SAVING MOTHERS

POLICY AND MANAGEMENT GUIDELINES FOR COMMON CAUSES OF MATERNAL DEATHS

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FOREWORD

The National Department of Health recognises the need to reduce maternal mortality in our country. It therefore set up, and strongly supported, the working of the National Committee on Confidential Enquiries into Maternal Deaths (NCCEMD). The Saving Mothers publication was the beginning of the process of highlighting deaths in pregnancy and these policy Guidelines are another step towards reducing maternal deaths in the next few years.

These Policy Guidelines were developed by the “Collaborative Guidelines Group” which consisted of a wide range of health professionals involved in the care of pregnant women. Representatives of nursing, medical and administrative groups was sought and obtained. The consultation process was extensive and draft guidelines were circulated, revised, and re-circulated to the various groups. There was consultation with representatives from medical schools and nursing colleges, DENOSA, SAMA, the College of Obstetricians and Gynecologists, and the NCCEMD. A special effort has been made to make the Guidelines applicable to the situation in South Africa. The Guidelines presented here are not casting stones, and as new developments occur and proven to be benefit, they will be included in revised versions of the guidelines. However, these guidelines are drawn from the best information available today and are the most suitable to South African conditions in 2000.

Each institution (clinic, community center, hospital) should use the Policy Guidelines to create institutional guidelines, which provides maternity care, and should then be implemented into clinical practice. Appropriate implementation is important so that all staff are not only aware of the guidelines, but utilize them constantly. Guidelines, however, are of little value unless some kind of audit occurs at regular intervals. Feedback will lead to updates in guidelines and further improvements in clinical practice.

The National Department of Health therefore intends to inspect institutions during the period 2001/2002, to ensure that guidelines are available at all sites of maternity care in the country.

[Signature]

DIRECTOR-GENERAL: HEALTH

DATE: 18/05/2001
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CHAPTER ONE

POLICY AND MANAGEMENT GUIDELINES

The National Department of Health has stated that the Maternal Mortality Ratio in South Africa is far too high and that a significant number of the maternal deaths are preventable. This is clearly illustrated in the “Saving Mothers: Report on Confidential Enquiries into Maternal Deaths in South Africa”. One of the key strategies to achieve this reduction in maternal deaths is to have clearly spelt out treatment regimen for the common conditions that cause maternal deaths.

There is hierarchy of strategies used when developing ways of treating patients. Initially there is a statement of policy or the problem, e.g. preventable deaths due to complications of Eclampsia must be prevented. Then, the basic tenants required to achieve this, in broad principle, are elucidated, e.g. in eclampsia, the airway of the patient must be ensured, the blood pressure convulsions must be controlled and further convulsion prevented and the fetus should be delivered. Thereafter more detail is added, but this detail becomes dependant upon the situation in which the health workers treating the patient find themselves. For example, the protocol for the managing eclampsia in a clinic is different from that in a tertiary hospital, although the basic principles remain the same. So in a clinic, the protocol would concentrate on ensuring that first aid is adequately performed, i.e. control of airway, blood pressure and convulsions and transferring the patient safely to an appropriate institution for delivery of the fetus. Hence the policy is carried out but at different institutions depending on their capability. A detailed protocol that is developed in an institution would for example have the phone numbers of the relevant referral centers and criteria for referral documented in the statement. This detail can obviously only be done at the institutional level, and at national or provincial level this would be inappropriate.
1.1. DIFFERENCE BETWEEN GUIDELINES AND PROTOCOLS

Guidelines are principles and protocols are detail. A guideline on hypertension will say for example that the blood pressure be controlled and which drugs are suitable. A protocol should say which drug, which dosage regime is used in the particular institution and also where the drug is kept (if necessary).

There is a natural three tier system of guidelines and protocols as illustrated above. A Policy Guideline indicates the policy regarding managing a certain condition. A Management Guideline gives where more details are given so that various institutions are able to choose what is most suitable for them. An Institutional Protocol is where, in each institution, the management guidelines have been adapted to suit the particular institution and the treatment protocol is given in considerable detail.

For example: the policy guideline for managing incomplete abortions will state among other things that an uncomplicated incomplete abortion less than 12 weeks pregnant should be managed at a community health center or level one institution. An evacuation of the uterus should be performed within 6 hours of admission and it can be safely performed as an outpatient procedure using a manual vacuum aspirator. Prior to evacuation prophylactic antibiotics should be given. Analgesia should be given where required. After the evacuation the patient should be advised with respect to contraception use.

The management guideline will indicate how to diagnose an uncomplicated incomplete abortion, which tests are required to make the diagnosis, what the choices are regarding prophylactic antibiotics and analgesia for the evacuation of the uterus.

The institutional protocol will state what tests should be done e.g. a copper sulphate test, haemoglobin meter, or laboratory test, to assess for anaemia.
The authors of management guidelines have ensured that their management guidelines fall within the policy guidelines. It is essential that each institution takes the management guidelines and adapts them for their particular institution.

The policy guidelines set a minimum set of national requirements.

Figure 1 illustrates the hierarchy in developing a treatment regimen.

**Figure 1.1. The hierarchy of strategies in developing treatment regimens**

<table>
<thead>
<tr>
<th>Policy</th>
<th>Policy Guidelines</th>
<th>Management guideline</th>
</tr>
</thead>
<tbody>
<tr>
<td>(preventable maternal deaths should be prevented. The causes of preventable deaths are known see “Saving Mothers” Report)</td>
<td>(Statement in broad principle what should be done to prevent specific preventable causes of maternal death)</td>
<td>(what should be done at each site)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Health Centre/ Sub-district Hospital</th>
<th>District/Secondary Hospital</th>
<th>Tertiary</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Institutional protocols</th>
<th>(Detail added to the management Guideline appropriate to the area)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area A</td>
<td>Sub-District Hospital</td>
</tr>
<tr>
<td></td>
<td>Tertiary Hospital</td>
</tr>
<tr>
<td>Area B</td>
<td>Sub-District Hospital</td>
</tr>
<tr>
<td></td>
<td>Tertiary Hospital</td>
</tr>
</tbody>
</table>

Every institution upon receiving the policy guidelines and the national management guidelines should develop their institutional guidelines. The National Department of Health and the

3
Provincial Maternal, Child and Women’s Health units will assist in the process. The aim is for each institution to have its institutional guidelines by 2002. To judge the success of this, assessors will visit institutions to see the protocols and whether the health workers are conversant with them.

1.2 LEVELS OF CARE:
There is considerable confusion with regard to the definitions of the various levels of health care. The following list gives the designations, together with the staff composition and the services provided at each level.

<table>
<thead>
<tr>
<th>Level Designation</th>
<th>Staff</th>
<th>Services provided</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clinic</td>
<td>Registered midwife</td>
<td>Antenatal and postnatal care</td>
</tr>
<tr>
<td>1 Health center / midwife</td>
<td>Midwife, sometimes with</td>
<td>Above + 24 hour delivery</td>
</tr>
<tr>
<td>Obstetric unit</td>
<td>Advanced Diploma in Midwifery plus sometimes Visiting Medical Officers (Mos)</td>
<td></td>
</tr>
<tr>
<td>Subdistrict hospital</td>
<td>Above + Mos + visiting Specialists</td>
<td>Above + 24 hour caesarean section service</td>
</tr>
<tr>
<td>2 District, Secondary, or Regional hospital</td>
<td>MOs + Specialists + Intensive Care Unit</td>
<td>All complex deliveries</td>
</tr>
<tr>
<td>3 Tertiary, Central, or Teaching hospital</td>
<td>Above + “Superspecialists”</td>
<td></td>
</tr>
</tbody>
</table>

4
**Strength of evidence:** it is customary to grade the evidence, on which clinical statements are based, according to the strength of such evidence, viz.:

- **Grade A**  Evidence from randomized controlled trials.
- **Grade B**  Evidence from other robust experimental or observational studies.
- **Grade C**  The evidence is more limited, but the advice relies on expert opinion and has the endorsement of respected authorities. The relevant textbook may be quoted, if the evidence is applicable to South African conditions, and there is consensus regarding such evidence in South Africa.
- **Grade D**  There is local evidence from observational studies. The evidence differs from the opinion quoted in current textbooks. There is no consensus regarding such evidence in South Africa, nor has consensus been sought.
CHAPTER TWO

A SYSTEMATIC APPROACH TO EXAMINING AN ILL PREGNANT PATIENT

One of the major areas of substandard care identified in the “Saving Mothers: Report on Confidential Enquiry into Maternal Deaths in South Africa” was the poor initial assessment of the patient. This occurred in about 30% of cases. All health care workers are trained in the traditional method of history taking, clinical examination and special investigations when assessing a patient. However, it is often difficult to assimilate the multiple abnormalities found and to formulate a management plan in a very patient with multi-organ disease, the very types of cases described in the maternal mortality report.

The systematic approach described below is meant to refocus the health worker on evaluating a patient using a simple easy to remember examination method, and if used should identify the major problems. Please remember that a relevant history must be taken on all occasions.

The rationale behind this approach is that a patient has a real risk of death when an organ system fails and is not supported, or the cause of the failure is not treated. An example is the postpartum woman who has a clinical insult of an atonic uterus and a subsequent postpartum haemorrhage. If unsupported and untreated she would develop cardiovascular dysfunction as her intravascular volume falls. She would initially demonstrate a tachycardia and tachypnoea. In other words a systematic response to her falling intravascular volume. If no intervention takes place she will go on to develop a weak thready pulse, low blood pressure, cold peripheries, poor urine output and even a depressed Glasgow coma scale. Her circulatory system is now failing and needs urgent support and treatment to save her life. If this is not forthcoming, she will die.

Figure 2.1 diagrammatically demonstrates how this case example progressively climbs up the ‘iceberg’ from the invisible depths (the unrecognized clinical insult of a postpartum haemorrhage, the systematic response and the organ dysfunction) to the pinnacle where she is now obvious but unfortunately dead! The signs of a systemic response and dysfunction of her circulatory system were present earlier on in her disease process. If picked up and if support was given to her circulatory system, her life would have been saved.
One can give other examples of clinical insults (diseases) that affect multiple organs such as pre-eclampsia/eclampsia. The same progressive ascent of the iceberg occurs, but this time involving multiple organ systems, e.g. possibly the central nervous system, the circulatory and respiratory systems, as well as the renal, hepatic and haematological systems. All of these systems have early signs manifesting in the form of a systemic response or dysfunction prior to overt failure and then death of the patient. Table 2.1 gives a breakdown of the type of organ system dysfunction and failure seen in a typical referral population of obstetric patients seen in Pretoria over a two-year period. If health care workers are to save maternal lives, they have to know how to identify and investigate each of these types of organ dysfunction and how to support and manage them. Failing this, they will be ineffective and pregnant women suffering a severe clinical insult will die.

The basic principle used to put a particular case together and decide what therapy and management is required is to evaluate each organ system systematically for signs of a systemic response or organ dysfunction. If an abnormality is detected, this serve as a trigger to investigate and initiate support of that particular organ. Thereafter one must identify the cause and address the cause. In this way on examination each potential problem identified on history can be evaluated and the systemic effects of the problem documented and managed.

2.1. SYSTEMATIC EVALUATION FOR THE PRESENCE OF ORGAN DYSFUNCTION

The clinical signs of organ dysfunction, with the special investigations required, as well as the supportive treatment, which must be given, are as follows. As an aid de memoir, the organ systems are grouped into the acutely life sustaining “Big Five”, the often neglected “Forgotten Four” and the organ system central to obstetrics, the “Core One”:
2.1.1. THE “BIG FIVE”:

1. Central Nervous system:
   - Clinical signs: drowsiness
     confusions
     convulsions
     delirium
     decreased level of consciousness
     Glasgow Coma Scale < 14/15 (see Table 2.2)
     Hypertension
     Hypotension
   - Special investigations:
     Haematocrit
     Blood glucose
     Urea & electrolytes
     liver function tests
     blood gas analysis or pulse oximetry and, if indicated,
     investigations for intracerebral haemorrhage
     brain abscess or meningitis
     lumbar puncture
   - Supportive treatment:
     dependant on the cause e.g. magnesium sulphate
     administer oxygen
     glucose etc.
2. **Circulatory system:**

Clinical signs:
- hypotension < 90 mm Hg systolic pressure
- tachycardia > 90 beats per minute
- cold and clammy extremities
- pulmonary oedema
- gallop
- hepatomegaly
- arrhythmias
- or hypertension
- blood pressure > 140/90 mmHg

- Special investigations:
  - urine test for protein
  - haematocrit
  - chest X-ray
  - and possibly an ECG,

- Supportive treatment:
  - For shock adequate venous access
  - possibly with a high flow line or central venous pressure monitoring
  - fluid replacement
  - inotrope support
  - For hypertension – control blood pressure, if necessary prevent convulsions
1. **Respiratory system:**

- Clinical signs:  
  - tachypnoea ≥ 20 breaths per minute  
  - use of the accessory respiratory muscles  
  - central or peripheral cyanosis

- Special investigations:
  - pulse oxymetry (saturation < 90%)
  - blood gas analysis (paO₂ (mmHg)< 3 times FiO₂, acidosis and alkalosis)
  - chest X-ray.

- Supportive treatment:
  - oxygen via nasal prongs or face mask  
  - CPAP mask  
  - intubation and ventilation  
  - treat pneumonia if necessary or pulmonary oedema if diagnosed

2. **Hepatic system:**

- Clinical signs:  
  - Jaundice  
  - Hepatomegaly  
  - ‘coke’-coloured urine (HELLP)
  - epigastric pain

- Special investigations:
  - blood glucose  
  - raised liver enzymes ALT  
  - AST  
  - LDH  
  - Haemoglobin  
  - liver sonar

Supportive treatment – nil per os, dextrose water injection
5. Renal system:

Clinical sign: (NB: the patient must have an indwelling catheter, and the urinary output must be carefully charted) – oliguria (< 1ml urine/kg/hr or < 30ml/hr), anuria, or very concentrated urine, coke coloured urine

- Special investigations: urine dipstix, raised urea and creatinine, urine microscopy
- Supportive treatment: rehydration and fluid replacement. If there is progressive Renal failure – dopamine, diuretic, dialysis

2.1.2. THE “FORGOTTEN FOUR”:

1. Haematological system:

Clinical signs: pallor, petechiae, bruising, bleeding from the gums or infusion sites, deep venous thrombosis

- Special investigations: low Hb (<10g/dl), hematocrit (<30%), low or high white cell count, low platelet count (<100x10^9/l), raised fibrinogen degradation products or D-dimers, prolonged INR or PTT
- Supportive treatment – blood as needed, treatment of DIC, whether with fresh frozen plasma, freeze dried plasma or heparin

2. Immunological system (any of the following):

- Clinical signs:
  - pyrexia >38oC
  - hypothermia <36oC
  - lymphadenopathy
  - tachycardia
  - tachypnoea

- Special investigations:
  - increased or decreased white cell count (>11,000 or <4,000)
  - HIV-testing
• Supportive treatment: aggressive treatment of the underlying sepsis
  appropriate antibiotics (gram positive, gram negative and anaerobic cover)
  conservative surgery (e.g. evacuation of uterus), aggressive surgery (e.g. laparotomy, hysterectomy)

3. Endocrine system (Thyroid, Breasts, Diabetes):

• Clinical signs:
  polyuria
  polydipsia
  confusion
  convulsions
  ketones and glucose in urine
  tachycardia
  sweating
  pyrexia
  engorged breasts

• Special investigation:
  blood glucose
  TSH
  white cell count

• Supportive treatment: correction of any metabolic abnormalities

4. Gastrointestinal system:

  Clinical signs: abdominal distension
  ileus
  peritonitis
  haematemesis
  diarrhoe
• Special investigations: abdominal X-rays (supine & erect)
  
  U&E

• Supportive treatment: nil per os
  
  nasogastric tube

  parenteral nutrition

2.1.3. THE “CORE ONE”:

Genital system:

• Clinical signs: Examine uterus for pregnancy or abortion as indicated on history

• Special investigations: Dependent on primary problem, e.g. cardiotocograph for assessing fetal well being, sonar for fetal size estimate etc.

In summary, every ill pregnant woman should be assessed systematically in this manner, covering all her organ systems (see figure 2.2).

In order to highlight the most common causes of maternal mortality as documented in the “Saving Mothers” report, and the organ systems that were involved in these diseases, the following tables give a disease-specific approach that can be followed after all the organ systems have been assessed.

Hypertension caused 23.2% of all maternal deaths with complications of the central nervous system and of the circulatory system each occurring in 38.9% of cases, respiratory system complications in 15.3% and renal and haematological systems each in 9.9% of cases (Table 2.3).

Obstetric haemorrhage (both antepartum and postpartum) occurred in 13.3% of maternal deaths and was complicated by hypovolaemic shock, disseminated intravascular coagulopathy and cardiac failure in 82.2%, 21.3% and 9.3% of cases respectively (Table 2.4).
Pregnancy-related sepsis was found in 11.9% of maternal deaths and was complicated by septic shock, multi-organ failure, respiratory failure and immune system failure in 73.2%, 24.4%, 17.1% and 14.6% of cases respectively (see Table 2.5).

Cardiac disease caused 5% of maternal deaths (see Table 2.6) and AIDS was responsible for 14.5% of the deaths (see Table 2.7).

Knowing the common causes of maternal deaths has enabled the National Committee on Confidential Enquiries into Maternal Deaths to make ten key recommendations to try and prevent these deaths at a national, provincial, regional and district level (refer “Saving Mothers: Report on Confidential Enquiry into Maternal Deaths in South Africa”). However, this report has also highlighted the types of complications and organ dysfunction/failures that these pregnant women developed. Knowledge on how to detect, diagnosis and manage these complications will help health care workers to save the individual lives of women who develop these common diseases in pregnancy.
Figure 2.1: Diagrammatic sequence of events from a normal healthy pregnancy to death in a pregnant population.
Fig 2.2: Schematic diagram of a systematic approach to examining and managing an ill pregnant woman

- Assess the “big five” organs
- Assess the “forgotten four”
- Assess the “core one”
- Support that organ
- Identify organ dysfunction failure
- Support that organ
- Address the cause
- Identify cause
- Address the cause
Table 2.1: Summary of the prevalence of organ systems dysfunction or failure complicating near misses and maternal deaths. Values are given as percentages of the total group.

<table>
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<th>Dysfunction</th>
<th>Near miss n = 300</th>
<th>Death n = 59</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central nervous system dysfunction</td>
<td>10</td>
<td>27</td>
</tr>
<tr>
<td>Circulatory dysfunction</td>
<td>41</td>
<td>31</td>
</tr>
<tr>
<td>Respiratory dysfunction</td>
<td>15</td>
<td>42</td>
</tr>
<tr>
<td>Gastrointestinal &amp; hepatic dysfunction</td>
<td>13</td>
<td>8</td>
</tr>
<tr>
<td>Renal dysfunction</td>
<td>19</td>
<td>29</td>
</tr>
<tr>
<td>Haematological dysfunction</td>
<td>17</td>
<td>15</td>
</tr>
<tr>
<td>Immunological dysfunction (sepsis)</td>
<td>16</td>
<td>25</td>
</tr>
<tr>
<td>Endocrine dysfunction</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
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Table 2.2: Glasgow coma scale

<table>
<thead>
<tr>
<th>Signs</th>
<th>Glasgow coma scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>OPEN EYES</td>
<td></td>
</tr>
<tr>
<td>Spontaneously</td>
<td>4</td>
</tr>
<tr>
<td>On command</td>
<td>3</td>
</tr>
<tr>
<td>On pain stimulus</td>
<td>2</td>
</tr>
<tr>
<td>Nil</td>
<td>1</td>
</tr>
<tr>
<td>BEST VERBAL RESPONSE:</td>
<td></td>
</tr>
<tr>
<td>Orientated</td>
<td>5</td>
</tr>
<tr>
<td>Confused conversation</td>
<td>4</td>
</tr>
<tr>
<td>Inappropriate words</td>
<td>3</td>
</tr>
<tr>
<td>Incomprehensible sounds</td>
<td>2</td>
</tr>
<tr>
<td>Nil</td>
<td>1</td>
</tr>
<tr>
<td>BEST MOTOR RESPONSE:</td>
<td></td>
</tr>
<tr>
<td>Obeys commands</td>
<td>6</td>
</tr>
<tr>
<td>Localizes pain</td>
<td>5</td>
</tr>
<tr>
<td>Withdraws</td>
<td>4</td>
</tr>
<tr>
<td>Flexion to pain</td>
<td>3</td>
</tr>
<tr>
<td>Nil</td>
<td>1</td>
</tr>
</tbody>
</table>

A count less than 10 a reduction of 3 or more points, regardless of the initial count, indicates serious brain damage.
Table 2.3: Hypertensive disorders of pregnancy

<table>
<thead>
<tr>
<th>Organ system</th>
<th>Trigger</th>
<th>Clinical response</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Central Nervous system:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Headache, blurred vision, nausea &amp; vomiting</td>
<td>Magnesium sulphate, delivery</td>
</tr>
<tr>
<td></td>
<td>GCS &lt; 14</td>
<td>CT scan, delivery, ICU, ventilation</td>
</tr>
<tr>
<td><strong>Circulatory system:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Severe hypertension: diastolic 110 mmHg or greater</td>
<td>IV line, 300ml fluid bolus, parenteral anti-hypertensives</td>
</tr>
<tr>
<td></td>
<td>Pulmonary oedema: tachycardia, tachypnoea, gallop, basal crepitations</td>
<td>Oxygen, arterial blood gas, pulse oxymeter, chest X Ray, furosemide, intubation, ICU, ventilation, delivery</td>
</tr>
<tr>
<td><strong>Respiratory system:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tachypnoea</td>
<td>As for pulmonary oedema</td>
</tr>
<tr>
<td><strong>Renal System:</strong></td>
<td>Oliguria (&lt;30ml/hour), raising urea &amp; creatinine</td>
<td>Check fluid balance, replace losses, delivery, low dose dopamine, high dose furosemide, nephrology consult, dialysis</td>
</tr>
<tr>
<td><strong>Haematological system:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>oozing from drip/puncture sites, low platelet count</td>
<td>FBC, INR, PTT, platelet transfusion if delivery, surgery or bleeding</td>
</tr>
<tr>
<td>Organ system</td>
<td>Trigger</td>
<td>Clinical response</td>
</tr>
<tr>
<td>-------------------</td>
<td>-------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Circulatory system</td>
<td>Hypotension $\leq$ 90 mmHg, systolic pressure, tachycardia $&gt;$ 90 beats per minute, cold and clammy extremities</td>
<td>2 large bore IV lines, 1-2 litres, Ringers lactate, 500 ml colloid, blood transfusion, CVP, Foley's catheter, oxygen</td>
</tr>
<tr>
<td></td>
<td>Pulmonary oedema: tachycardia, tachypnoea, gallop, basal crepitations</td>
<td>Oxygen, blood gas, saturation monitor, chest X Ray, furosemide, intubation, ICU, ventilation</td>
</tr>
<tr>
<td>Haematological system</td>
<td>Oozing from drip/puncture sites, low platelet count</td>
<td>FBC, INR, PTT, plasma (frozen or freeze dried), platelet transfusion if delivery, surgery or bleeding, empty uterus</td>
</tr>
<tr>
<td>Organ system</td>
<td>Trigger</td>
<td>Clinical response</td>
</tr>
<tr>
<td>--------------------</td>
<td>--------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Immunological</strong></td>
<td>Sepsis: $\geq 38^\circ$C, hypothermia $&lt;36^\circ$C, tachycardia,</td>
<td>Abdominal &amp; vaginal examination</td>
</tr>
<tr>
<td>system</td>
<td>tachypnoea, white cell count above 11,000 or below 4,000</td>
<td>looking for tenderness, sub-involution, open or necrotic cervix,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FBC, U&amp;E, chest x-ray, urine</td>
</tr>
<tr>
<td></td>
<td></td>
<td>microscopy, broad spectrum</td>
</tr>
<tr>
<td></td>
<td></td>
<td>parenteral antibiotics, referral, DIC screen, evacuation uterus, re-assessment within 24 hours,</td>
</tr>
<tr>
<td></td>
<td>Septic shock: systolic blood pressure $&gt;90$ mmHg not responsive to 1 litre Ringers lactate, oliguria, mental confusion</td>
<td>IV fluids, CVP, FBC, U&amp;E, DIC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>screen, blood gas, chest x-ray, antibiotics, hysterectomy, ICU, ventilation</td>
</tr>
<tr>
<td></td>
<td>Multi-organ dysfunction: biochemical evidence of failure/dysfunction of 2 or more organ systems</td>
<td>As for septic shock</td>
</tr>
<tr>
<td>Respiratory</td>
<td>Tachypnoea, use of the accessory respiratory muscles, oxygen saturation $&lt;90%$, $\text{paO}_2$ (mmHg) $&lt;3$ times $\text{FiO}_2$</td>
<td>Arterial blood gas, oxygen, chest X-ray, ICU, ventilation, remove source of sepsis (antibiotics, evacuation, hysterectomy)</td>
</tr>
<tr>
<td>system</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2.5: Pregnancy-related sepsis.
<table>
<thead>
<tr>
<th>Organ system</th>
<th>Trigger</th>
<th>Clinical response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Circulatory</td>
<td>History of cardiac disease or rheumatic fever, orthopnoea, dyspnoea</td>
<td>FBC, chest X-ray, ECG, internal specialist assessment, echocardiography</td>
</tr>
<tr>
<td></td>
<td>Pulmonary oedema: worsening dyspnoea, tachycardia, tachypnoea, gallop, basal crepitations</td>
<td>Oxygen, arterial blood gas, pulse oximeter, chest X Ray, furosemide, intubation, ICU, ventilation</td>
</tr>
<tr>
<td>Organ system</td>
<td>Trigger</td>
<td>Clinical response</td>
</tr>
<tr>
<td>-------------------</td>
<td>-------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Immunological</td>
<td>Early disease (WHO stage 2):</td>
<td>Counsel all pregnant women to have an HIV test, alter lifestyle,</td>
</tr>
<tr>
<td>system</td>
<td>persistent generalized lymphadenopathy, recurrent upper respiratory tract infections, unintentional weight loss (&lt; 10% body weight), shingles, seborrhoeic dermatitis, popular urticaria-like pruritic eruption, fungal nail infections, angular cheilitis</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Late disease (WHO stage 3):</td>
<td>As above plus antibiotic cover for all surgical interventions,</td>
</tr>
<tr>
<td></td>
<td>unintentional weight loss (&gt; 10% body weight), diarrhoea or fever &gt; 1 month, oropharyngeal candidiasis, oral hairy leukoplakia, vulvovaginal candidiasis &gt; 1 month, pulmonary tuberculosis, severe bacterial infections</td>
<td>supplementation of diet with vitamins and minerals</td>
</tr>
<tr>
<td></td>
<td>AIDS (WHO STAGE 4):</td>
<td>As above plus prophylactic antibiotic cover during labour</td>
</tr>
<tr>
<td></td>
<td>Opportunistic infections (e.g. PCP, extra-pulmonary tuberculosis, cerebral toxoplasmosis etc.), malignancies (e.g. Kaposi’s sarcoma, lymphoma), HIV encephalopathy</td>
<td></td>
</tr>
</tbody>
</table>
CHAPTER THREE
GUIDELINES FOR THE MANAGEMENT OF
HYPERTENSION IN PREGNANCY

Hypertensive disease in pregnancy is one of the 5 major causes of maternal mortality in South Africa. This important fact should always be remembered when pregnant mothers are provided with information and education during visits for antenatal care, during labour or in the puerperium. This important information should also be given to communities and relatives of pregnant mothers.

3.1 DEFINITION

A blood pressure of 140/90 mmHg or more during pregnancy is indicative of any hypertensive disease. The condition is called pre-eclampsia when proteinuria develops for the first time after 20 weeks gestation. Eclampsia is the name of the condition when hypertension and proteinuria in pregnancy is complicated by convulsions.

3.2 HYPERTENSIVE DISEASES IN PREGNANCY AFFECT MANY ORGANS

Although one usually considers blood pressure and proteinuria to define hypertensive diseases, it does not mean that other important organs are not involved. Severe pre-eclampsia affects many organs because the primary pathology involves endothelial cells and they are present in every organ. It is necessary to know how these organs are affected as this will help the health worker to diagnose complications at an early stage.

- **Central nervous system:** Severe headache
  - Changes in behaviour, decreased levels of consciousness
  - Restlessness
  - Hyperreflexia
  - Visual disturbance
• Cardiovascular system: Severe hypertension
  Headache
  Oedema

• Renal system: Proteinuria
  Poor urinary output (less than 1ml/kg/hr)
  Haematuria (from haemolysis)

• Haematological system: Petechiae
  Bruising
  Bleeding from puncture sites
  aundice (from haemolysis)

• Liver: Jaundice
  Upper abdominal pain

• Placenta: Poor fetal growth
  Fetal distress

• Respiratory system: Pulmonary oedema – shortness of breath

3.3 GENERAL MEASURES TO PREVENT MATERNAL DEATHS FROM HYPERTENSIVE DISEASE

1. See that all pregnant women receive antenatal care.

2. Healthcare workers attending to pregnant women should be aware of the risks of high blood pressure in pregnancy.

3. Healthcare workers should know which pregnant women have a high risk of developing hypertension or its complications.

4. Magnesium sulphate must be freely available at all antenatal clinics and emergency services and personnel should have the knowledge to administer it.
5. Healthcare workers should know how to use drugs for the management of acute hypertension.

6. Proper systems of referral and transport should be in place and known by healthcare Workers.

3.4 HOW IS BLOOD PRESSURE TAKEN IN PREGNANCY?

- Use the correct size cuff.
- Patient may sit or lie on her side.
- Cuff should be on the level of the heart.
- Use Korotkoff 5 sound (where the sounds disappear) to determine diastolic value.
- Only use Korotkoff 4 sound (where the sound muffles) when sound 5 approaches zero.

3.5 WHAT IS ABNORMAL?

- Blood pressure of 140/90 mmHg or more at 2 occasions or more at least 6 hours apart.
- Rise in diastolic blood pressure of 15 mmHg or more above values in early pregnancy.
- Rise in systolic blood pressure of 30 mmHg or more above values in early pregnancy.

3.6 WHAT IS DANGEROUSLY ABNORMAL?

- Blood pressure of 160/110 mmHg or more.
- Proteinuria, ++ on dipstix in a clean catch urine specimen.
- Complaints such as severe headache, abdominal pain and blurring of vision.
- Convulsions.
- Coma.

3.7 WHICH PATIENTS ARE MORE AT RISK?

- Hypertension before pregnancy.
- Hypertension early in pregnancy.
- Hypertension and/or convulsions in a previous pregnancy.
- Previous intrauterine death due to complications of hypertension.
- No antenatal care.
- History of previous/present renal disease.
- Medical complications such as diabetes.
- Elderly primigravidae.

### 3.8 SPECIFIC MEASURES

**Management of hypertension / pre-eclampsia when detected at the antenatal clinic:**

- Blood pressure $\geq 160/110$ mmHg, headache, vomiting, nausea, epigastric pain, blurring of vision, patients of 35 years or older, teenagers, ++ proteinuria – admit/ask for advice from referral centre.
- Blood pressure $< 160/110$ mmHg, no proteinuria, no symptoms: Advise bed rest. Enquire about transport and home surroundings. Review in 2-3 days. If in doubt, admit. Evidence is that these patients **should be started on antihypertensives** e.g. methyl dopa. (Magee *et al.*, 1999; Also in Cochrane Library). Clear evidence that use of antihypertensives decreases the number of acute hypertensive episodes etc. Grade A evidence.

**Emergency management of patient with a blood pressure of 160/110 mmHg or more:**

- Preload with 300ml Ringer’s lactate solution over 20 minutes.
- Use one of the rapid acting drugs to lower the blood pressure.
- Control diastolic blood pressure at 90-100 mmHg.
- Consider giving magnesium sulphate prophylactically.
- Exclude fetal distress clinically or by a cardiotocograph.
- Assess renal function (urea or creatinine), platelet count and liver function tests (AST all that required; full liver fuction tests are expensive and unnecessary).
- Assess fetal condition and gestational age.
- Obtain consultant / or experienced advice.
- Consider induction of labour.
- Arrange for delivery/indication of labour/transfer.
- Give steroids to enhance lung maturity if gestational age is 27 – 34 weeks.

**Magnesium sulphate:**

- Its use in the prevention of convulsions in women with pre-eclampsia is less certain. Prophylactic use of magnesium sulphate therefore depends on individual guidelines.

**Emergency management of eclampsia:**

- Turn woman onto her side, preferably left lateral.
- Clear airway and insert oropharyngeal airway, give oxygen.
- Call for help.
- Set up an intravenous line with Ringer's Lactate / plasmolyte.
- Dilute 4 g magnesium sulphate (8 ml 50% solution) with 12 ml normal saline.
- Give slowly intravenously over 4 minutes.
- Inject 5 g (10 ml 50% solution ) into each buttock.
- Insert Foley's catheter and measure output hourly.
- Measure blood pressure every 15 minutes, until stabilized. Control blood pressure using rapidly acting antihypertensives. E.g. dihydralazine, nifedipine, labetalol. Note potential of severe hypotension if using nifedipine and magnesium sulphate. Keep diastolic blood pressure between 90 and 100 mmHg.
- Monitor fetal condition.
- Limit fluids to 80 ml/hour.
- Arrange for transfer / indication of labour/delivery, depending on level of care.
• Continue with magnesium sulphate, 5 g IM every 4 ours, providing the urinary output is More that 100 ml in 4 hours, the patella reflex is present and the respiratory rate is above 16 per minute.
• MgSO₄ should be given for up to 24 hours following delivery.
• Continue observations at frequent intervals for at least 24 hours following delivery. These patients should preferably be kept in a high care area, or a specifically Surpervised, designated bed for “one to one” nursing. Keep longer, If necessary.
• An alternate to the intramuscular use is the intravenous administration. Following the intravenous loading dose of 4 g, a continuous infusion of 1 g/hr is given.
• Calcium gluconate, 10 ml of a 10% solution, is given intravenously in case of magnesium sulphate toxicity.

3.9 DELIVERY:
Patients with severe hypertensive disease often present in established labour at Primary health Care centers. This implies that there will be no time refer the patient to hospital. Health care workers working in primary health care centres should therefore be able to deliver these patients safely. However, if there is sufficient time, the patient should be referred, following the instructions as given under the section Emergency Management of Eclampsia.

First stage of labour:
• Monitor blood pressure at least every ½ hour.
• Assess urinary output hourly.
• Assess fetal condition half hourly.
• Continue with magnesium sulphate.
• Ensure good pain relief.
• Keep accurate partogram.
• Have emergency treatment ready: oxygen, suction, airway, calcium gluconate.
• Watch out for change in mental state or alertness.
• Transfer if there is any delay in progress.
• Obtain advice from your referral centre.

**Second stage of labour:**

• Take blood pressure every 15 minutes.
• Listen to fetal heart after every contraction.
• Ensure good progress.
• Deliver by vacuum extraction if there is poor progress and easy delivery is foreseen.
• Transfer in cases of poor progress or where easy delivery is not possible.
• **DO NOT GIVE ERGOMETRINE OR SYNTROMETRINE®.**

**Third stage of labour:**

• Prevent or control postpartum bleeding with oxytocin.
• Take blood pressure immediately after delivery.
• Control blood pressure between 140/90 and 150/100 mmHg.
• Continue with magnesium sulphate for 24 hours.
• Watch carefully for 24 hours.

3.10 **PUERPERIUM:**

• Recommend family planning. Women over the age of 30 years, or who have ≥ 5 children, should be strongly advised to have tubal ligation prior to discharge from hospital.
• Emphasise postpartum follow up after 6-12 weeks.
• Consider antihypertensive treatment if necessary.

3.11. **INDICATIONS OR REFERRAL OR DIRECT REFERRAL TO LEVEL THREE CARE (TERTIARY, CENTRAL OR TEACHING) HOSPITAL:**

• Comatose or semicomatose patient, other signs of central nervous system damage.
• Signs of poor coagulation.
• Abruptio placenta or antepartum haemorrhage.
- Prematurity 28 to 32 weeks (in general terms, this usually means estimated fetal weights of < 1500 g).
- Platelet count below 100 000 mm\(^3\) or rapidly decreasing counts.
- Urine output less than 60 ml in 4 hours.
- Postpartum haemorrhage.
- Renal failure.
- Coagulation deficiency.
- Abnormal liver function tests.
- Lung oedema.
- Underlying cardiac disease.
- Fetal death associated with severe hypertension.

3.12. **PREREQUISITES FOR REFERRAL TO SECONDARY HOSPITAL:**
- Exclusion of indications for referral to tertiary hospital.
- Facilities to do a Caesarean section within 40 minutes.
- Safe anaesthetic service.
- Facilities for electronic monitoring of the fetal heart rate.
- Laboratory facilities to do ~ platelet counts
  ~ blood gases
  ~ renal function
  ~ electrolytes

3.13. **TRANSPORT:**

Very sick patients will often be transported from remote hospitals. Certain patients will need to be transferred directly to a tertiary hospital, even if it means a longer journey, to avoid wasting valuable time by late transfer from the secondary to the tertiary hospital. On the other hand, the patient may be needed to be transferred to the secondary hospital first for stabilisation or delivery and only be transferred to the tertiary hospital. Careful planning and consultation
with the receiving hospital is therefore necessary before transfer. Where possible, transfer should always be discussed with relatives of the patient.

The following essential guidelines are recommended:

- Consult with receiving hospital.
- Send essential information with patient e.g. antenatal care, treatment received, investigations done. N.B.: *It is National Policy for case notes to accompany the patient.*
- Patient is to be accompanied by an experienced midwife / healthcare worker.
- The following facilities must be available:
  - Oxygen
  - Suction
  - Laryngoscope
  - Endotracheal tubes
  - Air way
  - Delivery pack
  - Resuscitation for newborn
- The following drugs should be available and the healthcare worker should know how to use it safely.
  - Magnesium sulphate
  - Calcium gluconate
  - Dihydralazine (Nepresol ®)
  - Oxytocin

3.14. **PATIENTS WHO MAY BE DELIVERED IN A LEVEL TWO (DISTRICT, SECONDARY OR REGIONAL ) HOSPITAL:**

- Before 28 weeks’ gestation.
- After 34-36 weeks, or babies weighing > 1500 g.
• No other complications than severe pre-eclampsia or eclampsia. (N.B. hospitals with Specialists which have “areas” for intensive/high care, specialist paediatricians, ventilation for small babies and experienced anaesthetists, can usually manage most cases of hypertension).

3.15. **ESSENTIAL SPECIAL INVESTIGATIONS FOR PATIENTS WITH SEVERE PRE-ECLAMPSIA / ECLAMPSIA:**
- Urea and electrolytes.
- Serum creatinine.
- Platelet count (if < 100,000/mm³ do AST, see earlier liver function tests).
- Non-stress test.
- Coagulation profile on specific clinical indications e.g. bleeding from venepuncture sites, petechial haemorrhages, haematuria associated with low platelet counts, bruising and jaundice.
- Brian scan when indicated clinically depressed Glasgow Coma Scale that persists for ≥ 24 hours.
- Chest x-ray when indicated e.g. history or signs of aspiration.
- Blood gases when indicated clinically depressed Glasgow Coma Scale < 9. Note that a pulse oximeter should be used in all cases.
- Blood glucose if AST elevated.

3.16. **INDICATIONS FOR TERMINATION OF PREGNANCY:**
- Eclampsia.
- Severe pre-eclampsia before 24-26 weeks that does not respond to expectant management (Grade C evidence).
- Before 28 weeks on maternal request or doctor’s advice.
- Renal failure.

3.17. **PREREQUISITES FOR EXPECTANT MANAGEMENT IN LEVEL THREE HOSPITAL:**
- Sufficient nursing facilities.
• Laboratory services – serum creatinine and platelet count at least twice weekly.
• Facilities for electronic monitoring of the fetal heart rate every 6-24 hours.
• Ultrasound facilities.
• Neonatal intensive care unit.
• Performance of Caesarean section within 30 minutes.
• Administration of betamethasone between 28 and 33 weeks to enhance lung maturity.

3.18. DRUGS FOR CHRONIC CONTROL OF HYPERTENSION:

Aim: 130/85 to 140/90 mmHg (Grade B evidence: Magee et al.)

First drug: **Methyldopa:** 500 mg 6 hourly or 750 mg every 8 hours.

Add 2nd drug: **Nifedipine:** 10-30 mg 8 hourly (start with 10 mg)

(Grade D evidence).

Add 3rd drug: **Prazosin:** 1-7 mg every 8 hours (start with 1 mg) (Grade D).

3.19. MANAGEMENT NOT RECOMMENDED OR TO BE USED WITH GREAT CAUTION

- Plasma volume expansion (does not refer to preloading before antihypertensive therapy).
- Central venous pressure to control plasma volume expansion.
- Use of diazepam to arrest convulsions. In circumstances where the patient is extremely restless, give clonazepam 1mg i.v.i. slowly.

3.20. COMMENTS

As facilities of different hospitals and provinces differ, these guidelines may be adapted to suit local conditions better. Care of all patients should be individualised and the guidelines should not be followed if the attending obstetrician is certain that alternative therapy is better.

3.21. REFERENCES


CHAPTER FOUR
GUIDELINES FOR THE PREVENTION AND TREATMENT OF
PREGNANCY-RELATED SEPSIS

4.1. INTRODUCTION

Pregnancy-related sepsis is the fourth commonest cause of all maternal deaths in South Africa, being responsible for 19% of direct, and 12% of all maternal deaths. Pregnancy-related sepsis includes cases of septic abortion and puerperal sepsis. According to the Confidential Enquiries into Maternal Deaths in South Africa, there were 67 maternal deaths attributable to pregnancy-related sepsis in 1998. Of these, 26 occurred as a result of septic abortion. These deaths are still underreported.

The major errors committed by health workers were (i) failure to diagnose septic abortions, (ii) failure to recognise the severity of puerperal sepsis and septic abortions, and (iii) significant delays in management, combined with poor observations. The medical personal generally failed to recognize the problem of sepsis and take appropriate action, according to standard management protocols. This was due to either very superficial assessment of patients or lack of monitoring thereafter.

For these guidelines, individual recommendations have been graded according to the level of evidence on which they are based.

Grade A: randomised controlled trials
Grade B: other robust experimental or observational studies
Grade C: more limited evidence but the advice relies on expert opinion and has the endorsement of respected authorities.
4.2. DEFINITIONS

An abortion is the ending of pregnancy before the fetus is viable. The World Health Organisation’s definition of less than 22 weeks’ gestation, or a birth weight of < 500g are used. Thereafter, it is called preterm labour.

A safe abortion is defined as any abortion where the temperature is $\leq 37.2°C$, the pulse is $< 90$ beats per minute, the respiratory rate is $< 20$ breaths per minute, the uterine size is $< 12$ weeks, and the ward haemoglobin concentration is $> 10$g/dl. Furthermore, there are no clinical signs of infection, no system or organ failure and no suspicious findings on evacuation of the uterus. An unsafe abortion is defined as anything else.

Puerperal sepsis is defined as pyrexia of $\geq 38°C$, on two separate occasions within the first fourteen days post-delivery, excluding the first 24 hours, if observations are taken on a 4- to 6-hourly basis.

4.3. SPECIFIC PREVENTATIVE MEASURES

Good aseptic technique, when performing any procedure, including a vaginal delivery, is still the corner-stone in the prevention of sepsis – and very easily not adhered to.

1. Abortion

Abortion care should encompass a strategy for minimizing the risk of post-abortion infective morbidity, in patients with safe incomplete abortions.

Recommendations:

- Antibiotic prophylaxis, using a single dosage oral regimen, covering both C.trachomatis and the anaerobes which characterize bacterial vaginosis. The most suitable drug appears to be doxycycline (Vibramycin). (Grade B)$^{2,3}$
- Suction curettage is safe under local anaesthesia, which is preferable to general anaesthesia.(Grade B)$^{4}$.
- Evacuation of the uterine contents without delay (i.e. within 6 hours). (Grade B)$^{4}$.
- Ensure haemoglobin of 10 grams per decilitre or more.
2. Preterm prelabour rupture of the membranes/Prolonged prelabour rupture of the membranes

Recommendations

- Antibiotics in therapeutic dosage, covering for Group B Streptococcus, Mycoplasma and Ureaplasma. (Grade A)⁵
- Only a sterile speculum examination to be done, to confirm the diagnosis. No digital examination must be performed, until the patient is in active labour. (Grade B)⁶
- Counselling for HIV-testing and possibly more aggressive treatment, if the patient is HIV-positive, because of diminished signs of sepsis. (Grade C)
- Use of an antiseptic cream, when doing digital examinations (Grade C).

3. Caesarean section/Puerperal pyrexia

Recommendations

- Antibiotic prophylaxis, using a single dosage regimen, prior to all elective and emergency caesarean sections. (Grade A)⁷
- Antibiotics in therapeutic dosage, using a 3-day intravenous regimen, for all emergency caesarean sections, where the patient is at high risk of sepsis, such as prolonged rupture of the membranes or obstructed labour. (Grade A)⁷
- Prompt and comprehensive work-up of every case of puerperal pyrexia, including investigations for respiratory tract infection, urinary tract infection, mastitis, wound infection and pelvic infection.
- Prompt management of subinvolution of the uterus, lower abdominal tenderness, a foul-smelling vaginal discharge, or an open cervix, coupled with signs of sepsis.
- Early mobilization and more aggressive usage of prophylactic anticoagulation.
- Counselling for HIV-testing, in the presence of puerperal sepsis, with a view to more aggressive management, if the patient is HIV-positive.
Three categories of abortion, with regard to the clinical severity thereof, can be distinguished:

- **Low Risk Abortion**
  - Temperature $\leq 37.2^0\text{C}$
  - Pulse $<90$ beats per minute
  - Respiratory rate $<20$ breaths per minute
  - Ward haemoglobin $>10\text{g/dl}$
  - No clinical signs of infection;
  - No system- or organ failure; and
  - No suspicious findings on evacuation of the uterus.

- **Moderate Risk**
  - Temperature 37.3-37.9$^0\text{C}$, or

- **Unsafe Abortion**
  - Offensive products of conception, or
  - Localised peritonitis
  - Uterine size 12 – 16 weeks
  - Pulse 90- 119 beats per minute
  - Respiratory rate 20-24 breaths per minute.

- **High Risk (Severe)**
  - Temperature $\geq 38^0\text{C}$, or

- **Unsafe Abortion**
  - Respiratory rate $> 24$ breaths per minute
  - Organ failure, or
  - Peritonitis, or
  - Pulse $\geq 120$ beats per minute, or
  - Presence of a foreign body or mechanical injury, on evacuation of the uterus, or
  - Systolic blood pressure $<90\text{ mmHg}$
  - Uterine size $>16$ weeks .

If on examining a woman with an abortion, there are signs of peritonitis, or the uterus is more than 16 weeks’ size, she has a high risk (severe) unsafe abortion, and is at very high risk of organ failure or death. **When examining any woman with an abortion, the organ systems**
must be systematically evaluated for signs of organ dysfunction. If there is any abnormal clinical finding, suggesting organ failure, prompt special investigations must be done to confirm such organ failure and start supportive treatment. If these investigations cannot be done or supportive treatment cannot be offered, the patient must be referred to a higher level of care, without delay.

4.5. ASSESSMENT AND EVALUATION OF THE SEVERITY OF PUERPERAL SEPSIS

Important considerations, when assessing the severity of puerperal sepsis:

Endometritis may present without significant pyrexia, thus daily observations and examinations are essential.

Severe intra-uterine infection could already have been present at delivery. Therefore, risk factors in the history, such as obstructed labour, prolonged rupture of the membranes, or chorioamnionitis, must be looked for.

Lochia need not necessarily be excessive, or foul-smelling.

Postpartum infections can initially be asymptomatic, especially in immuno-compromised patients. The patient’s temperature is, therefore, a poor indicator of the severity of the infection.

- Signs of peritonitis may be absent, even when there is free pus in the abdomen. This is especially so in puerperal and immuno-compromised patients.

Any abnormal observations in a postpartum patient must prompt the systematic evaluation of this patients for any signs of organ dysfunction. A sub-involuted, tender, uterus, an open cervical os, excessive and/or foul-smelling lochia, signs of peritonitis and/or lieus, are all pointers to pelvic sepsis. A non-genital origin of sepsis, such as a urinary tract infection, breasts engorgement or mastitis, infection of an episiotomy or other wound, thrombophlebitis, and a respiratory tract infection must be excluded. Examination, to find the origin of the sepsis, followed by appropriate antibiotic treatment, must be carried out, as soon as the diagnosis of postpartum sepsis is made. HIV-testing should be offered, and if the patient is
HIV-positive, treatment should be aggressive. Early referral, in cases where there is no or poor response to the treatment, is essential, so that a timely evaluation of the need for hysterectomy can be made.

4.6 SYSTEMATIC EVALUATION OF POSTPARTUM/ABORTION PATIENTS FOR THE PRESENCE OF ORGAN DYSFUNCTION

The clinical signs of organ dysfunction, with the special investigations required, as well as the supportive treatment, which must be given, are as follows:

- **Central Nervous System**
  
  Clinical signs – confusion, delirium, decreased level of consciousness, Glasgow Coma Scale < 14/15

  Special investigations - blood glucose, blood gas analysis or pulse oxymetry, and, if indicated, investigation for brain abscess or septic emboli

  Supportive treatment – treatment of underlying sepsis

- **Circulatory system**
  
  Clinical signs – hypotension < 90 mm Hg systolic pressure, tachycardia ≥ 100 beats per minute, cold and clammy extremities, pulmonary oedema, hepatomegaly, arrhythmias

  Special investigations – chest X-ray, and possibly an ECG

  Supportive treatment – adequate venous access, possibly with a high flow lior central Venous pressure monitoring, fluid replacement, inotrope support

- **Respiratory system**
  
  Clinical signs – tachypnoea ≥ 22 breaths per minute, use of the accessory respiratory muscles, central or peripheral cyanosis
Special investigations – pulse oxymetry (saturation < 90%), blood gas analysis (pao₂ < 3 times Fio2, acidosis, and alkalosis), X-ray.

Supportive treatment – oxygen via nasal prongs or face mask, CPAP mask, intubation and ventilation.

- **Gastrointestinal and hepatic systems**

  Clinical signs – jaundice, hepatomegaly

  Special investigations - blood glucose, raised liver enzymes ALT, AST, LDH

  Supportive treatment – treatment of the underlying sepsis

- **Renal System**

  Clinical signs (NB: the patient must have indwelling catheter, and the urinary output must be charted) - oliguria (<1ml urine/kg/hr or < 30ml/hr), anuria, or very concentrated urine

  Special investigations – urine dipstix, raised urea and creatinine

  Supportive treatment - rehydration and fluid replacement. If there is progressive renal failure - diuretics, dialysis

6. **Genital System**

  Clinical signs - pus or foul-smelling products of conception, a very tender uterus, peritonism, signs of trauma or foreign body, subinvolution of the uterus, an open cervical os.

  Special investigations - pre-evacuation culdocentesis, prompt evacuation of uterus, examination for non-genital sepsis, possibly hysterectomy, to remove the origin of the sepsis.
• Haematological system
  Clinical signs - pallor, petechiae, bruising, bleeding from the gums or infusion sites, deep venous thrombosis
  Special investigations – low Hb (<10g/dl), haematocrit (<30%), low or high white cell count, low platelet count (<100x10⁹/1), raised fibrinogen degradation products or D-dimers, prolonged INR or PTT
  Supportive treatment - blood as needed, treatment of DIC, whether with fresh frozen plasma or heparin

• Immunological system (any of the following)
  Clinical signs - pyrexia ≥ 38°C, lymphadenopathy
  Special investigations - increased or decreased white cell count, HIV-testing
  Supportive treatment - aggressive treatment of the underlying sepsis

• Endocrine System (Thyroid, Breasts, Diabetes)
  Special investigation - blood glucose
  Supportive treatment - correction of any metabolic abnormalities

4.6. MANAGEMENT AT DIFFERENT LEVELS OF CARE

The principles of management are: to resuscitate the patient, to empty the uterus and to remove the septic focus. Prior to discharge the patient’s ward haemoglobin concentration, Rhesus status and syphilis serology should be known, and contraceptive advice must be given. Where possible, counseling for HIV-testing should be provided and the test carried out, if requested.

1. Level 1 (excluding sub-district hospitals with 24-hour theatre facilities and blood available)
   Abortion (safe abortions only)
     - Prompt evacuation of the uterus, preferably by manual vacuum aspiration (MVA), under local anaesthesia.
- Antibiotic prophylaxis

**Postpartum:**

- Referral to the next level, if the patient has puerperal pyrexia.

2. **Level 1** (sub-district hospitals with 24-hour theatre facilities and blood available) and level 2

**Abortion:**

- Resuscitation of the patient
- Prompt evacuation of the uterus, preferably by MVA, but with the facilities for evacuation in theatre, for moderately unsafe abortions
- Antibiotics in therapeutic dosage, for unsafe abortions
- Referral of all patients, where there is dysfunction of 2 or more organ systems, and/or where it is contemplated to change antibiotics. Such patients may require urgent laparotomy.

**Puerperal sepsis:**

- Intravenous antibiotic coverage
- Special investigations, to localize the origin of the sepsis
- Prophylactic anticoagulation, in case of pelvic thrombophlebitis
- Referral of all patients, where there is dysfunction of 2 or more organ systems, and/or where it is contemplated to change antibiotics. Such patients may require urgent laparotomy.
- Referral to a higher level, if there is poor or no response to treatment Level 3 (including level 2 institutions with the specialist expertise to perform a hysterectomy, and with high care facilities).

**Abortion and postpartum:**

- Prompt evacuation of the uterus in theatre, for high risk abortions, and evacuation of the need for hysterectomy.
- Supportive care, for single – or multi – organ failure, in an ICU or high care facility.
- Careful evaluation of the need for laparotomy, where there is dysfunction of 2 or more organ systems, and/or where it is contemplated to change antibiotics.

4.8. **REFERRAL CRITERIA**

1. **Level 1 / Community or primary health care level, sub-district hospitals** (without 24-hour theatre facilities) -

   *Abortion:* referral of any patient who has anything other than a spontaneous safe abortion. A safe abortion is defined as an uncomplicated abortion, i.e. where the patient has no tachycardia, anaemia, pyrexia, or foul-smelling products of conception, and the uterine size is < 12 weeks.

   *Postpartum sepsis:* referral of any patient, where the sepsis is thought to be of genital origin.

2. **Level 1 sub-district hospitals** (i.e. hospitals which have blood products available, 24-hour anaesthetic facilities and the expertise to perform an evacuation of the uterus in theatre) **and**

   **Level 2 district or regional hospitals**

   Referral of any patient with signs of organ failure, except for anaemia, or if supportive treatment would not be available, if needed.

   Referral of any patient (septic abortion or puerperal sepsis) with a poor or no response to intravenous antibiotics.

3. **Level 2** (institutions with 24-hour consultant cover and intensive care/high care facilities available, which can provide adequate treatment and support for post-abortion or postpartum patients with single – or multi-organ failure) **and Level 3/ tertiary or central hospitals.**
4.9 **OBSERVATIONS POST – PROCEDURE**

Any observations to be carried out, should be specified as any other therapeutic modality, with specific instructions as to what must be charted, the frequency of each observation, and that the physician in charge of the patient must be contacted immediately, if any abnormal findings are obtained. “Specified” in this context means, as prescribed on the prescription sheet or by standing orders.

There is no point in carrying out any observations if the attending physician is not called for or Does not respond to abnormal clinical signs, or takes an inappropriate time to respond. All observations must be charted, any abnormalities noted and reported to the sister-in-charge, who must decide whether or not to consult the medical staff. If the sister-in-charge or the doctor are consulted, their names must appear in the nursing notes. Lack of written documentation will be interpreted as a failure to carry out the required observations, or that consultation did not occur.

4.10 **BASIC GUIDELINES FOR OBSERVATIONS**

2. **Post-normal vaginal delivery**

- Blood pressure, temperature, pulse rate, and respiratory rate. Abdominal examination, to check that the uterus is well-contracted. Check on any excessive vaginal bleeding, directly post delivery

- Ward haemoglobin concentration must be checked within 24 hours of delivery and must be known before the patient is discharged.

- Temperature, blood pressure, pulse rate, respiratory rate, and vaginal pad checks – to be charted every 30 minutes for 2 hours, then 6 hourly until discharge, if normal.

- Education of patients, regarding the basic observations which they can make themselves, and for which they can seek medical help, if such observations are abnormal.
2. **Post-uncomplicated evacuation of uterus/MVA**
   - blood pressure, pulse rate, respiratory rate, checks on any excessive vaginal bleeding, directly post-procedure
   - Ward haemoglobin concentration must be checked within 24 hours of delivery and must be known before the patient is discharged
   - Temperature, blood pressure, pulse rate, respiratory rate, and vaginal pad checks – hourly for 2 hours, and then 6 hourly until discharge, if normal.

3. **post-caesarean section/theatre evacuation**
   - Ward haemoglobin concentration must be checked within 24 hours of delivery and must be known before the patient is discharged
   - Temperature, blood pressure, pulse rate, respiratory rate, urinary output and vaginal pad checks for excessive bleeding – 30 minutes for the first hour, then hourly for 4 hours, then 6 hours for 24 hours and 12 hourly until discharge (provided the observations are normal).

4. **Abortion puerperal sepsis complicated by single – or multi-organ dysfunction**
   - Continuous to every 15-30 minutes’ evaluation of the blood pressure, respiratory rate, and pulse rate, according to the ICU – or high care protocol of the facility. Temperature and urinary output hourly, as well as other parameters, such as central venous pressure.

4.11. **CONCLUSION**

Adequate initial assessment of septic cases, i.e. taking a history, examining the patient and identifying the problem(s), will go a long way towards curbing the incidence of unnecessary pregnancy-related sepsis. Prompt and appropriate treatment, with regard to the level of care needed, should be instituted, with referral to a higher level, as soon as indicated. Identification of patients at high risk for the development of sepsis and the use of prophylactic antibiotics, to prevent sepsis, are advisable. Following the emergency event, the necessary observations must be done thoroughly and frequently, and abnormal findings must be acted upon promptly.
Sepsis-related maternal mortality and morbidity can be at least reduced, by high quality post-abortion and postpartum care, at all levels of the health care system. These levels include:

- the community level (with staff who have had basic health training, including traditional birth attendants)
- the primary level (with nurses, trained midwives, and in some cases doctors)
- the first referral level (district hospitals)
- the secondary and tertiary levels (regional, provincial or teaching hospitals).

4.12 REFERENCES

CHAPTER FIVE

GUIDELINES: MANAGEMENT OF OBSTETRIC HAEMORRHAGE

5.1 INTRODUCTION:

The goal is provinces should be to reduce deaths due to haemorrhage to less than 10% of their total maternal deaths. This can be achieved by focusing mainly on the quicker attainable reduction in deaths due to postpartum haemorrhage.

5.2 GENERAL PREVENTATIVE MEASURES:

1. permanent contraception must be positively encouraged for all women with a parity of ≥ 5 and/or in the age group ≥ 35 years. This could be female postpartum or interval sterilization or vasectomy for the male partner.

2. All pregnant women should receive antenatal care from early in pregnancy.

3. Routine iron supplementation is required to all antenatal women to minimize anaemia during pregnancy and delivery.

4. A referral network from primary through to tertiary level of care must be in place in each region. Women attending primary health care facilities must know which hospital to attend in the event of an emergency.

5. Anaemic patients with Hb < 8g% must deliver at level 2 care institutions

6. the “mother as a monitor concept” must be taught to all pregnant women. Following delivery of the placenta the mother must:
   • know how to feel for uterine relaxation and how to rub up her uterus if it relaxes
   • know to call for help if the amount of bleeding increases
5.3 SPECIFIC PREVENTATIVE MEASURES:

1. An effective and functional ambulance transport infrastructure must exist in all provinces. Obstetric haemorrhage must always receive the highest priority for emergency transport.

2. Establish good communication links between different levels of care to enable immediate action in the receiving hospital when patients are referred, which must include:
   • No delays on admission
   • Direct access to the labour ward
   • Prompt initial assessment by the person in charge of the labour ward

3. Identify all women with a risk factor for postpartum haemorrhage for delivery at subdistrict and level 2 hospital; i.e. women with multiple pregnancies, polyhydramnios, grande multiparas and previous postpartum haemorrhage that required blood transfusion.

4. Continuing in-service training regarding the emergency management of postpartum haemorrhage at Level 1 and 2 care must be maintained.

5. Emergency management especially at Level 1 care must be improved and standard protocols for managing postpartum haemorrhage must be known by all health workers at an institution who deal with pregnant women. Where deliveries are infrequent and postpartum haemorrhage is consequently rare, “fire drills” should be performed to ensure the staff is familiar with what to do with a postpartum haemorrhage.

6. Use a partogram for all women in labour to enable the early recognition and prompt management of prolonged labour.

7. The active management of the third stage should be practiced. There is overwhelming evidence that active management significantly reduces the incidence of postpartum haemorrhage. The oxytocin drug used during the active management of the third stage should preferably be 5U oxytocin given by intramuscular injection. Oxytocin has the advantage over Syntometrine and Ergometrine that it is not degraded by direct light and
need not be kept continuously in a fridge. The shelf life at normal room temperature is one month. Oxytocin is not contra-indicated in patients with hypertension or heart valve lesions.

8. Oxytocin must always be used with caution during labour:
   
   - Labour is not to be augmented in multigravid patients once in the active phase of the First stage of labour, unless discussed with a specialist.
   - Discontinue oxytocin following induction of labour (e.g for prelabour rupture of membranes) once in established labour.

9. Take the following into account when discharging patients postpartum:
   
   - Patients at risk for postpartum haemorrhage must not be discharged early.
   - Examine each patient for a well-contracted uterus before discharge.
   - Iron supplementation must continue for one month postpartum if the postpartum haemoglobin concentration is less than 10 g/dl.

10. Blood must be available at all hospitals providing level 2 care and level 1 hospitals where caesarean sections are performed.

11. Caesarean sections must only be performed by adequately trained persons. (An Adequately trained person is regarded as one who has performed at least 15-20 caesarean sections under supervision).

5.4 PROBLEM RECOGNITION:

1. Any amount of bleeding that appears more than normal during and following the third stage of labour.

2. Any patient with signs of shock (tachycardia and/or low blood pressure) due to haemorrhage.
5.5. MANAGEMENT AND REFERRAL GUIDELINES:

1. The initial emergency management of all patients with postpartum haemorrhage must include:

   - **Step 1:**
     The uterus must immediately be rubbed up. This will cause the uterus to contract and reduce the blood loss.

   - **Step 2:**
     Call for help. One health worker alone will not be able to manage a postpartum haemorrhage.

   - **Step 3:**
     A rapid intravenous infusion of 20 units oxytocin in a litre of intravenous fluids must be started. Once again make sure that the uterus is well contracted.

     **These three steps must always be carried out irrespective of the cause of the postpartum haemorrhage.**

   - **Step 4:**
     The patient’s bladder must now be emptied. A full bladder may cause poor contraction of the uterus with resultant haemorrhage.

   - **Step 5:**
     All patients managed at level 1 care where bleeding persists following the initial steps must be referred to the next level care where the cause of the haemorrhage must be determined and further management instituted according to the cause.

     - patients with retained placentas must always have an intravenous infusion of 20 units oxytocin in a litre inserted.

     - Their observations need to be done every 15 minutes and check continuously whether the uterus remains well contracted. Transfer to an appropriate level of care must be arranged.
• Manual removal of the placenta can be performed at level 1 care in a remote setting by an appropriately trained person.

3. During and following the third stage of labour any amount of bleeding that appears more than normal requires an intravenous infusion with 20 units oxytocin.

4. Any patient with signs of shock (tachycardia and/or low blood pressure) due to haemorrhage requires at least two intravenous infusion and rapid administration of crystalloids (i.e. Plasmolyte B, Ringers lactate, rehydration fluid, etc.).

• All patients managed at level 1 (primary care level) without 24 hour theatre facilities and personnel capable of managing PPH, must then be referred as acute emergencies.
• Patients already at an appropriate level of care require blood for transfusion and managed as acute emergencies.

5. An atonic uterus not responding to steps 1 to 3 must be bimanually compressed while the patient is transferred to the next level of care.

6. Abruptio placentae:
• Active resuscitation and prompt referral to a level 2 or level 3 hospital is mandatory when the diagnosis of abruptio placentae with an intra-uterine death has been made.
• The route of delivery in the event of abruptio placentae with an intra-uterine death is always vaginally, unless there are obstetric indications for caesarean section.

7. Placenta praevia:
• A patient with a previous caesarean section and anterior placenta praevia must be delivered in a level 2 hospital by:
  ➢ One with expertise to continue with a total abdominal hysterectomy, if required
• The is a risk for a morbidly adherent placenta.
5.6. **OBSERVATION GUIDELINES**

Poor observations contributed significantly to the death of women dying from postpartum haemorrhage. The following important improvements are required with regards to observations of patients at risk for postpartum haemorrhage:

- Identify women at high risk of postpartum haemorrhage.
- Adhere to accepted nursing norms in observing these postpartum women. Keep these patients under observation for longer (6 hours) in the labour wards.
- Ensure ongoing observations once transferred to postnatal wards.

The following postpartum observations must be done on all patients and noted in their records following completion of the first stage of labour:

- Whether the uterus is well contracted or not.
- The pulse and blood pressure.
- Whether there is excessive vaginal bleeding or not.
- Whether the episiotomy was sutured and an inspection for perineal and vaginal tears was done.
- Whether the placenta was completely delivered.

➢ **Observations must be documented, interpreted and action taken if abnormal**

If the third stage was normal, the placenta delivered completely, and the observations mentioned above was normal:

➢ The observations need to be repeated following one hour.

➢ It is important to check continuously whether the uterus remains well contracted during this hour.

If the third stage was abnormal, the placenta delivered incompletely, and of the observations mentioned above was abnormal:

➢ The observations need to be done every 15 minutes until the patient’s condition has stabilized.
During this time it is important to check continuously whether the uterus remains well contracted.

5.7. AUDIT:
To ensure that the changes are implemented, audit needs to be done regarding obstetric haemorrhage at all levels of care.

5.8. CONCLUSION:
Careful observation, prompt recognition and the initial emergency management will lead to a rapid reduction in maternal deaths due to postpartum haemorrhage.

5.9. REFERENCES:
   Available from:
   Editor-in-Chief, Perinatal Education Programme, PO Box 34502, Groote Schuur Hospital, 7937.
   Ph/Fax 021-618030
CHAPTER SIX

GUIDELINES FOR VAGINAL DELIVERY AFTER CAESAREAN SECTION

Vaginal birth after caesarean section (VBAC) is a safe and desirable procedure likely to succeed in about 60% of patients attempting it. The risks of VBAC is uterine rupture which although uncommon, ranging from ½% to 2% is dependent on patient selection and intrapartum care. Failure of VBAC with subsequent emergency caesarean section carries a higher morbidity and mortality than an elective caesarean section. Selection of patients and intrapartum management are important for safety and success. These guidelines are intended to enhance both safety and successful outcome. These guidelines are intended particularly for South African circumstances, especially those prevailing in level 1 and level 2 health facilities.

6.1. ANTENATAL CARE

This can be provided at all levels of health care. Patients with previous caesarean section however, must be booked as high risk patients and referred for medical assessment as early as possible in pregnancy and again at 36 weeks gestation. Decision for VBAC should be made at 36 weeks, not earlier, and may yet need to be revised and reviewed before term in changing circumstances.

6.2. PLACE OF VAGINAL DELIVERY

Delivery must take in a unit adequately equipped and staffed for emergency caesarean section. It must be possible to perform caesarean section within 30 minutes of the decision being made.

6.3. PATIENT’S CONSENT

Patients must be provided with a clear explanation of both the advantages and disadvantages of VBAC, including the knowledge that the procedure may fail and emergency caesarean section
Become necessary after hours of labour. Ideally this discussion should take place in the antenatal period before the stress and discomfort of labour clouds decision making. The patient must be willing and co-operative.

6.4. ADVANTAGES OF VBAC

1. Avoidance of caesarean section with its possible complications and post-operative pain.
2. Psychological satisfaction brought about by the accomplishment of a natural birth.
3. Saving in cost to the patient and/or state.

6.5. DISADVANTAGES OF VBAC

1. Possible failure to make progress during labour with an emergency caesarean section, which is associated with a slightly higher incidence of complications.
2. A very small but real risk of uterine rupture which may lead to fetal death and/or hysterectomy.
3. Labour pains.

6.6. ADVANTAGES OF ELECTIVE CAESAREAN SECTION (C/S)

1. Lower complication rate than emergency C/S.
2. No risk of uterine rupture during labour.

6.7. DISADVANTAGES OF ELECTIVE CAESAREAN SECTION

1. Higher complication rate than an uneventful vaginal delivery.
2. Eliminates all future chances of natural birth.

6.8. CONTRA-INDICATIONS FOR VBAC

1. Patients who decline the procedure after clear explanation should be delivered by elective caesarean section.
2. Previous classical caesarean section (including so-called vertical lower segment section).
3. Previous surgery involving the uterine fundus.

4. Previous uterine rupture.

5. Grossly contracted pelvis carries such small chance of success that VBAC is not appropriate. It is clearly shown that routine pelvimetry, either clinically or by radiologically, is not a useful predictor of success in VBAC (Grade B evidence) (Thubisi et al. 1993; Russell & Richards, 1971). Imaging pelvimetry is of no proven benefit but clinical evidence of a grossly contracted pelvis should make VBAC inappropriate.

6. Fetal size is of some importance in South Africa experience. It has been shown that VBAC is rarely successful if the baby weighs more than 3200 grams (Van der Walt et al., 1994). The fetal weight is difficult to estimate accurately, but using symphysis-fundal height (SFH) is useful. If the SFH is greater than 36 cms., elective caesarean section should be considered instead (Grade D Evidence).

7. Any medical or obstetric condition that precludes safe vaginal delivery is not suitable.

8. Patients who have had two or more caesarean sections should be delivered by elective caesarean section.

9. If the previous section ended in delivery of a stillborn infant, or one associated with an early neonatal death, as a result of difficult labour, VBAC may be an unwise option. Very careful consideration must be given before embarking on another attempt at vaginal delivery where a previous effort ended in disaster.

Successful vaginal delivery in preceding pregnancies are not a guarantee of safety or success in subsequent VBAC and each pregnancy must be carefully considered and assessed afresh despite previous good outcome.

If facilities are not present to enable emergency caesarean section, then it is safer for the patient to delivered there by elective caesarean section, or alternately to be referred before labour to a more suitable institution. These deficiencies may include lack of a surgeon, anaesthetist or other staff as well as equipment. Referral and transfer in labour are associated
With delays leading to greatly increased morbidity and mortality. Such transfer must be avoided, if necessary by performing elective caesarean section before labour.

6.9. **CIRCUMSTANCES SUITABLE FOR VBAC**

1. An informed consenting co-operative patient with one previous caesarean section. (Some women with two previous caesarean sections may possibly be suitable for VBAC, but most obstetricians will prefer elective caesarean section).

2. Clinically no obviously gross pelvic contracture.

3. Baby of average size, i.e., SFH not over 36 cms.

4. No malpresentation or multiple pregnancy.

5. Doctor immediately available throughout labour, capable of monitoring labour and performing emergency caesarean section if necessary.

6. Available theatre facilities and support staff for emergency caesarean section within 30 minutes.

6.10. **MANAGEMENT OF TRIAL OF LABOUR**

1. The labour must be conducted in a facility as described above, capable of emergency caesarean section within 30 minutes.

2. Patients in apparent latent phase of labour should remain in an area of supervision.

3. A qualified midwife must be present in the labour ward at all times.

4. An intravenous line should be set up in labour.

5. Indwelling catheterization of the bladder is not necessary.

6. Continuous electronic monitoring is ideal, but VBAC may be conducted without it, provided meticulous and very close clinical monitoring is performed.

7. Analgesia should be provided in the usual way with Pethedine and Aterax (or similar) Epidural analgesia should be avoided unless given by a very experienced physician.

8. The partogram must be used to monitor progress labour.
9. Induction and augmentation of labour with oxytocin are not allowed. Poor progress is an indication for emergency C/S.

10. Pain and tenderness involving the lower abdomen are NOT reliable indications of uterine rapture.

The trial should be abandoned in favour of emergency caesarean section:

1. There is poor progress as shown by the partogram graph crossing the alert line.
2. The fetal heart shows tachycardia or decelerations (except early dips in the late first stage).
3. There is sudden vaginal bleeding or haematuria.

Delivery in the second stage should follow ordinary obstetric practice but a prolonged second stage should be avoided. Emergency caesarean section is to a difficult operative vaginal delivery.

Exploration of the uterus after delivery to determine that it is intact is unnecessary and unreliable unless postpartum haemorrhage is present.

Post-partum haemorrhage or signs of maternal cardio-vascular instability should raise serious consideration of the possibility of uterine rupture.

6.11. REFERENCES

CHAPTER SEVEN

GUIDELINES FOR RESUSCITATION IN PREGNANCY

Collapse in pregnancy may occur as a result of several catastrophic events such as pulmonary embolism, amniotic fluid embolism, severe haemorrhage leading to hypovolaemia, acquired or congenital heart disease, anaesthetic complications, failed intubation, congestive cardiac failure etc. In the 1998 Report on Confidential Enquiries into maternal deaths in South Africa acute collapse and embolism accounted for 7.3% all deaths and 4.8% were from anaesthetic complications.

In all deaths, substandard care in relation to resuscitation was present in 28.8% of the cases. The goal of this chapter is to provide guidelines on resuscitation in order to prevent deaths due to failure to resuscitate.

It is impossible to perform effective cardiac massage in the third trimester of pregnancy as the gravid uterus prevents venous return from the legs and effective cardiac filling. When cardiovascular collapse occurs in the operating room the doctor must deliver the baby immediately if there is to be any maternal recovery. Outside the operating room, emergency operative delivery must performed as part of the resuscitation if there is no immediate response to simple measures.

7.1. Prevention of Circumstances Leading To Collapse

- Detailed initial assessment of patients
- Detailed management plan for those at risk
- Continuous monitor for those at risk
- Accurate documentation and interpretation of findings
- Prompt intervention when problems arise
7.2. Ensuring preparedness for Cardiopulmonary Resuscitation

- All medical and nursing staff must be able to administer basic cardiopulmonary resuscitation (CPR)
- A protocol for CPR should be clearly displayed in the obstetric unit.
- An emergency trolley with all the necessary drugs and equipment must be immediately available.
- Daily checks to ensure that drugs are not expired and equipment must be good working order

7.3. MANAGEMENT OF CARDIO-RESPIRATORY ARREST

1. Administer a firm precordial thump.
2. Call for help, for a defibrillator, for intubation equipment, for a doctor to do caesarean section if in the third trimester and undelivered.

   Perform external cardiac compression at a rate of 100/minute. Give breaths (lasting two seconds each) at a rate of one for every five compressions, or two every 15 compressions if alone.

4. Attach electrocardiograph leads and intubate using cricoid pressure.

   Ventilate with 100% oxygen.

5. In the presence of ventricular fibrillator or pulseless ventricular tachycardia, defibrillate, starting at 200 J, increasing to 200-300 J, and then to 360 J if necessary.

6. Give epinephrine (adrenaline) 0.01 mg/kg every 3 minutes, intravenously or into the endotracheal tube

7. Reassess for heartbeat and breathing every minute.

8. If resuscitation has not been successful in 4 minutes, and if the gestational age is more than 24 weeks, perform immediate operative delivery at the site of resuscitation.

9. Continue cardiopulmonary resuscitation during operation.
10. Treat the cause of the arrest.

11. Arrange for follow up care: transfer to a higher level of care for intensive care management.

Ensure that appropriate treatment is maintained throughout the transfer process. Unless there is complete recovery of consciousness and spontaneous respiration, maintain tracheal intubation and mechanically or manually assisted ventilation throughout the transfer. Ensure that the patient is accompanied by appropriately trained or experienced personnel.

It essential that after resuscitation a detailed post resuscitation plan be drawn up, documented and the necessary observations and instructions prescribed. These patients, if not being managed in an intensive care unit, should be observed in a high care area. The patient should be kept in that area for at least 12 hours following the incident, and after she is stable.

Accurate input and output charts should always be kept. Fluid overloading can occur following intra-operative resuscitation. Patients requiring intra-operative resuscitation should be observed in a high care area for at least 12 hours. Careful monitoring of the respiratory rate (and where possible pulse oximetry) is vital as it is often the first sign of pulmonary oedema in these situations. A fall in oxygen saturation is another very useful indicator of pulmonary oedema.

7.4. COMPLICATIONS DURING OBSTETRIC ANAESTHESIA

For all methods of obstetric anaesthesia a specially prepared “difficult airway” tray or trolley should be available in the room where anaesthesia is induced. Atropine 0.5mg should be immediately available (i.e. predrawn in a syringe). All resuscitation drugs and equipment (including a defibrillator) should be readily available. Epinephrine (adrenaline), ephedrine and phenylephrine should be available within the room where is induced. For regional anaesthesia (spinal or epidural) ephedrine 5mg/ml, thiopentone 25mg/ml and succinylcholine 50 mg/ml should be immediately available (i.e. predrawn). For induction of general anesthesia, cricoid pressure should be applied by a trained assistant. An obstetric wedge (or equivalent) is
mandatory in all cases. A freely flowing intravenous infusion should be secured before commencing anaesthesia.

**Spinal Hypotension**

**Prevention**
1. Do not transfer the patient from trolley to table once the spinal block has been administered. Perform the spinal with the patient on the operating table.
2. Ensure effective uterine displacement.
3. Correct any pre-existing hypovolaemia using appropriate intravenous fluid therapy.

**Treatment**
1. Increase the intravenous infusion to maximum flow rate.
2. Ephedrine bolus 5 – 10 mg IV (repeat up to 25-50 mg).
3. If no response, administer phenylephrine in repeated doses of 50 – 100 micrograms.
4. Do not tilt the patient into the head-down (Trendellenberg) position.

**High Motor Block**

Sensory neuronal to a level of thoracic dermatomes T2-4 is necessary for successful regional anaesthesia for caesarean section. Inevitably, there is an accompanying motor neural blockade which is usually a little less extensive than the sensory block. Higher sensory levels are often seen and are of little consequence. However, if the motor blockade extends to the 15th cervical level or higher, diaphragmatic movement is affected and severe respiratory compromise occurs. Without immediate intervention, apnoea and hypoxic cardiac arrest will follow.

**Prevention**

Unfortunately, the occurrence of high motor block is unpredictable. The most important aspects of care are constant vigilance following neuraxial injection of local anaesthetic, maintaining verbal contact with the patient, and immediate immediate intervention to prevent hypoxia. Always administer epidural anaesthesia in small (3ml) aliquots in case the catheter is in the...
subarachnoid position. Onset of spinal anaesthesia is probably more controllable with use of hyperbaric solutions. Never give more than the recommended dose of local anaesthetic.

Symptoms and Signs

- Patient complains of difficulty breathing: this is a common complaint in supine pregnant patients and does not necessarily indicate high motor blockade. However, the upper sensory level should be checked immediately, looking for an unusually high block.
- Patient complains of numbness of arms or is observed to rub her fingers against her thumbs: this is an indication of a high sensory level and the anaesthetist should be immediately alert to the possibility of high motor blockade.
- Patient makes unusual movements of arms and shoulders: this is an indication of the patient’s awareness of muscle weakness due to lower cervical blockade. Immediate action must be taken to prevent hypoxia associated with progression above C5.
- Failure of verbal response, apnoea or unconsciousness demand immediate action.
- Bradycardia is uncommon: treat immediately with atropine 0.5mg. If patient is apnoeic or unconscious, attend immediately to airway management and oxygenation.
- Hypotension is common and is not specific feature of high motor block. If severe it can be accompanied by loss of consciousness, which may mimic high motor block. Treat immediately with ephedrine and attend to airway management and oxygenation.

Treatment

- Administer 100% oxygen at the first sign of distress. If the patient is still conscious and breathing spontaneously, observe for progression of block. If the patient is apnoeic, manually assist ventilation.
- Tracheal intubation with ciroid pressure. Even if apnoeic, the patient may still be conscious. Administer thiopentone and succinylcholine (suxamethonium) before intubation.
- Mechanically assisted ventilation.
• Check for carotid pulsation: if absent, commence CPR. Electromechanical dissociation (presence of ECG signal on monitor without effective cardiac output) can occur.
• Maintain blood pressure.
• Administer ephedrine iv.
• Increase rate of intravenous fluid administration
• Administer epinephrine (adrenaline) bolus if no response.
• Administer volatile anaesthesia: consciousness will otherwise return with successful resuscitation.
• Do not administer further doses of muscle relaxant: maintain mechanical ventilation and anaesthesia until the completion of surgery.
• At completion of surgery, discontinue anaesthesia and allow the return of spontaneous ventilation.
• If spontaneous ventilation or a full return to consciousness does not occur, do not extubate the patient. Recommence mechanical ventilation and transfer to an intensive care unit.

Failed Intubation
Death following failed intubation is caused by hypoxia. The most important aspects of care are to recognize the problem promptly and to maintain a patent airway and oxygenation. Hypoxic cardiac arrest is often associated with persistent fruitless attempts at intubation. Difficult or failed intubation is an uncommon event (occurring in 1 in 200 to 1 in 1000 general anaesthetics for caesarean section), so it is important that a preplanned “drill” or algorithm is enacted whenever it occurs. All anaesthetics providing obstetric anaesthesia should have a thorough familiarity with such an algorithm and a difficult intubation tray or tray or trolley must be immediately available.

Prevention is best achieved by avoiding general anaesthesia in obstetrics. However, this is not always possible. If a general anaesthetic has to be administered, the patient should be questioned about any previous anaesthetics and examined for any obvious risk factors.
Risk factors for difficult intubation include:

- Difficulty with visualization of the oropharyngeal structures (Mallampati grades 3 and 4)
- Short neck
- Obesity
- Problems with the maxillary incisors (protruding, single or missing incisors)
- Receding mandible

Difficulty Airway Trolley

This should be prepared and readily available at all times in all maternity operating theatres.

Essential equipment will including:

- Laryngoscopes of different sizes and designs
- Endotracheal tubes of assorted sizes
- Laryngeal masks of different sizes
- Cricothyrotomy equipment
- Endotracheal tube stylets
- Oesophageal dilator (gum-elastic or silastic bougie)
- A self-inflating resuscitation (Ambu) bag
7.5 PROTOCOL FOR MANAGEMENT OF FAILED INTUBATION

Failed intubation

Maintain cricoid pressure, ventilate with 100% oxygen, prepare for cricothyrotomy

Fetal distress
Requiring immediate delivery

Ventilation easy

Ventilation difficult

Insert laryngeal mask airway

Volatile agent
With 10% oxygen

Ventilation easy

Ventilation difficult

Cricothyrotomy

Continue ventilation with Cricoid pressure

Deliver baby

Minimal or no fetal distress

Ventilation easy

Ventilation difficult

Wake patient

Maintain cricoid pressure

Do not turn the patient on her side

Do not administer additional doses of succinylcholine

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