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# ESSENTIAL OBSTETRIC FUNCTIONS AT FIRST REFERRAL LEVEL

Report of a Technical Working Group,  
Geneva, 23-27 June 1986



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ESSENTIAL OBSTETRIC FUNCTIONS AT FIRST REFERRAL LEVEL  
to Reduce Maternal Mortality

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## 1. INTRODUCTION

Complications related to pregnancy and childbirth kill 500,000 women each year. A sharp difference exists between the developed and developing countries. Only 1 per cent of the maternal deaths occur in the 26 per cent of the world's population who live in developed countries. In contrast, the number of maternal deaths each day in India alone exceeds the number of maternal deaths in all developed countries in one month. Maternal mortality rates between 5 and 30 per 100,000 births are common in developed countries. In the developing countries however, maternal mortality may reach 1,000 per 100,000 births. Anaemia, haemorrhage, eclampsia, infections, abortions and the complications of obstructed labour account for most of the maternal deaths in most developing countries. Deaths on this scale may be horrendous, but they represent only a small proportion of the total morbidity traceable to the same causes. To this must be added also the suffering which affects the bereaved families, particularly the children who are left behind. As more data have become available over the last decade or so, and strengthened by the common purposes and priorities expressed in recent UN Conference on Population and at the end of the Womens' Decade, the World Health Organization has become increasingly concerned and active about this problem. Supported by the United Nations Fund for Population Activity (UNFPA), WHO has initiated, in all regions, a programme of activities which include collection, analysis and dissemination of information on maternal mortality and coverage of maternal health care. Maternal mortality research projects have been supported in fifteen countries so far. As part of this programme WHO convened, in November 1985, an Interregional Meeting on Prevention of Maternal Mortality, where information from many parts of the third world was presented on the extent, causes and the circumstances surrounding maternal mortality and morbidity. The meeting brought together over forty health professionals, researchers and policy-makers from twenty-six countries and agencies. The summary report<sup>1</sup> is contained in document WHO/FHE/86.1 and the full proceedings will be published shortly.

After considering the extent and causes of the problem the meeting made recommendations for actions, in four main categories: (i) policy initiatives; (ii) programmes of maternal health care and family planning; (iii) training; and (iv) research.

Recommendations arising from a consideration of the circumstances surrounding many of the maternal deaths in the numerous studies presented at the meeting, dealt with the role of the health services, their availability, appropriateness and utilization. These recommendations not only endorsed and encouraged efforts to train Traditional Birth Attendants (TBA) and to provide within Primary Health Care (PHC) effective prenatal care, but also addressed the first referral level, at which many of the deaths occurred. By this first referral level is meant the district or sub-district hospital or health centre, to which a woman identified prenatally as definitely high risk is referred, or to which a woman is usually sent when she is in serious difficulty or emergency in pregnancy, childbirth or immediately after. There were certain "essential obstetric functions" which can only be performed at this level, most of them life-saving procedures in emergencies, and it is for the lack of one or more of these that most of the maternal deaths actually happened. Although these deficiencies were often only the proximate, not the fundamental, causes of maternal deaths, they represented a failure on the part of the health services to seize the last chance to save the woman. Seven essential obstetric functions at the first referral level were identified, namely:

- (1) to perform caesarean section
- (2) to give an anaesthetic
- (3) to give blood transfusion
- (4) to perform vacuum extraction
- (5) to carry out suction curettage for incomplete abortion
- (6) to insert inter-uterine devices
- (7) to perform tubal ligation or vasectomy



The interregional meeting recommended that WHO should convene a small working group in order to define more completely the essential obstetric functions at the first referral level necessary for the reduction of maternal mortality and morbidity; and to describe as specifically as possible what were the main indispensable requirements in order to carry out these functions, in terms of staff, training and supervision, physical facilities, equipment and supplies.

Therefore, in June 1987, WHO convened a Technical Working Group (TWG) on Essential Obstetric Functions at the First Referral Level with these terms of reference. The TWG re-classified these functions as follows:

1. Surgical functions
2. Anaesthetic functions
3. Medical treatment functions
4. Blood replacement
5. Manual and/or assessment functions
6. Family planning support functions
7. Management of women at high risk (e.g. maternity waiting homes in villages)
8. Neonatal special care

The last named was added in parenthesis, so to speak, because although it is clearly not for the purpose of reducing maternal mortality, it is difficult to imagine a facility which provides maternal health care at first referral level without provision of some special care for newborns, many of whom may not be in optimal condition for much the same reasons which put their mothers at risk. Thus the requirements for such care needed to be included for practical planning purposes.

In order to support effectively the primary care level, these functions must be carried out at the most peripheral level at which they can be undertaken safely and effectively. The central focus of this report is the situation in developing countries and in particular in their rural areas, because this is where, as the research studies considered clearly showed, the major part of the problem is most acutely encountered. This emphasis underlies two particular points about this report. The first is the designation of this level of care as the "first referral level", rather than employing "hospital, first class health centre" or any other such term which would prejudice the issue. The second feature is that the functions, tasks and skills needed in the management of obstetric complications are described, and this avoids using the job titles of particular kinds of health workers, again prejudging issues which should be decided at the country level. Nevertheless, the general levels of health workers considered appropriate to carry out these functions are indicated.

Having stated the essential functions and tasks at the first referral level of health care, the materials and personnel needed to prevent so many unnecessary deaths from haemorrhage, anaemia, infections, abortion, eclampsia and obstructed labour are considered. Physical facilities, essential equipment, supplies and drugs are described and the requirements are listed in five annexes. Implicit in the recommendations is the need for supervision, evaluation and operational research, as well as financial considerations.

This report is directed to those decision-makers at local, national, and international level who are concerned with the planning, financing, organization and management of maternity care services. The guidelines provided in this report should make it possible to determine how, and how far it may be possible to extend the functions of the first referral level to more peripheral levels than at present exist. This may involve the upgrading of both staff and facilities where feasible and affordable, or may only require the extension of the skills of certain cadres of health workers, together with a quite modest addition of equipment and/or supplies and redeployment of space. The severe economic constraints faced by many countries is a major background consideration in the preparation of these guidelines. Every effort is made to include only the truly essential and indispensable requirements.



Not included here is any description, except by implication, of the requirements of the primary maternal health care system. This is not omitted because the group thought it as in any way of lesser importance, but because the terms of reference of the group concern essential obstetric functions at the first referral level. The definition of these functions implies that there exists also a primary level of care in the family and the community, and that at this level such functions are carried out as prenatal examination, screening for high risk, primary and secondary prevention of certain conditions, treating such conditions as anaemia before they become so serious as to threaten safe childbirth, health education, counselling, and domiciliary delivery by trained persons (whether nurse, midwife or trained TBA) of women who desire it and are not at high risk. All these are the very foundation on which the essential obstetric functions at first referral level should rest: but it would have been outside the terms of reference of this group to enter into any comprehensive description of this system of primary maternal health care. The reader can find a description of at least the component elements in a number of other publications.

## 2. MATERNAL HEALTH CARE IN DEVELOPING COUNTRIES

When, as at the Interregional Meeting on Prevention of Maternal Mortality mentioned above, the circumstances in which most maternal deaths occur are examined, one striking feature is that a considerable majority of these came from rural areas, to an extent quite out of proportion with the rural/urban distribution of the populations in question. As one investigator put it succinctly "There are two notable features of the women who died in our obstetric service: they came from far, and they arrived too late."

To substantiate this statement the reader is referred to the summary report of the above meeting and to the Proceedings of the meeting (in press) and many of the actual study reports therein or to fuller accounts of these studies published elsewhere e.g. that of Kwast in Addis Ababa<sup>2</sup> and that of Harrison in Zaria, Northern Nigeria<sup>3</sup> or that of Khan et al. in rural Bangladesh<sup>4</sup>. There will be found the general background of illiteracy, poverty, malnutrition, inadequate sanitation and water supply, socio-cultural problems, often relating especially to women's status, and adverse traditional attitudes and practices which will be familiar to all who have lived and worked for any length of time in the rural areas of developing countries. Most significantly from the point of view of this report, such studies show the high proportion (suspected, estimated or actually documented) of maternal deaths which occur either at home, without trained assistance, or actually en route to a district hospital. Thus, while it is quite true that the general features of poverty and deprivation mentioned above contribute considerably to the high maternal mortality rates, as does also the inadequate availability of preventive health services such as prenatal care, examination of the immediate causes of death and the circumstances in which they occur vividly demonstrates a grave problem for most rural women of access to life-saving procedures in emergencies during childbirth.

It was just such evidence which led the Interregional Meeting of November 1985 to conclude that, although this problem was far from being the sole cause of high maternal mortality rates in these rural areas, it was one of the most important reasons, and yet at the same time had not so far received anything like the specific attention which it deserved.

The TWG believes that improvements in the quality of obstetric care at this first referral level are necessary, achievable and affordable, in spite of the economic constraints faced by many nations. China, Chile, Cuba, Costa Rica, Korea and Singapore, are examples where the transformation of health services has brought about a considerable reduction in maternal mortality.

There can be no substitute for a well organized system of maternity care with the following characteristics:



1. Total population coverage, which means that every pregnant woman should receive essential prenatal care from trained personnel.
2. All complicated deliveries must be attended by trained health personnel in a suitable facility.
3. Facilities for this purpose must be accessible and equipped to tackle pregnancy complications most commonly associated with maternal deaths.
4. Family planning, as an essential part of total health care, must be provided in an appropriate manner in all preventive and curative programmes.
5. Transport must be managed efficiently in order to support the primary level, for supervision, supply and for referral in emergency.
6. The health facility must be made to function in such a way that the people it serves have confidence in it as well as in the system of health care it represents.
7. Records of births, maternal deaths, perinatal deaths, contraceptive acceptance and use, must be kept in a form which will permit periodic analysis of the data with the aim of assessing performance, and planning steps for improvement.

### 3. THE ESSENTIAL OBSTETRIC FUNCTIONS

#### 3.1 The essential obstetric functions related to major causes of maternal mortality

The formulation of eight groups of essential obstetric functions in relation to the major causes of maternal mortality are shown in Table 1.

The eight groups are:

1. Surgical functions
2. Anaesthetic functions
3. Medical treatment functions
4. Blood replacement
5. Manual/assessment functions
6. Family planning support functions
7. Management of women at high risk
8. Neonatal special care

The order in which the eight groups are presented is not indicative of their ranking in importance. In each group the tasks outlined have all been related to either the prevention or management of the major causes of maternal death. In this way, the interdependence of, or the interrelationship between, each group and its tasks become evident. Almost all causes of death are interrelated, and priorities for implementation of interventions can be made according to the ranking of the major causes of death prevailing in an individual country. Health planners have an option to adopt some groups or expand others, and not necessarily all at the same time, so as to effect a gradual build-up for improvement of maternal health care at first referral level.

#### 3.2 Requirements for essential obstetric functions

In planning the improvement or expansion of obstetric services, it is necessary to be clear about the specific skills of health staff, the facilities, the special equipment, and the essential drugs and supplies for these essential obstetric functions. In Table 2, these requirements have been summarized for each of the essential functions, together with guidelines for the level or kinds of staff who are considered capable of being trained to carry out the functions. Indications of the tasks are included.

Important points relating to specific practice and linkage between primary, secondary and tertiary level in the health care system have been included in the column 'Remarks' and are therefore not necessarily repeated in the main body of the text. The same applies to requirements of staff and facilities. More complete lists of requirements are included in Annexes 1 to 5.



**TABLE 1**  
**EIGHT GROUPS OF ESSENTIAL OBSTETRIC FUNCTIONS**  
**RELATED TO THE MAJOR CAUSES OF MATERNAL MORTALITY**

**MAJOR CAUSES OF MATERNAL MORTALITY**

| ESSENTIAL OBSTETRIC FUNCTIONS   | Obstructed Labour   | Ruptured Uterus | Antepartum Haemorrhage | Postpartum Haemorrhage and Retained Placenta | Abortion | HDP | Puerperal or post-abortion sepsis | Ectopic Pregnancy | Severe Anaemia |
|---|---|-----------------|------------------------|--|----------|-----|-----------------------------------|-------------------|----------------|
| <b>GROUP 1 - SURGICAL FUNCTIONS</b><br>- <u>Caesarean section</u><br>- Surgical treatment of sepsis<br>- Repair of high vaginal and cervical tear<br>- Laparotomy for repair of ruptured uterus<br>- Removal of ectopic pregnancy presenting as acute abdomen<br>- <u>Evacuation of uterus in uncomplicated abortion</u><br>- Oxytocin intravenous infusion for augmentation of labour<br>- Amniotomy with/without I.V. oxytocin infusion |   |                 |                        |  |          |     |                                   |                   |                |
| <b>GROUP 2 - ANAESTHESIC FUNCTIONS</b><br>- <u>General anaesthesia</u>  |   |                 |                        |  |          |     |                                   |                   |                |
| <b>GROUP 3 - MEDICAL TREATMENT FUNCTIONS</b><br>- Treatment of shock<br>- Intravenous total dose iron infusion<br>- Medical treatment of sepsis<br>- Control of hypertensive disorders of pregnancy and eclamptic fits  |   |                 |                        |  |          |     |                                   |                   |                |
| <b>GROUP 4 - BLOOD REPLACEMENT</b><br>- <u>Blood typing, cross-matching and transfusion</u>   |   |                 |                        |  |          |     |                                   |                   |                |
| <b>GROUP 5 - MANUAL AND/OR ASSESSMENT FUNCTIONS</b><br>- Manual removal of placenta<br>- <u>Vacuum extraction</u><br>- Partograph   |   |                 |                        |  |          |     |                                   |                   |                |
| <b>GROUP 6 - FAMILY PLANNING SUPPORT FUNCTIONS</b><br>A. <u>Surgical family planning</u><br>- tubal ligation<br>- vasectomy<br>B. <u>Intrauterine device (IUD)</u><br>C. Norplant<br>D. Other contraceptives  | PREVENTION OF UNPLANNED/UNWANTED PREGNANCIES LEADING TO MANY OF THE MAJOR CAUSES OF MATERNAL MORTALITY                          |                 |                        |  |          |     |                                   |                   |                |
| <b>GROUP 7 - MANAGEMENT OF WOMEN AT HIGH RISK</b><br>- Maternity "Villages" or Homes  | TO PROVIDE A PLACE AT WHICH WOMEN AT HIGH RISK OF COMPLICATIONS CAN WAIT AND RECEIVE SUPERVISION DURING LAST MONTH OF PREGNANCY |                 |                        |  |          |     |                                   |                   |                |
| <b>GROUP 8 - NEONATAL SPECIAL CARE</b><br>- Resuscitation<br>- Thermal control<br>- Feeding   | FOR PREVENTION AND TREATMENT OF ASPHYXIA NEONATORUM, NEONATAL HYPOTHERMIA AND HYPOGLYCAEMIA                                     |                 |                        |  |          |     |                                   |                   |                |

NOTE: Underlined above are the seven functions identified by the Interregional Meeting of November 1985

**TABLE 2**  
**REQUIREMENTS FOR ESSENTIAL OBSTETRIC FUNCTIONS**  
**AT FIRST REFERRAL LEVEL**

| Function                                      | Indications  | Level of skills required   | Facilities and additional functions   | Special equipment or supplies                                 | Remarks   |
|---|--|--|---|---|---|
| <b>GROUP 1 - ESSENTIAL SURGICAL FUNCTIONS</b> |  |  |   | (see Annex)   |   |
| Caesarean section                             | Frequent and life-saving; indications include:<br>(a) CPD<br>(b) APL<br>(c) Previous difficult operative vaginal delivery<br>(d) Previous VVF<br>(e) Malpresentation, especially transverse lie. | (a) Specifically trained in the skills required, could be obstetrician, general duty medical officer, medical/clinical officer or medical assistants or professional midwife;<br>(b) The decision about when and which health worker can perform CS should be made by the health authorities and professional bodies of each individual country;<br>(c) This decision should be based on:<br>(1) availability of different kinds of manpower;<br>(2) the number of CS required;<br>(3) availability of transport for referral;<br>(4) properly conducted and evaluated health system research acceptable to professional bodies and the community. | Anaesthesia<br>Blood trans-<br>fusion<br>Blood substi-<br>tutes<br>Operating theatre<br>Local anaesthesia | Doyens retractor<br>Green Armitage forceps<br>(Annex 3 A + B) | (a) Number of CS required per year to maintain skills and justify expense;<br>(b) Use of partogram at primary level to facilitate early referral;<br>(c) transport;<br>(d) maternity home.  |
| Surgical treatment of severe sepsis.          | Severe sepsis with complications;<br>Peritonitis, septic shock.  | Ability to perform CS  | Operative facilities<br>Blood trans-<br>fusion  | Equipment for laparotomy<br>(Annex 3 A + B)                   | If tertiary level is easily accessible, referral of severe sepsis may sometimes be advisable. If renal failure, bowel-injury, tetanus or gas gangrene are present, referral to the tertiary level is imperative. Prophylactic antibiotics & fluid therapy should always be given in cases where infection can be anticipated, e.g. prolonged obstructed labour, prolonged rupture of membranes, haemorrhage and severe anaemia. This applies at all levels. |
| Repair of high vaginal and cervical tears.    | Prevent and treat excessive blood loss.  | As for CS  | Operating theatre<br>Blood trans-<br>fusion or substitute   | -   | -   |
| Laparotomy for repair of uterine rupture.     | Uterine rupture following neglected obstructed labour, previous CS or other obstetric trauma.  | (a) The minimum is the skill to perform CS;<br>(b) It should be performed by the most experienced person available as hysterectomy may be necessary.   | Operating theatre<br>Anaesthesia, including local<br>Blood trans-<br>fusion and substitutes               | -   | The need for prevention rather than treatment must be stressed.   |



| Function  | Indications   | Level of skills required  | Facilities and additional functions   | Special equipment or supplies       | Remarks  |
|---|---|---|---|-------------------------------------|--|
| Removal of ectopic pregnancy presenting as acute abdomen.           | Presenting as acute abdomen and the diagnosis is not in doubt.                                    | As for CS   | Operative facilities<br>Anaesthesia<br>local infiltration<br>Blood transfusion or substitute            | -                                   | Auto-transfusion is sometimes advantageous.  |
| Evacuation of uterus in incomplete abortion                         | Incomplete abortion   | Adequately trained in the procedures and in the recognition of complications and in giving emergency treatment.   | Sterilization<br>Blood transfusion or blood substitute<br>Anaesthesia (Analgesia)<br>Paracervical block | Vacuum aspiration is best           | (a) Digital removal of uterine products can be done at primary level as a life-saving procedure;<br>(b) Countries where septic abortion is a major cause of maternal death should review carefully the circumstances under which this occurs and adopt the most appropriate means to prevent these deaths. |
| Use of oxytocin by intravenous infusion for augmentation of labour. | For inefficient uterine action in the absence of CPD, especially in cases with APH and eclampsia. | (a) Assessment of progress of labour and exclusion of CPD;<br>(b) Carry out a vaginal examination to exclude the presence of CPD, make up solution, monitor the i.v. drip and the progress of labour. | Facilities for CS if needed   | -                                   | While the procedure itself is relatively simple, the dangers from mismanagement are serious and include uterine rupture.   |
| Amniotomy with/without oxytocin.                                    | Severe HDP<br>Eclampsia<br>APH, especially abruptio placentae.                                    | Someone who decides on and performs CS  | Facilities for CS   | Kocher's forceps or amniotomy hooks | Augmentation of labour by oxytocic infusion may be required.   |

Staff: These surgical and associated skills generally require an obstetrician or general duty medical officer but, under certain conditions, some of these tasks may be carried out by suitably trained medical assistants/clinical officers or professional midwives.

General facilities required: Operating theatre

| Function   | Indications   | Level of skills required  | Facilities and additional functions  | Special equipment or supplies   | Remarks  |
|--|---|---|--|---|--|
| <b>GROUP 2 - GENERAL OR LOCAL ANAESTHESIA</b>  |   |   |  |   |  |
| Anaesthesia general  | Operative deliveries  | Specific training in skills required.   | (a) Delivery room<br>(b) Operating theatre   | Equipment listed in text and annexes  | -  |
| <u>Staff:</u> Any doctor, professional nurse or medical assistant/clinical officer with appropriate training.<br><u>General facilities required:</u> Operating theatre.  |   |   |  |   |  |
| =====  |   |   |  |   |  |
| <b>GROUP 3 - MEDICAL TREATMENT FUNCTIONS</b>   |   |   |  |   |  |
| Intravenous total dose infusion of iron  | Severe iron-deficiency anaemia and women who have had major blood loss. | Calculate correct dose; set up i.v. infusion; detect and manage complications.  | Laboratory to test haemoglobin or haematocrit and read blood-film; Resuscitation equipment.  | Iron dextran preparation; Promethazine for allergic reactions   | -  |
| Management of severe HDP and eclampsia   | Severe HDP Eclampsia  | Measure blood pressure<br>Urinalysis<br>Set up i.v. infusion<br>Emergency treatment of convulsions<br>Recognize complications, e.g. renal failure | "Eclamptic" room   | Resuscitation equipment<br>Diazepam<br>Hydrallazine<br>Frusemide  | Primary level should be able to initiate treatment with diazepam.  |
| Management of uncomplicated sepsis   | Puerperal sepsis<br>Post-abortion sepsis<br>Mild sepsis                 | Anyone capable of conducting a delivery and allowed to give intravenous therapy   |  |   | -  |
| Management of shock due to haemorrhage   | Haemorrhage and obstetric shock   | Monitor vital functions, including urinary output.  | Blood cross-match<br>Management of cause of haemorrhage  | Blood or blood substitutes  | -  |
| <u>Staff:</u> These functions are usually carried out by doctors, but may also be carried out by professional midwives or medical assistants/clinical officers who have had adequate training.<br><u>General facilities required:</u> Maternity ward, delivery suite, operating theatre. |   |   |  |   |  |
| =====  |   |   |  |   |  |
| <b>GROUP 4 - BLOOD REPLACEMENT</b>   |   |   |  |   |  |
| Blood transfusion  | (a) Operative deliveries;<br>(b) Severe anaemia;<br>(c) haemorrhage     | Laboratory technicians or physicians or health worker, all with necessary skills.   | (a) Direct donor/patient cross-match;<br>(b) transportation of donor blood from a regional or national centre;<br>(c) maintenance of small local blood-bank. | For (a) and (b) see list of equipment in annex; for (b) refrigeration for vehicles and transportation; for (c) refrigeration. (Annex 4 A + B) | This is an absolute life-saving tool, but it carries hazards, the frequencies of most of which are not known in the obstetric practice of developing countries. The type of service required, whether (a), (b) or (c) will depend on the number of transfusions required, the availability of skills and requirement and ease of transportation. |
| <u>Staff:</u> Any doctor, health worker or laboratory worker with appropriate training.<br><u>General facilities required:</u> Laboratory.   |   |   |  |   |  |
| =====  |   |   |  |   |  |



### 3.3 Commentary on essential obstetric functions (see Table 2)

#### 3.3.1 Group 1 - Surgical functions

Caesarean section: Caesarean section, together with the circumstances surrounding it, holds one of the most important keys to the whole question of maternal mortality in developing countries. On the one hand, the maternal pregnancy complications necessitating caesarean sections (e.g. obstructed labour, antepartum haemorrhage and severe pregnancy-induced hypertension) are among the commonest causes of maternal mortality. On the other hand, caesarean section performed for neglected emergencies necessarily has a much higher mortality than elective caesarean section or those performed in less dire circumstances.

Morbidity and mortality after this operation depend to a very large extent on the state of health of the woman who is to undergo the operation and on the condition of the fetus in utero just before the operation is performed. If a pregnant woman develops a complication, and yet the condition of the baby in utero is still good, this means that the complication is at an early stage, and that its effects are not sufficiently serious to impair either maternal or fetal health. If the operation is performed at this stage, there will be fewer technical problems, anaesthesia will be straightforward, blood loss will be minimal and for its replacement, intravenous fluids will suffice and blood transfusion will probably not be needed. Most elective caesarean sections and about half of all emergency caesarean sections come under this category. Caesarean section is comparatively easy to perform under these circumstances. Even in the hands of health personnel with limited operative skill, the operation is quite safe, and afterwards, post operative complications will be few and even when such complications develop the chances are that they will not threaten the life of the affected woman. However, when a pregnant woman develops a complication needing operative delivery she may be dehydrated and acidotic, and the complication may be advanced. In this case there is every likelihood that the operation will be technically difficult to perform, and the risks from this source and from complications afterwards, will be high. Under these circumstances, the most experienced health personnel available must perform the operation. If the operation is being performed to relieve obstructed labour, haemorrhage is likely to be profuse, and to arrest it, hysterectomy might even be required. Afterwards, pelvic sepsis, peritonitis and paralytic ileus may all prove fatal. Injury to the bladder and ureters are additional hazards and such injuries may result in urinary incontinence and even death. There are additional dangers for women who are undergoing repeated caesarean sections. Intra-abdominal adhesions resulting from a previous caesarean section may distort the anatomical relationships in the area around the uterus and thus complicate the operation.

If efficient primary obstetric care with a functioning referral system exists, it will add considerably to the safety of caesarean section. This safety will be enhanced by the use of partographs for monitoring labour, especially in the presence of cephalopelvic disproportion (see notes on the partograph later in this chapter).

Instruments for caesarean section are listed in Annex 3 A under standard laparotomy set, to which must be added the special instruments shown in Table 2.

Surgical treatment of sepsis: This operation ranks among the important life-saving surgical functions. It may involve more than drainage of pelvic abscess. When adhesions are present in the peritoneal cavity the risk of injury to bowel or bladder is quite high. If, however, renal failure, bowel injury, tetanus or gas gangrene are present, referral to tertiary level is imperative.

Repair of high vaginal and cervical tear: The operation is fairly straightforward unless the cervical tear extends upwards to involve the lower uterine segment in which case, a hysterectomy may be the only means of controlling the bleeding.

Laparotomy and treatment of uterine rupture: Some comments have been made on the subject of uterine rupture in discussing operative deliveries in relation to obstructed labour. In places where pelvic contraction is common, and the standard of obstetric care is poor, especially at the community level, the health services can expect to handle one case of uterine rupture for every twenty caesarean sections. Whether the operative treatment is by



repair of the rupture or by hysterectomy, the maternal mortality rate associated with this complication can be as high as 20 per cent. As in the case of caesarean section, women who have received full prenatal care rarely die from uterine rupture.

Removal of ectopic pregnancy presenting as acute abdomen: Delay in treatment is particularly dangerous, and death can only be averted by arresting haemorrhage through the removal of the ectopic pregnancy, securing haemostasis and replacing the blood loss.

Evacuation of uterus in abortion: Much of the statement made about the need for rapid removal of the placenta or retained products of conception (see page 21) also applies to cases of incomplete abortion, whether these are induced or spontaneous. Once evacuation is complete, rapid recovery is usual in the majority of cases. Continuing ill health after evacuation points to the fact that the abortion is complicated, and that there might even be serious injuries to the genital tract, and even to the urinary bladder and gut in case of illegal abortions. In such cases care in well-equipped hospitals is necessary if the affected woman is to survive. The essential instruments for evacuation of uterus are listed in Annex 3 F.

Intravenous oxytocin infusion for augmentation of labour: Treatment by oxytocin infusion should only be carried out in a facility which is equipped to perform caesarean section. The safety of this procedure depends largely on the dosage. The most dangerous complication of the use of oxytocin infusion is uterine rupture.

Amniotomy with/without intravenous oxytocin: Suitable instruments are necessary for this relatively simple procedure to be performed efficiently. Even so the danger at this stage is to the fetus because of cord prolapse. Maternal risk associated with this procedure is intrauterine infection, which is not difficult to prevent by the use of prophylactic antibiotics.

Craniotomy: This obstetric operation merits discussion here as it might save a woman's life as an alternative to caesarean section in certain areas and circumstances. Craniotomy is performed mainly to relieve obstructed labour due to cephalopelvic disproportion in cases where the baby is dead. However, the maternal death rate associated with craniotomy is one of the highest in operative obstetrics and it must never be undertaken lightly. The degree of technical skill needed to perform this operation with safety is in general greater than that which is required for uncomplicated caesarean sections. Uterine rupture may complicate the operation, requiring immediate laparotomy and thus greatly increase maternal mortality. For all these reasons and because, as obstetric services improve, need for craniotomy decreases rapidly, it is not included as an essential obstetric function here. (Items for this operation are listed in Annex 3 E, however, recognizing that sometimes, in a few countries, the circumstances are so adverse, but the operative skills are sufficient and the indications are sufficiently frequent, that the operative skills required can be maintained through use.)

Symphysiotomy: Symphysiotomy (not included in Tables 1 and 2), is a useful alternative to caesarean section in geographical areas where cephalopelvic disproportion is common. In places where women may not return for future delivery after caesarean section, the advantage of symphysiotomy is that by leaving the uterus intact, it avoids future obstetric deaths from rupture of uterine scars. However, there are significant orthopaedic hazards, pain on walking and abnormal gait, and the procedure should never be done unless the operator is skilled in the technique. Eventually symphysiotomy should be completely abandoned in favour of caesarean section.

### 3.3.2 Group 2 - General anaesthesia

When discussing general anaesthesia, a clear distinction must be made between the problems of anaesthesia in women in good physical condition and the problems in those who, in spite of being in poor physical condition, still require general anaesthesia. In the former, the essential features to be observed are the maintenance of a clear airway, the avoidance of hypertension and the replacement of blood loss by intravenous infusions, blood substitutes, or by whole blood.



the attendant risk of serious transfusion reactions. The decision to transfuse with blood or its products, rather than employing plasma expanders, should be based on sound physiologic grounds given the dangers of the former.

Solution to these problems of blood donation, storage and maintenance of adequate supplies can be made to apply at three levels. In the case of rural hospitals, blood grouping and direct cross-match of the recipient and donor blood, and the immediate transfusion of the donor blood may be all that can be possible. The equipment needed is listed in Annex 4 B. The immediate and especially the remote risks of transfusion are considerable. It is under these circumstances that disease transmission is a real risk, especially in places where syphilis, hepatitis B viral infections and AIDS are common. In many parts of Africa, the carrier rate for hepatitis B virus is as high as 10 per cent compared to only 0.1 per cent in developed countries. Most diseases transmitted through blood transfusion are manifest several weeks or months after the transfusion, so, when hazards such as hepatitis occur the patients seek help or die elsewhere without being seen by the health workers who were responsible for the initial blood transfusion.

Another option is to maintain a small storage facility at the first referral level. Domestic refrigerators are suitable for this purpose, but refrigerators which open at the top are preferable to cabinet refrigerators.

For maximum safety, there is no doubt that the establishment of a national blood transfusion service, with blood banks at tertiary hospitals is the best prospect. Blood from this source can then be transported at weekly intervals to replenish the stocks held in domestic refrigerators in the first and second referral hospitals. The success of this scheme relies heavily on the development of basic infrastructure, particularly transportation, and on sophisticated technical support.

### 3.3.5 Group 5 - Manual and/or assessment functions

The tasks of group 5 include manual and assessment skills which, even though they are part of surgical skills, do not need the same level of specific skills as required for group 1. Vacuum extraction and forceps delivery, even though not life-saving for the mother, play a role in prevention of morbidity and can be life-saving for the fetus.

Manual removal of placenta: The need for this life-saving procedure can arise following any vaginal delivery, and the TWG recommended that midwives should be trained to carry it out. The longer the placenta is retained, the greater are the hazards, death in these cases being due to shock from haemorrhage and infection. The best results are obtained where manual removal of the placenta is carried out within the first hour after delivery.

There are, however, circumstances where the placenta may be retained for forty-eight hours or longer before the woman reports for treatment. In such cases, severe anaemia and septicaemic shock are the dominant problems, and management is best provided at the tertiary level of health care.

Vacuum extractor: Vacuum extraction is used to expedite vaginal delivery in certain circumstances where, either through physical exhaustion or in the presence of ill health (e.g. HDP), the woman in labour is unable to achieve vaginal delivery by her own efforts. Similarly, in cases where towards the end of labour, a baby shows signs of distress while it is still in its mother's womb, vacuum extraction can effect rapid delivery of the baby and so save its life. Annex 3 D lists the essential items of equipment for this procedure. In relation to maternal mortality, the vacuum extractor has one important advantage which none of the other forms of operative delivery possess. Maternal hazards of extraction are rarely fatal, whereas the same is not true of any of the other operative deliveries. Another reason for its safety lies in the fact that while undergoing this operative delivery, special preparations, including inhalation anaesthesia are not required. Adverse climatic conditions and lack of accessories may create problems in keeping the instrument in good working order.

Forceps delivery: The indications for forceps delivery are broadly speaking the same as for vacuum extraction. Low cavity forceps delivery is a good alternative to vacuum extraction.



Situations not infrequently arise where the vacuum extractor may not be in good working order when needed urgently, in which case a pair of Wrigley's forceps can be used to affect delivery of the baby. However, the degree of skill required for its use is much more than is the case with a vacuum extractor.

Partograph (labour graph): The major difficulty with the prevention of prolonged and obstructed labour is the accurate recognition of the degree of cephalo-pelvic disproportion (CPD), either antepartum or during labour. A partograph is meant to display the essential features of labour against the passage of time during the first stage of labour. The three major findings recorded on the graph are: fetal condition, labour progress, maternal condition. These provide a visual display of the progress of labour and immediately alert the attendant to abnormal development. In this way the labour graph acts as an "early warning system" for the detection of CPD. It is a useful tool in the management of labour at all levels of maternity care in many countries, and, used in peripheral clinics, has contributed to reduction of prolonged labour and its sequelae because of earlier referral than was previously the case. Its value in relation to the termination of labour by caesarean section has already been mentioned. Midwives of all levels can be taught to use and interpret partographs correctly. After implementation, continued use in the periphery with resulting reduction of prolonged labour, maternal morbidity and perinatal mortality, needs encouragement and regular supervision by the first referral level, which includes discussion of cases and feed-back on referrals.

### 3.3.6 Group 6 - Management of women at high risk

Results of supervision of pregnancy are optimal when prenatal clinics are supported by hospital beds, particularly for those women needing special care during pregnancy or labour.

Maternity "villages" or homes: A maternity village or home close to or within the grounds of the district or provincial hospital should form an important part of maternity care in a rural setting where distances are far and transportation is poor. Through health promotion and education community participation should be encouraged in building and maintaining such a home and organizing transport for referral. The home is intended for pregnant women with risk factors. The first group of such women should be those who have major obstetric abnormalities and for whom operative delivery is anticipated, but whose homes are in remote and inaccessible rural areas. Such pregnant women having received prenatal care at their local primary health centres in the first eight months of pregnancy, are then transferred to the maternity village to continue receiving prenatal care, and to await either elective operative delivery or transfer to the labour ward as soon as labour starts. Pregnant women with previous caesarean sections, previous repair of vesicovaginal fistula, and those at risk of obstructed labour are the commonest occupants of the maternity village. Each pregnant woman transferred from her home to the maternity village is usually accompanied by one or two relatives. The hospital should bear the cost of providing water and also fuel for cooking, as well as space for laundry. The accommodation should be self-catering to allow for differences in nutritional habits and customs.

Unpublished reports indicate that maternity villages properly run and supervised, are very effective in preventing the complications of obstructed labour, especially uterine rupture and obstetric fistulae. Unfortunately, documented reports on the work of maternity villages are rare. More attention should be focussed on this little known, but highly important area of obstetric care at the first referral level in rural hospitals, and the results should be evaluated and published.

Prenatal Care: Prenatal care is an important obstetric function at all levels of health care, primary, secondary, or tertiary, and everything possible must be done to promote it. Since it is mainly a function at the primary level, it is not mentioned further here, except to say that the first referral level, like all others, must provide it as part of its educational and preventive work; and that at this level it can sometimes serve as an example of the expected standards of quality of care and as a training centre for this activity.



### 3.3.7 Group 7 - Family planning support functions

Family planning has been included in essential obstetric functions because advances in prevention and reduction of maternal mortality from all major causes are partly dependent on progress in family planning. For example, where maternal mortality from illegal, unskilled abortion is high, contraception is the first line of defence against unwanted pregnancy, particularly those occurring in teenagers or multiparae. Delay of first pregnancy will reduce mortality and resulting morbidity from obstructed labour where this is common. High parity women often enter pregnancy at a disadvantage from repeated childbearing and are consequently at greater risk of death, e.g. anaemia, haemorrhage, sepsis and rupture of uterus, and control of grand-multiparity through appropriate family planning can be expected to reduce the number of deaths among such women.

It is clear that family planning is an essential part of total health care and must be introduced in an appropriate manner into all preventive and curative care programmes at all levels. The aim must be to make family planning services widely available and to provide a high standard of care. The latter is particularly important if acceptance and continued attendance is to be encouraged and maintained. All training schools for health professionals should ensure that their graduates have a thorough understanding of determinants and implications of human fertility, and have a high degree of competence in counselling, providing and supervising family planning services. Family planning counselling should be an integral part of prenatal and postnatal care. There are certain family planning activities however, especially those of a surgical nature, which require either to be performed at first referral level, or like IUD and Norplant insertion and even provision of oral contraceptives, should be performed at primary level but benefit from back-up and support at first referral level also. Hence their inclusion at this level is indispensable.

#### A. Sterilization

Sterilization is the most effective of all family planning methods. The procedures are relatively simple and safe and any risk must be weighed against the risk of pregnancy itself. The advantages and disadvantages must be explained very carefully in view of the virtual irreversibility of many sterilization procedures. In assessing male and female sterilization procedures it is evident that there are certain differences in the context of skills, facilities and supplies. Female sterilization requires an operating theatre, more staff, more surgical equipment and general anaesthesia. Male sterilization can be performed in less time, requires less equipment and can therefore be done also in remote rural areas.

Mini-laparotomy for tubal ligation is well established and the instruments needed are listed in Annex 3. The technical aspects of these procedures are well known and documented in a WHO publication<sup>5</sup>. Tubal ligation can, of course, be carried out in the course of a laparotomy for other reasons, e.g. in women admitted as emergencies with uterine rupture or women undergoing caesarean section.

Fears still exist about contraception, more so about vasectomy than in any of the other methods. Therefore comprehensive counselling is especially important in readily understandable terms. Essential information for couples contemplating sterilization by vasectomy should include details and effects of the operation, post-operation fertility, tests for sterility and post-operative contraception. Equipment for vasectomy is listed in Appendix 3 I. WHO Guidelines for vasectomy are in press.

Clinical services for induced abortion have not been mentioned separately in Group 7. Whether such services should be provided depends entirely on the individual country's laws, national health policies, priorities, needs and resources. Requirements of skills and facilities will correspond to those listed in Group 1 under evacuation of uterus in uncomplicated abortion. Detailed information on provision of care and services for induced abortion are available in a WHO publication<sup>6</sup>.

#### B. Intra-uterine contraceptive device



C. Norplant

D. Other contraception (oral)

For family planning services to reach the whole community they must be widespread. Insertion of IUDs, distribution of oral and barrier contraceptives should, of course, not be limited to secondary care. However, they have been recommended here as an essential function at first referral level for two reasons: firstly, to emphasize the availability of services where appropriate facilities at primary care level do not exist; secondly, to provide clinical back-up services for a peripheral family planning programme.

The skill of the person performing the IUD insertion, the quality of counselling, selection, reassurance and follow-up are important determinants for the success of an IUD programme. Studies from developed and developing countries show that nurses, midwives, PHC-workers and rural village midwives can perform routine IUD insertion very well. For further details, see Table 2.

The insertion and removal of Norplant requires appropriate clinic facilities. Information should be given on all aspects of the method, including access to removal, the procedure itself and alternative methods of continued contraceptive protection. Health care providers, both doctors and other health personnel can easily be trained to insert and remove the capsules<sup>7</sup>.

Aseptic techniques must be observed for insertion of IUD or Norplant and will thus form one of the conditions for the health care facility in relation to provision of these family planning procedures.

Requirements for IUD insertion are listed in Appendix 3 G. Guidelines on IUD and oral contraception have been written up extensively by WHO<sup>8,9</sup>. WHO Guidelines on the implantation and removal of Norplant are in preparation.

3.3.8 Group 8 - Neonatal special care

Neonatal special care has been included as maternal and newborn care are inseparable in the discussion on requirements for essential obstetric functions. When wishing to up-grade maternity care at this level, it would be unrealistic in practical terms if the planner did not consider at the same time the requirements for looking after the newborn, often in sub-optimal condition when these have survived as the products of high risk pregnancies or complicated labours.

Some neonates - particularly those which are premature, dysmature or have been subject to stress in obstructed labour - may suffer from severe asphyxia and are particularly vulnerable to environmental temperatures below 20°C, which may result in hypothermia. These conditions are mutually aggravating and can in turn result in neonatal hypoglycaemia. Prompt and efficient resuscitation and maintenance of body temperature are essential, not only for survival of the infant but also for the prevention of sequelae from birth trauma. For this reason basic resuscitation equipment in good working order must be available in the labour ward, together with an oxygen supply and a heat source. All health professionals should be trained in newborn resuscitation methods as the quality of life of the infant depends on proficient resuscitation.

4. IMPLEMENTATION

4.1 General remarks

Decisions on the implementation of any or all of the recommendations in any particular country will depend upon circumstances at national, regional and local levels. Needs vary between and within countries both in terms of the size of the maternal mortality problem and the relative importance of the different causes. Septic abortion is a major cause of maternal death in many countries and requires serious consideration of the ways of



preventing it. In other countries, that may not be a problem, others like obstructed labour or eclampsia may be more important. Differing emphasis, therefore, may need to be given to individual functions.

Population density, the size and distribution of settlements, communications, and the availability of transportation vary from place to place and the types and numbers of different health staff available at present will all determine the ways in which the extension of essential obstetric services through a first referral level is implemented. The most important of these considerations are discussed below.

#### 4.2 Health manpower

The recommendations of this report are based on two familiar but important axioms. First, that health services should be made available as close to people's homes as possible, and second, that any health care procedure should be carried out by the least trained person who is competent to perform it safely and effectively.

The grouping of the essential functions according to the levels and types of skills required is considered very important because it allows a more rational allocation of functions to different types of health personnel. In some countries, for instance, midwifery staff have not been permitted to do a manual removal of placenta; yet in other countries, such a vital procedure is a normal part of the practice of health workers of comparable levels of training and experience. The use of the partograph, manual removal of the placenta and the use of the vacuum extractor involve manual and assessment skills which are basic to the work of all trained midwives. The group felt that these functions should therefore be included in the competence of all trained midwives.

The medical treatment functions in Group 3 require more arithmetic skills and a greater understanding of normal and abnormal physiology and basic pharmacology. These are certainly normal functions for doctors, and in many countries, professional midwives and medical assistants/clinical officers are routinely trained to carry them out. In the same way the essential surgical functions of Group 1, like caesarean section and the repair of high vaginal or cervical tears are carried out by obstetricians. However, in many countries, they would be considered an essential part of the work of general duties medical officers, whose basic training is organized to ensure that they do develop these skills before they are posted out to hospitals or major health centres without specialist obstetric services. In other countries, where there is a great shortage of doctors, selected, experienced medical assistants/clinical officers have been given extra training so that they are able to perform such functions.

The concept of the health team is very important at the first referral level. Any attempt to expand essential services further to the periphery may impose a strain on the supply of available manpower, especially those with higher levels of training. If a doctor is to be the most senior person at the first referral level, there will be many demands, not just obstetric, on his or her time and energy. For the efficient running of the obstetric service, therefore, it is very important that he or she be able to delegate as much of the work to the midwifery and other staff as they are competent to accept. In such a situation, therefore, it is imperative to maximize the potential of each kind of health worker by ensuring that if they have a certain level of competency, they are trained to perform all the relevant tasks in that group of functions.

This approach has the advantage of extending the skills of existing staff without necessarily having to increase greatly the overall numbers. In the short-run, however, there will be the need for changes in basic training programmes and the provision of adequate in-service training for staff already working in the field. An additional advantage of this approach is that if the skills of any group of midwifery-trained health workers are increased, the benefit will not only be felt at the first referral level, but also at the primary level, since essential functions like manual removal of the placenta and the use of the partograph will be brought even closer to the women whose lives may depend upon them. This will also reduce the work load at the tertiary level, with beneficial effects.



### 4.3 Physical facilities

General considerations. At the first referral level, the services should be based in centres, designated as maternity centres.

In planning the necessary physical facilities, knowledge of the work load envisaged is critical. It is intended that the facilities should cater for all the abnormal deliveries taking place in a catchment area with a total population of 100,000 people, together with a fair proportion of women with pregnancy complications, and others who are self-referrals. In trying to arrive at a reasonable estimate of the number of abnormal deliveries, certain assumptions are being made. The first is a crude birth rate of 40 per 1,000 population each year; the second is that 5 per cent of all deliveries will be assisted or operative deliveries; and the third is that at least half of the operative deliveries will be caesarean sections. These estimates are based on reports from various areas in developing countries, in particular India and Africa. Working on the above assumptions, each year we should expect in the catchment area some 4,000 deliveries, of which 200 will be operative deliveries and 100 caesarean sections. Some of the spontaneous deliveries, and all of the operative deliveries will be conducted at the maternity centre, but the important point here is that, on average, each week the maternity centre will carry out two caesarean sections.

Special points about physical facilities. The description of the maternity centre which follows is not intended to cover all the physical characteristics of each component of the maternity centre(s). Rather, the aim is to highlight the principal features. Two of the components of the maternity centre(s) are the maternity ward and a delivery suite. The others are a maternity home or "village" and an outpatient section which will include facilities for family planning. For construction of special facilities the reader is referred to a WHO publication<sup>10</sup>.

Maternity ward. The only way in which the basic functions of the maternity ward differ from those of a general ward is that it accommodates not just pregnant women and delivered mothers but also their newborn babies. A total bed complement of 24 beds will suffice. If 25 per cent of the hypothetical number of 4,000 deliveries per annum are high-risk or referred for delivery the ward should be capable of giving delivery care to 1,000 women. If each patient stays on average five days in hospital, taking into account that some may stay longer because of complications, each bed can accommodate sixty patients per year. A maternity unit doing 1,000 deliveries per year needs 17 beds if this standard is adhered to. A varying number of additional beds are needed for prenatal patients. Suppose that one prenatal to three postnatal beds will suffice, an additional six beds will be needed. The total number of obstetric beds for a unit which conducts 1,000 deliveries a year should thus be at least 25 beds. Eight are for septic cases following delivery or abortion, while the remainder are for prenatal and postnatal women. The proportion of beds assigned to prenatal and postnatal women should remain flexible. Ideally, the septic and clean areas of the maternity ward should be separate and they should not share anything in common, the aim being to minimize the risk of the spread of infection from the septic ward to the occupants of the clean ward, especially the newborn babies. In some countries this particular need is rarely met. A useful compromise will be to make available extra washing facilities throughout all sections of the maternity ward.

Because newborn babies will be nursed in cots alongside their mothers, enough room has to be provided for this as well as for the usual medical and nursing functions. Therefore, the distance between the centres of adjacent beds should be between 2.0 and 2.4 metres, and the bed ends should be about 2 metres apart.

Delivery suite. From the nature of the function it serves, the delivery suite should have easy access to both the operating theatre and the maternity ward and it should be close to one of the main entrances to the hospital itself. Special accommodation required are a first stage room, a delivery room, an eclamptic room, a recovery room, and space for resuscitation of the severely asphyxiated baby.

Six beds will be sufficient for the first stage room, and one delivery bed in the delivery or second stage room. Occasions will arise when some deliveries will have to be conducted on beds in the first stage room. As far as possible, the necessary privacy must

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be observed by the use of mobile screens. Operative vaginal deliveries not needing general anaesthesia can all be safely conducted in the delivery room, which should also accommodate at one of its corners, space for resuscitation of the asphyxiated newborn baby. Separate from the delivery room, but equal in floor space is the eclamptic room with enough space to provide intensive care for one patient and to conduct assisted vaginal delivery.

Recovery room. Very early discharge from hospital, within 6-12 hours after normal delivery, is very popular with women in developing countries. All that is required in such places, is that somewhere adjacent to the delivery room, or close to it, is set aside a room with 4-6 beds, for recovery after normal delivery, and from whence the delivered mothers and their newborn babies can be discharged home. Early discharge from hospital has obvious merits, but the risk of puerperal and neonatal complications will always exist. Ideally, therefore, early discharge should be combined with domiciliary care by community nurses. Such arrangements rarely exist because of staff shortage.

Side ward laboratory. Only one side ward laboratory is necessary in the maternity centre, and this side ward laboratory should be in the labour ward because this is the location where the need for the services of a side ward laboratory are greatest. The measurements and tests to be carried out are as follows: (a) haematocrit (or haemoglobin values); (b) blood counts and smears, and preparation of smears of other body fluids such as cerebrospinal fluid; (c) examination of the urine for abnormal constituents such as protein, sugar, acetone, bilirubin and urobilin; (d) blood grouping and blood cross-matching. Details are provided in the annexes.

Outpatient services. The organization of this section of the maternity centre is geared towards early prevention and detection of most of the important complications which cause maternal mortality and morbidity, and towards health education. Another important facility provided will be for family planning. Not all women can be seen at the same time in the consulting and examination rooms, and for this and other reasons, a large waiting area or hall that can accommodate up to 200 women and their relations, including husbands and young children, is necessary. This waiting area will also be used for health education and for demonstrations given by the nursing staff. Supporting facilities should include sanitary facilities, provision of drinking water and good ventilation, among others.

Maternity village or home. This has been is discussed under Group 6 of the Essential Functions.

Operating theatre. This is an essential component of the obstetric services, and although its use is shared with other areas in the hospital, it is still necessary to include in this report information about the operating theatre. The equipment that is necessary is shown in the annexes.

#### 4.4 Equipment, supplies and drugs

The recommendations made regarding equipment, supplies and drugs are listed in Annex 2 to 5. For their compilation we relied heavily on UNIPAC catalogue 1986<sup>11</sup> and the WHO list of essential drugs<sup>12</sup>. It needs to be stressed that the supply of consumable items should not be allowed to run out before orders for fresh supplies are made. There should still be enough of them to last for eight months when fresh orders are placed.

#### 4.5 Supervision

The functions that have been included in the list of essential obstetric functions are there because they are essential and life-saving. It has to be recognized, however, that many of them, especially in emergency situations or where problems have been neglected, do carry inherent risks. The importance of supervision in order to maintain and develop standard of skills cannot be over-emphasized. Periodic visits by the nearest obstetrician or midwifery supervisor to the first referral level in order to review cases, discuss referrals and problems, and ensure that facilities, equipment and supplies are adequate help to maintain morale as well as technical competence. The other method found invaluable in many countries for the maintenance of skills is the provision of written standing orders or instructions for carrying out different procedures as agreed upon by senior professionals.



#### 4.6 Evaluation

It is expected that the extension of essential obstetric services will have an impact on the health care of women. Simple reporting systems at both primary and the first referral level will indicate the numbers of women from the local population making use of obstetric services. Any increase in coverage that has occurred can then be calculated. The proportions of normal and complicated deliveries at the first referral level will give some indication of whether or not complicated cases are reaching that level. For instance, in many populations 5 per cent of all pregnant women are delivered by caesarean section. If the percentage of caesarean sections at the hospital or centre is found to be significantly less, it probably means that there are problems to be identified and remedied. Finally, a careful recording of the outcomes of all complicated deliveries will indicate if the effectiveness of the service is improving or not.

#### 4.7 Research

The consideration of this list of essential obstetric functions, and the requirements of skills and materials for their performance has highlighted the need for further research. Appropriate technology research is needed to produce such things as simple, inexpensive methods for detecting and measuring anaemia, durable tubing for vacuum extractors, and simple, effective partographs for use at primary level. Health systems research is needed into the delegation of obstetric functions to non-physician health workers and to more peripheral health facilities.

#### 4.8 Cost and financial considerations

Useful information on the components of costs of building has been provided in Kenya, thus:

|                                  |     |
|----------------------------------|-----|
| Primary building structure       | 35% |
| Secondary structure and finishes | 25% |
| Equipment and furniture          | 15% |
| Electrical                       | 11% |
| Plumbing                         | 8%  |
| Mechanical                       | 4%  |
| Sewerage                         | 2%  |

Ideas on the overall cost of providing maternal health care for the whole of the third world, based on something like the model described here, were given by Taylor and Berelson 1971<sup>13</sup>. The figure they came up with was an annual per capita cost varying between US Dollars 0.32 and 1.65 in the 1970s. The overall average cost per annum per capita was US\$ 0.60, or about US\$14 per pregnant woman. At that time Taylor and Berelson estimated that "the total bill for the whole of the developing world would come to just under US\$ one billion per year, including both amortized capital and operating costs". Maintenance costs per year could take up about a third of the capital cost. Allowing for inflation the equivalent global cost in 1986 would be \$2.6 billion. While one cannot generalize over costs at least the following points could be borne in mind:

- (i) What is envisaged in this report does not, in most countries, entail a large number of new district and sub-district hospitals. Rather it implies a mixture of some new establishments with the up-grading of others, such as good health centres in appropriate sites. The latter may well be the majority. Even up-grading must cost money, but the community and local authority may well contribute voluntarily, at least in labour and possibly also in cash or kind.
- (ii) Equipment also costs money, but in poor countries missions or other non-government organizations often find equipment such as operating tables, electricity generators, etc. one of the easiest things for which to raise money, being tangible and obviously needed.



- (iii) On the other hand, supplies, and all other recurring costs, whether maintenance of buildings, of vehicles, or fuel or salaries, deserve to be planned for carefully in advance and a source of funds secured, whether central or provincial or district government funds, or fee for service, or a mixture of any or all of these.
- (iv) In respect of personnel, while again it is the up-grading and better use of existing staff which is most necessary, a significant addition to total workload of the service will entail some increase in staff number in most cases, and possibly some increase in remuneration. Cost of training, in-service training and of supervision needs to be budgeted for also.
- (v) Efficient referral being an essential element some budgeting for transport is advisable, as well making use of community effort and the goodwill of other departments.
- (vi) For maternity waiting homes or "villages" near the hospital here community effort should play a large part, the accommodation to be provided resembling something like a "model" home of ordinary people. The clients should provide their own food, and only some maintenance, water supply and fuel, general cleaning of the site, and supervision will be needed as cost of government or non-government organizations or by the community.

From these considerations one may see that the cost of providing essential obstetric care at the first referral level may vary greatly even from province to province and country to country according to the administrative and managerial skills deployed and the community support enlisted.



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# A N N E X 1

## PHYSICAL SPACE

### A. MATERNITY WARD

| <u>Rooms</u>                 | <u>Area in m2</u> |
|------------------------------|-------------------|
| 8-bed room accommodation     | 35                |
| 8-bed room accommodation     | 35                |
| 1-bed room accommodation     | 10                |
| 1-bed room accommodation     | 10                |
| Treatment room               | 10                |
| Equipment store              | 10                |
| Bathrooms                    | 10                |
| Nurses' bay and station      | 8                 |
| Shower rooms                 | 3                 |
| Sluice room                  | 6                 |
| Cleaners/Domestic staff room | 6                 |
| Staff cloakroom              | 6                 |
| Pantry/ward kitchen          | 6                 |
| WCs                          | 5                 |
| Corridor space               | -                 |
| Trolley Bay                  | 6                 |

### B. DELIVERY SUITE

| <u>Rooms</u>                                  | <u>Area in m2</u> |
|---|-------------------|
| First stage                                   | 35                |
| Second stage/delivery room                    | 10                |
| Eclamptic room                                | 10                |
| Sluice room                                   | 6                 |
| Nurses' bay                                   | 8                 |
| Admission/examination and<br>preparation room | 16                |
| Side laboratory                               | 6                 |
| Store for consumable items                    | 4                 |
| Cleaners' room                                | 4                 |
| Store for non-consumable items                | 6                 |
| WCs   | 3                 |
| Shower  | 3                 |
| Waiting area for relatives                    | 6                 |
| Recovery room                                 | 20                |



C. OUTPATIENT SERVICES

| <u>Rooms</u>                                  | <u>Area in m2</u> |
|---|-------------------|
| Waiting area -<br>0.9m <sup>2</sup> per woman | 180               |
| WCs:  |                   |
| Patients                                      | 3                 |
| Doctors                                       | 3                 |
| Nursing staff                                 | 3                 |
| Store   | 4                 |
| Cleaners' room                                | 4                 |
| Dispensary                                    | 6                 |
| Side laboratory                               | 4                 |
| Consulting and examination<br>apartments      | 35                |
| Medical records/registration counter          | 6                 |
| Sisters/nursing staff office                  | 4                 |
| Height/weight measuring space                 | 4                 |
| Blood pressure measuring area                 | 4                 |
| Instrument preparation/packing room           | 6                 |
| Treatment room                                | 10                |

D. OPERATING SUITE

| <u>Room or compartment</u>                    | <u>Area in m2</u> |
|---|-------------------|
| Sterilizing section with store                | 70                |
| Main operating room                           | 35                |
| Staff changing rooms (2) -<br>male and female | 6                 |
| Trolley bay                                   | 4                 |
| Shower (2) - male and female                  | 6                 |
| WC (2) - male and female                      | 6                 |
| Scrub-up post                                 | 4                 |
| Anaesthetic rooms                             | 12                |
| Office  | 10                |
| Recovery room                                 | 12                |

A N N E X 2

ITEMS OF FURNITURE AND EQUIPMENT

A. MATERNITY WARD

| <u>Room</u>                 | <u>Furniture and Equipment</u>   |
|-----------------------------|--|
| 8-bed room ward             | Bed*(8), chair (8), bedside locker (8), overbed table (8), hand wash-basins (2), mobile screens (3). Spring beds, initially comfortable, sag in the middle later. For this reason, the preference is for hoop iron mesh rivetted to frames which ventilate well and do not sag with age. The mattress should be about 10 cm thick, size 200 cm x 100 cm.<br><br>*Beds should be standardized, and a convenient size for a bedstead is 200 cm x 100 cm. |
| 1-bed room ward             | Bed (1), bedside locker (1), table (1), chair (1), arm chair (1), tray for meals (1), locker for clothes (1), hand wash-basin (1).   |
| Treatment room              | Cupboard unit, work top, wall cupboards (3), shelves, hooks, examination couch (1), stool (1), trolley (1), bin (2), paper towel stand or its equivalent (1), hand wash-basin with elbow-operated taps.  |
| Bathroom                    | Freestanding bath (1), chair (1), hand-rail (1), hooks for clothes and towels.   |
| Shower room                 | Same as bathroom, except that shower replaces bath.  |
| Sluice room                 | Bed-pan drier (1), bed-pan washer (1), bed-pan sterilizer (1), ventilated cupboard for storage of specimens (1), storage for specimen testing equipment (1), working surface, small sink (1), hand wash-basin.   |
| Nurses' station             | Table (1), chairs (4), trolley for patients' records (1), storage for stationery, wall cupboard, refrigerator (1), notice board (1), cabinet (1), book case (1), wash-basin.   |
| Nurses' bay                 | Office table (1), chairs (2), dwarf wall, work-top, clock (1).   |
| Cleaners and domestic staff | Cleaning sink, domestic sink, draining board, locker, storage for brushes and brooms, bins, duster rack, cupboard for cleaning materials.  |
| Staff cloakroom & WC        | WCs (2), hand wash-basin (2), bins (2), mirrors (2), toilet paper racks (2), clothes hooks (3), Lockers (?).   |



Pantry or ward kitchen Water boiler (1), boiling plate (1), refrigerator (1), cupboard for storage of crockery and cutlery (1), cupboard for storage of snacks and beverages (1), sink (1), draining board (1), working surface (1), bins (2).

Equipment store Shelves, racks, hooks.

#### B. DELIVERY SUITE

| <u>Room</u>  | <u>Furniture and Equipment</u>   |
|--|--|
| Admission room   | Examination couch (1), hand wash-basin (1), scrub-up unit with elbow taps (2), bin (1), towel/paper towels, intravenous fluid drip stands (2), writing table (1), chairs (2), cupboard unit with work-top (1), wall cupboards (3), trolleys (2).   |
| Nurses' bay  | Office table (1), chairs (3), dwarf wall, work-top (1), storage for stationery, wall cupboard (1), notice board (1), cabinet, bookcase (1), hand wash-basin (1), small refrigerator (?).   |
| First stage room   | As for 8-bedded room in maternity ward.  |
| Second stage or delivery room                                  | Delivery bed with lithotomy rods and stirrup (1), surgeon's stool (1), wash-basin with elbow taps (2), trolley (1), cupboard for storage of sterile packs for various forms of vaginal delivery (2), bin (1), wall clock with seconds hand (1), thermometers and sphygmomanometer (1), mobile operating theatre light (1). Neonatal resuscitation trolley or shelf, cupboard for resuscitation equipment |
| Eclamptic room   | Same as for delivery room with these additions: Delivery bed should have side railings; suction machine (1).   |
| Shower room )<br>Toilet )<br>Cleaners' room )<br>Sluice room ) | Same as in maternity ward.   |
| Store for consumables  | Shelves, racks, cupboards  |
| Side Laboratory  | Laboratory sink (1), hand wash-basin (1), laboratory bench with writing space (1), cupboards for reagents (listed separately in Annex 4), hand or electrically-operated centrifuge, refrigerator if it is to be used for blood cross-matching, together with special equipment.  |
| Store for non-consumables                                      | Shelves, racks, hooks.   |

#### D. OPERATING SUITE

| <u>Room</u>   | <u>Furniture and Equipment</u>   |
|---|--|
| Main operating theatre  | Operating table (1), ceiling-mounted shadowless lamp, with 5 lamps or bulbs, pedestal-mounted shadowless lamp, run off storage batteries in emergencies, trolleys for instruments (3), drip stands (2), air conditioners (2), cupboards, shelves, drums for linen, diathermy apparatus, swab rack, containers for used swabs and instruments, suction apparatus, sterilizer 35 cm x 38 cm 139 L fuel (1), sterilizer drums 20 cm x 10 cm x 6 cm (1), kerosine stove (1), Cheatles forceps 26.5 cm (1), sterilizer forceps 20 cm (1). |
| <p><u>Comments:</u> The operating table must be sufficiently sturdy to support the heaviest patient, and yet be moveable, easy to tilt into head down position, easy to clean and permit a patient to be placed in the lithotomy position. Regarding the trolley for surgical instruments, one made of stainless steel is best, with flat tops, and no guard railings. The recommended shelves and cupboards are for storage of packs of sterile, autoclaved surgical instruments, in individual wrappings, and made into sets designed for particular operations. One set of cupboards should be fixed to the end where the anaesthetic team is customarily stationed.</p> |  |
| Sterilizing room and store  | Small autoclaves, cupboards and shelves for sterile store, large tables and sorting-out space, drums, changing-room facilities, toilet facilities.   |
| <p><u>Comments:</u> The instruments to be autoclaved should have first been cleaned in their respective wards or health centres. The same with linen, which should be laundered before being sterilized. On the whole, in a district hospital setting small capacity autoclaves are preferable to large capacity ones. Compared to large capacity autoclaves, small ones take a shorter time to run and are therefore less damaging to soft goods like linen and dressing. For this reason, it is more efficient to use a small autoclave several times a day than to use a large machine once daily. Maintenance of autoclaves is imperative.</p>                          |  |
| Staff changing rooms  | Lockers, mirror (2), hand wash-basin (2), towels, shelves for clean scrub suits, masks and caps, rows of hooks, mackintoshes (10), large laundry baskets for used scrub suits.   |
| Trolley bay )<br>Shower )<br>Toilet )   | Same as those described for maternity and labour wards.  |
| Scrub-up post   | Sink units with elbow-operated taps (2), soap, bowls containing antiseptic solution, scrub-up hand brushes.  |
| Anaesthetic room  | Sink and drainer (1), work-top (1), cupboard for storage of drugs and instruments (2), writing table or shelf (1), trolley (1), stool (1), anaesthetic gases, anaesthetic machine E.M.O. (2).  |
| Recovery room   | Trolley(s), sphygmomanometer (1), stethoscopes (2).  |
| Office  | Writing desk with cupboards under (1), chairs (3), low table (1), notice board (1), crockery and cutlery for light refreshments, small refrigerator (1).   |



### ANNEX 3

#### SURGICAL AND DELIVERY EQUIPMENT

##### A. STANDARD LAPAROTOMY SET (Instruments)

| <u>Description</u>  | <u>Quantity</u>  |
|---|------------------|
| Stainless steel covered instrument tray -<br>31 cm x 20 cm x 6 cm                       | 1                |
| Surgeon's gloves - 6 <sup>1</sup> / <sub>2</sub> , 7, 7 <sup>1</sup> / <sub>2</sub> , 8 | 12 pairs of each |
| Towel clips, Backhaus box lock  | 4                |
| Sponge holding forceps - 22.5 cm  | 6                |
| Straight artery forceps - 16 cm   | 4                |
| Hysterectomy forceps, straight - 22.5 cm  | 4                |
| Mosquito forceps - 12.5 cm  | 6                |
| Tissue forceps, Allis - 18.4 cm   | 6                |
| Uterine tenaculum forceps - 28 cm   | 1 pair           |
| Needle holder, straight, Mayo - 17.5 cm   | 1                |
| Surgical knife handle - No. 3   | 1                |
| - No. 4   | 1                |
| Surgical knife blades   | 10 packets       |
| Triangular point suture needles - 7.3 cm, size 6  | 2 packets        |
| Round-bodied needles No. 12, size 6   | 2 packets        |
| Deavers abdominal retractor, size 3, 2.5 x 22.5 cm                                      | 1                |
| Richardson's double-ended abdominal retractor   | 2                |
| Curved operating scissors, Mayo - blunt pointed 17 cm                                   | 1                |
| Balfour abdominal retractor 3-blade self-retaining                                      | 1                |
| Straight operating scissors, blunt pointed, Mayo, 17 cm                                 | 1                |
| Scissors, straight 23 cm  | 1                |
| Suction tube - 22.5 cm 23 fr gauge  | 1                |
| Intestinal clamps, curved, Dry - 22.5 cm  | 2                |
| " " straight - 22.5 cm  | 2                |
| Dressing forceps - 15 cm  | 2                |
| " " - 25 cm   | 1                |

##### B. STANDARD LAPAROTOMY SET (Dressing and Linen)

| <u>Description</u>  | <u>Quantity</u> |
|---|-----------------|
| Bundles of abdominal swabs with tapes<br>(6 in each bundle) | 3               |
| Vulval pads   | 2               |
| Dressing towels   | 6               |
| Trolley towels  | 4               |
| Abdominal sheets  | 2               |
| Mackintoshes - large  | 2               |
| - small   | 1               |
| Bundles of Ray-Tee gauze (6 in each bundle)                 | 3               |
| Operating gowns   | 3               |
| Plain gauze and wool swabs                                  | -               |
| Lithotomy set   | 1               |
| Mersilk in strands (each strand 0.5 m long)                 | 6               |

C. ITEMS FOR NORMAL DELIVERY

| <u>Description</u>         | <u>Quantity</u> |
|----------------------------|-----------------|
| Trolley                    | 1               |
| Sterile mackintosh         | 2               |
| Trolley towels             | 2               |
| Operating gown             | 1               |
| Glove towels               | 3               |
| Dressing towels            | 3               |
| Anal packs                 | 2               |
| Cord ligatures             | 3               |
| or                         |                 |
| Cord clamp                 | 1               |
| Plain gauze and wool swabs |                 |
| Kidney dish                | 2               |
| Dressing bowl, large       | 1               |
| Clover placental dish      | 1               |
| Gallipots                  | 2               |

D. VACUUM EXTRACTOR (OR FORCEPS) SET

| <u>Description</u>                 | <u>Quantity</u> |
|------------------------------------|-----------------|
| Malstrom vacuum extractor          | 1               |
| Wrigley's obstetric forceps        | 1 pair          |
| Neville Barnes obstetric forceps   | 1 pair          |
| Sponge-holding forceps             | 4 pairs         |
| Spencer Wells artery forceps:      |                 |
| large                              | 2 pairs         |
| small                              | 2 pairs         |
| Needle holder                      | 1               |
| Stitch scissors                    | 1 pair          |
| Episiotomy scissors                | 1 pair          |
| Toothed dissecting forceps         | 1 pair          |
| Non-toothed dissecting forceps     | 1 pair          |
| Urethral catheter, rubber or latex | 1               |
| Foley's urethral catheter,         |                 |
| gauges 12-21                       | 1 of each       |
| Towel clips                        | 4               |
| Sim's vaginal speculum, large      | 1               |
| Hamilton Bailey's vaginal speculum | 1               |

E. EMBRYOTOMY (CRANIOTOMY) SET\*

| <u>Description</u>               | <u>Quantity</u> |
|----------------------------------|-----------------|
| Neville Barnes obstetric forceps | 1 pair          |
| Decapitation hook                | 1               |
| Breech hook                      | 1               |
| Morris's bone forceps            | 4 pairs         |
| Simpson's perforator             | 1               |
| Embryotomy scissors              | 1 pair          |
| Episiotomy scissors              | 1 pair          |
| Stitch scissors                  | 1 pair          |

\*See cautionary remarks in Chapter 3, page 14



|                                 |        |
|---------------------------------|--------|
| Sponge-holding forceps          | 1 pair |
| Toothed dissecting forceps      | 1 pair |
| Non-toothed dissecting forceps  | 1 pair |
| Spencer Wells artery forceps:   |        |
| large                           | 2      |
| small                           | 2      |
| Willet's scalp forceps          | 4      |
| Volsellum forceps:              |        |
| large                           | 4      |
| small                           | 1      |
| Urethral catheter female, latex | 1      |
| Needle holder                   | 1      |
| Vaginal speculum                | 1      |
| Sim's vaginal speculum, large   | 1      |
| Towel clips                     | 4      |

#### F. EVACUATION OF UTERUS

| <u>Description</u>                      | <u>Quantity</u> |
|---|-----------------|
| Sponge-holding forceps                  | 4               |
| Sim's vaginal speculum, large           | 1               |
| Auvard self-retaining vaginal retractor | 1               |
| Teale's Volsellum forceps               | 2               |
| Simpson's uterine sound                 | 1               |
| Set of Hegar's dilators, double-ended   | 2               |
| Uterine curettes:                       |                 |
| blunt                                   | 2               |
| sharp                                   | 2               |
| Spencer Wells artery forceps, small     | 1               |
| Dissecting forceps                      | 1               |
| Ovum forceps                            | 1 pair          |

#### G. STANDARD KIT FOR INSERTION OF INTRAUTERINE CONTRACEPTIVE DEVICE

##### Available with UNICEF

| <u>Description</u>                                   | <u>Quantity</u> |
|--|-----------------|
| Metal sterilization tray with cover                  | 1               |
| Bivalve speculum: small                              | 1               |
| medium   | 1               |
| large  | 1               |
| Sponge holding forceps                               | 1 pair          |
| Long straight artery forceps                         | 1 pair          |
| Uterine sound  | 1               |
| Torch with batteries, or other suitable light source | 1               |
| Scissors   | 1 pair          |
| Antiseptic solution                                  |                 |
| Aqueous iodine 1 in 2500                             |                 |
| Benzalkonium chloride 1 in 75                        |                 |

IUD  
IUD inserter  
Sterile gloves  
Sterile vulsellum  
Dressing forceps  
Sterile metal bowl  
Vulval pads

#### H. MINI-LAPAROTOMY KIT

(List compiled by UNICEF in collaboration with UNFPA and WHO)

| <u>Description</u>                                   | <u>Quantity</u> |
|--|-----------------|
| Allis clamp - 19 cm                                  | 1 pair          |
| Towel clips, Backhaus                                | 4               |
| Control syringe 10 ml                                | 1               |
| Hypodermic syringe 10 ml                             | 4               |
| 20 gauge hypodermic needles, 4 cm                    | 12              |
| Dressing forceps - 14 cm                             | 1               |
| Tissue forceps, standard - 14 cm                     | 1               |
| Curved mosquito forceps - 13 cm                      | 6               |
| Straight artery forceps - 15.5 cm                    | 3               |
| Babcock tissue forceps - 19.5 cm                     | 2               |
| Curved artery forceps - 20 cm                        | 1               |
| Dressing forceps - 25 cm                             | 1               |
| Surgical knife handle                                | 1               |
| Surgical blades, size 10                             | 8               |
| Mayo's needle holder - 17.5 cm                       | 1               |
| Straight triangular point<br>suture needles - 5.5 cm | 2               |
| Mayo's taper point needles,<br>size 6                | 12              |
| Urethral catheter -                                  |                 |
| size 14, French                                      | 1               |
| size 16, French                                      | 1               |
| size 16, French                                      | 1               |
| Tenaculum forceps                                    | 1 pair          |
| Uterine elevator (Ramathibodi)                       | 1               |
| Tubal hook ( " )                                     | 1               |
| Proctoscope  | 1               |
| Stainless steel sponge bowl                          | 1               |
| Richardson-Eastman retractors                        | 2               |
| Abdominal retractor                                  | 1               |
| Graves vaginal speculum (medium)                     | 1               |
| Suture scissors                                      | 1 pair          |
| Straight operating scissors, 15 cm                   | 1 pair          |
| Curved scissors, 17.5 cm                             | 2 pairs         |
| Instrument pan with lock lid                         | 1               |



I. EQUIPMENT FOR VASECTOMY  
(from UNICEF)

| <u>Description</u>                                   | <u>Quantity</u> |
|--|-----------------|
| Instrument tray, covered<br>22.5 cm x 12.5 cm x 5 cm | 1               |
| Backhaus towel clamp                                 | 4               |
| Forceps, haemostatic:                                |                 |
| straight 14 cm                                       | 4 pairs         |
| curved 12.5 cm                                       | 2 pairs         |
| Forceps, tissue - Allis 15 cm                        | 2 pairs         |
| Knife handle, size 3                                 | 1               |
| Knife blades   | 10 packets      |
| Hypodermic needle 22 gauge                           | 1 box           |
| Needle, hypodermic (Luer) 25 gauge                   | 1 box           |
| Needle suture - straight                             | 2 packets       |
| Needle, suture, catgut, Mayo<br>1/2 circle           | 2               |
| Scissors, suture angled on<br>flat - 14 cm           | 1 pair          |
| Syringe anaesthetic (control)<br>Luer - 5 ml         | 1               |
| Syringe hypodermic - 5 ml                            | 4               |
| Sterilizer instrument<br>20 cm x 10 cm x 6 cm        | 1               |
| Cheatele forceps - 26.5 cm                           | 1               |

(All above items can be ordered as a single kit from UNIPAC -  
Director, UNIPAC, Freeport, DK 2100 Copenhagen, Denmark)

J. EQUIPMENT FOR NEONATAL RESUSCITATION

| <u>Description</u>  | <u>Quantity</u> |
|---|-----------------|
| Mucous catheter (rubber, open-<br>ended 15 French-gauge-FG)                                   | 1 or more       |
| Nasal catheter (rubber, open-<br>ended, 8FG)  | 1               |
| Endotracheal tubes (sterile, 12FG)  | 3               |
| Curved stillette (for stiffening<br>endotracheal tube in difficult<br>intubations)            | 1               |
| Suction catheters (sterile, 6FG)  | 3               |
| Magill's infant laryngoscope<br>with spare bulb and batteries                                 | 1               |
| Ventillatory bag  | 1               |
| Oxygen cylinder with flow-meter   | 1               |
| 40 cm water manometer or a simple<br>form of resuscitator with safety<br>valve and rubber bag | 1               |
| Laerdal infant fact mask  | 2               |

K. EQUIPMENT FOR ANAESTHESIA

|  |  |
|--|--|
| Anaesthetic facemasks                            | 2 of each size,<br>infant to large adult. Total 14   |
| Oropharyngeal airways                            | 2 of each size,<br>00 to 5. Total 12   |
| Laryngoscopes                                    | 2 handles + 3 pairs of blades or<br>2 adult + 2 paediatric plastic (Penlon)<br>+ 2 packs of 6 spare bulbs +<br>30 batteries (or 8 rechargeable<br>batteries + charger) |
| Endotracheal tubes                               | 2.5-10 mm in 0.5 mm steps, Oxford or<br>Magill or similar, with cuffs only on<br>sizes 6 mm  |
| Urethral bougies                                 | for use as intubating stylet   |
| Magill's intubating forceps                      | In emergency, ovum forceps can be used   |
| Et Tube connectors                               | 15 mm plastic (can be connected<br>directly to breathing valve), 3 for<br>each tube size   |
| Catheter mounts (endotracheal<br>tube connector) | antistatic rubber, 4   |
| Breathing hose + connectors                      | 2 lengths of 1 metre anti-static,<br>4 lengths of 30 cm for connection of<br>vaporizers, T-piece for oxygen<br>enrichment  |
| Breathing valves                                 | Universal non-re-breathing valve,<br>e.g. AMBU El, Ruben, Laerdal IV,<br>2 of each AMBU paidi valve 2  |
| Breathing systems                                | (for continuous-flow)<br>Ayre's T-piece system<br>Magill breathing system  |
| Self-inflating bellows<br>or bag (SIB)           | Oxford Inflating Bellows (OIB)<br>AMBU, Cardiff, Vitalograph, Laerdal,<br>SIB, 1 adult + 1 child   |
| Anaesthetic vaporizers                           | for ether, halothane & trilene<br>e.g. EMO, AFYA, OMV, PAC   |
| Intravenous equipment                            | IV needles, cannulas including<br>paediatric sizes & umbilical vein<br>catheter IV infusion sets   |
| Spinal needles                                   | Range of 18- to 25-gauge   |



# A N N E X 4

## MATERIALS FOR SIDE LABORATORY TESTS AND BLOOD TRANSFUSION

### A. SIDE LABORATORY

| <u>Test</u>                            | <u>Materials</u>   |
|--|--|
| Blood film preparations                | Glass rods over a sink or staining tank (2), measuring cylinder 50 ml capacity (1), wash bottle with buffered water (1), interval timer clock (1), rack for drying slides (1), Leishman stain, methanol. |
| Blood film for malaria parasites       | Field stains A and B. Four glass containers, microscope slides, blood lancets, cotton wool.  |
| Total and differential leucocyte count | Counting chamber (Newbauer), 0.05 ml pipette, graduated 1 ml pipette, Türk diluting solution, tally counter (differential if possible).  |
| Haematocrit                            | Microhaematocrit centrifuge (1), scale for reading haematocrit results (2), heparinised capillary tubes 75 mm x 1.5 mm, spirit lamp (1), blood lancet, ethyl alcohol.                                    |
| Detection of glucose in urine          | Benedict solution, pipette, pyrex test-tubes, test-tube holder, beaker, Bunsen flame,<br>or<br>Indicator papers and tablets.   |
| Detection of protein in urine          | Test-tubes, pipettes 5 ml, sulphosalicylic acid 300g/litre aqueous solution<br>or<br>Indicator paper and tablets.  |

### B. ESSENTIAL MATERIALS FOR THE PROVISION OF DONOR BLOOD FOR TRANSFUSION

#### Cross matching

Patient's serum  
Patient's red cells  
Donor red cells from pilot bottle  
8.5 g/l sodium chloride solution  
20% bovine albumin  
37°C water bath or incubator  
Centrifuge  
Pipettes  
Test-tubes - small and medium

Collection and storage of blood

Healthy adults aged between 18 and 50 years.

A haemoglobin level above 11 g/dl.

A pregnant woman is not to donate blood.

Blood donation by an individual can take place at six-monthly intervals.

Collection of blood

Cotton wool and ethylalcohol

Sphygmomanometer cuff

Airway needle for collecting blood

Blood collecting set containing 120 ml of ACD solution

An object for donor to squeeze

Artery forceps (a pair)

Pair of scissors

Adhesive tapes

Pilot bottle containing 1 ml ACD solution attached to the collecting bottle

Refrigerator (temperature 4°C to 6°C) for storage of donor blood. A domestic refrigerator operated either on gas, or electricity can also be used, but the refrigerator must not be opened too often. A refrigerator which opens at the top is preferred to a cabinet refrigerator.



# A N N E X 5

## ESSENTIAL DRUGS LIST

|  | Essential function groups<br>in which a particular drug<br>is used |
|--|--|
| <u>Anaesthetics - General</u>  |  |
| Ether  | 4.5  |
| Diazepam   | 1.2.5  |
| Nitrous oxide  | 4.5  |
| Oxygen   | 1.2.4.5  |
| Thiopentone  | 4.5  |
| Atropine   | 4.5  |
| Suxamethanium  | 4.5  |
| <u>Anaesthetic - Local</u>   |  |
| Lignocaine   | 1.4  |
| <u>Analgesics</u>  |  |
| Paracetamol  | 2.3  |
| Acetylsalicylic acid   | 6  |
| Morphine   | 2.4  |
| Pethidine  | 1.4  |
| <u>Antiallergic</u>  |  |
| Hydrocortisone   | 2  |
| Promethazine   | 6  |
| <u>Anti-infective/antibiotics (oral and parenteral preparations)</u> |  |
| Ampicillin   | 1.2.4  |
| Benzylpenicillin   | 1.2.4  |
| Crystalline penicillin   | 1.2.4  |
| Chloramphenicol  | 1.2.4  |
| Gentamycin injections  | 4  |
| Metronidazole  | 1.2  |
| Sulfamethoxazole-trimethoprim  | 1.2.4  |
| Tetracycline   | 1.2.4  |
| <u>Antimalarials</u>   |  |
| Chloroquine  | 4  |
| Pyrimethamine  | 4  |
| Proguanil  | 4  |
| Quinine  | 4  |
| <u>Antianaemia drugs</u>   |  |
| Ferrous sulphate   | 4  |
| Folic acid   | 4  |
| Iron dextran   | 2.4  |
| <u>Anticoagulants</u>  |  |
| Heparin  | 4  |
| Protamine sulfate  | 4  |

|   |            |
|---|------------|
| <u>Other blood products</u>                     |            |
| Dried human plasma                              | 1.2        |
| <u>Antihypertensive and other related drugs</u> |            |
| Hydrallazine                                    | 2          |
| Digoxin   | 2          |
| Propranolol                                     | 2          |
| <u>Disinfectants</u>                            |            |
| Chlorhexidine                                   | 1.3.4      |
| Iodine  | 1.3.4      |
| Savlon  | 1.3.4      |
| Surgical spirit                                 | 1.3.4      |
| <u>Diuretics</u>                                |            |
| Frusemide                                       | 2          |
| <u>Oral contraceptives</u>                      |            |
| Ethinylestradiol + levonorgestrel               | 7          |
| Ethinylestradiol + norethisterone               | 7          |
| Depot medroxy-progesterone acetate              | 7          |
| Norethisterone                                  | 7          |
| Norethisterone enantate                         | 7          |
| <u>Other hormones</u>                           |            |
| Insulin   | 2          |
| Glibenclamide                                   | 2          |
| <u>Sera</u>                                     |            |
| Anti-D immunoglobulin (human)                   | 4          |
| Tetanus antitoxin                               | 4          |
| Tetanus toxoid                                  | 4          |
| <u>Oxytocics</u>                                |            |
| Ergometrine injection                           | 1.4        |
| Ergometrine tablets                             | 1          |
| Oxytocin injection                              | 1.4        |
| <u>Psychotherapeutic drugs</u>                  |            |
| Diazepam  | 1.4        |
| <u>Intravenous solutions</u>                    |            |
| Water for injections                            | all groups |
| Sodium lactate (Ringer's)                       | 1.2.4      |
| Glucose 5%, 50%                                 | 1.2.4      |
| Glucose with sodium chloride                    | 1.2.4      |
| Potassium chloride                              | 1.2.4      |
| Sodium chloride                                 | 1.2.4      |



ANNEX 6

LIST OF PARTICIPANTS

|                     |  |
|---------------------|--|
| Dr I. Aitken        | Postgraduate Coordinator, Faculty of Community Medicine, University of Papua New Guinea, <u>Boroko</u> , Papua New Guinea  |
| Dr K. Bhasker Rao   | Consultant Obstetrician & Gynaecologist<br><u>Madras</u> , India   |
| Dr M. Fathalla      | Formerly Dean, School of Medicine, Assiut University, <u>Assiut</u> , Egypt; presently Responsible Officer for Research and Development, Special Programme of Research Development and Research Training in Human Reproduction, World Health Organization, <u>Geneva</u> , Switzerland |
| Dr K. A. Harrison   | Professor of Obstetrics & Gynaecology, University of Port Harcourt, <u>Port Harcourt</u> , Nigeria (rapporteur)  |
| Dr Barbara E. Kwast | Formerly Lecturer in Community Obstetrics (Ethiopia) Netherlands Technical Cooperation;<br>Presently Public Health Nurse & Midwife, Division of Family Health, World Health Organization, <u>Geneva</u> , Switzerland  |
| Dr P. Severyns      | Senior Technical Adviser, UNFPA, <u>New York</u> , United States of America  |

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