected pre-eclampsia. Not all cases follow an orderly progression from mild to severe disease and some women may develop eclampsia suddenly.

The symptoms of eclampsia are generalised tonic-clonic convulsions that may be associated with loss of consciousness, faecal and urinary incontinence. It is similar to an epileptic fit. It can be antepartum (before onset of labour), intrapartum (during labour) or postpartum (after delivery).

The stages of the fits are as follows:

Premonitory stage: lasts 10-20 seconds and characterised by
- Rolling of the eyes
- Facial and hand muscle twitching

Tonic stage: lasts about 30 seconds and characterised by
- Muscle spasm
- Clenching of the fists and teeth
- Spasm of the diaphragm which may stop breathing and leading to cyanosis
- Bulging of the eyes

Clonic stage: lasts 1-2 minutes and characterised by
- Violent contractions of the muscles
- Facial congestion and foaming at the mouth
- Noisy breathing

Coma stage: lasts for minutes or hours and characterised by
- deep unconsciousness with noisy breathing
- Further fits may occur

In real life situations, events occur so rapidly that the most obvious stage is the clonic phase where there are violent contractions of the muscles (fits).

RELEVANT INVESTIGATIONS

The following investigations should be conducted:
- Full blood count, grouping and cross-matching
- Urinalysis (protein, sugar and acetone)
- Liver function test
- Urea, electrolyte and creatinine
- Urea, electrolyte and creatinine; Serum uric acid

DIFFERENTIAL DIAGNOSIS

The following are differential diagnosis:
- Epilepsy
- Meningitis

- Cerebral malaria
- Electrolyte imbalance; Hypo/hyperglycaemia
- Hypertensive stroke; Head trauma; cerebral tumours, drug overdose

COMPLICATIONS

The complications of eclampsia are maternal and foetal.

Maternal:
- Respiratory problems (Pulmonary Oedema, Broncho-Pneumonia)
- Renal complications (Acute renal failure)
- Cerebral oedema, thrombosis or haemorrhage
- Heart failure and Liver rupture
- HELLP syndrome (haemolysis, elevated liver enzymes, low platelet count)
- Clotting and Coagulation failure
- Visual impairment (e.g. blurring, blindness)
- Physical injuries/fractures during convulsions
- Maternal death

Foetal:
- Birth Asphyxia
- Jaundice
- Prematurity
- Intrauterine growth retardation (IUGR)/Still birth
- Still birth (due to placental insufficiency)
- Intrauterine foetal death (IUFD)

Prevention of pre-eclampsia and eclampsia
- Focused antenatal care to detest early signs of pre-eclampsia and early treatment
- Improving the referral system (early referral)
- Access to skilled and motivated health personnel
- Access to appropriate drugs and supportive care
- Awareness creation on importance of antenatal care and identification of danger signs of pre-eclampsia
- Improving literacy level
- Eradicating poverty and empowering women socio economically
- Involvement of other stakeholders (community and religious leaders) in the management of pre-eclampsia and eclampsia
- Overcoming the three models of delays in obstetrics: delay at home in deciding to seek treatment, delays in reaching a health facility and delay in receiving care at the health facility

Trainee's Notes: GROUP WORK

In assigned groups, appoint a group leader to facilitate and a note taker to present the group report.

The groups should brainstorm on “how eclampsia can be prevented in our communities”

Document your notes in the flipchart sheet provided.
Present work to the larger group

SESSION 3:

TREATMENT OF PRE-ECLAMPSIA

OBJECTIVES
At the end of this session participants will be able to:

1. Know the principles of treatment of pre-eclampsia
2. Know the antihypertensive and anticonvulsant drugs in the treatment of pre-eclampsia
3. Know the modes of delivery for women with pre-eclampsia

METHODOLOGY
- Lecture
- Group work
- Brainstorming
- Bedside practical demonstration

RESOURCE
- Flip chart & markers
- Sphygmomanometer/stethoscopes
- Power point projector
- Text books
- Instructional materials

DURATION
45 minutes

CONTENT

The principles of treatment are as follows:

1. Controlling the hypertension
2. Prevention of convulsions
3. Delivery of the foetus

1. Controlling the hypertension

Drugs are used to control the blood pressure with the aim of achieving or maintaining a diastolic blood pressure of 90-100mmHg.

Mild pre-eclampsia can be treated on outpatient basis, while severe pre-eclampsia will require hospital admission.

The following classes of antihypertensive drugs can be used in controlling hypertension:

- Vasodilators (e.g. Hydrallazine) - This is used when the diastolic blood pressure is 110mmHg or more. It is a rapid acting vasodilator. It is given at a dose of 10mg given intravenously (IV) slowly over 5-10 minutes. It may to be repeated after 30 minutes if the diastolic blood pressure remains more than 100mmHg.
  The side effects include headache, dizziness, hypotension and collapse (common if the drug is administered rapidly)

- Centrally acting antihypertensive (e.g. methyldopa) - This is the preferred long-term oral antihypertensive agent in pregnancy. Its safety in pregnancy has been established and no serious fetal side effect has been documented. The dose is 250mg given orally three times a day although the dose can be increased up to a maximum dose of 4g in 24 hours in order to achieve the desired blood pressure.
  Its side effects of alpha methyl-dopa include sedation, tiredness and postural hypotension

- Calcium channel blockers (e.g. Nifedipine) - The drug can be used orally or sublingually. It has a rapid onset of action of 10-15 minutes. The daily dose is 20mg, which can be increased to a maximum daily dose of 120mg. The side effects include headache, hypotension and dizziness.

- Other antihypertensive drugs that can be used include labetalol and verapamil.

2. Prevention of convulsions

In severe pre-eclampsia, there is need to use anticonvulsants to prevent the progression of the condition to eclampsia. Previously diazepam was used for this purpose. It has however been confirmed that magnesium sulfate is the best drug for this purpose. Magnesium sulfate should be used to treat women with severe pre-eclampsia as discussed under the session for the treatment of eclampsia.

3. Delivery of the foetus

Where the foetus is matured (37 weeks of gestation or more), in a patient with pre-eclampsia, immediate delivery is advised. This is usually by induction of labour. However, other obstetric indications (e.g. associated intrauterine growth restriction) may be considered and the patient offered elective caesarean section.

For gestational ages less than 37 weeks of gestation, conservative treatment could be offered provided the pre-eclampsia is mild. Once the gestational age of 37 weeks is achieved, the patient should be delivered.

Conservative treatment involves the following:

- Bed rest
- Fetomaternal monitoring: maternal blood pressure monitoring, foetal kick chart, CTG (cardiotocography) (non-stress test) as appropriate and twice weekly biophysical profile (where available)
- Regular investigations: daily urinalysis, twice weekly urea, electrolyte, creatinine, uric acid and liver function test estimations

It should be noted however that a patient with mild pre-eclampsia may suddenly progress to severe pre-eclampsia or even eclampsia, in which case the management will change appropriately.

In severe pre-eclampsia, where the gestational age is equal to or more than 34 weeks, immediate delivery is advised. Where the gestational age is less than 34 weeks, the risk of the delivery should be weighed against the maternal benefit.

With delivery of the baby and placenta, there is usually an improvement in the clinical condition of the mother.

Note: avoid the use of ergometrine after delivery as it can cause a further rise in the blood pressure. Rather, syntocinon can be given 10 IU IM stat.

Learner's Note:
<u>GROUP WORK</u>

Divide into two groups of A and B.

Group A shall answer Question 1 (use flipchart sheets to write answers)

1. What are the principles of treatment of pre-eclampsia?

while Group B shall answer Question 2 (use flipchart sheets to write answers)

2. Name three common drugs used in the treatment of pre-eclampsia

<u>PRACTICAL SESSION: BED SIDE TEACHING</u>

Both groups should demonstrate the administration of Hydrallazine using the syringe and needle provided

SESSION 4

TREATMENT OF ECLAMPSIA

OBJECTIVES
At the end of this session participants should be able to:

1. Know the principles of treatment of eclampsia
2. Know the early resuscitative measures used in the treatment of eclampsia
3. Know the regimen of the antihypertensives and anticonvulsants used in treating eclampsia
4. Know the modes of delivery for women with eclampsia
5. Know the post partum care of eclampsia

METHODOLOGY
- Lecture
- Group work
- Brainstorming
- Bedside practical demonstration

RESOURCE
- Flip chart & markers
- Sphygmomanometer/stethoscope
- Power point projector
- Text books
- Instructional materials

DURATION
60 minutes

CONTENT

Eclampsia can be antepartum, intrapartum or postpartum (refer to session on diagnosis of eclampsia).

The principles of management are as follows:

1. Resuscitation
2. Controlling the fits
3. Controlling the blood pressure
4. fluid and electrolyte balance
5. Nursing care
6. delivery of the baby
7. post delivery care to prevent further fits and other complications

1. Resuscitation

It is important to resuscitate the patient as follows:

- position patient in left lateral position away from harmful objects
- Clear and maintain airway (insert oropharyngeal airway and suction when necessary)
- Give oxygen by face mask
- Pass NG tube and indwelling Foley's catheter (take urine specimen to check for protein)
- Set up an intravenous infusion and take blood samples for investigations
- Take brief history and determine the patient's blood pressure
- If in a primary health facility, refer the patient to a higher facility for further care

2. Control of fits

Several agents can be used to control fits in eclampsia. These include diazepam, phenytoin, paraldehyde, 'lytic cocktail' and magnesium sulfate. However, the best agent for this is magnesium sulfate.

There are principally two main regimens (Pritchard and Zuspan) for the administration of $MgSO_4$. Others like Dhaka and Sokoto 'ultrashort protocols are not popular yet.

In the Pritchard Regimen, the loading dose is $MgSO_4$ 4g bolus given slowly intravenously over 5-10 minutes and this is followed by 10gm given intramuscularly (5g in each buttock). Subsequently, 5g is given IM four-hourly in alternate buttocks. This is the preferred regimen in Nigeria.

In the Zuspan regimen, the loading dose consists of an initial intravenous dose of 4g slowly over 5-10 minutes followed by a maintenance dose of 1-2g hourly given by an infusion pump. A gravity fed infusion set can be used in the absence of the pump especially in the developing countries.

Note that for the 50% $MgSO_4$, 1 ml of the solution contains 0.5g of $MgSO_4$ while for the 20% solution; 1 ml contains 0.2g of $MgSO_4$. There is need to dilute the initial intravenous loading dose if the 50% solution is been used to 20% solution to avoid vascular irritation. This is done by diluting 8mls (4g) of the 50% solution to 20mls using a 20ml syringe. The commonly used diluents are 5% dextrose water, normal saline or water for injection (using a 20ml syringe).

[3] Belumet al, 2001
[4] Ekele et al, 2009
[5] FMOH, 2009

Monitoring is important to ensure that the right doses are administered and this is not an easy task. Whatever regimen chosen, the drug should be administered for 24 hours after delivery or after the last fit (whichever comes last). If convulsions recur, give an extra 2 g of $MgSO_4$ IV over five minutes

Toxicity of the drug should be monitored using the following clinical parameters;

- the knee jerk (should be present)
- respiratory rate (should be more than 16 per minute)
- Urine output (should be more than 30 ml per minute).

The first warning sign of toxicity is loss of the knee jerk.

In case of toxicity:

- Stop the drug
- Support respiration with ambu bag and oxygen/ventilator
- Administer the antidote which is 1g of 10% Calcium gluconate given intravenously slowly over 10 minutes.

3. Controlling the blood pressure

If diastolic blood pressure is equal to or more than 110mmHg, administer IV hydrallazine 10mg slowly over 5-10 minutes. The aim is to reduce and maintain the diastolic blood pressure below 110mmHg. Where the blood pressure cannot be controlled by repeated boluses of Hydrallazine, the drug may be put into the infusion and titrated against the blood pressure at the rate of 1mg per minute.

This can be administered by putting 40mg of Hydrallazine in 500mls of normal saline in the infusion/infusion pump to run over 4 hours (1-5mg per hour)

4. Correct fluid and electrolyte imbalance

Eclamptic patients have a contracted blood volume. Fluid replacement should be with care. The best recommended intravenous fluid is Ringers Lactate administered at the rate of 1L every 8 hours. Where it is not available, other fluids such as normal saline, 5% dextrose water or dextrose saline could be used. Electrolytes may need to be corrected depending on the result of the serum urea and electrolyte.

5. Nursing care

The patient should ideally be nursed in the intensive care unit (ICU) or high dependency area (HDA). Nursing care will involve the following:

- Nurse in a cool quite environment
- Regular turning of the patient every 30 minutes
- Care of the pressure areas to avoid bed sores
- Regular vital signs monitoring
- Catheter care
- Infection prevention

6. Delivery of the baby

After stabilization, eclamptic patients should be FULLY examined, which ideally should include the following:

- General physical examination
- Vital signs: pulse rate, blood pressure, respiratory rate, temperature and urine output
- Examination of the cardiovascular, respiratory, central nervous and the abdomen
- Pelvic examination to determine if the patient is in labour

After the examinations are completed, delivery of the patient should be planned. Vaginal delivery is the route of choice, and the labour could be augmented to speed up the delivery. The second stage should be assisted preferably by forceps or vacuum can also be used.

However, if the delivery is not feasible in the next 6-8 hours, caesarean section is recommended.

With delivery of the baby and placenta, there is usually an improvement in the clinical condition of the mother. Avoid the use of ergometrine after delivery as it can cause a further rise in the blood pressure. Rather, syntocinon can be given 10IU IV stat and 40 IU added to 500mls dextrose/saline infusion to run over 4 hours

7. Post delivery care to prevent further fits and other complications

It is important to continue the maintenance doses of intravenous fluids, anticonvulsant and antihypertensives (where indicated). The nursing care should be continued. As the patient recovers, oral feeding can be commenced within 24 to 48 hours. At that point, oral antihypertensive drugs can be introduced (as described under the session for treatment of pre-eclampsia). The patient can be discharged after full recovery of consciousness and stabilization of the blood pressure.

EXAMPLE OF A MANAGEMENT PROTOCOL

General measures
- Call for help;
- Maintaining a patent airaway: insert oropharyngeal tube and suction PRN
- Support breathing (Oxygen administration) and if not breathing: assist ventilation with ambu bag or perform intubation
- Monitor vital signs: BP, temperature, respiration
- Catheterise bladder; Monitor fluid input and output
- Full blood count, grouping and cross-matching, Urine analysis, Random blood sugar

Control of fits (Use of Pritchard regime)
- MgSO4 4gm IV bolus over 5-10 minutes (loading dose)
- Additional MgSO4 of 10g (5g in each buttock IM)
- If convulsions recur after 15 minutes, give 2 g of MgSO4 IV over five minutes
- Maintain with 5g IM 4hrly in alternate buttocks for 24hrs after delivery or for 24 hours after the last fit (whichever comes last)
- Put patient in left lateral position;

Monitor for MgSO4 toxicity
- Patella deep tendon reflex should be present (first to go if there is toxicity)
- Respiratory rate should be > 16/min
- Urine output should be >30ml/hour

- Administer 1g of 10% Calcium gluconate IV (slowly over 5-10 minutes) if there is evidence of magnesium sulphate toxicity

Control BP:
If diastolic BP > 110: 10 mg Hydrallazine slowly IV (in 5 minutes);
then 5 mg iv every 30 minutes until diastolic BP <100mmHg

Fluid management:

Limit fluid intake to 1L 12 hourly (2litres in 24 hours)

Deliver the baby within 6-9 hours:
- If not in labour: Caesarean section
- If in labour: consider augmentation of labour and shorten 2nd stage with forceps or vacuum extraction;

- Avoid ergometrine after delivery; rather use syntocinon 10 IU IM stat.

Consider other measures like:
Anti-malarial
Antibiotics
Antipyretics

Follow up

The patient should be reviewed in the post natal clinic within a week after discharge. She should be asked and investigated (verbally and physically) for any complaints. Her vital signs especially the blood pressure should be measured. Oral antihypertensive drugs may need to be continued for some time if the blood pressure remains high.
The patient should be educated on the cause of the condition and how it could be prevented in subsequent pregnancy. The importance of antenatal care should be emphasized especially as there is risk of recurrence of the condition. Contraception should be offered.

At the six-week post natal visit, the patient should be referred to the physician if the blood pressure remains high.

Management of some common complications of Eclampsia

- Acute Renal Failure:
  Renal challenge with frusemide
  Fluid restriction (maintain with previous days output and insensitive loss)
  Monitor Input and Output
  Monitor and correct Electrolyte, Urea, Creatinine
  Give antibiotics
  Dialysis

- Aspiration Pneumonitis
  Antibiotics
  Chest physiotherapy
  Steroids and oxygen in severe cases
  Controlled ventilation in the ICU

- Hyperpyrexia
  Nurse in a cool environment
  Tepid sponge
  Antipyretics

Trainees' Notes: BED SIDE TEACHING

The group may be divided into three groups A, B & C.
Each of the group shall demonstrate one of the tasks mentioned below:

- Demonstrate resuscitation in the eclamptic patient who has just been presented to the health facility
- Administer magnesium sulfate with the drug in the syringe provided
- Demonstrate the use of patella hammer to check for knee reflex with the patella hammer provided

MODULE 3

CASE STUDIES

SESSION	OBJECTIVES	METHODOLOGY/ ACTIVITY	RESOURCES	E TIME FRAME
(1) PHARMACOLOGY OF MAGNESIUM SULFATE	1. Know the physiological roles and mechanism of action of magnesium sulphate 2. Know the clinical indication for the use of magnesium sulphate 3. Know the dosage and the route of administration of magnesium sulphate 4. Know the common side effect and toxicity of magnesium sulphate.	• Lecture • Discussion • Brainstorming	• Flip charts/stand and markers • Power point projector • Text books	1 hours

PHARMACOLOGY OF MAGNESIUM SULPHATE

OBJECTIVES

At the end of this session participants should be able to:

1. Know the physiological role and the and mechanism of action of magnesium sulphate
2. Know the clinical indication for the use of magnesium sulphate
3. Know the dosage and the route of administration of magnesium sulphate
4. Know the contra-indications and precautions for the use of magnesium sulphate
5. Know the common side effects and toxicity of magnesium sulphate.

METHODOLOGY

- Lecture
- Discussion

RESOURCE

- Flip chart & markers
- Power point projector
- Text books
- Instructional materials

DURATION

1 hours

CONTENT

1. Clinical pharmacology and mechanism of action of magnesium sulphate
2. Indications for the use of magnesium sulphate
3. Dosage and route of administration including clinical indication for the use of magnesium sulphate
4. Contraindications and precautions for the use of magnesium sulfate
5. Side effects and toxicity of magnesium sulphate

1. Clinical pharmacology / Mechanism of action

- Magnesium [Mg^{2+}] is an important cofactor for enzymatic reactions and plays an important role in neurochemical transmission and muscular excitability.
- The mechanism of action of magnesium sulfate is not completely understood.
- Magnesium sulphate acts peripherally to produce vasodilatation
- It controls convulsions by blocking N methyl D-aspartate receptors (NMDA) centrally
- It is also thought to displace calcium at the neuro-muscular endplate thereby inhibiting neuromuscular transmission.
- Magnesium is said to have a depressant effect on the central nervous system

2. Dosage and administration / clinical indication

Dosage and administration

• Magnesium sulfate can be administered either intravenously or intramuscularly; however the regimen used, initial dose is intravenous.

- Intramuscular regime (Pritchard):

The loading dose is 4g bolus given slowly intravenously over 5-10 minutes, and this is followed by 10g intramuscularly [5g into each buttock]. Subsequently 5g is given intramuscularly four hourly in alternate buttocks

- Intravenous regimen (Zuspan):

The loading dose consist of an initial intravenous dose of 4g given slowly over 5-10 minutes, followed by a maintenance dose of 1-2g hourly

Whatever the regimen chosen, the drug should be administered till 24 hours after delivery or after the last fit; although the optimal length of treatment is not established. Other protocols like Dhaka and Sokoto (ultra-short) regimens are not popular yet.

3. Clinical indications:

- Parenteral administration of magnesium sulphate is indicated for prevention and control of convulsions in the treatment of severe pre-eclampsia and eclampsia respectively.
- Magnesium sulphate can be used as tocolytic agent in the management of preterm labour.
- Magnesium sulphate injection can also be used in the control of hypertension, encephalopathy and convulsions associated with acute nephritis in children.

4. Contraindications / Side effect

Contraindications:

Magnesium sulphate should not be administered parenterally in patients with heart block or myocardial damaged. Caution should be exercised in patients with impaired renal function and in the presence of electrolytes imbalance.

5. Side effect:

Adverse effects of parenterally administered magnesium sulphate include flushing, sweating, hypotension, depressed reflexes, flaccid paralyses, gastro-intestinal disturbance (diarrhoea, abdominal distention) urinary retaintion, hypothermia, circulatory collapse, cardiac and CNS depression (central sedation, decreased excitability) proceeding to respiratory paralysis. Hypocalcaemia with signs of tetany may occur.

6. Symptoms and treatment magnesium sulphate toxicity

Disappearance of the patella reflex is the first sign to detect the onset of magnesium intoxication. The next is respiratory depression followed by cardiac arrest. In the event of over dosage, artificial ventilation must be provided until a calcium salt can be injected intravenously to antagonize the effect of magnesium.

In adults, intravenous administration of 10mls of 10% calcium gluconate slowly over 10 minutes will usually reverse respiratory depression or heart block due to magnesium intoxication. In extreme cases, peritoneal dialysis or haemodialysis may be required.

Trainees's Note:

1. Ask questions or seek clarifications

MODULE 4:

CASE STUDIES

SESSION	OBJECTIVES	METHODOLOGY/ ACTIVITY	RESOURCES	TIME
(1) CASE STUDIES	1. Present a case study and discuss the important questions relating to it. 2. Identify the process which led to the outcome of the case studied, emphasizing the important points of practice in the prevention and management of eclampsia. 3. Discuss how other women may also benefit from aspects of care which contributed to a safe outcome or lessons learned from a poor outcome. 4. Describe how improved maternity care can influence the outcome of the management of eclampsia and pre-eclampsia, giving examples from experience. 5. Explain the importance of reflecting on practice in order to evaluate and improve care.	• Case studies • Discussion Group work	Managing eclampsia. Educational material for teachers of midwifery. WHO Midwifery education module - second edition	2 hours

CASE STUDIES

OBJECTIVES
At the end of this session participants should be able to:

1. Present a case study and discuss the important questions relating to it.
2. Identify the process which led to the outcome of the case studied, emphasizing the important points of practice in the prevention and management of eclampsia.
3. Discuss how other women may also benefit from aspects of care which contributed to a safe outcome or lessons learned from a poor outcome.
4. Explain the importance of reflecting on practice in order to evaluate and improve care.

METHODOLOGY
- Case studies
- Discussion
- Group work

RESOURCE
- Flip chart & markers
- Handouts
- Instructional materials

DURATION
2 hours

Trainee's Notes:
Read the following case studies carefully and answer the accompanying questions. Preferably, this be done as group work

CONTENT

Case studies

Case 1:

Mrs. X was a 16 year old primigravida reported to the primary health care centre in her village at eight month of pregnancy when she developed severe headache. The community health extension worker [CHEW] that received her could only check her blood pressure which was 150/110mmHg, and performed abdominal examination. She made a diagnosis of hypertension, gave her aldomet tablets 250mg twice daily for one week and asked her to return for follow up a week later.

Two days later Mrs.X came back with the complaint of severe headache and inability to see very well. Few minutes later she started convulsing.

1. Comment on the diagnosis made by the CHEW and the treatment given.
2. What is the most likely diagnosis and why?
3. How best would you have managed Mrs. X?

Case 2:

A 23-year-old, primigravida at 36 weeks gestation, was brought to the hospital with history of convulsions. She had 2 episodes at home and 2 on the way to the hospital. On admission she was not pale but had bilateral pitting pedal oedema. Her blood pressure was 160/110 mmHg. A single fetus in cephalic presentation and normal fetal heart rate were the findings on abdominal examination. Pelvic examination confirmed a 6cm cervical dilatation with adequate pelvis On pelvic examination her cervix was 6cm dilated, cephalic presentation. Urinalysis revealed 2+ of proteinuria.

1. How would you manage this patient
2. What difficulties would you have had managing this patient in your centre

Case 3

An 18year old primigravida was referred from a primary health care facility at 38 weeks gestation having convulsed twice at home. She was unconscious; her blood pressure was 170/120mmHg. She had 10mg of diazepam intravenously and 40mg in 500mls of normal saline.

She had four further episodes of convulsions before referral. At the referral hospital, she was given Parenteral Magnesium sulphate which controlled her convulsions. She was also placed on antihypertensive.

At vaginal examination, cervical os was 7cm dilated and membranes were intact with adequate pelvis. Samples were taken for full blood count, liver function test, electrolyte, urea and uric acid, and urinalysis.

She had artificial rupture of membranes. Three hours later, she had assisted delivery of a live baby boy with a low Apgar scores. She regained consciousness 72 hours after admission but continued to have impaired vision.

1. Why did she continue to have recurrent convulsions at the primary health care facility?
2. At the referral hospital, what abated (stopped) the convulsions?
3. Comment on the possible cause of slow recovery (unconsciousness for 72 hours) and impaired vision this patient had.
4. Why did you think the baby had low Apgar scores?

Case Four

Sister Florence was the only midwife on night duty assisted by one CHEW when a 22year old unbooked primigravida was brought into the labour ward unconscious. She had fitted 4 times at home. She was given traditional medications because her illness was believed to be due to evil spirit. She convulsed twice on the way to the hospital. Her husband said she was 9months pregnant and had enjoyed good health until 2days ago when she complaint of progressive leg swelling, chest pain, and then the first episode of convulsion. She has not passed urine since the previous day.

Sister Florence gave the patient the only remaining 10mg of diazepam available when she began to convulse again.

The midwife recorded a blood pressure of 140/100mmHg and performed pelvic examination and confirmed she was not in labour after which she made a diagnosis of ante partum eclampsia. The midwife referred the patient to the nearby General hospital that was 60km away. The patient was still at the primary health care facility 2hours after the referral due to transportation problem when suddenly started gasping and died 30 minutes later despite resuscitative measures.

1. What was the probable cause of death and what factors contributed to the death?
2. What were the challenges in giving live saving management?
3. What should be done in order to avoid these problems in the future?

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