MATERNAL HEALTH
AND SAFE MOTHERHOOD PROGRAMME

THE PREVENTION AND MANAGEMENT
OF PUEPERAL INFECTIONS

Report of a Technical Working Group
Geneva, 20 - 22 May 1992

World Health Organization
Division of Family Health
Geneva
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PREFACE

The Safe Motherhood Initiative (SMI) is a global interagency effort to reduce maternal mortality and morbidity. The target is to reduce maternal deaths by at least half by the year 2000 and to achieve substantial reductions in maternal morbidity. Activities within the Initiative include: increasing awareness of the nature of the problem and the need for action; strengthening maternal health services; training of health workers and others; facilitating educational and economic opportunities for women; and research, particularly operational research. All these measures, which will help to reduce maternal mortality, will also exert at least equal effect on maternal morbidity which derives from the generally poor health of women and girls and inadequate care during pregnancy and labour.

In order to be able to provide more effective support to countries in technical fields, WHO has been holding a series of meetings and consultations with experts on a variety of subjects relating to maternal health. Their task is to review current knowledge and experience of a given high priority topic, produce guidelines and, if necessary, to recommend needed epidemiological and operational research.

Several technical working groups have been established to develop guidelines for prevention and management of the major conditions that are the leading causes of maternal mortality in developing countries, namely, anaemia, obstetric haemorrhage, maternal and perinatal infections, hypertensive disorders of pregnancy, abortion and obstructed labour. This Technical Working Group on the prevention and management of puerperal infections is part of the effort to provide more effective support to countries, particularly in areas where WHO has a unique contribution to make in norm-setting and the establishment of agreed upon standards.
1. **INTRODUCTION**

Globally, the state of women’s health is often reflected in pregnancy-related morbidity and mortality. For most mothers in the world, puerperal sepsis, along with haemorrhage, eclampsia, obstructed labour and abortion are the main obstetric complications. Puerperal sepsis is still highly prevalent throughout much of the world and continues to present a significant risk of morbidity and mortality. There is a lack of up-to-date population-based data for out-of-hospital births in a number of countries and regions. The evidence indicates that puerperal sepsis figures prominently in nearly every report though the proportionate role that infection plays in maternal death varies greatly.

An informal meeting of experts with relevant experience in this area was convened in Geneva, 20-22 May 1992. As the incidence of puerperal sepsis is undoubtedly higher than reported and a public health problem in developing countries of the world, especially those with great physical, social and economic barriers to modern maternity services and other health services for women, the group’s discussions centred on the situation in those countries rather than on that in the developed countries.

Although infections after an abortion contribute significantly to pregnancy related deaths and morbidities, the Technical Working Group did not include them in their discussions, given the fact that the Maternal Health and Safe Motherhood Programme has recently issued document on the topic. *Clinical Management of Abortion Complications: A Practical Guide* (WHO/FHE/MSM/94.1), *The Prevention and Management of Unsafe Abortion* (WHO/FHE/MSM/92.5) and *Complications of Abortion: Technical and Managerial Guidelines for Prevention and Treatment* (ISBN 92 4 154469 4. Price Sw.Fr.35; Price in developing countries Sw.Fr.24.50)

Please note that the terms *puerperal sepsis* and *puerperal infections* as defined in the overview are often used interchangeably throughout this report given that their difference is more of degree than substance.

2. **MEETING OBJECTIVES**

- Review patterns of puerperal infections presenting at different levels of health care, and the current status of the management of these conditions.

- Develop guidelines to prevent and/or detect puerperal infections in relation to their causes, skills of health workers and their training requirements, laboratory and facility needs, equipment and supply needs. Review the strategy for clean delivery and control of puerperal and neonatal tetanus and provide recommendations.

- Develop guidelines to treat puerperal infections in relation to their causes, skills of health workers and their training requirements, laboratory and facility needs, equipment and supply needs.

- Review the draft indicators for monitoring and evaluating strategies for clean deliveries, and recommend to the WHO secretariat how to proceed in the development of these indicators.

- Identify areas that still require operational research in the area of puerperal infections (treatment modifications, drug use, cost-effectiveness of different regimes, training of personnel, equipment and methods for diagnosis).
3. OVERVIEW

3.1 Definition of puerperal sepsis

Puerperal sepsis was defined as infection of the genital tract occurring at any time between the onset of rupture of membranes or labour, and the 42nd day postpartum in which two or more of the following are present:

- Pelvic pain;
- Fever i.e. oral temperature 38.5°C/101.3°F or higher on any occasion;
- Abnormal vaginal discharge, e.g. presence of pus;
- Abnormal smell/foul odour of discharge;
- Delay in the rate of reduction of the size of the uterus (<2 cm/day during first 8 days).

3.2 Definition of puerperal infections

Puerperal infections is a more general term than puerperal sepsis and includes not only infections due to puerperal sepsis, but also all extra-genital infections and incidental infections:

- Infections of the genito-urinary systems related to labour, delivery and the puerperium:
  - infections related to the uterus and its associated structures;
  - infections related to the urinary tract;
- Infections specifically related to the birth process but not of the genito-urinary systems, e.g. breast abscess;
- Incidental infections, e.g. malaria, respiratory tract infections;

Puerperal infections are an important cause of morbidity and mortality for mothers in developing nations. The infected mother, in acute stages, suffers pain and illness. Her condition may eventually result in infertility, chronic debilitation, or death.

3.3 General definitions

Asepsis or aseptic technique: the combination of efforts made to reduce the number of microorganisms on both living surfaces (skin and tissue) and inanimate objects (e.g., surgical instruments) to a safe level in order to prevent infection.

Antisepsis: the prevention of infection by killing or inhibiting microorganisms on skin and body tissues. Antiseptics include surgical spirit (70-90% alcohol), chlorhexidine, and iodine.

Cleaning: physically removing blood, soil, dust or dirt from skin or inanimate objects by using soap or detergent and water.

Decontamination: first step in handling soiled instruments by process such as soaking in 0.5% chlorine solution for 10 minutes.
Disinfection: destroys most but not all microorganisms by using chemicals or heat. **High-level disinfection** destroys all microorganisms except endospores (e.g., tetanus endospores) and is achieved by boiling equipment for 20 minutes or soaking equipment in chemicals such as 0.5% chlorine, formaldehyde, or glutaraldehyde for 20 minutes.

Sterilization: destroys all forms of microorganisms including endospores by use of sterilization facilities (dry heat or steam) or soaking instruments for long periods in formaldehyde or glutaraldehyde.

Obstructed labour: a labour in which progress is arrested by mechanical factors and delivery is impossible without caesarean section, symphysiotomy, embryotomy or craniotomy.

Prolonged labour: active labour with regular uterine contractions for more than 12 hours

**Premature rupture of membranes** (at term or pre-term): rupture of the membranes before the onset of labour.

**Prolonged rupture of membranes**: ruptured membranes for more than 12 hours irrespective of labour status or gestational age.

### 3.4 Incidence of puerperal infections

How many mothers develop puerperal infections during labour and after pregnancy? The numbers may be vast. However, data on the overall incidence are insufficient for most regions in the world. According to hospital-based studies, one of the most common complications during the puerperium is infection. In developed countries, 1-7% of postpartum women develop puerperal infections. A recently completed study in Ghana that surveyed the status of maternal infection and related mortality identified that 33% of deaths were attributed to infection, and 60% of caesarean section patients had associated infections, as compared with 1-2% of women who delivered vaginally (see Table 1).

Although there are few measures of obstetric morbidity - from any cause - in developing countries, it is reasonable to assume that if a condition is associated with a high mortality rate, then it is undoubtedly also associated with a high incidence among women who survive. In a sense, mortality is just the tip of the iceberg.

### 3.5 Aetiology of puerperal infections

**Uterine Infections:** Uterine infections and their complications are responsible for the majority of deaths from puerperal infections. Many of the microorganisms that cause uterine infections are endogenous inhabitants of the lower genital tract and include organisms such as anaerobic streptococci and staphylococci, E. Coli and group B streptococci (which is normally found in the gastrointestinal tract, but may colonize the vagina). These organisms may ascend into the uterus during labour or are pushed in by the examining finger during pelvic examinations, and become pathogenic in the presence of traumatized, devitalized tissue or when host defense mechanisms are altered as in anaemic, malnourished or diabetic patients.

Uterine infections are also caused by exogenously introduced bacteria such as aerobic streptococci and staphylococci (which are normal inhabitants of skin, nostrils and perineum), clostridium tetani, pseudomonas. These bacteria are introduced into the uterus by contaminated instruments and hands, or by the insertion of foreign objects into the vagina such as herbs,
Table 1. Risk factors for puerperal infection in vaginal and cesarean section deliveries, Ghana, 1992

<table>
<thead>
<tr>
<th></th>
<th>Vaginal (n=15)</th>
<th>Vaginal (n=1248)</th>
<th>p=</th>
<th>Cesarean section (n=27)</th>
<th>Cesarean section (n=18)</th>
<th>p=</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Referred</td>
<td>1</td>
<td>39</td>
<td>p=385</td>
<td>11</td>
<td>6</td>
<td>p=851</td>
</tr>
<tr>
<td>2. Prolonged labour (&gt;24 hours)</td>
<td>2</td>
<td>17</td>
<td>p=0.037</td>
<td>7</td>
<td>6</td>
<td>p=0.417</td>
</tr>
<tr>
<td>3. Obstructed labour</td>
<td>0</td>
<td>9</td>
<td>p=0.896</td>
<td>16</td>
<td>10</td>
<td>p=0.951</td>
</tr>
<tr>
<td>4. Premature rupture of membranes</td>
<td>8</td>
<td>82</td>
<td>p&lt;0.001</td>
<td>17</td>
<td>11</td>
<td>p=0.977</td>
</tr>
<tr>
<td>5. Foul smelling amniotic fluid</td>
<td>4</td>
<td>35</td>
<td>p&lt;0.001</td>
<td>10</td>
<td>4</td>
<td>p=0.237</td>
</tr>
<tr>
<td>6. Frequent pelvic examinations (&gt;1)</td>
<td>3</td>
<td>192</td>
<td>p=0.417</td>
<td>17</td>
<td>11</td>
<td>p=0.977</td>
</tr>
<tr>
<td>7. Inadequate prenatal care (less than 7 visits)</td>
<td>14</td>
<td>1026</td>
<td>p=0.239</td>
<td>21</td>
<td>14</td>
<td>p=0.547</td>
</tr>
<tr>
<td>8. Anaemia</td>
<td>6*</td>
<td>882*</td>
<td>p=0.384</td>
<td>26</td>
<td>13</td>
<td>p=0.031</td>
</tr>
<tr>
<td>9. Cephalo-pelvic disproportion</td>
<td>0</td>
<td>1</td>
<td>p=0.888</td>
<td>16</td>
<td>12</td>
<td>p=0.881</td>
</tr>
<tr>
<td>10. Vaginal herpes insertion prior to delivery</td>
<td>1</td>
<td>3</td>
<td>p=0.046*</td>
<td>1</td>
<td>1</td>
<td>p=0.666</td>
</tr>
<tr>
<td>11. Emergency section</td>
<td>NA</td>
<td>NA</td>
<td></td>
<td>21</td>
<td>5</td>
<td>p=0.01*</td>
</tr>
<tr>
<td>12. Episiotomy</td>
<td>1</td>
<td>48</td>
<td>p=0.456</td>
<td>NA</td>
<td>NA</td>
<td></td>
</tr>
</tbody>
</table>

* Significant by Chi square or Fisher's exact test.

** Among vaginal deliveries, ten women who became infected and 991 who were not were tested for % haemoglobin. The 96 women not tested are not represented in this analysis.

cow dung, or cloths, a common traditional practice in developing countries.

The organisms most responsible for infection may vary from population to population. For example in many regions, sexually transmitted disease (such as gonorrhoea or chlamydial infections) are highly prevalent and cause the majority of uterine infections in the postpartum period.

Before delivery, prolonged rupture of membranes allows bacteria to ascend through the cervical canal into the amniotic cavity. On occasion, bacteria may migrate across the intact amniotic membranes during labour. The resulting chorioamnionitis may develop into a postpartum uterine infection.

After delivery, the area of placental attachment is similar to a wound and is an excellent culture medium for bacteria. In addition, blood clots, tissue or placental fragments may be present and these easily become infected. After a caesarean section, the site of the uterine incision could become infected.

In uterine infections, bacteria invade the placental site then infection spreads rapidly to involve the entire endometrium resulting in endometritis. If untreated, the infection may then spread to other layers of the uterus and adjacent structures, resulting in myometritis, parametritis or salpingitis. Pelvic abscesses, peritonitis, septic thrombophlebitis, septicaemia and septic shock may complicate the illness.

**Wound Infections:** Lacerations of the cervix or vagina, episiotomies, the site of the abdominal incision from a caesarean section, "gishiri" cuts (traditional vaginal cuts), provide ready sites for bacterial invasion from endogenous or exogenous sources. In obstructed labour, pressure necrosis of the rectum or urethra may lead to infection of the necrosed tissue and the formation of vaginal fistulae. Wound infections, when mild, remain localized but more serious ones can lead to gangrene and shock.

**Urinary tract infections:** The urinary tract is another common site of puerperal infection. During the postpartum period, the urinary tract is particularly vulnerable to infection. Bladder and urethral trauma occur during labour and delivery, and bacteria may be introduced when the urethra is catheterized. Moreover, the bladder remains enlarged from the pregnancy and the presence of residual urine due to decreased bladder tone increases the risk of a postpartum urinary tract infection, resulting in cystitis or pyelonephritis. Studies have shown that women with asymptomatic bacteriuria during pregnancy and postpartum have a greater risk of developing pyelonephritis.

**Other extragenital Infections:** Acute mastitis and breast abscess produce painful symptoms following delivery. Pneumonia may follow aspiration of gastric contents while under general anaesthesia for caesarean section. Thrombophlebitis in the legs due to increased coagulability of the blood postpartum occasionally complicates the puerperium.

**Incidental infections:** Infections which are unrelated to the birth process may occur in the puerperium and these include respiratory and gastrointestinal tract infections, malaria, typhoid, AIDS-related infections.
3.6 Relationship between puerperal and neonatal infections

Puerperal infections may affect the newborn. Chorioamnionitis can cause neonatal infection which is evident at birth, or within a few hours of delivery manifesting as septicaemia, respiratory distress syndrome and pneumonia, with symptoms being more severe in preterm infants. Chorioamnionitis is also associated with an increased likelihood of premature birth which, in itself, is a risk factor for neonatal morbidity and mortality.

Gonococcal or chlamydial vaginal infections lead to uterine infections in the postpartum and can also cause gonococcal or chlamydial ophthalma in the newborn which is acquired at delivery during passage through the infected birth canal. Sexually transmitted infections are also associated with a higher risk of congenital infections, stillbirth, premature delivery.

Untreated urinary tract infections and bacteriuria during pregnancy, although not puerperal, predispose to puerperal urinary tract infections and are associated with an increased incidence of premature delivery, neonatal morbidity and mortality, and low birth weight.

Tetanus neonatorum is not acquired from the mother but is caused by the same factor as puerperal tetanus, namely: unclean delivery.

3.7 Risk factors for puerperal sepsis

Investigators have noted several risk factors which increase a woman's risk of developing puerperal sepsis. In the developing world, predisposing factors include: pre-existing sexually transmitted infections and other vaginal infections; prolonged rupture of membranes; retained products of conception; diabetes; caesarean delivery (especially if performed as an emergency) and other operative deliveries; postpartum haemorrhage; anaemia and malnutrition; poor infection control practices.

Factors which increase a woman's risk of developing puerperal sepsis and of dying from it, include: delivery by an untrained traditional birth attendant; traditional practices such as the insertion of foreign objects and substances into the vagina; delay in reaching appropriate level of health facility due to lack of transportation and resources; and long distance from a women's home to a health facility, the inadequacy of health facilities which are often ill-equipped and ill-staffed; cultural factors which delay care-seeking behaviour; the low status of women which contributes to their poor health in general and deprives them of adequate medical care and resources; the lack of knowledge about signs and symptoms of puerperal sepsis and of its risk factors; the lack of postnatal care.

4. ANTENATAL CARE

Antenatal care can diagnose a number of the risk factors associated with puerperal infections. Women at risk of complications can be identified early and referred to a higher level of care. Pregnant women and other community members need to be educated about pregnancy risk factors. Barriers to antenatal care and referral should be minimized. Health care workers should be trained to recognize risk factors and respond appropriately, and to persuade the high-risk woman and her family for her to go to the appropriate health facility for delivery.
4.1 Positive benefits of antenatal care as related to puerperal infections

- Prevention of tetanus.
- Diagnosis and treatment of urinary tract infections.
- Diagnosis and treatment of syphilis.
- Diagnosis and treatment of gonorrhoea and chlamydial infections.
- Diagnosis and treatment of anaemia and malnutrition.
- Diagnosis and treatment of diabetes mellitus.
- Assessment of risk factors for feto-pelvic disproportion.

4.2 Antenatal prevention and early diagnosis of puerperal infections

- At village level (with local health workers):
  
  ▶ Participate in decision-making and conduct of health practices and services.
  
  ▶ Mobilize women to seek antenatal care.
  
  ▶ Promote availability, value, and proper use of materials for clean delivery.
  
  ▶ Teach women (family) community the importance of antenatal services, linked to early referral if problems occur (e.g. prolonged rupture of membranes, prolonged labour).
  
  ▶ The community, and especially all pregnant women, should be informed about STD/HIV and its effects on pregnancy and newborns; ways of prevention; recognition of signs and symptoms; and places for seeking care promptly.

- At health post level (with midwife or health centre worker):
  
  ▶ Determine cultural beliefs and perceptions of available health services.
  
  ▶ Determine communication network system (women’s groups, religious groups, TBAs) and agents for change.
  
  ▶ Develop and maintain a pregnancy registry (to provide certain baseline denominators for future ongoing evaluations of services).
  
  ▶ Develop and disseminate appropriate messages, encouraging cooperative participation of village-based health workers and village leaders.
  
  ▶ Information on how to recognize conditions related to risk of puerperal infections for which early care should be sought:
    - ruptured membranes for longer than 12 hours
    - prolonged labour for longer than 12 hours
    - genital swelling, ulcers, discharge
    - previous prolonged labour, difficult delivery, miscarriage, stillbirth.
    - increased weakness, dizziness, difficulty breathing (anaemia symptoms)
- feverishness and uterine tenderness late in third trimester (which may suggest amniotic infection)
- urinary frequency with dysuria.

- Encourage attendance at antenatal care.
- Stress the necessity of a nutritious diet including iron-rich foods.
- Mobilize village communication network system to provide education regarding risk management, i.e. referral.
- Refer all suspected cases of sexually transmitted disease.

- **At health centre level:**
  - Detect and manage:
    - STDs
    - urinary tract infections
    - fever including malaria
    - premature rupture of membranes
    - anaemia
    - diabetes.
  - Identify and upgrade tetanus toxoid status.
  - Discuss family planning - spacing options (prevent missed opportunities)
  - Recognize women who are at high risk for puerperal infections based on history and physical exams, and recommend delivery at health care facility, refer to waiting home:
    - previous prolonged labour
    - previous operative delivery
    - women at risk of obstructed labour, e.g. primigravida of short stature,
    - abnormal presentations
    - history of repeated abortion
    - use of partograph for all women in labour.
  - Review patient status and refer to a higher level, when necessary.

- **At first referral level:**
  - Provide advanced diagnosis and treatment of conditions associated with high risk of puerperal infections (STDs, UTIs, fever with abdominal or flank pain, or other unresponsive fevers, diabetes, anaemia).
  - Treat septic shock: blood transfusion (if necessary), monitoring input and output of fluid therapy, antibiotic therapy based on sensitivity testing, oxygen therapy. Surgical treatment of pelvic abscess if necessary.

---

5. INTRAPARTUM CARE

Poor aseptic practice, including unclean hands and instruments, has long been recognized as a cause of nosocomial infection among women undergoing delivery. To minimize the risk of maternal infection, health care workers should maintain an infection-free environment. Prevention of prolonged labour by the use of the partograph is another essential element of intrapartum care.

Intrapartum care also requires that providers know methods of preventing infection in the presence of premature ruptured membranes, and prolonged ruptured membranes during labour. Conditions for which there was an agreement among the group for the use of prophylactic antibiotics included prolonged labour, prolonged rupture of membranes, emergency caesarean section, and post-delivery manual exploration for removal of placental fragments. There was no consensus for use of prophylactic antibiotics for premature rupture of membranes or elective caesarean section without accompanying risk factors (see Annex 4).

5.1 Intrapartum prevention and early diagnosis

- At village level:
  - Promote clean delivery - clean hands, surface, perineum, cord care.
  - Avoid harmful traditional practice - inserting herbs or other substances in vagina, "gishiri" cuts
  - For each community, explore the best approach to ensure that clean delivery kits are prepared and used - using locally relevant promotional and marketing techniques.
  - Discourage vaginal examination by untrained persons during labour and third stage practices such as violent cord traction.
  - Encourage early referral in cases of prolonged labour (use partograph if midwife available) and prolonged rupture of membranes.

- At health centre and first referral level:
  - Re-emphasize clean delivery - environment, mother, instruments and procedures.

<table>
<thead>
<tr>
<th>Table 2. Intrapartum prevention of puerperal sepsis</th>
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<tbody>
<tr>
<td>- Clean hands immediately prior to delivery</td>
</tr>
<tr>
<td>- Clean perineum</td>
</tr>
<tr>
<td>- Clean delivery surface</td>
</tr>
<tr>
<td>- Clean cutting instruments</td>
</tr>
<tr>
<td>- Clean cord tie and clean cord care</td>
</tr>
<tr>
<td>- Use of an appropriate clean delivery kit</td>
</tr>
<tr>
<td>- Prevention of prolonged labour by use of the partograph and early maternal referral</td>
</tr>
<tr>
<td>- Prevention of harmful traditional practice during labour e.g., insertion of herbs in the vagina</td>
</tr>
<tr>
<td>- Prevention of excessive unnecessary catheterizations</td>
</tr>
<tr>
<td>- Prevention of unnecessary or excessive vaginal examinations especially if risk factors such as premature and prolonged rupture of membranes exist</td>
</tr>
<tr>
<td>- Avoid unnecessary (routine) episiotomy</td>
</tr>
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</table>
- Encourage voiding urine during labour and avoid unnecessary catheterization.

- Avoid unnecessary vaginal examination and manage the third stage of labour correctly (e.g. administration of oxytocics after delivery of anterior shoulder and gentle cord traction).

- Avoid routine episiotomy.

- Use soap, water and effective antiseptics (e.g. chlorhexidine, surgical spirit - see Annex 2) to clean hands, wear gloves on both hands for vaginal examination, delivery and handling of infants.

- Use correct methods for decontamination (e.g. 0.5% chlorine solution), high-level disinfection (e.g. boiling for 20 minutes) and sterilization (dry heat or steam) of instruments and equipment. See Annex 3 and Figure 1.


- Obtain and maintain appropriate equipment and supplies (Table 3).

- Diagnose and manage complications early: prolonged/obstructed labour (use partograph), prolonged rupture of membranes, retained placenta.

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Table 3. Equipment needed for vaginal and cesarean delivery
(health centre and first referral level)

<table>
<thead>
<tr>
<th>Vaginal Delivery</th>
<th>Cesarean Delivery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soap</td>
<td>Soap</td>
</tr>
<tr>
<td>Clean water</td>
<td>Clean water</td>
</tr>
<tr>
<td>Antiseptic</td>
<td>Antiseptic</td>
</tr>
<tr>
<td>chlorhexidine</td>
<td>chlorhexidine</td>
</tr>
<tr>
<td>surgical spirit</td>
<td>surgical spirit</td>
</tr>
<tr>
<td>Disinfectant</td>
<td>Disinfectant</td>
</tr>
<tr>
<td>chlorine bleach</td>
<td>chlorine bleach</td>
</tr>
<tr>
<td>surgical spirit</td>
<td>surgical spirit</td>
</tr>
<tr>
<td>Autoclave (pressure cooker)</td>
<td>Autoclave (pressure cooker), hot air oven</td>
</tr>
<tr>
<td>or</td>
<td>Heat source</td>
</tr>
<tr>
<td>Boiler (pan with lid)</td>
<td>electricity</td>
</tr>
<tr>
<td>Heat source</td>
<td>kerosene</td>
</tr>
<tr>
<td>electricity</td>
<td>Sterile instruments</td>
</tr>
<tr>
<td>local fuel (wood, charcoal, kerosene)</td>
<td>forceps</td>
</tr>
<tr>
<td>Sterile or high level disinfected</td>
<td>clamps</td>
</tr>
<tr>
<td>instruments</td>
<td>scissors</td>
</tr>
<tr>
<td>forceps</td>
<td>sutures</td>
</tr>
<tr>
<td>scissors</td>
<td>etc.</td>
</tr>
<tr>
<td>clamps</td>
<td></td>
</tr>
<tr>
<td>Sterile or disinfected cord ligatures</td>
<td>Sterile cord ligatures</td>
</tr>
<tr>
<td>Sterile or disinfected cotton or gauze</td>
<td>Sterile cotton or gauze</td>
</tr>
<tr>
<td>3 pairs sterile or high-level disinfected gloves</td>
<td>Sterile surgical gloves, gowns, drapes</td>
</tr>
<tr>
<td>2 or more clean cloths</td>
<td>Sterile dressings</td>
</tr>
<tr>
<td>Clean sanitary pads</td>
<td>Clean sanitary pads</td>
</tr>
<tr>
<td>Leakproof waste container</td>
<td>2 or more clean cloths</td>
</tr>
<tr>
<td></td>
<td>Leakproof waste container</td>
</tr>
</tbody>
</table>

5.2 Rupture of membranes for more than 12 hours (prolonged rupture of membranes) (see Flow Chart 1)

- At village and health centre level:
  
  ▶ Assess gestational age:
    
    if <37 weeks gestation: refer to first referral level
    
    if ≥37 weeks gestation: check next step.
    
  ▶ Assess for infection (fever, foul discharge, abdominal pain):
    
    **Infection present:**
    
    - Give antipyretic to avoid hyperpyrexia in the fetus e.g. paracetamol 500 mg orally, 4 times daily.
    - Give ampicillin 3 g orally or procaine penicillin 1.2 million units IM immediately and
    - Refer to first referral level unless delivery is expected soon.
    
    **No evidence of infection:**
    
    - Give ampicillin 500 mg orally every 6 hours for 24 hours
    - Observe labour.

  ▶ Assess duration of labour:
    
    if in labour for > 12 hours: manage as prolonged labour
    
    if in early labour or not in labour:
    - observe progress
    - refer to first referral level after a maximum of 12 hours.

- At first referral level:

  ▶ Assess the condition of the:
    
    - mother (anaemia, septicaemia, shock) and resuscitate if needed
    - fetus (heart rate, gestational age and size).
  
  ▶ Confirm:
    
    - rupture of membranes (speculum examination)
    - dosage and route of antibiotics given and continue prescription accordingly.

  ▶ Assess for oxytocin induction/augmentation or caesarean section:
    
    - from history and referral notes for poor progress of labour
    - disproportion/obstructed labour
    - fetal distress

---

For women at term: Aim to deliver within 24 hours of rupture of membranes.
Flow Chart 1

Rupture of fetal membranes for more than 12 hours

VILLAGE AND HEALTH CENTRE LEVEL

History of passage of fluid from the vagina, confirmed by perineal inspection

NO ➔ In labour? ➔ YES

YES ➔ Infection? ➔ NO

Antipyretic and antibiotic e.g. ampicillin 3 g orally. Refer to first referral level.

NO ➔ Prophylactic antibiotics e.g. ampicillin 500 mg 4 times daily.

YES ➔ Ampicillin 3 g orally. Refer to first referral level.*

Pre-term?

NO ➔ YES ➔ Infection? ➔ NO

Antipyretic and antibiotic e.g. ampicillin 3 g orally. Refer to first referral level.

NO ➔ Prophylactic antibiotics e.g. ampicillin 500 mg 4 times daily.

YES ➔ In labour >12 hours?

NO ➔ Monitor progress of labour.

YES ➔ Refer to first referral level.*

FIRST REFERRAL LEVEL

Assess the condition of the mother and fetus and treat accordingly. Confirm the rupture of membranes, the dosage and route of antibiotics and continue treatment. Assess for oxytocin induction/augmentation or caesarean section.

* Delay referral if delivery is imminent
5.3 Prolonged labour

- **At village level:**
  
  - Prevention through community education on the need to seek help if baby is not delivered within half a day after onset of labour/rupture of membranes.
  
  - Educate TBAs to refer all cases with abnormal lie or labour of more than 12 hours' duration to health centre.
  
  - If a midwife is available at village level, she should be trained to use the partograph.

- **At health centre level:**
  
  - Prevention by training midwives in proper management of labour:
    - by using partograph
    - by referral to first referral level if partograph is abnormal or cervical dilatation is <1 cm/hour in active phase of labour over a period of 4 hours.
  
  - When a woman presents with prolonged labour, look for signs of infection, malpresentation, disproportion, obstructed labour and fetal distress:
    - if above present, refer woman to first referral level accompanied by a midwife and a potential blood donor (start IV fluid, antibiotics catheterization - see section on obstructed labour)
    - if above absent, and cervical dilatation is >3 cm and head is 4/5th or less above the brim, rupture the membranes, reassess progress in 4 hours and refer to first referral level if cervical dilatation is <1 cm/h.

- **At first referral level:**
  
  - Prevention and early detection by proper management and assessment of labour through the use of the partograph.
  
  - Assess for fever, foul vaginal discharge and abdominal pain:
    - if infection is suspected, do culture of endocervical discharge and start antibiotics treatment and intravenous infusion as appropriate
  
  - Assess for malpresentation, disproportion, obstruction and fetal distress:
    - if present, do caesarean section
    - if not, try oxytocin augmentation and review every 3 hours for a maximum of 6 hours.

---

Aim to deliver a woman within 18 hours of onset of labour.
5.4 Obstructed labour

- At first referral level:
  - Consult the most experienced person available.
  - Set up IV infusion, antibiotics.
    Cross-match blood and check for anaemia.
    Check renal function, electrolytes, if laboratory facilities available.
    Catheterize bladder gently and monitor urine output.
  - Assess presentation and signs and symptoms of ruptured uterus.
  - Determine whether to do caesarean section as judged by the experience of operator and
    findings on examination. In rare situations of severe intrauterine infection associated with
    fetal death as a result of obstructed labour, craniotomy followed by vaginal delivery may
    be considered by those with the technical skill. Repair of ruptured uterus during
    laparotomy is safer than emergency hysterectomy.
  - Provide intensive care after delivery:
    - monitor vital signs and urine output
    - monitor temperature
    - change antibiotics if initial treatment not effective after 24-48 hours
    - look for residual abscesses that require drainage via laparotomy
    - monitor status of anaemia and treat.

6. POSTPARTUM MANAGEMENT

Early diagnosis and treatment of infections are important, as is careful aseptic wound care for
caesarean section incisions, episiotomies and laceration repairs. It is also important to prevent the
unnecessary insertion of foreign materials into the vagina and to carefully remove any gauze packs
or sponges used during the repair of lacerations or episiotomies.

6.1 Management of postpartum infections, including urinary tract infections

6.1.1 Fever - or temperature >38.5°C (101.3°F) for 2 days - without focal
symptoms, e.g. cough, sore throat, dysuria, etc.

- In malarious area: standard malaria therapy with chloroquine or second line alternatives
  according to local situation and national policy.

- In non-malarious area: antipyretics for 24 hours and re-evaluate for localizing signs. If no
  response, refer to health centre, or hospital for investigation and appropriate therapy as
  indicated.
6.1.2 Urinary tract infections (see Flow Chart 2)

- **At village level** (if there is evidence of infection - frequency and painful urination):
  - if antibiotics are available, give the woman ampicillin 2 g orally (500 mg every 6 hours) daily for 10 days or sulfonamides* 4 g orally (1 g every 6 hours) daily for 10 days (if antibiotics are not available, refer).
  - increase fluid intake.
  - reassess in two days: if there is no response, refer the woman to the health centre.

- **At health centre level**:
  - Treat the woman with second choice drug such as sulfamethoxazole - trimethoprim\(^b\), 2 tablets every 12 hours for 10 days.
  - If there is no response, refer the woman to the first referral level.

- **At first referral level**: take a urine culture and sensitivity test if available, and start treatment with an antibiotic based on culture and drug availability.

---

\(^a\) **Sulfamethoxazole**:
Sulfonamide are probably safe in the first trimester although throughout the pregnancy they should be used only in absences of a suitable alternative drug. They should be avoided close to delivery because of the risk of kernicterus in the neonate.

\(^b\) **Trimethoprim**:
There are no large well-controlled studies on the use of trimethoprim and sulfamethoxazole in pregnant women. Because they both may interfere with folic acid metabolism, cotrimoxazole should be used during pregnancy only if potential benefit justifies the potential risk to fetus.

The combination of sulfamethoxazole-trimethoprim is not recommended for infants younger than two months.
Flow Chart 2

Urinary tract infections

**VILLAGE LEVEL**

Symptoms include frequency and painful urination (dysuria)

**Antibiotics available?**

- **NO** Refer to health centre
- **YES**
  - Amoxicillin 500 mg every 6 hours for 10 days or sulfonamides 1 g every 6 hours for 10 days
  - Increase oral fluid intake.

**Clinical response in 2 days?**

- **NO** Refer to health centre
- **YES** Monitor postpartum progress

**HEALTH CENTRE LEVEL**

**Second level drug available?**

- (sulfamethoxazole-trimethoprim)

- **NO**
- **YES**
  - Treat with second level drug e.g., sulfamethoxazole-trimethoprim 2 tablets every 12 hours for 10 days

**Clinical response in 2 days?**

- **NO**
- **YES**

**FIRST REFERRAL LEVEL**

Urine culture and sensitivity test

- Antibiotic based on culture and drug availability.

- Continue antibiotics for seven days
6.1.3 Puerperal sepsis (see Flow Chart 3)

- **At village level:**
  
  - If the woman is very sick (high fever, altered consciousness, rapid pulse): give her ampicillin 3 g orally and refer her to the health centre immediately.
  
  - If the woman is not so sick and antibiotics are available:
    - give one dose of 1 g ampicillin orally, then 500 mg every 6 hours
    - increase her fluid intake
    - reassess in 24 hours: if there is a response, continue ampicillin 500 mg every 6 hours for 4-6 more days; if there is no response, refer to the health centre.

- **At health centre level:**
  
  - Assess for signs of shock, septicaemia, anaemia, and treat accordingly.
  
  - Perform an abdominal examination for uterine size.
  
  - Check for uterine haemorrhage and control it.
  
  - Start antibiotics: 2 million units penicillin IV or IM every 6 hours or ampicillin 500 mg IV or IM every 6 hours plus gentamicin 80 mg IV or IM every 8 hours plus metronidazole 500 mg every 6 hours orally. Giving penicillin with gentamicin and metronidazole provides the broadest coverage.
  
  - Give IV fluids: 1 litre of 5% dextrose in saline or normal saline quickly, followed by 3000 cc every 24 hours.
  
  - Check vital signs and urinary output every 6 hours.
  
  - Reassess in 24 hours: if there is no improvement refer her to the hospital; if there is improvement, continue intravenous antibiotics for 3 days and then discontinue IV. At this point, if the woman is much better, send her home on oral antibiotics for 4-7 days, after having checked her haemoglobin level and given her treatment for any anaemia found. If the area is malarious, treat her according to the local situation and national policy. Inform her to return if she develops fever, vaginal bleeding or abdominal pain. If the woman is not better after three days on intravenous antibiotics, refer her to the first referral level.

- **At first referral level:**
  
  - Perform a physical examination to rule out pelvic abscesses, pelvic thrombophlebitis, anaemia.
  
  - Take a culture and sensitivity test on the vaginal discharge, a gram stain, and a blood culture.
  
  - Continue IV therapy, changing the antibiotics based on the sensitivity test.
  
  - Manage complications appropriately:
    - retained placental fragments
    - pelvic abscess
    - pelvic thrombophlebitis
    - anaemia.
Flow Chart 3

Puerperal sepsis

VILLAGE LEVEL

History of pelvic pain, fever, foul smelling vaginal discharge

NO

Very sick? e.g. high fever, altered consciousness, rapid pulse

YES

Antibiotics available?

YES

Ampicillin 1 g orally then 500 mg every 6 hours. Increased fluid intake.

Refer to health centre

Response at 1 day?

YES

Continue ampicillin 500 mg every 6 hours for 6 more days

Refer to health centre

NO

YES

Improved at 24 hours?

NO

Refer to first referral level

FIRST REFERRAL LEVEL

Physical exam: rule out
- pelvic abscess
- pelvic thrombophlebitis
- anaemia

Culture and sensitivity test on vaginal discharge, gram stain.

Blood culture if available.

Continue IV therapy.

Review and change antibiotics based on sensitivities.

Appropriate management of complications:
- retained placental fragments
- pelvic abscess and thrombophlebitis
- anaemia

NO

Discontinue IV.
Send home.
Oral antibiotics 4-7 days.
Check haemoglobin.
Treat anaemia.
Inform to return if:
- fever
- vaginal
- vaginal discharge
- pelvic pain

Refer
6.1.4 Infections of wounds, episiotomies and vaginal tears (see Flow Chart 4)

- At village level:
  - If there is evidence of infection (pain, swelling, wound discharge, temperature elevation or feverishness) and there is no wound fluctuance or drainage, give the woman antipyretics and/or analgesics, sitz baths for perineal wounds and reassess in three days.
  - If the woman has not improved or if from the start there was wound fluctuance or drainage, refer to the health centre.

- At health centre level:
  - Assess the wound, remove sutures, clean with peroxide, eusol or betadine, probe the wound and drain it, pack the wound if indicated with gauze soaked in eusol or saline.
  - Clean the wound daily.
  - Give the woman analgesics as needed.
  - Allow healing by secondary intent.
  - Reassess in 72 hours: if she is improving, continue care and observation; if she is not improving or worse, refer her to the hospital.

- At first referral level:
  - Re-evaluate wound status, perform surgical exploration and debridement.
  - Consider secondary suturing of wound.
  - Start antibiotic treatment.
Flow Chart 4

Infections of wounds, episiotomies and vaginal tears

**VILLAGE LEVEL**

Symptoms: pain, swelling, wound discharge, temperature elevation

- NO: Wound fluctuance or drainage?
  - NO: Antipyretics and/or analgesics. Sitz baths for perineal wound. Reassess in 3 days.
  - YES: Refer

- YES: Improved?
  - YES: Continue sitz baths until pain subsides.
  - NO: Refer

**HEALTH CENTRE LEVEL**


- Improved?
  - YES: Refer to first referral level
  - NO: Continue care and observation
6.1.5 Breast infection (mastitis, abscess) (see Flow Chart 5)

- **At village level** (if there is evidence of infection - pain, localized mass, tenderness, redness):
  
  ▶ if there is fluctuance of the breast mass, refer the woman to the health centre or hospital.
  
  ▶ if there is no fluctuance and antibiotics are available:
    - give the woman ampicillin 500 mg every 6 hours orally for 3-5 days; or IM procaine penicillin 900 000 units daily for 3-5 days
    - let the woman continue breast-feeding or express milk from the infected breast until breast-feeding resumes and support the breast with a loose fitting brassiere or sling
    - give analgesics as needed
    - reassess the woman in three days: if she has not improved, refer her to the health centre or hospital.

- **At health centre or first referral level**:
  
  ▶ Incise and drain the breast abscess.
  
  ▶ Pack the wound with gauze to help the pus drain.
  
  ▶ Give analgesics and supportive care.
  
  ▶ Continue antibiotics for a total of 10 days.

---

Breast-feeding should continue uninterrupted in the unaffected side and the baby returned to the affected side as quickly as possible.
Flow Chart 5

Breast infection
(mastitis - abscess)

VILLAGE LEVEL

Symptoms: include pain, localized mass, tenderness, redness

Fluctuance of breast mass?

NO

Antibiotics available?

YES

Ampicillin 500 mg every 6 hours orally, or IM procaine penicillin 900 000 units daily for 3-5 days.

Continue breast-feeding.
Analogesia as needed.
Supportive care: milk expression; breast support.
Reevaluate in 3 days.

Improved?

YES

Treatment complete

NO

Refer to health centre or hospital

Antibiotic Rx

Refer to health centre or hospital

HEALTH CENTRE OR FIRST REFERRAL LEVEL

Incise and drain abscess.
Pack wound.
Analogesics.
Supportive care.
Continue antibiotics for total of 10 days.
Continue breast-feeding

Refer to health centre or first referral level
7. GENERAL PREPARATIONS FOR TRANSFER OF WOMEN TO FIRST REFERRAL LEVEL

The ability to refer and transfer women requires substantial improvement. Poor or inadequate referral or transfer can delay the provision of essential services, leading to increased levels of morbidity and mortality. A clinical "scoring system" for potential need for referral would be useful.

Poor communications systems and poor transportation systems impede referral and transfer. Research is needed on the most effective and practical communications systems. Transportation would be significantly improved if a vehicle were dedicated to medical referral needs.

When transferring a woman to first referral level, health centre staff or village level providers should:

- Arrange for a potential blood donor to accompany patient;
- Arrange for a midwife or birth attendant to accompany patient;
- Give analgesics for labour pain and antipyretics for fever;
- Rehydrate the patient - preferably by intravenous infusion;
- Start antibiotics where indicated.

8. EMERGENCY TREATMENT: SEPTIC SHOCK

Septic shock is a life-threatening condition and must be managed with all urgency. Village level providers should learn to suspect potential shock early and promptly arrange for referral and transportation. All trained health care workers should be capable of detecting and managing shock by providing life supporting fluids and techniques such as cardio-respiratory support:

- Assess other causes of shock and altered consciousness:
  - Haemorrhage
  - Pregnancy induced hypertension (PIH) complications.
- Symptoms and signs:
  - Warm extremities
  - Hypotension
  - Bleeding associated with disseminated intravascular coagulation (DIC).
- Intensive care:
  - High-dose IV antibiotics
  - Aggressive and appropriate fluid replacement
  - Urinary catheterization - monitor urine output
  - Renal function studies
Cardio-respiratory support, if indicated

- Early ventilatory therapy to reduce risk of Acute Respiratory Distress Syndrome

- Control of haemorrhage if DIC present:
  - plasma administration
  - heparin

9. MANAGEMENT OF NEWBORN

In those cases when puerperal infection is apparent during the intrapartum period, the newborn will require special attention. The actions listed below represent only an overview and do not serve as a protocol.

- **At village level:**
  - Keep airways clean from infected materials and meconium with clean cloths.
  - Ensure thermal protection by wrapping the baby with warm cloths.
  - Continue breast-feeding.
  - Take the baby to the nearest health facility, as soon as possible.

- **At health centre level:**
  - Apply suction to airway to clear away infected material and meconium.
  - Give first dose of antibiotics and refer baby with mother to the hospital.
  - Ensure thermal protection and breast-feeding.

- **At first referral level:**
  - Treatment with antibiotics (ampicillin and gentamicin).
  - Supportive care.
  - Breast-feeding.

10. TRAINING AND SUPERVISION NEEDS

All health staff responsible for delivery care should be trained to:

- Prescribe and administer antibiotics and intravenous fluids;

- Monitor progress of labour including the use of the partograph and vaginal examination using aseptic technique;

- Maintain an acceptable standard of asepsis with the use of instruments and procedures related to labour, delivery and operative manoeuvres;

- Maintain inventories of drugs and equipment;
- Communicate with health professionals and with the community to facilitate supervision and mobilization of community support;

- Hold regular meetings involving all grades of health care staff, on quality of care.

11. SOCIAL MARKETING ISSUES

Antenatal care contributes to healthier mothers and healthier babies. In some areas, however, the value and quality of antenatal care is not considered as critical by clients. All levels of the health sector could help motivate a family's use of antenatal and delivery services through basic social marketing techniques.

11.1 Factors that negatively influence client attitudes towards seeking antenatal care

- The amount of time it takes to get care.
- The cost of the visit, including transportation, medications, etc.
- Service provider attitudes.
- Perceived quality of care.
- Attitudes of influential family and community members.
- Linkages between traditional and formal medical service providers.
- Level of information available to client to make informed choices about health care.

11.2 Factors that negatively influence service provider attitudes towards providing antenatal care

- Client flow.
- The timeliness of a client's visit.
- The availability of equipment, supplies, medication.
- Level of information available to service providers to make informed decisions about care, treatment and referral.
- Identifying with the community.

11.3 Methods to heighten value of antenatal care

Among clients:

- Identify knowledge, attitudes and behaviours of key audiences, including pregnant women, their husbands/partners, their other familial influencers, their community decision-makers. Educational topics should take into account cultural, religious, ethnic and linguistic factors and include self-care; recognition of risk factors, danger signs and complications and decisiveness of action; utilization of traditional and formal health care systems.
• Increase knowledge, dispel misinformation and reinforce positive attitudes through an integrated information, education and communication (IEC) activities. Focus specifically on what women and families can do themselves and what additional antenatal care can provide in order to prepare for a healthier pregnancy and safer birth.

• Improve accessibility and quality of antenatal and delivery care.

Among service providers:

• Identify knowledge, attitudes and behaviours of key health workers, including midwives, their supervisors, their other managerial influencers, their professional decision-makers. Educational topics should take into account political and social factors and include self-perception of role and responsibility; recognition of risk factors, danger signs and complications and decisiveness of action; utilization of traditional and formal health care systems; perception of client and community.

• Increase knowledge, dispel misinformation and reinforce positive attitudes of the above audiences and topics through and integrated IEC activities. Focus specifically on counselling and interpersonal skills; self-esteem; medical training.

• Strengthen the linkages between clients (and their communities) and the formal medical network by reinforcing use of formally upgraded traditional care-givers and community outreach programmes.

• Address policy, management (includes equipment, supplies and drugs) and supervision issues to enhance the role and responsibility of principal service providers.

12. RESEARCH

There is a need for research on collecting accurate and reliable data concerning the extent of puerperal infections and the characteristics and circumstances surrounding its occurrence in developing countries. Although knowledge exists for preventing and managing infection, the conditions surrounding the majority of births in the developing world - few resources, lower levels of women's education and provider training - require a more practical and universal set of protocols.

12.1 Research issues

• Problem definition
  
  ▶ Study local cultural practices to identify those that are harmful/helpful.
  
  ▶ Community-based morbidity studies.
  
  ▶ Prevalence studies of micro-organisms, and antibiotic sensitivities in various settings.
  
  ▶ Medical audit/confidential enquiries on deaths and morbidities in hospital.

• Evaluation of interventions and treatments
  
  ▶ Bleach as an effective disinfectant.
  
  ▶ Use of prophylactic antibiotics in controversial situations.
Use of proposed diagnostic criteria to guide treatment.

Use of standard treatment protocols.

- Adaptation of technology e.g.
  - Fever strips.
  - Quick culture methods.

13. INDICATORS

Mechanisms must be established for measuring the incidence of puerperal sepsis and for assessing the progress of implementing programmes to reduce the rate of infection and the risk of death associated with puerperal infection. Indicators include:

- Maternal mortality ratios from vital registration if available.
- Regular reports of cases from all hospitals and health facilities.
- Random audits of hospitals with either continuous or intermittent surveillance.
- Community cluster surveys (examples below):
  - Infection during the last delivery
  - Knowledge of signs and symptoms of infection
  - Use of the delivery kits
  - Use of TBAs
  - Facilities for delivery.

14. CONCLUSIONS

Worldwide concern about maternal health in developing countries has so far concentrated on the need to reduce high levels of maternal mortality, a major cause of which is puerperal sepsis.

Investigators who have studied maternal mortality have noted several risk factors associated with puerperal infections. These factors include women's underlying health status (e.g. malnutrition, anaemia, diabetes, STD), delivery practices (poor use of aseptic technique, lack of appropriate antibiotic therapy, poor communications and transportation systems), and predisposing intrapartum events (e.g. prolonged and obstructed labour, prolonged rupture of the fetal membranes, poor use of aseptic technique, retained products of conception).

Specific strategies and research questions revolve around service delivery.

- Antenatal care should ideally include screening for underlying risk factors such as fever and foul discharge late in the third trimester, which may suggest amniotic infection. In areas where sexually transmitted infections are common among pregnant women, screening for gonorrhoea, where resources are available, could reduce postpartum pelvic infection
significantly. Pregnant women should be taught to recognize risk factors, for example, the "breaking of waters" and what it means.

- **Labour and delivery care** must rely on aseptic technique, prompt recognition of risk factors such as prolonged rupture of the membranes or long labour, avoidance of dangerous traditional practices such as violent cord traction, use of unclean invasive procedures or routine episiotomies, and prompt referral of high-risk women to a higher level facility.

- **Postnatal care** must include monitoring for fever, foul lochia, or haemorrhage; appropriate administration of pre-packed doses of broad-spectrum antibiotics, and referral to trained medical providers.

- **Family planning programmes** may benefit the pregnant woman who could be educated to use condoms during intercourse if her partner's sexual behaviours placed her at risk of a sexually transmitted infection.

A lasting and substantial improvement in maternal care will require the cooperation of social, political, and economic systems in which women live. Illiteracy, lack of personal resources and decision-making power, and poverty of women contribute to the overall poor medical and health environment.

15. **SUMMARY OF RECOMMENDATIONS**

1. National policies regarding implementation of infection control, supplies, equipment and staffing in maternity care facilities should be reviewed in the context of the prevention and management of puerperal infections.

2. The activities proposed by the technical working group should be assessed for implementation into health care programmes through development of guidelines and training workshops.

3. Standard treatment regimes should be developed for different levels of care. Such standard instructions, in the form of flow charts, should be distributed for display as wall charts in health facilities.

4. Standard antibiotics should be made available at the village level where health workers should be trained to prescribe and administer them.

5. The essential drug list should separate antiseptics from disinfectants, and bleach (sodium hypochlorite) should be included in it.

6. First referral level facilities should have the capability to perform culture and sensitivity tests on specimens. Alternatively, suitable transport media and culture collection devices should be made available for obtaining and transporting specimens to designated laboratories for analysis.

7. Urgent attention is drawn to basic, post-basic, and in-service training of all staff in prevention and management of puerperal infection. This includes the prevention of prolonged labour through the use of the partograph by all formally trained health personnel.

8. All opportunities should be utilised to inform communities, and especially pregnant women, about STD/HIV and its effects on pregnancy and newborns; ways of prevention; recognition of signs and symptoms, and places for seeking prompt care.
9. Support, supervision and auditing of programmes should be encouraged. Quality assurance can be in the form of clinical meetings or structured maternity infection surveillance.

10. Lifelong home-based maternity cards should be promoted to facilitate recording of baseline reproductive and immunization data.

11. A research methodology work group should be formed to develop core protocols for identification of problems, evaluation of intervention and assessment of new technology.

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## Annex 2: Antiseptic Solutions

<table>
<thead>
<tr>
<th>GROUP</th>
<th>Gram positive</th>
<th>Most gram negative</th>
<th>TB</th>
<th>Viruses</th>
<th>Fungi</th>
<th>Endospores</th>
<th>Relative speed of action</th>
<th>Affected by organic matter</th>
<th>Surgical scrub</th>
<th>Skin preparation</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcohols (60-90% ethyl or isopropyl)</td>
<td>Very good</td>
<td>Very good</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
<td>None</td>
<td>Fast</td>
<td>Data varies</td>
<td>Yes</td>
<td>Yes</td>
<td>Not for use on mucous membranes</td>
</tr>
<tr>
<td>Chlorhexidine (4%) (Hibitane, Hibiscrub)</td>
<td>Very good</td>
<td>Good</td>
<td>Poor</td>
<td>Fair</td>
<td>Fair</td>
<td>None</td>
<td>Slow</td>
<td>Slight</td>
<td>Yes</td>
<td>Yes</td>
<td>Has good persistent effect</td>
</tr>
<tr>
<td>Hexachlorophene (3%) (pHisHex)</td>
<td>Good</td>
<td>Poor</td>
<td>None</td>
<td>Fair</td>
<td>Poor</td>
<td>None</td>
<td>Slow</td>
<td>Slight</td>
<td>Yes</td>
<td>No</td>
<td>Rebound growth of bacteria may occur</td>
</tr>
<tr>
<td>Iodine preparations (3%) Iodine and alcohol (tincture of iodine)</td>
<td>Very good</td>
<td>Very good</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
<td>Poor</td>
<td>Intermediate</td>
<td>Slight</td>
<td>No</td>
<td>Yes</td>
<td>Not for use on mucous membranes</td>
</tr>
<tr>
<td>Iodospheres (1:2,500) (Betadine)</td>
<td>Very good</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
<td>None</td>
<td>Slow</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Can be used on mucous membranes</td>
</tr>
</tbody>
</table>

*Note: Savlon, which contains chlorhexidine, is not listed because the concentration of chlorhexidine varies from country to country from as little as 1% to 4%.

Source: Adapted from World Federation of Health Agencies for Advancement of Voluntary Surgical Contraception, 1988 and Larson, 1988

### Alcohol Solution for Surgical Scrub

A non-irritating alcohol solution for surgical scrub can be made by adding either glycerine, propylene glycol or Sorbitol® to the alcohol (2 ml in 100 ml 60-90% alcohol solution) (Pierce, 1990). Use 3 to 5 ml for each application and continue rubbing the solution over the hands for about 2 minutes, using a total of 5 to 10 ml per scrub (Larson, 1989 and Potter, 1980).
### ANNEX 3: Preparing and Using Chemical Disinfectants

<table>
<thead>
<tr>
<th>Disinfectant (common solution or brand)</th>
<th>Effective concentration</th>
<th>How to dilute</th>
<th>Skin Irritant</th>
<th>Eye Irritant</th>
<th>Respiratory Irritant</th>
<th>Corrosive</th>
<th>Leaves residue</th>
<th>Time needed for HLD</th>
<th>Time needed for sterilisation</th>
<th>Activated shelf life</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcohol</td>
<td>60-90%</td>
<td>Use full strength (can dry skin)</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Do not use</td>
<td>Do not use</td>
<td>Change weekly; daily if heavily used; sooner if cloudy</td>
<td></td>
</tr>
<tr>
<td>Chlorine</td>
<td>0.5%</td>
<td>Dilution procedures vary³</td>
<td>Yes (with prolonged contact)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>20 minutes</td>
<td>Do not use</td>
<td>Change daily; sooner if cloudy</td>
</tr>
<tr>
<td>Formaldehyde (35-40%)</td>
<td>8%</td>
<td>1 part 35-40% solution to 4 parts boiled water</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>20 minutes</td>
<td>24 hours</td>
<td>Change every 14 days</td>
</tr>
<tr>
<td>Glutaraldehyde (Cidex®)</td>
<td>Varies</td>
<td>Varies: read instructions on container</td>
<td>Yes</td>
<td>Yes vapours</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>20 mins at or above 25°C</td>
<td>10 hours for Cidex®</td>
<td>Change every 14 days; sooner if cloudy</td>
</tr>
<tr>
<td>Sporicidin®</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>20 mins at or above 20°C</td>
<td>Do not use Sporicidin®</td>
<td></td>
</tr>
<tr>
<td>Hydrogen Peroxide (30%)</td>
<td>6%</td>
<td>1 part 30% solution to 4 parts boiled water</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>30 minutes</td>
<td>Do not use</td>
<td>Change daily; sooner if cloudy</td>
</tr>
<tr>
<td>Iodophors (10% providone Iodine-PVI)</td>
<td>Approximately 2.5%</td>
<td>1 part 10% PVI to 3 parts water</td>
<td>No⁵</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Do not use</td>
<td>Do not use</td>
<td>Change daily</td>
</tr>
</tbody>
</table>

1. Alcohol and iodophors are not high level disinfectants (HLDs); however, they can be used as intermediate-level disinfectants. For this purpose, soak for 20 minutes.
2. All chemical disinfectants are heat and light sensitive and must be stored appropriately.
3. See instructions on preparing chlorine solutions.
4. Different commercial preparations of Cidex and other glutaraldehydes (e.g. Wavicide) are effective at lower temperatures (20°C) and have a longer activated shelf life (always check manufacturers instructions).
5. Except in people with allergies to iodophors.

*Source: Adapted from Wenzel, 1987*