International Maternal & Child Hospital Health Care

An in-depth practical manual for health workers in low resources settings and worldwide
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Brian Coulter MD, Dr Su Bunn

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5.16.D The child with epilepsy
Professor Charles Newton

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Dr Nawar Najam, Professor Charles Newton, Dr Bernhards Ogutu

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Allie Moosa MD

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Allie Moosa MD

5.16.I The child with breath holding episodes
Allie Moosa MD

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Allie Moosa MD

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Dr Jamshed Akhtar, Dr Aqeel Safdar

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Dr Jamshed Akhtar, Yogesh Nathdwara, Ian Mackie

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Dr Aqeel Safdar
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Dr Alaister Baker

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Dr Ejaz Khan

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Prof David Southall

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Prof David Southall

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Prof David Southall

8.5 Other procedures
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8.6 Assessing nutrition, growth and development
Prof David Southall

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Preface

This textbook is written to help health workers treating pregnant women and girls, their newborn infants, and all children (including adolescents) admitted to hospitals in countries all over the world. It is especially aimed at those working in countries where material and human resources are limited, where borders and infrastructures are insecure, and in rural areas where staff find it particularly difficult to work. Dedicated doctors, nurses and midwives in these settings are already providing life-saving healthcare, but inevitably find their work hard and often overwhelming. Access to up-to-date evidence based guidelines in the settings described here is extremely difficult. The internet is too slow, printing from computers is too expensive, and in our experience, books remain essential. Following requests from the health workers in low resource settings, the aim of the editors and our authors is to provide this textbook free of charge to as many as possible of those health workers on the front-line in the most disadvantaged hospitals in the world which are open to all women and children irrespective of their or family’s ability to pay.

The book has been written and peer-reviewed by over 100 experts from around the world with experience in hospital settings where there are poor resources. They have freely given their time and expertise. It covers all aspects of hospital care for pregnant women and girls, newborn infants and children and addresses the full range of possible illnesses and injuries and includes complications of pregnancy and delivery. It is based on the latest evidence and guidelines available, including Cochrane reviews and WHO guidelines. This textbook attempts to build on existing efforts and seeks further to identify an internationally applicable minimum standard of healthcare in these poorly resourced hospitals and to reflect the management of problems inherent in low-resource, disadvantaged hospitals. It suggests global minimum standards, both in the treatments given, but also in the medical ethics which should be practiced in caring for these particularly vulnerable patients.

The vision of our authors and editors relates to the provision of a useful reference for all health workers in all settings to help them provide the best clinical management for their patients in addition to highlighting basic minimum standard of care in all hospitals.
Section 1
1.1 Hospital management: non-clinical support and facilities

Introduction
For effective delivery of healthcare, a secure financial strategy with robust financial and manpower controls, a properly maintained technical infrastructure, clear lines of accountability, and good management and communication lines all need to be in place. There should, ideally, be clearly defined written personnel procedures, good training systems and written policies and guidelines for all staff functions. The facilities and functions described in this chapter need to be in place and are as important as the quality of medical care given. The services and facilities discussed in this text are basic, not comprehensive; well resourced countries may have many additional ones. If these services and facilities are in place, managed efficiently, supported and maintained, mainline healthcare delivery will be effective.

Advice on generic hospital management is difficult since the ability to deliver a minimum standard of care depends on the political, social and economic context in which the hospital is placed. Ideally, there should be a named person responsible for each facility and service, in addition to an overall hospital manager or management team. The hospital manager, or management team, should have overall responsibility for finances, estates and facilities, human resources, direct clinical patient care and support services (laboratories, radiology, therapies, pharmacy etc), training for all staff and the administrative services necessary to support all of these activities. There should always be a head nurse, a head of support services and a senior doctor within the management team.

Staff management
Staff motivation and retention (Human Resource Management) is an essential component of hospital management.

In order to achieve the provision of quality essential health services to the people served, hospitals must put in place strategies and mechanisms to retain staff and help them to provide the best possible service for patients. The health worker crisis in hospitals in poorly resourced countries has numerous dimensions. There are inadequate numbers of healthcare professionals and they are poorly distributed with an unplanned brain drain regionally and internationally (attrition). According to the WHO (2006), this phenomenon is due to workers experiencing: low salaries; poor, unsafe work environments; a lack of defined career paths; and poor quality education and training.

Another most important issue is the support of every health worker’s family. Ministries of Health must not disrupt such vital bonds by moving staff away from their families, without their full, freely given agreement.

In the light of the above forces confronting health services and compromising hospital based care, managers must endeavour to motivate the limited human resources available to ensure retention.

From a systematic review of six papers evaluating the management and leadership strategies which are effective in health worker retention in poor countries, the key lessons were as follows:

- Payment of financial incentives to professionals, especially those working in unpopular rural areas.
- Hospitals are run by boards which, as such, should be able autonomously to initiate better financial incentives for their staff. In the review, 86% of the studies revealed payment of attractive salary and allowances as a key motivational strategy to maintain health workers in their posts. Often what made most health workers leave their jobs, particularly in the public health sector, was being unable to provide basic support to their families from the meagre salaries provided. According to a study conducted in South Africa, an increased in salary of health workers has resulted in many health professionals who previously left the public health sector to work in private facilities to return.

However, financial incentives are not the only factor that matters.

Appreciation
The sense of community loyalty, personal commitment and sacrifice from health workers is an attitude which must be recognised and encouraged by appreciation from both the hospital management and the communities they serve.

Staff must be respected for and thanked for the work they do. Personal appraisal followed by periodic awards is a motivating factor for staff retention. The views of all staff should be listened to and they must be involved in decision making to enable the best problem solving to be identified and implemented: it is their hospital and their community.

Orderlies, porters and cleaners are just as important in patient care as doctors and nurses; this needs to be made clear to all staff. It can be helpful for events such as the monthly deep cleaning of a ward for doctors and nurses and hospital managers to participate and help the cleaners.

An Annual Awards Ceremony can be important where every department is awarded certificates for example for:

- the most punctual member of staff.
- the most improved member of staff
- the best dressed member of staff
- an award of Excellence for the best all round member of staff

Then there are special categories, e.g.

- Long serving member of the staff, (e.g. the refuse collector)
- For services over and above the ‘call of duty’.

This allows you to award staff who might not be in a position to further their education and to receive a certificate.

Recognition in front of management and invited guests who are prominent in the hospital’s catchment area is a huge honour and boost to morale.

Training and supervision
Studies conducted on human resource management for health in Africa indicate health workers’ frustration at having to be assigned to responsibilities and functions for which they have limited or no training. This can be effectively managed by providing ‘on the job’ support through the provision of simple and clear guidelines on clinical procedures. While resources may be limited for specialised
advanced training, priority should be given to locally conducted ongoing training that are cost effective and sustainable, aimed at equipping health staff with the requisite knowledge needed to provide efficient and quality patient care.

Providing the programme, space and encouragement for health workers taking turns to train and update their peers (such as an internal Continuing Medical Education programme) can also be a low cost and effective way for health workers to share new or updated practice and also develop their own teaching skills.

Similarly, provision of basic information technology, computers and internet connection where possible, are important methods for reducing professional isolation, helping health workers remain updated in their practice and to connect with the wider health community.

Some hospitals have done very well by training the locally recruited nurse attendants (healthcare assistants) to second level (state enrolled nurses) at the local nurse training school. Such nurses are usually born locally and have their families living nearby which further ties them to continue serving the community in which they live. In one site that has used this approach, the hospital has been able to train over 30 nurse attendants to the second level.

The introduction of an on-call support service to nurses working out of hours can be valuable. Senior nursing staff who are knowledgeable and experienced have volunteered to help with difficult health or social problems arising. It provides a link between management and the nursing and clinical staff, facilitating resource mobilisation and making sure staff are on duty at the right time and filling in gaps where necessary. Many social problems for both the staff and patients can be heard and addressed appropriately.

Similarly a suggestion box for any member of staff to air their views anonymously if they wish is important.

**Provision of essential equipment and supplies**

The lack of or inadequate provision of medical supplies, drugs and equipment in hospitals is one of the most difficult situations health workers have to cope with. Research has shown the demotivating situation health workers are faced with when trying to treat patients without the necessary drugs and equipment. Providing adequate and regular medical supplies, drugs and equipment is part of the answer to some of the ongoing questions of how best health systems in developing countries can retain their health workforces. Such provision should be a management priority.

**Provision of social and family amenities**

Provision of basic facilities such as housing and good accommodation for health staff is found to have contributed immensely to retention in many parts of the poorly resourced countries where such projects have been implemented as part of a retention package.

This is evident in Bansang hospital, The Gambia, where staff retention for the past five years has been well recognised by authorities. Health workers in Bansang hospital are given fully furnished accommodation with water and electricity at no cost to the staff. This helps staff to increase their savings and hence boost their income since they do not have to pay house rent and also do not have to pay for water and electricity. This initiative has not only made the hospital retain its staff but also served as an attraction for other health workers to come and work there.

A particular challenge for recruiting and retaining experienced health professionals in remote places is the provision of education for their children, particularly at secondary level. Arrangements for children to be educated and looked after elsewhere are offered in some countries, but this remains a barrier to retention. Nutrition is an important aspect of medical care for in-patients particularly patients whose relatives could not provide the required nutritious or special diets required. Encouraging all staff to grow their own vegetables and fruit for both patients and staff gives staff a sense of belonging and extends their care for patients. In Bansang hospital in The Gambia, for the past three years, staff have formed their own ‘Charitable Farming Association’. They pay to be a member, the reward for them is that they can sustain the feeding of the patients with cous cous and beans. Farming activities are to increase this year as the hospital have been given 20 hectares and will grow rice.

A social centre for staff, particularly those who are not living close to or with their families, with a television, sports facilities etc. can help. In conclusion, financial incentives can contribute to retention, but other non-financial incentives are equally likely to lead to sustainable retention. Given the economic situation in most poor countries, wages paid to health workers in well-to-do economies might not be payable by low income countries. However, the implementation of cost effective human resource strategies is a more realisable step forward.

Furthermore, the implementation of one strategy at the expense of others is unlikely to result in the long term aim of achieving health worker retention. Therefore there is need to adopt both financial related and non-financial strategies to retain health staff. Strategies might differ between low-income countries due to socio-cultural and economic differences.

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### Essential services and facilities

#### Hospital security and access

The security and accessibility of the hospital are the most essential facilities of all, especially given the relative lack of police resources in many poorly resourced countries. There is also a need for governmental and international agencies to ensure that hospitals are protected and do not become targeted during armed conflict.

On a local level, the hospital should have a perimeter fence with secure entrances where all persons attending have to demonstrate a legitimate reason for entry. Clearly no weapons should be allowed into the hospital and it may be necessary in some countries to have a metal detector to screen all visitors.

A well organised car parking system is required, with strictly policed access areas for emergency vehicles and for parents or relatives bringing very sick patients to and from the hospital.

**Safety and cleanliness**

There should be clear written evacuation and fire policies, together with appropriate equipment, for instance fire extinguishers. The perimeter fence should be adequate to keep out animals.
Communications
Good communications systems for staff, visitors and patients are essential. In an ideal situation, both outside and internal telephone systems should be available. If telephones are not possible alternative effective, reliable systems of communication should be used. A hospital paging system for doctors, senior nurses and managers aids communication in emergency situations. Internet access is invaluable for information sharing and education, both within a country and globally. Provision can be sought via governmental or non-governmental donor sources. A nominated person with overall responsibility for hospital computer systems predisposes to a cohesive service both internally and externally, avoiding duplication and ensuring appropriate usage.

Effective communication between groups of staff improves the effectiveness and efficiency of care. Regular meetings should discuss individual patients, debrief following death/clinical incidents, and audit particular aspects of clinical and unit management such as infection control. The outcome of audit, particularly any changes of practice, need to be available to those staff it affects, but such meetings should be educational and not be used for blame.

Utilities

Water and sanitation
Hygiene within the hospital is paramount and is dependent on a constant and high quality water supply and adequate sanitation and washing facilities (bathrooms, showers, toilets and accessible sinks with an effective, functioning drainage system), all of which are vital if hospital related infection (see chapter 1.2) is to be minimised.

Electricity
An electricity supply within the hospital that functions whatever the state of the supply to the rest of the area is mandatory. This means that a generator of sufficient power should be an essential piece of equipment (the generator size calculated from bed dependency and operating theatre requirements). In poorly resourced countries where erratic power supply is common due to high fuel cost, solar backups are needed for hospitals to function efficiently and effectively. There should be special emergency circuits. Power cut simulations should be carried out regularly to test the system.

Heating and Ventilation
Ideally, there should be a functioning central heating system within the hospital. For this to work, there will also need to be a continuous water supply. If either of these cannot be ensured, then electric heaters should be installed in areas where there are patients. In hot weather, there should be sufficient windows allowing a comfortable temperature during the hottest part of the day. An air conditioning system or fans, either electric or manual (to be worked by relatives), should be available in areas of the hospital which become particularly hot or for patients who must be kept cool (for example children with high fevers or with head injuries).

Laundry Service
Bedding and other items must be frequently washed. To do this, the hospital must have a staffed laundry service that ideally has industrial washing machines in sufficient number and drying facilities or where hand washing is used, staff should wear protective clothing and high quality thick gloves. Clean bedding, towels and nappies need to be available. A small supply of night wear and other clothing may be needed on the wards for families who do not have changes of clothes.

Cleaning services
The patients being cared for in the hospital are particularly vulnerable to nosocomial (hospital acquired) infection (see chapter 1.2). To reduce this risk, sufficient staff should be employed on a rota over the twenty four hour period to keep all areas of the hospital and grounds clean at all times. Written cleaning policies and training for cleaners should be in place and a supply of appropriate cleaning materials and disinfectants readily available. Clean hospital grounds, pathways and entrances reduce the dirt being transmitted into the ward and other patient areas by staff, relatives and other visitors. Stray animals must be kept away from the hospital premises.

Vermin need to be kept away from the hospital buildings. Once found, seek professional advice.

Toilets, bathrooms and other facilities needed for personal hygiene and for equipment cleaning are of particular importance and these areas should always be scrupulously clean.

Certain areas must be aseptic, for example operating theatres and selected equipment items (see chapter 1.5). Ideally there should be a Central Sterilising Service, if this is not possible there should be suitable sterilisers and a supply of appropriate disinfectants at differing dilutions. Manufacturers’ instructions should be followed for specific items of equipment wherever possible.

Rubbish disposal system
A powerful incinerator working 24 hours a day is essential for the safe disposal of clinical waste. A system to handle and dispose of all waste (clinical and non-clinical), including ‘sharps’ is also needed. Written policies for various types of rubbish disposal, and training, should be available to all staff.

Facility and Utility Maintenance Services

Buildings, utilities and equipment
It is essential for these to be maintained to as high a standard as possible. Suitably trained engineers, builders and other maintenance staff are necessary. There is no point in having expensive medical and surgical equipment if this cannot be maintained or used. Sufficient trained bio-engineers are therefore essential. All equipment used in the hospital should be robust, compatible if at all possible, suitable for the conditions and level of expertise available and, when new, should be purchased with accompanying staff training and servicing arrangements.

Porters
For the functional relationships between different departments, for example the movement of patients to and from the operating theatres, a well organised, trained and sympathetic team of porters is essential.
Caterers

Hospital food must be prepared under very hygienic conditions and by staff who do not have gastroenteritis or superficial skin infections. Ideally nutritious food should be provided free of charge. Special diets for malnourished children should be available (see chapter 5.10.B).

Administration support

Rather than using the skills of a trained nurse, reception and other administrative support staff need to be employed to aid facility managers and other non-clinical and clinical staff. There needs to be a staffed system to store and process medical and nursing records. There should be strict rules about who has access to the medical and nursing records, where they are stored and for how many years they are kept.

Human resource and personnel issues

Hiring and dismissing staff

There should be transparent procedures for advertising for, interviewing and employing staff which include non-discrimination policies, in particular on the basis of sex, age, ethnic or religious status.

Employment and financial issues

It is essential that the professions of medicine and nursing in all countries are highly regarded or respected. As a consequence the salaries for doctors and nurses in the National Health Services must reflect this. If not, the staff may have to undertake other jobs during the day and do not feel valued for their work. This lack of funding for salaries also leads to corruption with some doctors taking supplies and equipment from their hospital to use in private clinics, thus depriving the most needy and poor in the community.

Individual job descriptions and responsibilities should be agreed between professionals, their professional organisations and hospital management.

Arbitrary and compulsory transferring of staff from one place to another, at short notice and without consultation, is damaging to morale and damaging to the effectiveness of health services. This should be avoided.

There should be systems for ensuring the regular and secure recording of the time spent at work and the appropriate payment arrangements based on the contracted number of hours worked (part or full time). On call emergency work and its payment should also be part of the contract.

There should be a professional registration system for each country which ensures a basic level of training as well as a system which validates experience and ability at intervals after initial registration.

Training and continuing staff education (see also chapter 1.3)

Induction training for all staff concerning hospital policies should be mandatory.

Governments in well-resourced countries could encourage a support system of education for those working in less well-resourced situations.

New teaching techniques, such as skill and scenario based teaching e.g. EMNCH courses (see chapter 1.3), should be introduced.

Professional registration requirements for healthcare workers

These will vary from country to country. However some form of governmental registration is essential. There should also be procedures governing the employment of expatriate staff in the health service.

Vetting of health care workers

All staff working with patients, either locally or from abroad, should be checked to ensure that they are suitably trained and have not been involved in the abuse of children. This is also important with respect to expatriate staff.

Staff health (see also chapter 1.17)

There needs to be a system to advise the hospital management about staff health problems that may affect patient care. Staff with health related problems affecting their performance need access to a supportive occupational healthcare system. There should be systems to protect patients from staff who are ill. This is a difficult but vital issue particularly with respect to illnesses such as TB, HIV and Hepatitis. Sometimes other support is necessary in order that a health workers performance can be restored, in the interests of all.

Needle stick injury

Although the risk of infection is very small, a policy should be in place to deal with this issue urgently, especially in hospitals where there are many patients with HIV infection and hepatitis.

Needle stick injuries are the commonest of sharps injuries, although other contaminated sharp instruments may also cause injuries. All healthcare workers must be educated about the potential exposure that can occur during their duties and should have appropriate vaccinations. The risk of hepatitis B, hepatitis C and HIV infection should be assessed and appropriate immunisation or chemoprophylactic steps taken after an incident. Immediate treatment of such injuries should encourage washing thoroughly with running water and an antiseptic solution. Consult the infection control team for further advice and to follow basic protocol. An incident reporting system should be in place. It should not be seen as punitive; active support by managers should encourage prompt and accurate reporting.

Concern about individual performance should be addressed by a senior staff member on a one to one basis. Written guidelines should be used, transparently. Sometimes a period of supervised practice or re-training is appropriate.
Exposure to human immunodeficiency virus (HIV)
The route of transmission for HIV is person to person via sexual contact, sharing of needles contaminated with HIV, infusions that are contaminated with HIV, transplantation of organs or tissues that are infected with HIV. The risk of a healthcare worker acquiring HIV after a needle stick or other ‘sharps’ injury is less than 0.5%. Risk reduction must be undertaken for all blood borne pathogens, including: adherence to standard precautions using personal protective equipment and appropriate use of safety devices and a needle disposal system to limit sharps exposure. Training for healthcare workers in safe sharps practice should be ongoing.

Information on preventive measures must be provided to all staff with potential exposure to blood and blood products. Policies which are in keeping with the local and national guidelines must include screening of patients, disposal of sharps and wastes, protective clothing, managing inoculation accidents, sterilisation and disinfection. Hospital policy must include measures to obtain serological testing of source patients promptly where necessary, usually with the patient’s informed consent. Post exposure prophylaxis should be started as per local or national guidelines.

One possible strategy is as follows:

Discuss with the patient or in the case of a child the family what has happened and ask if the patient’s HIV status is known. If not discuss the possibility of testing, if the injury occurred during normal working hours. Remember that anyone having an HIV test has the right to counseling. If out of hours, or the family decline testing proceed to step 3.

If the patient has negative HIV ELISA and is over 18 months of age infection is extremely unlikely. If under 18 months a positive ELISA may reflect maternal antibody. However any positive test should lead to 3. If negative, the professional is not at risk of HIV infection. However further testing for hepatitis B and C on both the child and worker may be warranted.

Arrange a base line HIV ELISA for the professional after appropriate counseling. If positive the professional will need to discuss further treatment with his or her own doctor.

If the professional’s base line serology is negative and the patient is positive for HIV, anti-retroviral prophylaxis should be started urgently. Current recommendations advise 1 month of treatment. The professional will need a repeat ELISA after 3-6 months to check his/her status.

Exposure to hepatitis B virus
The route of transmission for hepatitis B virus is through body substances such as blood and blood products, saliva, cerebrospinal fluid, peritoneal, pleural, pericardial and synovial fluid, amniotic fluid, semen and vaginal secretions and any other body fluid containing blood. Following standard precautions is important, but immunisation is the best way of preventing transmission to healthcare staff. All HCWs that are in contact with patients or body fluids must be vaccinated against Hepatitis B.

Staff infected with blood-borne pathogens may transmit these infections to patients and require careful evaluation with respect to their duties. This status should not be used as cause for discrimination.

Exposure to hepatitis C virus
The route of infection is mainly parenteral. Sexual transmission does occur but is far less frequent. No post exposure therapy is available for hepatitis C, but seroconversion (if any) must be documented. As for hepatitis B viral infection, the source person must be tested for HCV infection. For any occupational exposure to blood borne pathogens, counseling and appropriate clinical and serological follow-up must be provided.

Confidentiality
Systems need to be in place to ensure that patient’s records and personnel files of employed staff are kept confidential.

Other services for patients and their relatives

Health Information should be available (see Maternal and Child Healthcare Initiative (MCHI) manual)

There should be toilets and when possible telephones available for visitors and facilities for those visitors with a disability.

Ideally there should be written policies concerning the rights and responsibilities of patients, resident parents/carers and visitors widely displayed around the hospital. These should include issues such as the prevention of smoking, alcohol, violence (verbal and physical) and weapons in the hospital. Smoking is particularly important with regard to children’s health but is so important in stressed parents that it may be inappropriate to ban it altogether, instead limit it to defined areas.

Family centred care
The role of families in caring for patients alongside and in partnership with professional staff is vital but must be handled extremely carefully. Families must not be exploited but equally in poor countries hospital care would not be possible without them. Good understanding of roles and good communication is of paramount importance (see also chapter 1.20 and MCHI manual)

Play and sensory stimulation and support for children’s wards
The importance of play and developmental support cannot be over emphasized. A friendly and stimulating environment helps the child to understand and cope with their hospitalisation and to get better far quicker (as advocated in WHO recommendations for the recovery management of children with malnutrition). It also helps to support parents and can provide them with additional skills that they can continue at home once discharged. Many mothers cannot afford to stay for long periods as the demands to return to their village are enormous as they are pivotal to the daily routine, farming etc. Mothers can be supported by passing on the knowledge of play as taught by a play worker. The fact that the sick child is provided the opportunity to have access to play and information facilities at hospital helps to reduce loneliness and fear.

Some well resourced countries have training programmes and qualifications for Play Specialists. These are not available in most low income countries, however much can be achieved by recruiting suitable people to support therapeutic, informational and recreational play with children in hospital. It is low cost and effective, as both an adjunct and core part of treatment, in the hands of a skilled play worker, any resources can be made of local and low cost materials.
Play workers need to have good communication and empathy skills with children and families. They need to have a good understanding of child development and the particular needs of children in hospital (especially children alone or with disabilities or other additional needs). They also need to be trained about some specific situations such as the comatose child, and the fact that they can hear and have feelings when touched, and how to encourage the parent to talk and play with the child.

**Conclusion**

The provision, organisation, and financing of these services, facilities and functions and the management of the human resource needed to service them is as important as those needed to provide the clinical and clinical support services. A sound hospital infrastructure and management is of paramount importance for the provision of good care.

Further information on other work related issues concerning healthcare staff can be found in chapters 1.17 and 1.20
2.5E Hypertension, pre-eclampsia and eclampsia

Minimum standards requirements
- BP machine
- Urine protein testing sticks
- Magnesium sulphate
- Diazepam
- Anti-hypertensive drugs (oral methyl dopa, labetolol, hydralazine and IV labetolol, hydralazine and oral nifedipine)
- Bag valve masks, oxygen and oropharyngeal airway
- Suction
- Patella hammer
- Pulse oximeter

Introduction
Hypertension in pregnancy is when systolic BP is greater than or equal to 140 mm Hg and/or diastolic BP is greater than or equal to 90 mm Hg. If the BP is elevated, confirm by repeated measurements (see below).

Severe hypertension (systolic pressure greater than or equal to 170 mm Hg and/or diastolic blood pressure greater than or equal to 110 mm of mercury) must be treated urgently, because systolic or a diastolic blood pressure at or above these levels risks cerebral haemorrhage and hypertensive encephalopathy.

Measuring blood pressure and looking for hypertension

When you measure a woman or girl’s blood pressure, she should be rested and seated at a 45o angle with the machine on the bed beside her. Don’t prop it up on her abdomen. Do not lie her down as this causes compression of the central veins. Open the cuff out flat. Be sure to place the centre of the inner bladder on the artery. A falsely high reading is obtained if the cuff’s bladder does not encircle at least 80% of the circumference of the arm.

If the blood pressure is consistently higher in one arm, this arm should be used for all subsequent measurements.

The systolic pressure is the onset of the first sound (K1). The diastolic pressure is the complete disappearance of sounds (K5). The normal systolic blood pressure in pregnancy is between 95 and 135 mmHg.
The normal diastolic blood pressure is between 60-85 mmHg. Diastolic blood pressure measures peripheral resistance and does not vary with the woman’s emotional state to the same degree that systolic pressure does. The BP normally falls during pregnancy reaching its lowest in the second trimester and being back to pre-pregnancy levels at term.

If the systolic pressure is 140 or more and/or the diastolic blood pressure is 90 mm Hg or more on two consecutive readings taken 4 hours or more apart, diagnose hypertension. If urgent delivery is needed, or if the systolic BP is 170 or more and/or the diastolic blood pressure is 110 mm Hg or more, repeat after 15 minutes.

In addition to a blood pressure of 140/90, any increase in systolic pressure of 30 mm Hg or more or diastolic of 15 mm Hg or more over recent previous measurements requires close monitoring even if the pressures do not reach 140 systolic or 90 diastolic.

### The causes of hypertension in pregnancy

These can be classified as follows:

1. **Pre-eclampsia** is hypertension (BP 140/90 or greater) after 20 weeks gestation usually, but not always, in association with proteinuria (greater than or equal to 0.3 gram in a 24 hour specimen). This level correlates with 1+ or more on dipstick testing.

   Pre-eclampsia is a multi-system disorder.

   Other conditions cause proteinuria, and false positive results are possible, for example from contamination with normal vaginal discharge or amniotic fluid. Urinary infection may also produce proteinuria, but rarely ≥2+. Blood in the urine due to catheter trauma, schistosomiasis and contamination from vaginal blood may also give false positive results.

   Random urine sampling, such as the dipstick test for protein, is a useful screening tool. A change from negative to positive during pregnancy is a warning sign. If dipsticks are not available, a sample of urine can be heated to boiling in a clean test tube. Add a drop of 2% acetic acid to check for persistent precipitates that can be quantified as a percentage of protein in the sample. Only clean-catch mid-stream specimens should be used. Catheterisation for this purpose is not justified due to the risk of urinary tract infection.

   Eclampsia is fitting associated with the syndrome of pre-eclampsia - seizures can occur without any previous signs or symptoms.

   The diagnosis of preeclampsia is made when there is hypertension after 20 weeks gestation along with one or more of the following:
   - Significant proteinuria (see above)
   - Renal involvement (serum/plasma creatinine > 90micromol/L with or without oliguria)
   - Haematological involvement (low platelets, haemolysis, DIC)
   - Liver involvement (raised transaminases, epigastric or right upper quadrant abdominal pain)
   - Neurological involvement (headache, persistent visual disturbances including photophobia, scotomata, blindness and retinal vasospasm, hyper-reflexia with sustained clonus, stroke)
   - Pulmonary oedema
   - Intra-uterine growth retardation
   - Placental abruption

   HELLP is a syndrome comprising Haemolysis, Elevated Liver enzymes and Low Platelets. It may occur in pre-eclampsia, sometimes without significant hypertension.

   Pre-eclampsia and eclampsia remains one of the main causes of maternal mortality and morbidity in low resource countries. In one study, 38% of eclamptic fits occur antenatally, 18% intra-partum and the remaining 44% post-partum, usually in the first 48 hours after delivery. Sometimes the first fit occurs post-natally.

2. **Gestational hypertension** This is hypertension developing only after 20 weeks gestation but with no other features of preeclampsia and which resolves within 3 months after birth. Patients presenting early in pregnancy (after 20 weeks) and with severe hypertension are more likely to develop pre-eclampsia.

3. **Chronic hypertension**
   a) Essential hypertension occurs prior to 20 weeks without cause (see b) below)
   b) Secondary to other medical conditions such as chronic renal disease, endocrine disorders or diabetes mellitus

   It is important to control the hypertension in these cases keeping it below 150/100 mm Hg but not permitting the diastolic pressure to go below 80 mmHg.

4. **Pre-eclampsia in a woman with chronic hypertension**

   Additional systemic features of pre-eclampsia (such as proteinuria) develop after 20 weeks gestation.
Risk factors for pre-eclampsia
First pregnancy
Multiple pregnancy
Family history of pre-eclampsia
Chronic hypertension (see above)
Renal disease
Hypertension/preeclampsia during a previous pregnancy
Diabetes mellitus

Investigations
Urine dipstick test for protein and microscopy to exclude infection
Hb, platelet count
Urea and electrolytes and creatinine
Liver function tests
LDH and uric acid
Fetal growth assessment by ultrasound
If there are signs of DIC, clotting studies should be undertaken (whole blood clotting time in low resource settings: see below).

If there is severe early pregnancy hypertension, investigations (if available) for the rarer causes such as auto-immune disorders, phaeochromocytoma etc. may be indicated

Management of pre-eclampsia and gestational hypertension
Preeclampsia progresses during pregnancy and the only definitive treatment is delivery. If the patient is at term (after 36 weeks) then, after stabilisation of the woman/girl, the baby should be delivered as soon as possible.

There is no evidence that bed rest improves outcome for the woman or fetus. However, heavy physical labour is clearly inappropriate.
However, it is common to see women in low income settings working in this way despite being in advanced pregnancy.

Mild cases can be cared for without hospital admission but there needs to be regular at least weekly checks on BP and urine and knowledge by the family of the warning signs of severe preeclampsia or eclampsia (see below).

If there is severe pre-eclampsia or eclampsia, if the blood pressure cannot be adequately controlled, if there is pulmonary oedema, deteriorating renal or liver function, placental abruption or evidence of falling platelets or DIC, then delivery is urgent but always after stabilisation. If before 37 weeks gestation, an injection of dexamethasone or betamethasone 12 mg IM 2 doses 12 hours apart or 6 mg IM 4 doses 12 hours apart, improves the chances of avoiding neonatal respiratory failure (see chapter 3.1).

Stabilisation involves correction of severe hypertension, control of fluid intake and output, correction of blood clotting disorder (in low resource settings with fresh blood transfusion) and prevention/control of eclampsia (see below).

Anti hypertensive drugs for pre-eclampsia
Mild pre-eclampsia does not require anti hypertensive drugs.

In moderate pre-eclampsia, where either the systolic BP is 150-160 mmHg and/or diastolic BP 95-105mmHg on two measurements 4 hours apart treatment with oral antihypertensive drugs should be considered.

Blood pressures ≥170 mm Hg systolic and/or ≥110 mmHg diastolic must be treated with antihypertensive drugs. However, it is essential that BP is not lowered too rapidly as this can seriously affect the woman’s cerebral circulation and circulation to the placenta and fetus.

Oral anti-hypertensive drug treatment
Methyldopa. This drug acts directly on the central nervous system and takes 24 hours to work. Doses are 250mg tds initially increasing every 2 days up to 750 mg tds. Side effects include dry mouth, postural hypotension, sedation and depression. It is contraindicated in depression and liver disease.

Labetolol. This is a beta blocker with mild alpha blocking effects. Doses are 100-400 mg tds. Side effects are Bradycardia, bronchospasm, weakness, scalp tingling (only for 24-48 hours), nausea and headache. It is contraindicated in asthma.

Hydralazine. This is a vasodilator. Doses are initially 25mg every 2 hours increasing gradually to 50 mg tds. Side effects are flushing, tachycardia, palpitations, headache and, uncommonly, a lupus syndrome.

Treatment of severe hypertension
It is vital that severe hypertension is controlled at any gestation, before and after delivery.

Anti-hypertensive drugs should be given urgently to all patients with a systolic BP of ≥170 mm Hg and/or diastolic BP ≥110 mmHg.

Without urgent treatment there is a risk of cerebral haemorrhage, eclampsia and pulmonary oedema.

The aim should be a gradual and sustained reduction in BP with one or more of the following drugs.

BP must not be allowed to fall below 140/80 mmHg.

Hydralazine
This is the anti-hypertensive drug of choice. Give 5 mg IV slowly over 5 minutes (it acts within 5 minutes), then 5 mg IV every 15 minutes until diastolic BP is 90-100mmHg. Repeat hourly as needed, or give hydralazine 12.5mg IM every 2 hours as needed.

Alternatively, give hydralazine IV infusion, 20 mg in 200 mL 5% dextrose at 0.5 mL (10 drops) per minute (20 drops = 1mL for a standard giving set), and stop the drip when diastolic BP is 90 mm Hg or less. Hydralazine may cause increased maternal heart rate.

Side effects are flushing, tachycardia, palpitations, headache and, uncommonly, a lupus syndrome.

Labetolol
Intravenous labetolol is preferable to hydralazine if the maternal pulse rate exceeds 120 beats per minute.
Labetolol dosage is 10 mg IV. If response is inadequate (diastolic blood pressure remains above 110 mm Hg) after 10 minutes, give a further dose of labetolol 20 mg IV. Increase the dose to 40 mg and then 80 mg if satisfactory response is not obtained after 10 minutes of each dose.

Alternatively use an IV infusion of 200 mg in 200 mL Ringer Lactate at 40 mg/hour, increasing dose at half-hourly intervals as required to a maximum of 160 mg/hour.

Side effects are Bradycardia, bronchospasm, weakness, scalp tingling (only for 24-48 hours), nausea and headache. Labetolol is contra-indicated in asthma, as it may cause severe bronchospasm.
### Severe pre-eclampsia and eclampsia

#### Symptoms
- None unless very severe

#### Signs
- Headaches increasing in frequency and unrelieved by paracetamol
- Visual disturbance
- Upper abdominal pain
- Shortness of breath
- Passing small amounts of urine
- Oedema

#### Investigations
- Diastolic BP > 90 mmHg before 24 weeks gestation
- Two readings of diastolic blood pressure 90–110 mm Hg 4 hours apart after 24 weeks gestation

#### Diagnosis
- Essential hypertension
- Hypertension secondary to other disease such as renal impairment, autoimmune disease
- Pregnancy induced hypertension
- Severe pre-eclampsia

#### Treatment
- Consider antihypertensive drugs
- Treat hypertension with drugs if severe and treat the underlying condition
- Treat hypertension with drugs if severe
- Adequate rest

### Table 2.5.E.1 Differential diagnosis of hypertension and convulsions in pregnancy

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Signs</th>
<th>Investigations</th>
<th>Diagnosis</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>None unless very severe</td>
<td>Diastolic BP ≥ 90mmHg before 24 weeks gestation</td>
<td>Urine for protein</td>
<td>Essential hypertension</td>
<td>Consider antihypertensive drugs</td>
</tr>
<tr>
<td>None unless very severe</td>
<td>Diastolic BP ≥ 90mmHg before 24 weeks gestation</td>
<td>Proteinuria up to 2+</td>
<td>Hypertension secondary to other disease such as renal impairment, autoimmune disease</td>
<td>Treat hypertension with drugs if severe and treat the underlying condition</td>
</tr>
<tr>
<td>None unless very severe</td>
<td>Two readings of diastolic blood pressure 90–110 mm Hg 4 hours apart after 24 weeks gestation</td>
<td>No proteinuria</td>
<td>Pregnancy induced hypertension</td>
<td>Treat hypertension with drugs if severe Adequate rest</td>
</tr>
<tr>
<td>None unless very severe</td>
<td>Two readings of diastolic blood pressure 90–110 mm Hg 4 hours apart after 24 weeks gestation</td>
<td>Proteinuria up to 2+</td>
<td>Mild to moderate pre-eclampsia</td>
<td>Adequate rest</td>
</tr>
<tr>
<td>Headaches increasing in frequency and unrelieved by paracetamol Visual disturbance Upper abdominal pain Shortness of breath Passing small amounts of urine Oedema</td>
<td>Diastolic blood pressure 110 mm Hg or more after 24 weeks gestation Hyper-reflexia Passing less than 400 mL urine in 24 hours Pulmonary oedema Generalised oedema</td>
<td>Proteinuria 3+ or more</td>
<td>Severe pre-eclampsia</td>
<td>Urgent admission to hospital Magnesium sulphate</td>
</tr>
<tr>
<td>May be history of the above Generalised convulsions Unconscious</td>
<td>Generalised fitting Coma</td>
<td>Diastolic blood pressure &gt;90 mm Hg or more after 24 weeks gestation Proteinuria 2+ or more Generalised oedema Pulmonary oedema</td>
<td>Eclampsia</td>
<td>ABC Magnesium sulphate</td>
</tr>
<tr>
<td>Difficulty opening mouth and swallowing</td>
<td>Spasms face, neck, trunk, Arched back Board-like abdomen</td>
<td></td>
<td>Tetanus</td>
<td>ABC, Penicillin Muscle relaxants NG feeding</td>
</tr>
<tr>
<td>Past history of convulsions</td>
<td>Convulsions Coma Normal BP</td>
<td>EEG abnormal</td>
<td>Epilepsy</td>
<td>ABC Anti-convulsant drugs</td>
</tr>
<tr>
<td>Chills/rigors</td>
<td>Fever Convulsions Coma Severe anaemia Jaundice</td>
<td>Blood smear for malarial parasites</td>
<td>Severe malaria</td>
<td>ABC Anti-malarial drugs</td>
</tr>
<tr>
<td>Headache</td>
<td>Fever Stiff neck Reduced conscious level or coma Convulsions</td>
<td>Full blood count Blood culture LP (unless raised intracranial pressure)</td>
<td>Meningitis or encephalitis</td>
<td>ABC Anti-bacterial or antiviral drugs</td>
</tr>
<tr>
<td>Headache</td>
<td>Normal BP</td>
<td>No proteinuria</td>
<td>Migraine</td>
<td>Paracetamol Bed rest in dark room</td>
</tr>
</tbody>
</table>

Table 2.5.E.1 Differential diagnosis of hypertension and convulsions in pregnancy
Nifedipine
Nifedipine is a calcium antagonist which may be administered as an initial 10mg oral dose (onset of action within 10-20 minutes) with a repeat of 10 mg if inadequate response after 30 minutes. Subsequent oral doses are 20 mg bd. Side effects are severe headaches associated with flushing and tachycardia. Oedema, weakness and constipation may occur. It may inhibit labour. It may interact with magnesium sulphate, and give profound hypotension and/or heart block.
Give prophylactic magnesium sulphate if severe hypertension is accompanied by at least 2 + of proteinuria and/or symptoms suggesting that eclampsia may occur (see below).

Eclampsia or severe pre-eclampsia

Although pre-eclampsia and eclampsia are commonest in primigravidae, they can occur in multiparous patients.

Symptoms and signs of impending eclampsia
• Headache, visual disturbances, epigastric pain, vomiting.
• Rapidly developing generalised (especially facial) oedema
• Pulmonary oedema
• Right upper quadrant tenderness
• Recently developed hypertension ≥170/110 with proteinuria >1 g/24hours or rapid rise in blood pressure
• Increased tendon reflexes
• Rapidly changing biochemical/haematological picture, including raised urates and low platelets (if measurable)

Differential diagnosis (see table 2.5.E.1)
Status epilepticus
• in patient with known epilepsy - see chapter 5.16.E
• in severe malaria - see chapter 2.8.D

Convulsions with signs of pre-eclampsia indicate eclampsia.
Convulsions due to eclampsia:
• can occur regardless of the severity of hypertension;
• are difficult to predict but rarely occur without increased tendon reflexes, headache or visual changes;
• are tonic-clonic and resemble grand mal convulsions of epilepsy;
• may recur frequently, as in status epilepticus, and may be fatal;
• will not be observed if the woman is alone;
• may be followed by coma that lasts minutes or hours depending on the frequency of convulsions.
• occur after childbirth in about 44% of cases, usually but not always within the first 24 hours after birth. The longer the gap between delivery and a fit, the more likely the diagnosis is to be other than eclampsia (for example cerebral venous thrombosis).

The first eclamptic fit is usually self limiting.

Control of BP is essential in the management of severe pre-eclampsia or eclampsia where high BP may cause a cerebrovascular accident (stroke). Magnesium sulphate is essential in preventing eclampsia and, if eclampsia occurs, in preventing further fits.

Maternal complications of severe pre-eclampsia:
• eclampsia
• cerebro-vascular accident (stroke)
• renal failure
• HELLP, possible leading to rupture of liver capsule
• pulmonary oedema
• placental abruption, possibly leading to DIC

Primary assessment, resuscitation and emergency treatment of convulsions in eclampsia

Call for help
• never leave the patient alone
• prevent maternal injury during the convulsion

Airway
• If the airway is not open - use an airway opening manoeuvre and keep it open. Consider an airway adjunct such as an oropharyngeal airway or intubation
• The oropharynx may need gentle suctioning under direct vision being careful to avoid inducing laryngospasm
• The recovery position should be adopted to minimise the risk of aspiration of vomit

Breathing
• If there is spontaneous breathing, give high concentration of oxygen via a facemask plus reservoir. Give 100% oxygen (mask with reservoir and flow rate of at least 6L/min) regardless of mother’s oxygen saturation (increases fetal O2 delivery as well as improving maternal tissue oxygenation).
• If apnoea or hypoventilation, provide chest inflations with bag-valve-mask-reservoir ventilation and 100% oxygen
Severe pre-eclampsia and eclampsia

Circulation

- Look for signs of life (breathing, movement, gagging/coughing) or for a pulse at the carotid: if absent or you are not sure, initiate CPR (see chapters 1.12 and 1.13)
- If over 20 weeks gestation, left lateral tilt and/or manually displace uterus to reduce vena caval compression
- Secure IV or intraosseous access
- Monitor blood pressure
- Attach pulse oximeter
- Insert urinary catheter with strict fluid input/output chart

Insert a 14G-16G IV cannula and take 20 mL blood for full blood count, cross-match (4 units = 2 L) and clotting. Undertake a 20 minute whole blood clotting time (WBCT20) test if laboratory studies not available (see chapter 7.5)

A central venous pressure (CVP) line may be a helpful monitor to avoid fluid overload, but the benefits must be weighed against risks. If disseminated intravascular coagulation (DIC) is established, CVP insertion is more hazardous (must avoid subclavian vein access). {Header 1}Emergency drug treatment of eclampsia

Stage 1 Stop convulsion and prevent further convulsions

The majority of seizures are self-limiting.

Commence magnesium sulphate

Magnesium sulphate (MgSO4) treatment

Magnesium sulphate is the anti-convulsant of choice.

If mother is conscious always warn her that there will be a feeling of warmth passing through her body when MgSO4 is infused and that this is not harmful. Failure to do so may result in the mother pulling out her IV cannula and other potentially dangerous reactions.

{Header 4}Loading dose in well- resourced settings

Four grams MgSO4 as 20 mL of a 20% solution of magnesium sulphate IV added to 80 mL of 5% dextrose solution given slowly over 20 minutes (total 100ml). (To make 20 mL of a 20% solution, add 8 mL of 50% MgSO4 solution to 12 mL sterile water).

If convulsions recur after completion of the loading regime, give 2 g MgSO4 (10 mL of 20% solution is added to 90 mL Ringer-Lactate or Hartmann’s) and given IV slowly over 10 minutes.

Do not use the same IV line to inject other drugs if MgSO4 is being given by IV infusion.

Loading dose in poorly - resourced settings

Five grams MgSO4 (10 mL of 50% solution) by deep intramuscular injection in each buttock. Thus total dose given = 10 grams. (sometimes 0.5mL of 2% or 1mL of 1% lignocaine is given in the same syringe for each injection of 5 grams to reduce the pain of the injections). An aseptic technique is essential

- Never give lignocaine intravenously, as it causes cardiac arrhythmia and death. Therefore always draw back on syringe when giving magnesium sulphate to ensure the needle is not in a vein.

Maintenance dosage

- Well- resourced countries: Provided there is close monitoring (ideally with a burette in giving set), give 1g MgSO4/hour IV for 24 hours that is 25ml/hour of the loading dose solution of 4 grams in 100ml described above.
- Poorly –resourced countries: 5 g IM 4 hourly (plus 1 mL of 1% lignocaine [ 0.5 mL of 2%] in same syringe) using alternate buttocks.

Alternative regime recommended in Asia where pregnant women are smaller than in Africa and resources better

Loading dose: Four grams MgSO4 as 20 mL of a 20% solution added to 80 mL of 5% dextrose solution slowly IV over 20 minutes (total 100ml). (To make 20 mL of a 20% solution, add 8 mL of 50% MgSO4 solution to 12 mL sterile water).

Then immediately give 3 g (6 mL of 50% solution) by deep intramuscular injection in each buttock. (sometimes 1 mL of 1% or 0.5mL of 2% lignocaine is given in the same syringe to reduce the pain of the injections)

Maintenance dose

Give 2.5 gram MgSO4 IM every 4 hours in each alternate buttock.

If seizures continue or recur:

Give MgSO4 2 g < 70kg; 4 g >70kg as an extra loading dose IV over 5-10 minutes or IM in low resource settings.

Alternative regime undertaken in some West African countries and recommended in 2003 by WHO

Loading dose: 4g IV of magnesium sulphate over 20 minutes: add 8ml 50% to 92ml Ringer-Lactate or Hartmann’s. This is followed by 10g 50% MgSO4 solution IM (5g in each buttock: deep IM injections with lidocaine as above in same syringe). Ensure needle is not in a vein

Maintenance dose is 5g MgSO4 50% solution with lidocaine every 4 hours into alternate buttocks

If eclampsia recurs and only after 15 minutes give 2g MgSO4 over 5 minutes IV: add 4ml 50% to 16ml of Ringer-Lactate or Hartmann’s

Continued treatment with magnesium sulphate

Continue MgSO4 for 24 hours after delivery or the last convulsion, provided that:

- respiratory rate is > 12-16 per minute
- urine output > 30 mL per hour (WHO figure is >100 mL over 4 hours)
- tendon reflexes are present

Discontinue magnesium sulphate when:

- BP stable and consistently below 150/100
- Diuresis started

Figure 2.5.E.6 The recovery position
• No neurological symptoms

Monitor the fetus by regular heart rate assessments. A fluid balance chart must be kept (see below)

Remember to subtract volume containing MgSO4 infused from total maintenance infusion volume to avoid fluid overload
When using magnesium sulphate, monitor hourly urine output, respiratory rate, SaO2 and tendon reflexes every 15 minutes for the first 2 hours, and then every 30 minutes

Progressive symptoms of magnesium toxicity:
1. feeling of warmth, flushing, double vision, confusion, slurred speech, nausea and weakness
2. loss of tendon reflexes
3. respiratory depression (<12-15 breaths per minute) and/or SaO2 < 94%
4. respiratory arrest
5. cardiac arrest
6. If magnesium toxicity is suspected, stop infusion and administer antidote of 10 mL 10% calcium gluconate IV over 10 minutes.
Stop infusion of magnesium sulphate if:
• patellar reflexes are absent
• there is respiratory depression (respiratory rate less than 12-15/min) or a fall in oxygen saturation ≤92% on a pulse oximeter.
Give oxygen to keep oxygen saturation 94-98%.
• urine output is less than 30 mL/hour over last 4 hours

If respiratory depression develops: give 100% oxygen by face mask with reservoir, and give calcium gluconate 1 g (= 10 mL of 10% solution) IV slowly over 5 minutes. Too rapid administration can result in loss of consciousness, cardiac arrhythmias and cardiac arrest

If respiratory arrest occurs:
• give chest inflations with bag-valve-mask ventilation with 100% oxygen
• inject calcium gluconate 1 g (10 mL of 10%) IV slowly over 5 minutes

The magnesium sulphate infusion may be recommenced at a reduced dose, if thought necessary, once normal respiration and reflexes have returned.

Note for anaesthetists: there is an increased sensitivity to muscle relaxants (particularly non depolarising agents) in patients on magnesium.

Note for obstetricians: If possible, avoid the use of nifedipine for lowering BP when magnesium sulphate is being used or anticipated, because of potential cardiac toxicity when the two drugs are given together.

In patients with known renal disease or myasthenia gravis, magnesium sulphate is contraindicated and, if available, phenytoin should be used. The loading dose is 15 mg/Kg (maximum dose 2grams) over 20 minutes by slow IV injection. Subsequently a dose of 100mg bd orally can be given. IV injection if given too rapid can cause severe hypotension, cardiac arrhythmias or respiratory arrest.

Other anticonvulsant drugs
If repeated fits occur despite magnesium sulphate, give either rectal paraldehyde (dose = 10-30 mL as an enema mixed with 10 parts of Ringer Lactate; do not give if brownish colour or smells of acetic acid. NB. crosses the placenta) or rectal diazepam (dose = 500 micrograms/kg or 10-20 mg; may cause neonatal hypothermia, hypotonia and respiratory depression).

Other causes of fitting should be considered if fits persist/recur despite magnesium sulphate. These include a cerebrovascular accident (stroke), malaria and meningitis.
If magnesium sulphate is not available: use diazepam (see below)

Diazepam
Must have bag valve mask immediately available in case patient stops breathing
Loading dose
Diazepam 2 mg increments IV every 2 minutes up to 10 mg.
If convulsions recur, repeat loading dose.
Maintenance dose
Diazepam 40 mg in 500 mL Ringer-Lactate/Hartmann’s, titrated to keep the mother sedated but able to be woken and without hypoventilation.

Maternal respiratory depression may occur when dose exceeds 30 mg in 1 hour:
• Assist ventilation (bag-valve-mask, anaesthesia apparatus, intubation), if necessary.
Do not give more than 100 mg in 24 hours.
Rectal administration: give diazepam rectally when IV access is not possible. The loading dose is 20 mg in a 10 mL syringe. Remove the needle, lubricate the barrel and insert the syringe into the rectum to half its length. Discharge the contents and leave the syringe in place, holding the buttocks together for 10 minutes to prevent expulsion of the drug. Alternatively, the drug may be instilled in the rectum through a catheter.
If convulsions are not controlled within 10 minutes, administer an additional 10 mg per hour or more, depending on the size of the woman and her clinical response.

Be prepared for neonatal resuscitation when diazepam has been used, especially if in large doses.

Severe pre-eclampsia

Stage 1 Prevention of fitting
If significant increased tendon reflexes often also with ankle clonus, before delivery or afterwards, and the patient shows other signs of impending eclampsia, (e.g. confused, jittery, has severe headache), prophylactic anticonvulsant therapy (where possible magnesium sulphate) should be commenced.

Other indications for magnesium sulphate treatment where eclampsia has not yet occurred:

• Persistent hypertension despite adequate antihypertensive drugs and good fluid management
• Evidence of thrombocytopenia or liver dysfunction if these can be measured
The same regimen of magnesium sulphate (or diazepam if magnesium sulphate is not available) is used for prophylaxis as described above for the treatment of eclampsia. A loading dose alone may suffice.
Severe pre-eclampsia and eclampsia

Magnesium sulphate

In poorly resourced settings

Loading dose MgSO₄ 5g in 10ml by deep intramuscular injection in each buttock. Thus total dose given = 10 grams.

Maintenance dose MgSO₄ 5g IM 4 hourly using alternate buttocks.

In well resourced settings

Loading dose MgSO₄ 4g IV over 20 minutes.

Maintenance dose MgSO₄ 1g per hour infusion

If seizures continue or recur

MgSO₄ 2g IV over 10 minutes or IM.
If this fails: Diazepam 2mg IV every 2 minutes to maximum total 10mg IV or rectal 10-20mg

Stop MgSO₄ if:
respiratory rate < 12-15/minute OR if SaO₂ <94%
OR urine output < 30 ml per hour
Antidote: 10% calcium gluconate 10 ml IV over 10 minutes

Call for surgical and anaesthetic help and initiate resuscitation Protect from injury

Airway open and place in recovery position: consider oropharyngeal airway
Breathing: 100% oxygen and mask/bag if not breathing

Circulation: assess pulse and BP place in left lateral tilt and IV access

CONTROL FITS
Magnesium sulphate MgSO₄

TREAT HYPERTENSION

DETERMINE THE BABY UNLESS POST PARTUM

Antihypertensives

Treat hypertension if systolic BP≥170 mmHg and/or diastolic BP ≥110mmHG
Aim to reduce BP to around 140-150 systolic and/or diastolic 90-100mmHg
Do not allow BP < 140/80

Hydralazine 5 mg IV slowly
Repeated doses of 5mg IV 15 minutes apart may be given if necessary. If heart rate > 120 do not give hydralazine - use labetalol
Labetolol 10 mg IV slowly and repeat after 10-20 minutes or start IV infusion 40mg/hour increasing dose at 30 minute intervals up to maximum 160mg/hour
If IV not available give 100mg orally and transfer

Urgent delivery

Aim to deliver within 12 hours STABILISE THE MOTHER BEFORE DELIVERY
• Ergometrine should not be used in severe pre-eclampsia and eclampsia
• Maintain close monitoring as the majority of eclamptic seizures occur after delivery
Stage 2. Reduction of BP and expansion of intravascular volume.

Hypertension should be treated if ≥170/110 mm Hg as described above. Careful fetal monitoring during commencement of treatment is vital as a rapid fall in maternal blood pressure may cause fetal heart rate abnormalities, especially in a growth-restricted or compromised fetus.

If the gestation is less than 36 weeks, dexamethasone or betamethasone 12 mg IM in two doses 24 hours apart should be given to improve fetal lung maturity and decrease the risk of neonatal respiratory failure if time allows.

Anti-hypertensive drugs (see earlier)

Volume expansion during anti-hypertensive treatment

Antihypertensive agents such as nifedipine and hydralazine, act as vasodilators. In pre-eclampsia where intra-vascular volume is reduced, a small volume load should be given immediately prior to IV antihypertensive treatment (300 mL Ringer-Lactate/Hartmann’s IV over 20 minutes). Better still, if available, is a colloid or starch such as Haemaccel (500 mL) which remains for longer in the intravascular compartment. Clinical examination for signs of cardiac failure (see chapter 2.7.A) should be sought before and after such treatment.

Stage 3 Anticipate/manage complications

Airway and Breathing
- Keep airway clear.
- The respiratory rate should be recorded regularly. Respiratory rate should be 15 to 40 breaths per minute.
- Beware of over-sedation, aspiration, pulmonary oedema and laryngeal oedema (which presents with stridor)
- If respiratory rate <12-15 breaths per minute, particularly if the mother is receiving magnesium sulphate or opiates for pain control, action should be taken and other signs of toxicity sought (see above).
  o If an opiate is being used, naloxone may be required.
  o If magnesium sulphate is being given, stop magnesium sulphate and give calcium gluconate (see above).
- Oxygen can be given using nasal cannulae (ideally with SaO2 monitoring) if SaO2 <94%. Keep SaO2 94-98%.
- Arrange chest X-ray if aspiration is suspected.
- An increased respiratory rate is an early sign of pulmonary oedema.

Circulation
Consider fluid balance/fluid overload (urinary catheterisation is important)

Usually there is net fluid overload in pre-eclampsia, but the fluid has leaked out of the intra vascular compartment due to low oncotic pressure (partly due to hypoalbuminaemia) and increased capillary permeability. Complications of excessive fluid in the wrong compartment include cerebral oedema, pulmonary oedema and laryngeal oedema (stridor).

Renal failure may develop secondary to the hypertension or to intravascular hypovolaemia (or as a primary injury in severe pre-eclampsia).

Keep IV fluids at a rate less than 100 mL per hour or less than 1ml/Kg per hour (WHO suggests a rate < 1 L in 6 to 8 hours). Fluid restriction should be maintained until there is post partum diuresis which is easy to recognize as there is usually oliguria in severe pre-eclampsia. If there is APH or PPH fluid restriction will probably not be appropriate.

- Insert indwelling urinary catheter, and keep strict intake-output chart with hourly running totals. The total maintenance fluid intake should not exceed 1.5 - 2 L over 24 hours. If the average urine output is less than 30 mL per hour over a period of four hours, this is usually due to the decreased intra vascular volume and will respond to a bolus of 200 mL of IV Ringer-Lactate/Hartmann’s, which can be repeated if necessary.
- In the presence of over hydration, particularly with heart failure or renal impairment, furosemide 20-40 mg IV should be given. Mannitol is not advisable because of the fluid load resulting from its administration and because of its rebound effects.
- Beware cardiac arrhythmias: ideally monitor potassium regularly and ECG continuously.
- Magnesium sulphate is renally excreted and so careful observation for magnesium toxicity is required if there is oliguria.
- Fluid infusion equal to the same quantity as the urinary output in the preceding hour plus 30 mL is a guide to IV fluid administration.
- Central venous pressure monitoring may be useful to guide management, especially if urine output is low. (Keep at up to +6 in a spontaneously breathing patient)

Additional organ involvement

Neurological complications

These include cerebro-vascular accidents and cerebral oedema.

Undertake regular (two hourly) neurological examination (including pupillary and tendon reflexes) and record AVPU and/or Glasgow Coma Scale (GCS) levels. All patients should open their eyes to stimulus, obey commands and respond to questions about name and age - if not they are over sedated or may be developing cerebral complications.

GCS is made up of three components with maximum score of 15:

E Eye opening response (E) Spontaneous 4
  To speech 3
  To pain 2
  None 1

M Best motor response (M) Obeys command 6
  Localizes to pain stimulus 5
  Withdraws 4

A GCS of 8 or less indicates coma and an airway that is not protected by pharyngeal/laryngeal reflexes.
Cerebral oedema is usually localised to the occipital and parietal cortical areas and is a result of cerebral vasospasm. Magnesium sulphate can help prevent this by vasodilating these vessels. Mannitol is not indicated. Recurrent convulsions despite magnesium sulphate +/- other anticonvulsants may require intubation and controlled ventilation (if available).

**Haematological complications**
These include disseminated intravascular coagulation (DIC).
- Group and save and cross-match fresh blood.
- Check FBC including platelet count if possible.
- Do a whole blood clotting test as well as APTT (if available) see 7.5. Failure of a clot to form after 7 minutes or a soft clot that breaks down easily suggests coagulopathy.
- Measurement of fibrinogen and fibrin degradation products-FDPs may be helpful if available.
- If platelet count is $>$100 000 x 10^9, a major coagulation problem is unlikely. Spontaneous haemorrhage may occur with counts below 40,000 x 10^9.
- In frank DIC, give whole fresh blood.

**Hepatic complications**
These include jaundice, bleeding tendency, hepatic failure, hepatic sub-capsular oedema or hepatic rupture (the last two causing right upper quadrant or epigastric pain).

Do daily liver function tests if possible. Delivery of the baby is urgent.

**Fetal problems**
These include intra uterine growth retardation, fetal distress in labour, preterm delivery as a result of obstetric intervention, fetal death due to placental abruption or fetal asphyxia in labour.

**General nursing care**
- Airway management as appropriate
- Inspired oxygen to keep SaO2 94-98% or, if no oximetry, to keep mother centrally pink (usually minimum 2 L/minute by nasal cannulae)
- Maintain patient in lateral tilt at all times before delivery
- Indwelling aseptically placed urinary catheter and hourly urine output measurement
- Change of posture two hourly
- Care of eyes and oral hygiene

HELLP (Haemolysis, Elevated Liver enzymes, Low Platelet counts) syndrome
This is a dangerous form of severe preeclampsia. If the platelet count is $<$50,000 x 10^9 there is a high risk of bleeding and if bleeding occurs in the absence of platelet transfusions, fresh blood may be helpful. Liver dysfunction may cause upper abdominal pain and lowering of the BP may help. Delivery is urgent

**Stage 4. Delivery of the baby**
The need for in-utero transfer should be considered, particularly if there are maternal complications likely to require a caesarean section or high dependency care. The need for delivery is dependent on the maternal and fetal conditions. Either caesarean section (CS) or induction of labour may be appropriate, depending on the clinical findings. Although delivery will resolve the disease, it is inappropriate to deliver an unstable mother, even if there is fetal distress. Once eclamptic seizures are controlled, severe hypertension treated and any hypoxaemia corrected, delivery can be expedited. In severe pre-eclampsia, aim to deliver within 24 hours of symptoms. In eclampsia, aim to deliver within 12 hours of the onset of convulsions.

It is important to stabilise the mother’s condition first – then decide about the mode of delivery

In selected patients, labour may be induced if the following conditions apply:
- the cervix is favourable
- the maternal condition is stable, – eclampsia and blood pressure are controlled
- there is no fetal distress and a cephalic presentation

**Assess the cervix**
- If the cervix is favourable (soft, thin, partly dilated), rupture the membranes with an amniotic hook or a Kocher's forceps, and induce labour using an oxytocin infusion (see chapter 2.3) or oral misoprostol (see chapter 2.3 and above).
- If vaginal delivery is not anticipated within 12 hours (for eclampsia) or 24 hours (for severe pre-eclampsia), deliver by CS.
- If there are fetal heart rate abnormalities (less than 110 or more than 160 beats per minute), consider CS if safe for the mother.
- If the cervix is unfavourable (firm, thick, closed) and the fetus is alive, deliver by CS if mother is adequately resuscitated.
- If there are no facilities for caesarean section or if the fetus is dead or too premature for survival then deliver vaginally.

**Aiming for vaginal delivery**
If the cervix is unfavourable (firm, thick, closed), and the fetus is alive, caesarean section should be carried out. If the fetus is dead, consideration should be given to induction of labour using misoprostol (unless there has been a previous caesarean section when misoprostol is contraindicated).

There are many possible misoprostol regimens for induction of labor (vaginal misoprostol tablet, oral misoprostol solution or oral misoprostol tablet). Each has been widely used. The latest evidence is that oral misoprostol solution is the most appropriate treatment (Cochrane reviews).

Oral misoprostol solution. A single misoprostol tablet is dissolved in drinking water (200 micro grams tablet in 200 mL water or a 100 micrograms tablet in 100 mL of water), and 20-25 mL of misoprostol solution(20-25 micrograms) is then given every two hours. The solution is stable for up to 24 hours at room temperature but should then be discarded

Oral misoprostol tablets. 100 microgram misoprostol tablets cut to 25 micrograms size and administered orally every 2 hours to a maximum of 6 doses. However, this may not be very accurate and there is a danger of incorrect dosage: the solution above is much safer. (Header 4)Caesarean section (CS)

If CS is performed, ensure that coagulopathy has been treated. Have fresh blood for transfusion available.

Spinal anaesthesia is usually safer than GA for Caesarean section unless there is a contraindication i.e. maternal refusal, coagulopathy, thrombocytopenia, decreased conscious level or ongoing seizures. There does not appear to be an exaggerated decrease in blood pressure after spinal anaesthesia and vasopressors (such as ephedrine, should be used cautiously to avoid a hypertensive response. An IV bolus of 500mL of Ringer-Lactate or Hartmann’s may occasionally be required if BP does fall.

General anaesthesia in severe preeclampsia/eclampsia is high risk – there may be laryngeal oedema making airway management difficult and increases in blood pressure during intubation and extubation, risking intracranial haemorrhage. Drugs to weaken the vasopressor response to intubation should be used.

Local anaesthesia or ketamine in women with pre-eclampsia or
eclampsia are contraindicated unless facilities and/or expertise dictate that these are the safest options in that situation.

Stage 5. Management after delivery

- If post eclampsia or at high risk of convulsions, continue parenteral anticonvulsants i.e. magnesium sulphate (or diazepam if MgSO4 is not available) for 24 hours after birth. Continue for as long as the patient has increased tendon reflexes.
- Do not give ergometrine to women with pre-eclampsia, eclampsia or high blood pressure because it increases the risk of convulsions and cerebrovascular accidents.
- Monitor the mother closely.
- Use antihypertensive agents if diastolic BP > 105 110 or systolic BP >160mmHg.
- Continue oxytocin infusion to keep the uterus contracted.
- Syntometrine (which contains ergometrine and can cause/worsen hypertension) is contraindicated. Give oxytocin alone or with misoprostol and avoid possible hypertensive effects of ergometrine. If post partum haemorrhage manage as in chapter 2.5.D.iv.
- Keep in delivery unit/high observation area for at least 24 hours after the last fit.
- Review need for further anti convulsants and anti hypertensives.
- Regular monitoring.
- Plans for care should be communicated with the patient and her attendants. The attendants should be educated about the left lateral tilt pre delivery, recovery position post convulsion, risk of aspiration of food and care of IV site.
- Before going home, the family and attendants should be warned about the risk of postnatal depression, especially if the outcome has been poor. The woman/girl should be followed up closely in the community.
- Antenatal care by the hospital during a future pregnancy is important. There is an increased risk of preeclampsia and hypertension if these problems have been present.
- All patients are at risk of deep vein thrombosis and so close observation and appropriate treatment when identified are important (see chapter 2.5.H). Anti-embolism stockings and low molecular weight heparin prophylaxis should be considered early on.

Hypertension may take many days and even up to 3 months to resolve. Resolution will happen if the diagnosis is pre-eclampsia unless there is an underlying medical cause.

### Monitoring and preparation for emergencies

- Pulse rate and volume, BP, respiratory rate and oxygen saturation regularly.
- Monitor fluid intake and urinary output hourly.
- Monitor AVPU/GCS, reflexes, and pupil responses hourly.
- Monitor for confusion and visual disturbance.
- Monitor fetus regularly.

Record all drugs used.

Each maternity unit should have an emergency box to ensure that appropriate equipment and drugs are readily available.

### Emergency box for eclampsia

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drugs</td>
<td>Magnesium sulphate 50%, 5 g in 10 mL ampoule x 10 ampoules</td>
</tr>
<tr>
<td></td>
<td>Calcium gluconate 10% 10 mL ampoule x 2 ampoules</td>
</tr>
<tr>
<td></td>
<td>Hydralazine 20 mg in 1 mL ampoule x 2 ampoules</td>
</tr>
<tr>
<td></td>
<td>Labetalol 200 mg in 20 mL ampoule x 1 ampoule</td>
</tr>
<tr>
<td></td>
<td>0.9% Sodium chloride 10 mL ampoule x 10 ampoules</td>
</tr>
<tr>
<td></td>
<td>Diazepam 5mg/ml ampoules x 20</td>
</tr>
<tr>
<td>Intravenous fluids</td>
<td>500 mL bag of Ringer-Lactate/Hartmann's Giving set x 1 IV blood giving set x 1</td>
</tr>
<tr>
<td>Venous access</td>
<td>20-gauge Cannula (pink) x 2 18-gauge cannula (green) x 2 16-gauge cannula (grey) x 2 Tourniquet x 1 Fixation tape x 1 roll</td>
</tr>
</tbody>
</table>

### Airway equipment

- Guedel airways: sizes 4, 3, and 2
- Self inflating bag, mask and valve
- Green oxygen tubing 2 meters and high and Medium Concentration (MC) facemasks for oxygen delivery
- Yankauuer sucker

### Other equipment

- 50 mL syringe x 2
- 20 ml syringe x 2
- 10 mL syringe x 2
- Green needles x 2
- Patella hammer x 1
- Urinary catheter
- Charts for vital signs and fluid balance
**Introduction**

Twins occur in around 1:80 pregnancies. Non-identical twin rates vary depending on age, parity and racial background; rates are higher than world average in Africa. The incidence of monozygous (identical) twins is relatively constant worldwide, at 3.5 per 1,000 births.

Multiple pregnancies are associated with greater risks for both the mother and the fetus. Ultrasound scanning should be undertaken if the uterine size is larger than expected, or if abdominal examination of fetal parts leads to suspicion of multiple fetuses. If labour has not started by 39 weeks gestation, consider induction.

If ultrasound scan is not available, abdominal examination after delivery of any first baby should be performed to exclude a second twin before oxytocin or Syntometrine is given to aid delivery of the placenta.

**Maternal risks associated with multiple pregnancy**

- Miscarriage
- Anaemia
- Pre-term labour
- Hypertension
- Polyhydramnios
- Operative delivery
- Post-partum haemorrhage

**Fetal risks associated with multiple pregnancy**

- Stillbirth or neonatal death
- Pre-term delivery
- Intra-uterine growth restriction
- Congenital abnormalities
- Cord accident
- Specific complications of twin pregnancies, e.g. twin to twin transfusion syndrome
- Difficulties with delivery

When a twin pregnancy is diagnosed, additional care should be provided. Iron and folate treatment must be ensured, due to the increased risk of anaemia. Pre-term labour and delivery presents the greatest risk of fetal illness and death. If the mother develops premature labour, a course of ante-natal steroid injections dexamethasone 12 mg IM 2 doses 12 hours apart or dexamethasone 6 mg IM 4 doses 12 hours apart, will improve the maturity of the fetal lungs and reduce the risk of respiratory distress syndrome in the newborn.

**How twins present**

In 40% of cases, both twins are cephalic. In 21%, the second twin is a breech. In 14%, the first twin is a breech. In 10% of cases, both twins are breeches. In all remaining cases, one twin or other, or occasionally both, are transverse. In figure 2.6.D.2, the first twin is the lower one.

**Antenatal monitoring in multiple pregnancy**

- Check-up two-weekly from 28 - 32 weeks; warn about the risk of preterm delivery
- Check-up weekly from 32 weeks
- Watch for signs of pre-eclampsia and premature labour

**Twin delivery**

Vaginal delivery is usually safe but must be undertaken in a health facility where comprehensive EmOC is available.
Summary of management during labour

Delivery of first twin

1. Insert i.v. cannula. Maternal blood should be obtained for a full blood count and blood group. A blood sample should be kept for cross-match.
2. Augment contractions only when indicated.
3. Prepare two delivery packs / extra clamps. Remember there are almost always two membranes to rupture with twins.
4. Make sure the cervix is fully dilated.
5. Empty mother's bladder.
6. Ensure longitudinal lie of the first baby, and deliver first baby as normal, while assistant stabilises the lie of twin two in a longitudinal plane.
7. After birth of first baby: tie gauze to clamp on cord of first baby to identify it.

Delivery of second twin

1. The second baby should be born within 30 minutes.
2. Check FHR of second baby.
3. Confirm the lie of the second twin.
4. If lie is longitudinal and contractions do not restart 5 - 10 minutes after delivery of the first baby, then start oxytocin infusion 5 Units in 500 mL 5% dextrose, commenced at a rate of 1 milliunit per minute, that is 6 mL/hour (in a standard giving set where 20 drops per mL), increasing carefully to achieve adequate contractions.
5. When the presenting part is well into the pelvis, rupture of membranes can be performed during a uterine contraction.
6. Delivery of the second baby should not be rushed, but assisted delivery should be considered if the baby has not been delivered by 20 minutes after delivery of the first.
7. If the lie of the second twin is transverse, attempt ECV.
8. If ECV is successful, or the second twin is longitudinal, wait for the presenting part to enter the pelvis then do artificial rupture of membranes (ARM) and allow normal or breech delivery if there is no fetal distress.
9. If ECV is unsuccessful, either carry out internal version with breech extraction or perform a CS.
10. Internal podalic version: Grasp the fetal foot (ensure it is a foot not a hand) and pull gently down in to the birth canal. The membranes are ruptured as late as possible. The baby is delivered as an assisted breech or breech extraction. If the back is inferior, the operator’s hand needs to go over the baby’s head to find the foot. Ultrasound, if available, may be helpful.
11. If there is fetal distress or delay, carry out assisted vaginal delivery.

Postpartum management of twin birth

1. After birth of second baby, give 10 IU oxytocin IM/IV after ensuring that there is no third baby in the uterus. Then give oxytocin 40 units IV in 500 mL of Ringer-Lactate or Hartmann’s over 4 hours, to reduce the risks of PPH due to atonic uterus.
2. Deliver the placenta by controlled cord traction after oxytocin IV/IM.
3. After birth of placenta and membranes, examine and record in chart the number of placentas, amnions, chorions and cord vessels. Check the placenta and membranes for completeness.

Figure 2.6.D.3 Internal version for transverse lie in a second twin

Figure 2.6.D.4 Transverse lie in a second twin
4. Check and repair any vaginal and perineal damage.
5. Monitor carefully for post-partum bleeding over the next few hours.
6. Provide extra support to assist with the care of the babies.
7. At least 24 hours stay in hospital.
8. Observe vaginal bleeding closely, because of risk of PPH.

Hooking/locking of heads
This is a rare complication, found only with mono-amniotic twins, during vaginal delivery. Delivery of mono-amniotic twins should ideally be by CS.

Women may present with locked twins with the first trunk partially delivered. The head of the second twin will have entered the maternal pelvis, and needs to be pushed upwards to allow descent of the head of the first twin. If the first baby is already dead, it can be delivered by decapitation. After delivery of the body, the head is dis-impacted and the second twin is delivered. Finally the first head is delivered with a volsellum.

Pathway of care for twin delivery

- **First Stage:**
  - IV Access.
  - Fetal heart rate monitoring of both twins.
  - Oxytocin augmentation for poor contractions in nulliparous women.
- **Second Stage:**
  - Set up two delivery packs with extra clamps and an amniohook.
  - Have oxytocin infusion ready for second twin, and IV fluids in case of postpartum haemorrhage.

**Deliver first baby as normal while the assistant stabilises the lie of twin 2.**

- **Check the lie of twin 2 - is it longitudinal?**
  - **Yes - longitudinal**
    - Anticipate spontaneous delivery
    - Start oxytocin if no contractions after 10 mins
    - Wait for the presenting part to descend well into the pelvis before rupturing the membranes
    - Delivery of second baby should not be rushed, but consider assisted delivery if second twin has not been delivered approx 30 minutes after first baby

- **Cephalic - forceps/ventouse if head engaged**
- **Breech - breech extraction**

- **Internal podalic version (grasp the fetal foot and gently pull into the birth canal leaving membranes intact as long as possible) then do an assisted breech delivery or a breech extraction**

- **Unsuccessful**
  - Caesarean Section

**Third Stage**
- **Syntometrine IM (5 units oxytocin plus 500 micrograms ergometrine) or if pre-eclampsia Oxytocin 5 units IV then CCT for delivery of placenta (WHO 10 units Oxytocin IM)**
- **Check placenta and membranes for chorionity.**

Figure 2.6.D.6 Pathway of care for twin delivery
Malpresentations and malpositions including breech delivery

Introduction

Malpresentations can be due to maternal pathology (e.g. contracted pelvis or uterine fibroids), or fetal pathology (e.g. hydrocephalus), which ideally should be diagnosed antenatally. Most often, there is no apparent cause.

Malpresentations are all presentations of the fetus other than vertex, for example breech presentation.

Malpositions are abnormal positions of the vertex of the fetal head (with the occiput as the reference point) relative to the maternal pelvis.

The problem is that the fetus is in an abnormal position or presentation which may result in prolonged or obstructed labour to the detriment of both mother and baby.

General issues regarding management

Make a rapid evaluation of the general condition of the mother including vital signs (pulse, blood pressure, respiration, temperature). Assess fetal condition

- Listen to the fetal heart rate immediately after a contraction:
- Count the fetal heart rate for a full minute at least once every 30 minutes during the active phase, and every 5 minutes during the second stage;
- Undertake cardiotocograph (CTG) if available.
  If there are fetal heart rate or pattern abnormalities (less than 110 or more than 160 beats per minute, and abnormal dips), suspect fetal distress. If the membranes have ruptured, note the colour of the draining amniotic fluid.
- Presence of thick meconium indicates the need for close monitoring and possible intervention for management of fetal distress.
- Absence of fluid draining after rupture of the membranes is an indication of reduced volume of amniotic fluid, which may be associated with fetal distress.

Review progress of labour using a partograph (see chapter 2.2) Note: Observe the mother closely. Malpresentations increase the risk for uterine rupture because of the potential for obstructed labour.

Assessing the fetal position

Determine the presenting part

The most common presentation is the vertex of the fetal head. If the vertex is the presenting part, use landmarks of the fetal skull to determine the position of the fetal head (Figure 2.6.E.1).

Determine the position of the fetal head

The fetal head normally engages in the maternal pelvis in an occiput transverse position.

With descent, the fetal head rotates so that the fetal occiput is anterior in the maternal pelvis (figure 2.7.E.4a-c). Failure of an occiput transverse position to rotate to an occiput anterior position should be managed as an occiput posterior position.
Figure 2.6.E.3a Right occiput transverse

Figure 2.6.E.3b Left occiput transverse

Figure 2.6.E.4a Right occiput anterior

Figure 2.6.E.4b Left occiput anterior

Figure 2.6.E.4c Occiput anterior

Figure 2.6.E.5a Positions of the occiput in a vertex presentation

A baby’s head cannot come out sideways, ....

The occiput usually turns forwards (anterior). Occasionally the occiput turns backwards (occipito-posterior position)
An additional feature of a normal presentation is a well-flexed vertex (figure 2.7.E.6), with the fetal occiput lower in the vagina than the sinciput.

If the fetal head is well-flexed with occiput anterior or occiput transverse (in early labour), proceed with delivery. If the fetal head is not occiput anterior, identify and manage the malposition (table 2.6.E.1).

If the fetal head is not the presenting part or the fetal head is not well-flexed, identify and manage the malpresentation.
Malpositions of the fetal head

As a baby's head extends, the diameter that has to pass through the mother's birth canal gets greater, until the baby becomes a brow presentation (14 cm). Then it gets smaller as the baby becomes a face presentation (see Figure 2.6.E.8).

Malpositions A to E are all vertex presentations. The only normal one is the well flexed head A. As A turns to become E, a baby's head gets more and more extended (deflexed). The baby can also present as a breech F, a transverse lie G, or with the occiput at the back, H. In this position the head is usually deflexed.

Until the brow presents (D), labour gets more difficult as the head extends. B, is more difficult than A. C, is more difficult than B. D is more difficult than C, but E, a face, is easier than F, a brow. This is because the head has now bent (deflexed, extended) in three quarters of a circle.

The vertex presentations show the long and short diameters of the skull – 'S' and 'L'. When the head is well flexed (A) the shortest diameter of the skull is entering the mother's pelvis. In a brow presentation (D, most difficult) the longest diameter is trying to enter it.

Figure 2.6.E.9 Increasing extension of the head changing the diameter of the presenting part (near here)

Management of malpositions

Occipito posterior positions

Spontaneous rotation to the anterior position occurs in 90% of cases. Arrested labour may occur when the head does not rotate and/or descend. Delivery may be complicated by perineal tears or extension of an episiotomy.

1. If there are signs of obstruction or the fetal heart rate or pattern is abnormal (less than 110 or more than 160 beats per minute or abnormal dips) at any stage, deliver by Caesarean section if this can be safely undertaken.
2. If the membranes are intact, rupture them.
3. If the cervix is not fully dilated and there are no signs of obstruction, augment labour with oxytocin.
4. If the cervix is fully dilated but there is no descent in the expulsive phase, assess for signs of obstruction and if there are no signs of obstruction, augment labour with oxytocin.
5. If the cervix is fully dilated:
   • and if the fetal head is more than 3/5 palpable above the symphysis pubis, or the leading bony edge of the head is above -2 station, perform caesarian section.
   • and if the fetal head is between 1/5 and 3/5 above the symphysis pubis, or the leading bony edge of the head is between 0 station and -2 station: it may be appropriate to undertake delivery by vacuum extraction after symphysiotomy.
   • and if the head is not more than 1/5 above the symphysis pubis, or the leading bony edge of the fetal head is at 0 station, deliver by vacuum extraction or forceps.

If the operator is not proficient in symphysiotomy, perform caesarean section.

Figure 2.6.E.11 Occipito posterior positions
Malpresentations and malpositions including breech delivery

The occipito-posterior position: Three

A. This baby's occiput (which cannot be seen because it is behind the head) starts ROP. Each time the mother is examined, she is a little more dilated.

B, C and D show what is found on vaginal examination. B, the mother is about 5 cm dilated, one may feel the anterior fontanelle and the sagittal suture. This shows that the occiput must be ROP. C, the mother is now about 7 cm dilated. The anterior fontanelle has moved, which shows that the occiput must also have moved; it is now nearly ROA. D, the mother is nearly fully dilated. The head has flexed as it turns, so that one can now feel the posterior fontanelle.

E, if a baby's back and occiput are anterior, the mother's abdomen has a smooth curve.

F, if the occiput is posterior, there is usually a slight depression below the umbilicus.
Delivery of a brow presentation

In brow presentation, engagement is usually impossible, and arrested labour is common. Spontaneous conversion to either vertex presentation or face presentation can rarely occur, particularly when the fetus is small or when there is fetal death with maceration. It is unusual for spontaneous conversion to occur with an average-sized live fetus once the membranes have ruptured. If the fetus is alive, deliver by caesarean section if this can safely be undertaken.

If the fetus is dead and:
- the cervix is not fully dilated, deliver by caesarean section
- the cervix is fully dilated, deliver after craniotomy
If the operator is not proficient in craniotomy, deliver by caesarean section.

Do not try to deliver a brow presentation by vacuum extraction, outlet forceps or symphysiotomy.

Delivery of face presentation

Background

Occurs in 1 in 500 to 1 in 1,000 pregnancies. It is due to extension of the fetal neck, either from a fetal abnormality or progression from a deflexed occipito-posterior position in labour. Diagnosis is important as it may be mistaken for breech presentation.

Risk factors
- Multiparity
- Prematurity
- Multiple pregnancy
- Loops of cord around neck
- Neck tumours
- Uterine abnormalities
- Cephalo-pelvic disproportion
- Fetal macrosomia

Diagnosis

Face presentation may be detected on ultrasound scan before labour but the majority are unpredictable as they arise in labour.

On abdominal examination, a large amount of head is palpable on the same side as the back, without a cephalic prominence on the same side as the limbs.

On vaginal examination: in early labour the presenting part is high. Landmarks are the mouth, jaws, nose, and malar and orbital ridges. The presence of alveolar margins distinguishes the mouth from the anus. The mouth and the maxillae (upper jawbone) form the corners of a triangle, whilst the anus is on a straight line between the ischial tuberosities.

Avoid damaging the eyes by trauma or antiseptics.
Malpresentations and malpositions including breech delivery

Ventouse must not be used.

In early labour, particularly with the occipito-posterior position and a multiparous patient, deflexion is common. In such cases, uterine contractions often cause increased flexion, and delivery will proceed as normal. If extension occurs however, a brow presentation and finally the fully extended face will result. Most face presentations therefore only become obvious late in labour.

Descent is usually followed by internal rotation with the chin passing anteriorly. If the chin is towards the pubis (mento-anterior), then the baby can often be delivered normally, although an episiotomy is usually necessary. If the chin lies towards the back, then delivery will not occur and a caesarean section will be required.

The widest biparietal diameter is 7cm behind the advancing face, so even when the face is distending the vulva, the biparietal diameter has only just entered the pelvis. Descent is less advanced than vaginal examination suggests, even allowing for gross oedema. The head is always higher than you think.

Abdominal examination is vital.

The head is born by flexion, causing considerable perineal distension in the process and risking considerable perineal trauma; consider an episiotomy. Anterior rotation having occurred, the neck comes to lie behind the symphysis pubis and the head is born by flexion. The shoulders and body are born in the usual way.

With satisfactory uterine action and mento-anterior (MA) position, spontaneous delivery or easy “lift out” (forceps only) assisted delivery will ensue in 60-90% of cases.

If spontaneous delivery of a mentoanterior face does not occur, a “lift out” forceps delivery can be performed (see section on forceps delivery).

In mento-posterior (MP) positions, the neck is too short to span the 12cm of the anterior aspect of the sacrum. Additionally the neck would have to be extended to pass under the symphysis but it is already maximally extended. Delivery is impossible unless a very small fetus or one that is macerated allows the shoulders to enter the pelvis at the same time as the head.

Even with MP positions, anterior rotation will occur in the second stage in 45-65% so that persistent MP position or mento-transverse arrest is encountered in only 10% of face presentations.

Persistent MP positions are usually delivered by caesarean section (if possible and safe) to reduce fetal and maternal morbidity.

After birth, the oedema and bruising of a child’s face may persist for some days, and may make feeding difficult.

Vaginal manipulation of persistent MP position has been successfully achieved with ultrasound guidance.
Management

- Make a diagnosis.
- Check for cord presentation or prolapse.
- Continuously monitor fetal heart rate.
- Examine regularly to check progress is adequate.
- Give oxytocin if progress not satisfactory.
- Do not use scalp electrodes or perform fetal blood sampling.
- If the position is mento-anterior, vaginal delivery should be possible.
- Perform an episiotomy.
- If fetus is persistently presenting mento-posterior, deliver by caesarean section (if appropriate resources and safe).

Delivery of compound presentations

Here more than one part of the fetus is facing the cervix, for example an arm protruding alongside the presenting part. It is more common in prematurity. It can be managed expectantly in the early stages of labour in the multiparous patient, with active treatment only being required if there is a delay in the first or second stages of labour.

Transverse and oblique lies

Background
These are particularly associated with prematurity, uterine fibroids and placenta praevia, and consequently are associated with high maternal and fetal morbidity. Always try to identify the underlying pathology. The resulting presentation of shoulder, limb or cord means that Caesarean section is the only option for delivering a viable infant. If the fetus is dead, unless it is very small and macerated, it is safer to perform a destructive procedure.

Practical points to remember
- Try to identify the cause of the abnormal lie (ultrasound)
- Positively exclude placenta praevia with ultrasound before conducting digital vaginal examinations
- Caesarean section can be extremely difficult:
  o The lower segment will be poorly formed.
  o Fibroids, when present, can distort anatomy and inhibit access.
  o Placenta praevia is associated with severe haemorrhage.
- A vertical uterine incision may be most appropriate for the above reasons.
- Keep the membranes intact while making and extending the uterine incision, as this helps with manipulating the fetus into a longitudinal plane for delivery.
- If there is any difficulty in delivering a fetal head or breech, then find, grasp and bring down a foot (recognisable by the heel) into the wound.
- If delivery is still impossible, the uterine incision can be extended upwards in the midline, making an ‘inverted T’. It is essential to undertake an elective Caesarean section in subsequent pregnancies, because of the risk of uterine rupture in labour.
# Breech delivery

## Background

At 28 weeks, 20% of babies present by the breech, but most fetuses will turn spontaneously so that only 3-4% will remain breech at term. There is a higher rate with prematurity. Vaginal delivery (although safer for the mother than caesarean section) carries higher risk of perinatal and neonatal mortality and morbidity due to birth asphyxia and trauma.

### Hazards of vaginal breech delivery.

Compared to the cephalic presentation at term, there is a greater risk of perinatal and neonatal mortality and morbidity, due principally to fetal congenital anomalies and birth trauma/asphyxia. In terms of maternal outcomes, vaginal birth is generally better for mother than CS, as the operative complications associated with major abdominal surgery and the resulting uterine scar are avoided. All of these are especially relevant in poorly-resourced countries.

## Minimising problems

### Options

- If no associated complications of pregnancy (e.g. previous Caesarean section, pre-eclampsia) explain the 3 options to the patient and her family:
  - 1. external cephalic version (ECV),
  - 2. trial of vaginal breech,
  - 3. elective caesarean section (CS) only if safe.
- On current evidence, all women with uncomplicated breech presentation at term should be offered ECV.
- If CS, wait until 39+ weeks (babies may still turn spontaneously until then).
- A trial of vaginal breech delivery is appropriate if both mother and baby are of normal proportions.
  - The presentation should be either frank (hips flexed, knees extended) or complete (hips flexed, knees flexed but feet not below the fetal buttocks).
  - There should be no evidence of feto-pelvic disproportion: adequate pelvis - using clinical judgment and Estimated Fetal Weight (EFW) <4000g (clinical measurement).
  - In some smaller women it may be appropriate to exclude a vaginal breech option where the EFW is <4000g provided CS is safe.
  - There should be no evidence (on ultrasound) of hyper-extension of the fetal head.

## Fetal complications of breech presentation

- cord prolapse
- birth trauma as a result of extended arm or head, incomplete dilatation of the cervix or cephalopelvic disproportion
- asphyxia from cord prolapse, cord compression, placental detachment or arrested head
- damage to abdominal organs
- broken neck.

## External cephalic version (ECV)

### Background

ECV has been practiced since the time of Hippocrates, throughout the European Middle Ages to modern times. Anecdotal reports of complications have made it unpopular in the past 15 years in well-resourced countries.

Current recommendations in well-resourced countries are that ECV be carried out with the mother wide awake, but 'starved', having made her informed choice and having given consent for CS if necessary, close to theatre, after fetal monitoring has been carried out, and using ultrasound guidance, and tocolysis where necessary. These safety guidelines minimise the risks of maternal injury and fetal distress, allowing early detection and treatment, if necessary.

ECV may be performed between 37 and 42 weeks if there is a single uncomplicated breech pregnancy. There should be no previous uterine scars, previous ante-partum bleeding, fibroids or a placenta praevia. On admission, the fetal heart should be monitored. If available, ultrasound should be performed to demonstrate the fetal presentation, a good amount of liquor, a flexed fetal head and the position of the fetal legs. The mother should be awake and consent to the procedure.

### Methodology

The membranes must be intact, with adequate amniotic fluid and no complications of pregnancy.

### Procedure: External cephalic version

If possible, use ultrasound to demonstrate fetal position, adequate liquor, a flexed fetal head, a free loop of cord and the position of the fetal legs (extended or flexed).

A consent form (to ECV, with drug-induced uterine relaxation if necessary) should be signed by the mother after suitable discussion.

- The mother lies on the side (usually her right) which will allow a forward somersault (from 'left sacro-anterior' position - which is the commonest breech position).
- The bed is tilted head down to allow gravity to assist in disengaging the breech.
- If the uterus is relaxed, an attempt is carried out to turn the baby - disengaging the breech with one hand and flexing the head further with the other.
  - This should not hurt the mother but will be uncomfortable; the movement on her abdomen is made easier by using lubricant e.g. sweet almond oil, talc or ultrasound gel).
  - See Figure 2.6.E.22 for illustration of the manoeuvres
- Ensure fetal heart rate is normal (110-160 beats/minute).
- If the uterus is not relaxed, tocolysis will be required. Check that there are no medical contra-indications to B-sympathomimetcs. Usually slow intravenous administration of Salbutamol (in 50 microgram boluses up to total or 250 micrograms; often 100 will be sufficient) will rapidly cause a tachycardia, and, after that, uterine relaxation.
  - Undertake a maximum of three attempts to turn the baby. The fetal heart rate should be listened to regularly.
  - Whether the ECV is successful or not, after the procedure listen carefully to the fetal heart every 5 minutes for 30-60 minutes. If this is normal, the mother is allowed home.
  - If the fetal heart rate becomes abnormal, turn the woman onto her left side, give a high concentration of oxygen by face mask and reservoir, reassess every 15 minutes. If FHR does not become normal within 30 minutes, deliver by CS, if safe to do.
  - In cases where the mother is rhesus negative, 500 international units of anti-D should be given after ECV. A subsequent Kleihauer test is carried out to confirm the mother does not need an additional dose.
Where ECV is successful, the pregnancy can be managed as if always cephalic. There is no indication to offer an early induction. In unsuccessful cases, the woman should be counseled again about the remaining two options, or offered the opportunity to discuss these again in clinic.

Consider a repeat attempt one week later or if she presents in early labour with breech or transverse lie.

All mothers need to be given a full opportunity to ask questions and express anxieties (e.g., if the ECV has been unsuccessful). In addition, routine advice about checking for a reduction in fetal movements, and reporting any bleeding or spontaneous rupture of membranes should be given.

Figure 2.6.E.22 shows the steps in ECV. It shows how a right-handed person would turn a baby. If you are left-handed, turn the baby the other way.

A, place one hand below the breech, and your other hand above the head.

Lift the breech out of the pelvis.

Bring the head and breech closer together so as to flex the baby.

B, and C, turn the baby by guiding the head forwards as you lift the buttocks up. In this way you make the baby do a forward somersault (turn head over heels).

D, if you fail to turn the baby, try turning with a backward somersault.

All mothers should be warned about the risks of reduced fetal movements, bleeding, rupture of the membranes or onset of labour. If ECV is successful, the pregnancy can be managed as a cephalic presentation. If unsuccessful, future management should be discussed and a decision made regarding elective caesarean section or trial of vaginal breech delivery.

**Trial of vaginal breech delivery**

This is appropriate if:

- mother and baby are of normal proportions.
- presentation of breech is frank (hips flexed, knees extended) or complete (hips flexed, knees flexed, but feet not below the fetal buttocks).

- no evidence of fetal-pelvic disproportion: adequate pelvis, using clinical judgment and estimated fetal weight <4000g.
- no evidence (on ultrasound) of hyper-extension of the fetal head.

If there has been a previous caesarean section or other scar in the uterus, a repeat CS may be preferable, although this will depend on the availability of safe surgery.

**Procedure**

- The mother should confirm her informed choice of vaginal delivery.
- An obstetrician, anaesthetist and operating theatre should be ready.
- Opiate analgesia as required.
- Careful fetal monitoring and documentation of the partograph undertaken.
- If spontaneous rupture of membranes occurs, do a vaginal examination to check for cord prolapse. Meconium is common and not a sign of fetal distress.
- Amniotomy may be used to accelerate labour, and careful use of oxytocin may be used to correct poor uterine activity if the mother is having her first baby. However, oxytocin should only be used in a well resourced hospital. Oxytocin should not be used for poor progress in a mother who has previously given birth.
- Caesarean section should be considered if there is poor progress or fetal distress.
- Ensure an obstetrician with adequate experience in delivering breech babies vaginally is present during the second stage.

The basic principle of delivering a breech is to avoid interfering:

- Active pushing should not be encouraged until the breech has descended to the pelvic floor and the cervix is fully dilated as confirmed by vaginal examination (VE).
- Sitting the patient up at this stage may help to encourage descent of the breech. An episiotomy may well be required, but should not be performed until the anus is visible or until the baby’s buttocks are distending the perineum.
- The breech will usually rotate spontaneously to lie with the sacrum anteriorly (rarely it will try to turn posteriorly - this must be prevented)
- Extended legs are delivered by flexing the knee joint of the baby and then extending at the hips.
- The baby is supported only when the arms are delivered and the nape of the neck becomes visible. (Avoid holding the baby’s abdomen as internal organs may be traumatized; the pelvis should be held gently).
• As the mother pushes, the anterior shoulder tip will become visible. A finger is run over the shoulder and down to the elbow to deliver the arm. The other shoulder will rotate anteriorly spontaneously to allow similar delivery of the other arm.

• The baby lies supported as the head engages and the neck comes into view. Delivery of the head may then be performed by the Maurice-Smellie-Veit manoeuvre. The right hand is placed into the vagina, the fetus is supported on the right forearm, the middle finger of hand is passed into the baby’s mouth and the first and third fingers are placed against the cheekbones. Pressure is applied on the tongue to flex and deliver the head. The left hand is used to press upwards and posteriorly on the back of the fetal head to encourage flexion.

• Alternatively, forceps may be used to achieve the controlled delivery of the head. An assistant should hold the baby’s feet to elevate the body above the horizontal to allow the operator access to apply forceps. The nape of the neck must be in view before the baby’s body is lifted upwards, or damage to the fetal neck may be caused. If the head fails to descend into the pelvis, that is the nape of the neck does not appear, a symphysiotomy should be considered.

• A weighted speculum into the vagina may allow the baby to breathe. If there is failure of the head to completely enter the pelvis (the nape of the neck does not come into view) then care must be taken not to lift the baby’s body upwards as this will damage the neck. In these cases supra-pubic pressure can help to flex the neck and bring the head down. If this fails consider symphysiotomy.

Illustrations of breech delivery

Lovset’s complete method is shown in Figure 2.6.E.24. In A to E, you are looking from a mother’s left side. F to J shows the same stage of delivery, but from below. K and L show bringing down the baby’s arms.

Delivering the head

The baby lies supported as the head engages and the nape of the neck comes into view. Delivery of the head may then be performed by the Maurice-Smellie-Veit manoeuvre as shown in Figure 2.7.B.25.

The operator’s right hand is placed into the vagina, the fetus is supported on the right forearm, the middle finger of hand is passed into the baby’s mouth with care and the first and third fingers are placed against the cheekbones. Pressure is applied on the tongue to flex and deliver the head. The operator’s left hand is used to press upwards and posteriorly on the back of the fetal head to encourage flexion.
Elective caesarean section for breech

This is advisable for:

- double footling breech
- a very large fetus
- a small or malformed maternal pelvis
- hyperextended or deflexed fetal head

Before and at operation:

- explain to the woman that she will have a scarred uterus, which may create problems in future pregnancies
- ensure that the presentation remains breech before anaesthetising the patient
- note that if the uterine incision is too small, there can be difficulty delivering the after-coming head
- remember to keep the fetal back upwards during delivery.
**Minimum standards**

Two clean dry towels  
Firm work surface with padding  
Stethoscope  
Laryngoscope with straight blades size 0 and 1, spare bulbs and batteries  
Set of ET tubes 2.5, 3.0, 3.5, 4.0 with connectors to fit the inflation system  
Umbilical catheter with fixating system  
Adrenaline 1:10 000  
Sodium bicarbonate 8.4%  
Naloxone  
Dextrose 10%  
Normal saline (0.9%)  
Soft suction device  
Warming device  
Food grade plastic wrapping

**Introduction**

Neonatal mortality in under resourced countries runs at an unacceptably high level. The World Health Organisation (WHO) estimates that worldwide there are 9000 neonatal deaths per day. Of these, approximately one third are a result of neonatal infections, one third is due to fetal hypoxia and a further third due to prematurity and low birth weight.

If death and long-term or permanent disability is to be avoided, the management of neonatal emergencies must be both coordinated and effective. The care delivered in the first few minutes and hours of life is a major determinant of the outcome. Since in resource poor countries almost half of the deliveries do not occur in hospitals, it is important that community based skilled birth attendants (SBAs), traditional birth attendants (TBAs) and community health workers (CHWs) be encouraged to develop skills to recognise the vulnerable baby prior to delivery and provide effective intervention as required after birth.

**Basic aspects of newborn care that apply to both community and hospital deliveries.**

In order to minimise the number of infants dying from birth related problems (including perinatal asphyxia) or arriving at hospital with major complications which cannot be corrected, it is important for the hospital to work closely with the community.

The following approach has been shown to be helpful:

- all community based health professionals including SBAs, TBAs, CHWs should be able to undertake basic resuscitation of the newborn. Skills based training involving manikins and the provision of a self-inflatable bag and mask to all these health workers is essential as delaying newborn resuscitation until the infant reaches the hospital will usually be too late resulting in death or severe brain damage
- clean delivery kits should be available to all such health workers
- there should be regular clinical audits and educational meetings with participation from all community based health workers
- community based SBAs, TBAs and CHWs should ensure that mothers with pregnancy related complications (e.g. preterm birth, breech presentation or twins etc.) are identified and referred to the local hospital where there are good facilities for obstetric and newborn care
- the local hospital must provide comprehensive emergency obstetric and neonatal care. Good management of labor and delivery is the key to intact neonatal survival.

**Mothers requiring referral to hospital for delivery**

a. Peri-partum bleeding  
b. Malpresentation (breech, face, shoulder)  
c. Preterm labor (<35 weeks)  
d. Twins

**Delivery of compound presentations**

**Preterm birth**

Maturity matters more than birth weight. Prematurity is defined as gestation less than 37 weeks gestation (or less than 259 days from the first day of the mother’s last menstrual period). In the absence of special facilities, mortality increases substantially in cases of gestation less than 32 weeks and survival at less than 28 weeks is unlikely in low resource settings. When a preterm delivery is anticipated, realistic expectations should be discussed with the parents and any limitations on resuscitative efforts should be agreed upon.

**Preventative strategies in may include:**

- Minimising the risk of surfactant deficiency:
  - can be halved if the mother is given a short course of high dose steroid treatment before delivery.  
    - dexamethasone 12 mg IM 2 doses 12 hours apart  
    - or  
    - dexamethasone 6 mg IM 4 doses 12 hours apart,

- Stopping premature uterine contractions:
  - give a 10 mg nifedipine capsule orally. Up to three further doses can be given at 15 minute intervals if uterine contractions persist  
  - if this stops labour, give between 20 mg and 50mg of a slow release nifedipine tablet three times a day for the next three days.

- Other problems associated with preterm birth:
  - even very small babies can survive preterm birth successfully once the early problems associated with surfactant deficiency have been overcome and as long as they are nursed in a clean environment and not allowed to get cold  
  - preterm babies are at increased risk of infection and hypothermia.

The main challenge is to give these babies enough nutrition for them to start growing again as soon as possible (see chapter 3.3).

- here, too, maturity is more important than weight. Babies born before 36 weeks of gestation nearly always need some help with feeding.
• breast milk is ideal, and everything possible should be done to help
  the mother sustain her lactation until the baby is ready to feed
  reliably from the breast. A limited ability to suck and swallow usually
  appears from 32 weeks of gestation but it remains unpredictable,
  unreliable and uncoordinated until 36 weeks gestation. In the event
  that breastfeeding cannot be initiated immediately after birth,
  mothers should be encouraged to start expressing breast milk, to
  be given by nasogastric tube or cup and spoon.
• partial breast feeding can also help the mother to sustain her
  lactation but in any event the mother should regularly express milk.
  Some mothers might find expressing breast milk difficult and may
  require help with this.

Infection

It is important to identify babies at risk of infection prior to delivery. If
identified, the mother should be given antibiotics appropriately. Many
of the babies who become infected during delivery develop
respiratory symptoms very soon after birth but, in a few, the features
are those of neonatal sepsis. In addition, there are a proportion of
babies who are initially asymptomatic and therefore prophylactic
antisepsis should be commenced in the infant if there are risk factors
for infection.

When to consider antibiotics for the (mother) and newborn:
• symptomatic ascending infection in utero needs urgent treatment. If
  this is overlooked both the mother and the baby's life will be in
  danger
• asymptomatic infection is however a much commoner problem.
  This occasionally progresses so rapidly once labour starts that,
  unless treatment is started at once, the baby will die even if the
  most appropriate antibiotic is given immediately after birth.
  Because such infection by definition is silent, it is important that
  treatment be considered in any mother going into active
  spontaneous labour before 35 weeks gestation
• membrane rupture can be both a sign of, and a risk factor for
  ascending bacterial infection. What most people mean by
  premature rupture of membranes (PPROM) is really preterm pre-
  labour rupture of membranes (PPROM) where the membranes
  rupture before there is any overt sign of uterine activity or any
  detectable uterine contractions. When this happens in the preterm
  baby, it is often a sign of the start of some sort of ascending
  infectious process. This process has already weakened the
  amniotic membranes and may stimulate the onset of preterm
  labour. Antibiotics must be given to the mother.
• treatment with antibiotics should also be considered at any
  gestation if the mother’s membranes rupture more than 18 hours
  before delivery. If premature rupture of membranes occurs before
  the onset of premature labour contractions then infection is more
  likely
• maternal fever (>38°C) in labour is a strong indication for initiating
  antibiotics for the mother. Similarly foul-smelling or purulent liquor
  requires i.v antibiotic treatment of the newborn from birth without
  waiting for any signs of infection.

Antibiotic management of perinatal
infection

Where facilities allow, a blood count, C-reactive proteins and blood
cultures should be taken before starting antibiotics. Because a range
of bacteria can be involved, treatment of the baby needs to protect
against group B streptococcal, coliform and Listeria infection, making
a combination of ampicillin and gentamicin the best strategy
(Ampicillin 50-100 mg/kg IV 12 hourly and Gentamicin 5mg/Kg every
24 hours IV if more than 32 weeks gestation and 3mg/Kg if less than
32 weeks).

Hypothermia (see chapter 3.3 )
Hypothermia seriously increases the risk of surfactant deficiency and
hypoglycaemia and must be avoided.

For the majority of deliveries, only a minimum amount of resuscitation
equipment is needed.

Equipment needed for basic resuscitation of the infant at home

Preparation for birth in the home and the hospital

Management at delivery of a baby not
needing resuscitation

Most babies do not need any resuscitation at birth but only require
basic care to prevent infection and hypothermia. Extensive mouth
suction, face mask oxygen, and vigorous stimulation in order to
provvoke a first gasp or cry are unnecessary rituals without clinical
justification. As long as the baby becomes pink, and starts to breathe
without distress, most babies should stay with their mothers and have
a first feed at the breast within minutes of birth.

A simple approach would be to keep newborns without complications
in skin-to-skin contact with their mothers during the first hour after birth
to prevent hypothermia and promote breastfeeding. Colostrum, the
initial milk with a clear, yellowish and thick appearance is an extremely
nutritious and concentrated feed rich in immunoglobulins (it is present
during the first 3-4 days only). Mothers should be informed of its
benefits and that it is ideal for their baby to feed on this as soon after
birth as possible and as frequently as possible.

Preventing heat loss after birth

• Once any necessary resuscitation process has finished and as
  soon as the baby becomes pink, and starts to breathe without
  distress, he/she can be given to the mother for skin to skin contact
  and their first feed at the breast. This practice, amongst other
  benefits, not only prevents hypothermia but also helps in better
  uterine contraction following delivery
• The practice of using water or oil to clean the skin within a few
  hours of birth before body temperature has stabilised can make the
  baby dangerously hypothermic. A simple drying of the skin with a
  warm towel or sheet is all that is required
• Nothing is a more effective source of warmth than the mother’s own
  body as long as the baby is first well dried to minimise evaporative
  heat loss. A larger sheet or blanket can then be used to protect
  both mother and baby from the convective heat loss caused by
  draughts
• Babies have relatively big heads. Covering the head with a shawl or
  blanket or woollen cap can significantly reduce heat loss
• Heat and water loss through the skin can be a particular problem in babies born before 32 weeks of gestation. This can be limited initially by wrapping all but the face in a clean plastic wrapping like cling-film or a food grade plastic bag with a hole cut in the end of the bag for the baby’s head to protrude, for a few hours after birth. Remember, however, that plastic over the face can cause death from suffocation. If plastic bags/ cling film is not available, the pre-term baby must be wrapped well in a clean towel/blanket.
• Heat supplementation can be provided by locally built and maintained incubators, overhead heating systems and by skin-to-skin (kangaroo) care.
• Ideally, the first bath should be delayed for at least twenty-four hours.

Managing the placenta, cord and umbilical stump

Babies often become relatively anaemic 4-6 months after birth because red cell production does not keep pace with body growth. This problem can be minimised by ensuring that blood intended for the baby is not left in the placenta at birth. If the baby is held higher than the placenta (i.e. on the mother’s abdomen) while the cord is still pulsating, blood will drain out of the baby and into the placenta, so hold the (covered) baby just below the placenta for two minutes if the cord is still pulsating. If the cord is clamped before it stops pulsating, this will also reduce the normal ‘placental transfusion’ at birth, especially if the uterus has not yet contracted.

If however, blood is artificially ‘milked’ from the placenta into the baby, it is possible to leave the baby with so many red cells that the blood becomes thick and polycythaemic. Neonatal polycythemia has many complications including putting the circulation under strain making the baby capillary circulation very sluggish, and increasing the risk of jaundice. Often the cord manifests a little ‘stickiness’ which may be of no concern. However a local antiseptic should be applied if a red skin flare suggests early spreading staphylococcal cellulitis. Some of these babies must also be given an anti-staphylococcal antibiotic if the skin around the stump becomes oedematous with increasing redness. Intravenous cloxacin or oral flucloxacillin (25 mg/kg three times a day for seven days) is usually the most logical choice. Babies who are systemically unwell need urgent broad-spectrum antibiotic treatment, IV or IM, for septicaemia.

The risk of neonatal tetanus can be eliminated by ensuring that all mothers are immunised against tetanus with at least two injections of tetanus toxoid one month apart during pregnancy.

The risk of cross-infection during or after birth

Puerperal infection (‘child-bed fever’) is an illness that killed thousands of recently delivered women for more than two centuries. The fact that this could be eliminated if birth attendants washed their hands thoroughly every time they moved from one woman to the next was shown many years before it was ever realised that this lethal illness was caused by group A streptococcal infection. The coming of antibiotic treatment has reduced the risk of death, but it has not lessened the need for meticulous hand washing before vaginal examination or delivery. Failure to observe this simple but important precaution also puts the baby at risk of cross-infection, especially if the baby is being cared for in a hospital setting.

Neonatal examination before discharge of a baby from the hospital

Before discharging the baby it is important that some basic things should be checked out. These may include ensuring the baby is feeding well, has passed meconium and urine and does not have any gross congenital abnormalities. Always check for jaundice. If there are qualified personnel available, a more detailed check could be done. All examinations should be documented including abnormalities even if there is no other action which can be taken. It is also important to check local guidelines if any.
The following data should be recorded in the notes of every new-born baby.

Baby's Name (if given at the time)

**Mother's data**
- Name, address, date of birth, and any identifying number
- Parity and previous obstetric history
- Blood group
- First day of last menstrual period
- Results of any antenatal serology (for example rubella, syphilis, Rh titres, HIV status)
- Illness during the pregnancy
- Drugs taken during the pregnancy
- Family history of any illnesses

Father's data
- Full name, address and date of birth
- Family history of any illnesses

**Labour and delivery data**
- Time of onset: whether induction of labour or spontaneous
- Time membranes ruptured and any other known risk factors for infection (see below)
- Duration of first and second stage of labour
- Drugs given to the mother in labour
- Presentation and mode of delivery
- Full details of any resuscitation for baby or mother
- Time, dose, route of administration and full generic name of any drugs given to the mother

**Baby data**
- Temperature shortly after delivery to document adequate thermoregulation
- Birthweight
- Head circumference (best measured after 24 hours when moulding subsided)
- Length (ideally)
- Full physical examination, noting any abnormalities or evidence of birth trauma detected
- Details of dose, preparation and route of administration of any drugs given at delivery (for example vitamin K)
- If not already given, ensure vitamin K 1mg intra-muscularly
Section 5
Introduction

'Shock' is the result of the failure of the circulatory system to deliver adequate amounts of primarily oxygen, but also nutrients, to the tissues and a failure to remove unwanted metabolites from the tissues for excretion.

Pathology at cell level

At a cellular level, the end result of shock is anaerobic metabolism (oxygen depleted metabolism). This is an inefficient mechanism and requires much more energy than aerobic metabolism (the normal oxygen dependent system). In addition, anaerobic metabolism builds up excess toxic acid products in the cells which cannot be removed by the failed circulation. Cellular function deteriorates and there is a downward spiral of increasing loss of homeostasis, the onset of disseminated intravascular coagulation and after a short while so much cell death occurs in vital organs that recovery is impossible and the patient dies.

The body has mechanisms at the early stages of shock to try to combat this process. The circulatory system is under the control of the sympathetic nervous system. This system regulates the flow of blood in health and in disease to all organs so as to respond to demands on different organs. In health, more blood is sent to muscles if we are exercising, more to the digestive system if we are eating, more to the skin if our bodies are too warm.

In shock, the sympathetic nervous system attempts to protect the vital organs by diverting blood away from muscle, skin and digestion and directing it to heart, brain, kidneys. This gives rise to some of the earlier signs of shock, for example the cold peripheries, the increased capillary refill, cerebral anxiety, tachycardia to increase cardiac output and the reduced urine output as the kidneys conserve fluid.

Later signs such as depressed consciousness, weak pulses, falling blood pressure and acidic breathing show that the body's compensation mechanisms are failing. It can be seen that it is vital to recognise and treat shock in a patient as soon as possible for that will give the best chance of patient recovery.

The signs in the list below are all signs of shock, although not all are present in all types of shock.

- Tachycardia* (best measured with a stethoscope)
- Weak pulse* (ideally central - brachial, femoral or carotid but difficult to gauge)
- Low BP (late sign and very difficult to measure in young children)
- Extreme central pallor (severe anaemia)
- Raised respiratory rate (due to acidosis)
- Cold skin with poor circulation *
- Prolonged capillary refill time (CRT) > 3 seconds*
- Increased skin sweating in some cases
- Agitation, anxiety (early sign)
- Reduced conscious level *
- Reduced urine output (early sign)

The WHO diagnosis of shock includes all of the above identified by *

The problem is that shock is quite difficult to diagnose in the early stages as some signs also occur from medical causes other than shock. The diagnosis in the early stages depends on:

- tachycardia, which is a very useful sign of shock, but also occurs with fever and with anxiety or fear

It is vital that if any of these early signs are noted in a patient that they are not dismissed as some unrelated cause, but are seriously considered as likely to be indicating the development of shock.

This is why it is so useful to have regular vital signs (pulse, respiration, conscious level, temperature, blood pressure) observations on patients, so that abnormal trends can be spotted early.

It is also important to note that shock cannot be diagnosed on one physical sign alone but on several together. For example, a tachycardia alone does not diagnose shock but if you note a tachycardia, look for cold limbs, prolonged capillary refill or a history suggestive of a cause of shock such as a fever or severe diarrhoea or bleeding.

Pathological mechanisms that can cause shock

The circulatory system is complex, so there are many causes of shock. The organs, systems and pathologies that can be the primary cause of the shock include the heart itself, the blood vessels, restriction to the flow of blood, failure of the oxygen carrying capacity of the blood and loss of blood or fluid from the body. See list below.

1. loss of fluid or blood (hypovolaemic e.g. diarrhoea, blood loss)
2. failure of the heart pump (cardiogenic e.g. dysrhythmias, cardiomyopathy, myocarditis, malnutrition)
3. abnormal function of vessels supplying nutrients and oxygen to tissues (distributive e.g. sepsis, anaphylaxis)
4. inadequate capacity of blood to release oxygen (dissociative e.g. severe anaemia or carbon monoxide poisoning)
5. restriction of circulation to the tissues (obstructive e.g. some congenital heart diseases, tension pneumothorax, cardiac tamponade, pulmonary embolus)
In many individuals with shock, more than one mechanism may coexist, therefore the clinician must consider which emergency treatments will be effective and which will be harmful for any individual patient. One of the most difficult situations is in the anaemic, malnourished child with sepsis where fluid is required to expand the circulating volume but the heart is already failing and cannot cope with a rapid fluid infusion (see chapter 5.10.B).

### Basic management of shock

The management of shock follows these principles:
- high concentrations of oxygen are safe and must be given in all causes of shock
- airway and breathing stability or support must be established promptly first (the only exception is to control exsanguinating external bleeding in trauma or major obstetric haemorrhage concurrently with A and B; see chapters 7.3.A, 2.5.D.i and 2.5.D.iv)
- frequent re-assessment, at least after every therapeutic manoeuvre, is vital to avoid both under-infusing and over-infusing fluids
- the underlying pathology must be treated to arrest the pathological process

The clinical diagnosis of the cause of shock is not easy or definitive: shock is a spectrum of conditions and mechanisms. It is a clinical challenge.

Immediate resuscitation is needed to maintain oxygenation and perfusion of vital organs. Once this is underway, the cause of shock needs to be found and treated.

Diagnosis depends on history, clinical examination, and response to treatment given. It is often possible to identify the cause of shock with a good history and a careful examination.

### Investigations

- Hb is essential
- Blood glucose is essential as some signs of shock are the same as signs of hypoglycaemia
- Plasma electrolytes helpful, especially sodium and bicarbonate
- Lactate helpful (if available)
- CVP measurement if skilled staff to undertake procedure and measurement (not an emergency procedure, helpful if in High Dependency Care)

### The choice of intravenous fluid

Fluid infused into the circulation should approximate to plasma in its electrolyte content, osmolality and pH.

#### Dextrose only fluids

It is clear that while glucose or dextrose is necessary to prevent or manage hypoglycaemia, the use of fluids containing only dextrose should never be used for IV fluid replacement or maintenance or for the emergency management of shock.

The reason for this is that the dextrose is rapidly metabolised so the effect of a dextrose only IV fluid on the child's body is as though pure water had been given. The outcome of this treatment would be severe hyponatraemia which could quickly lead to brain damage or death. In addition, this pure water is rapidly moved into the cells out of the circulation and the state of shock is worse than before the infusion.

#### Sodium containing fluids

The fluid traditionally infused into the circulation for the management of shock has been ‘normal saline’ (0.9% NaCl). This fluid has increasingly shown to be dangerous, especially in the sick patient. An infusion of normal saline causes a hyperchloraemic acidosis (a high chloride concentration leading to an acidosis) which in the shocked patient, who is already acidic, causes a deterioration in the health of cells in vital organs even though perfusion of the cells has been improved by the increased circulating volume.

There are sodium containing alternatives to normal saline which are safer as they approximate more closely to human serum in content (see table 5.5.A.2) although they are a little more expensive.
recommend the use of either of these alternatives (Ringer-Lactate and Hartman’s solution are widely available) for all fluid replacement. Recognising that not all hospitals will have access to these solutions immediately, there may sometimes be no alternative but to start fluid replacement with normal saline. But if more than 20 mL/Kg needs to be given, then one of the safer alternatives should be used in these very sick children if at all possible.

Note: Hospitals and clinics will need to have access to some 0.9% NaCl (normal saline), usually in 5 mL or 10 mL ampoules. This will be used for dissolving or diluting drugs for IV injection. If a specific fluid is indicated as the diluent for a particular drug (e.g. 0.9% NaCl, 5% dextrose, water for injection) this fluid must be used. If drugs are infused using the wrong fluid then their effect on the patient may be altered.

Clinicians should try to ensure that their hospital facility does have access to these safer infusion fluids such as Hartman’s or Ringers solutions.

Table 5.5.A.2 Comparison of electrolytes, osmolality and pH levels in IV fluids with those in human serum

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**Initial management of shock**

Even though it may be clear on initial inspection that the child is in shock, the first priority will still be to call for help, manage the airway, followed by breathing and then management of the circulation.

**Call for help**

**Airway and stop any obvious exsanguinating bleeding**

Assess the airway by the simple technique of asking the child ‘are you alright?’ any vocalisation such as a reply or crying indicates an open airway and some ventilation. In the absence of a response, formally open the airway with a head tilt/chin lift or a jaw thrust manoeuvre (see chapter 1.12) and assess breathing by looking, listening and feeling for its presence.

Stop any obvious exsanguinating bleeding by external pressure (or in the case of post partum haemorrhage see chapter 2.5.D.iv)

**Breathing**

All children with suspected shock must receive high flow oxygen.

In the absence of spontaneous breathing give assisted ventilation with a bag/mask (see chapter 1.13)

**Circulation**

Intravenous access with a short, wide bore venous cannula, or placement of an intracoronary line (see chapter 8.4.b) is vital. More than one line is preferable as rapid fluid resuscitation may be needed, although always start treatment as soon as the first access has been achieved and insert the second line when possible. Take blood for investigations: FBC, glucose, electrolytes, blood culture (and, if relevant, cross matching and malarial parasite test).

The next step is to give fluid intravenously. In most cases this should be a crystalloid such as Hartmann’s or Ringer-Lactate solution but give Normal Saline (0.9%) if this is all that is available. In children, the volume of fluid to be given is usually 20 mL/Kg which is one quarter of the child’s circulating volume (10 mL/Kg in severe anaemia or severe malnutrition whilst awaiting blood for transfusion). Shock is not usually clinically evident until a quarter of the circulation has been lost, so any child with signs of shock must have lost this amount of fluid from the circulation, at least.

The concept of “hypotensive resuscitation” is important if the cause of hypovolaemic shock in a child is haemorrhage from a penetrating injury. Here the initial boluses of IV crystalloids required to treat shock should only be given to keep the vital organs (especially brain, heart and kidneys) perfused before surgery and blood transfusion are available. Fresh blood is particularly useful to combat the coagulopathy that occurs in major blood loss if specific coagulation components such as platelets are unavailable.

Giving too much IV fluids can increase the blood pressure and thus increase bleeding by disrupting early clot formation. IV crystalloid also dilutes the red cells in the circulation but whether or not this could reduce oxygen carrying capacity requires further research.

Our suggestion is that when giving boluses of crystalloid or blood in shock due to bleeding, only the amount needed to keep the blood pressure at a level sufficient to perfuse the vital organs should be given. There is no clear evidence to indicate the precise blood pressure that should be achieved in a child in shock due to haemorrhage from penetrating injury. Adequate perfusion of vital organs may best be indicated by the following: in the child older than 2-3 years by a radial pulse which can be palpated and a conscious level of A or V on the AVPU scale (i.e. the child is either awake or will respond by opening his/her eyes when spoken to). In children the radial pulse may be difficult to feel in those under 2-3 years of age and in children with shock due to haemorrhage the presence of a palpable brachial pulse may be the best available indicator at present.

In this situation, therefore, and to maintain a palpable radial or brachial pulse, start with IV boluses of 10 mL/Kg of crystalloid or ideally blood and reassess after each.

The next very important step is to re-assess the patient’s vital signs to see if the fluid has helped and to ensure that circulatory overload has not developed a situation where more IV fluids may produce very dangerous heart failure (see below for clinical signs of this).

During this re-assessment give intravenous antibiotics (see subchapter 5.5.C)

At this point, some children will need more crystalloid fluid, others will not or will need other fluids (plasma expanders such as albumin or blood). Many will need additional treatments. The next two chapters (5.5.B and 5.5.C) deal with two of the commonest causes of shock in children and the reader is referred to the chapters indicated in table 5.5.A.1 for details on the several other causes of shock.

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Section 8
Practical procedures should first be explained to the child (when old enough) and the parents, any risks discussed with them and their consent obtained. Procedures on young infants should avoid hypothermia. Good light is essential. Analgesia should be given, where necessary and invasive procedures only performed when essential.

**Analgesia and sedation for procedures**

Some procedures have to be undertaken immediately, to save life and many such are described in this section. Clearly, there is no time to use analgesia in these circumstances, nor, indeed, much need as children who are in such severe collapse will have significantly depressed conscious levels. Where there is consciousness, analgesia and/or sedation is a top priority.

For details on pain assessment and analgesia see chapter 1.15.

For some procedures (e.g. chest tube insertion or the dressing of burns) analgesia with a powerful drug such as ketamine should be considered with a skilled health worker (usually an anaesthetist) present and able to treat any adverse reactions immediately (see chapter 1.24).

For planned intubation, anaesthesia is induced first (see chapter 1.24). For some rarely used procedures such as defibrillation for cardiac arrest caused by a shockable rhythm (see chapter 1.13), there is no time nor need for sedation as the patient is unconscious while for defibrillation for an arrhythmia, sedation is necessary in most cases (see chapter 5.5.4).

For ketamine give 2–4 mg/kg IM. This takes 5–10 minutes to act and lasts for about 20 minutes. Ketamine can also be given IV in this situation 0.5 mg/kg IV and repeated as required to control pain.

When giving any analgesia, manage the child’s airway, beware of respiratory depression and monitor oxygen saturation with a pulse oximeter, where possible. Ensure you have a resuscitation bag and mask available (and oxygen).

Restraint is important for both the child and for the clinician undertaking the procedure. Clearly, the procedure will be undertaken more quickly, safely and accurately if the child is kept still: this benefits all. However, to prevent a child with a chronic condition who will experience many such procedures being made fearful of further attempts, sedation should be strongly considered if facilities allow.

If facilities do not allow or if the procedure is unlikely to need repetition then physical restraint can be used. It is ideal if a parent or trusted friend/relative can actually hold the child. It is also very useful to use distraction techniques such as singing a song, telling a story or using a glove puppet. Blowing soap bubbles is a very useful distraction for children and it costs very little to bend a piece of wire into a loop and make up some strong soap solution.

First explain to the child what is going to happen, taking into account their development. Never say ‘this won’t hurt’ when you know it will. Always use local analgesia if at all possible (see chapter 1.15). Explain why they are to be wrapped up (a ‘big cuddle’), what is to happen and what will happen afterwards. Use lots of praise before, during and after the procedure.

Restraining a child for examination usually does not require wrapping, but it is wise to leave examination of the nose, throat and ears until the end of the examination.