



World Health Organization

# **Best Practice Protocols**

*for*

# **Clinical Procedures Safety**

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# Hand Washing Techniques

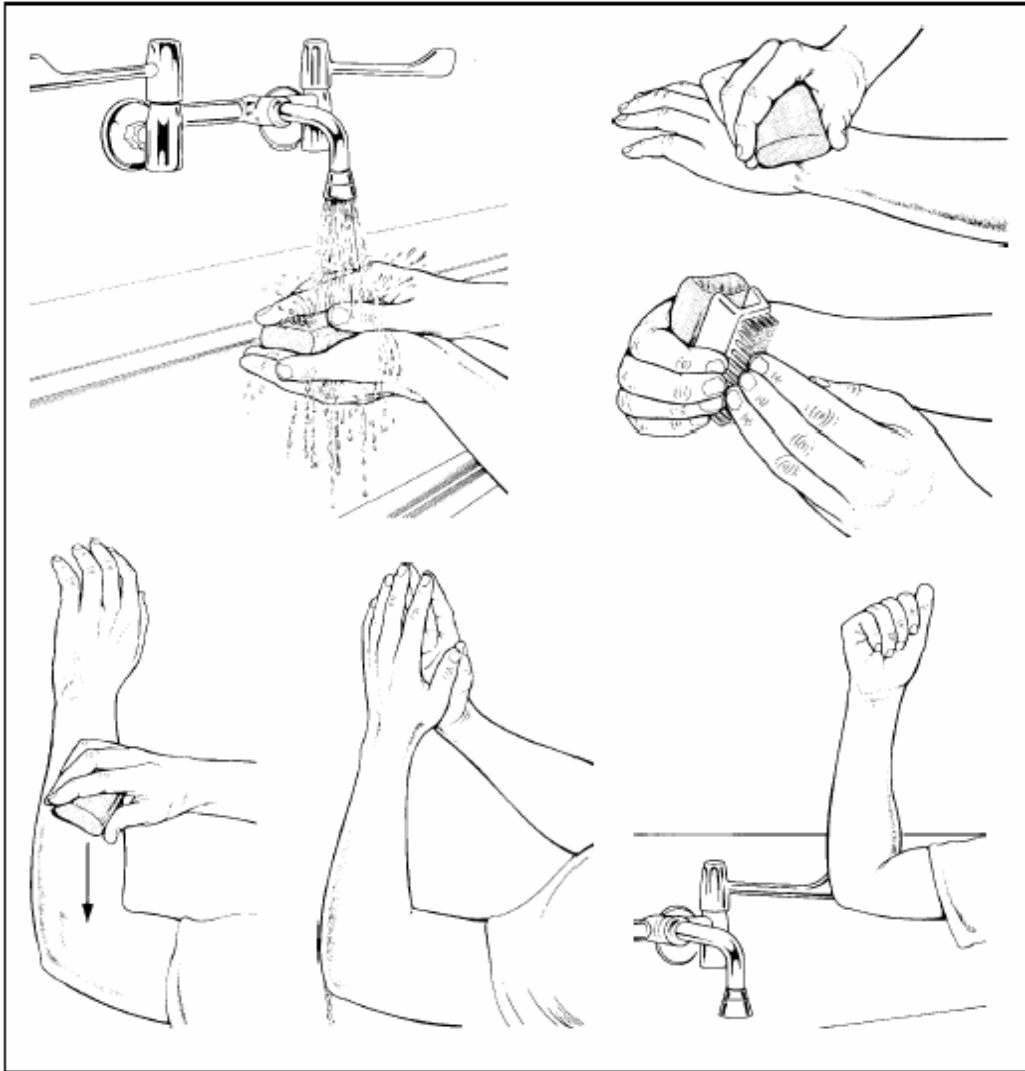


Figure 2.4

## **When scrubbing:**

- Remove all jewellery and trim the nails
- Use soap, a brush (on the nails and finger tips) and running water to clean thoroughly around and underneath the nails
- Scrub your hands and arms up to the elbows
- After scrubbing, hold up your arms to allow water to drip off your elbows
- Turn off the tap with your elbow.

## **After scrubbing your hands:**

- Dry them with a sterile towel and make sure the towel does not become contaminated.
- Hold your hands and forearms away from your body and higher than your elbows until you put on a sterile gown and sterile gloves.

*Always wash your hands after removing your gloves*

# Operating Room (O.R.)

- *The operating theatre is a room specifically for use by the anaesthesia and surgical teams and must not be used for other purposes. Both rooms require:*
  - Good lighting and ventilation
  - Dedicated equipment for procedures
  - Equipment to monitor patients, as required for the procedure
  - Drugs and other consumables for routine and emergency use.

## ***Ensure that procedures are established for the correct use of the O.R. and all staff are trained to follow them:***

- Keep all doors to the O.R. closed, except as needed for the passage of equipment, personnel and the patient
- Store some sutures and extra equipment in the O.R. to decrease the need for people to enter and leave the O.R. during a case
- Keep to a minimum the number of people allowed to enter the O.R. , especially after an operation has started
- Keep O.R. uncluttered and easy to clean
- Between cases, clean and disinfect the table and instrument surfaces
- At the end of each day, clean the O.R. : start at the top and continue to the floor, including all furniture, overhead equipment and lights, use a liquid disinfectant at a dilution recommended by the manufacturer
- Sterilize all surgical instruments and supplies after use and store them protected and ready for the next use
- Leave the O.R. ready for use in case of emergency.

# Prevention of Transmission of HIV

## ***Take care of your patients, your co-workers and yourself:***

- Do not recap needles
- Set up sharps containers in the places where you use sharps; the further you have to move to dispose of a sharp the greater the chance of an accident
- Do not use the same injection set on more than one patient
- Dispose of your own sharps
- Pass needles, scalpels and scissors with care and consideration.

## ***Several points of aseptic routine applicable to members of the surgical team are also particularly relevant to the prevention of transmission of HIV:***

- Protect areas of broken skin and open wounds with watertight dressings
- Wear gloves during exposure to blood or body fluids and wash your hands with soap and water afterwards
- Wash immediately with soap and water in case of skin exposure or contamination, whether from a splash, glove puncture or non-gloved contact
- Wear protective glasses where blood splashes may occur, such as during major surgery; wash out your eyes with water as soon as possible if they are splashed
- Wear a protective gown or apron if splash potential exists
  - Clean blood spills immediately and safely.

# Infection Prevention and Universal Precautions

*Hand washing is the single most important measure for prevention of infection*

Hand washing, the use of barrier protection such as gloves and aprons, the safe handling and disposal of "sharps" and medical waste and proper disinfection, cleaning and sterilization are all a part of creating a safe hospital.

## Key Points

1. A safe injection does not harm the recipient, does not expose the provider to any avoidable risk and does not result in any waste that is dangerous for other people
2. Use a sterile syringe and needle for each injection and to reconstitute each unit of medication
3. Ideally, use new, quality controlled disposable syringes and needles
4. If single-use syringes and needles are unavailable, use equipment designed for steam sterilization
5. Prepare each injection in a clean, designated area where blood or body fluid contamination is unlikely
6. Use single-dose vials rather than multi-dose vials
7. If multi-dose vials must be used, always pierce the septum with a sterile needle; avoid leaving a needle in place in the stopper of the vial
8. Once opened, store multi-dose vials in a refrigerator.

# Disaster Planning

It involves the following steps:

- Designating a senior person to be team leader
- Defining the roles and responsibilities of each staff member
- Establishing disaster management protocols
- Setting up systems for:
  - Identification of key personnel
  - Communication within the hospital
  - Calling in extra staff, if required
  - Obtaining additional supplies, if required
  - Triage
  - Communicating patients' triage level and medical need
  - Transportation of patients to other hospitals, if possible
- Mapping evacuation priorities and designating evacuation facilities
- Identifying training needs, including disaster management and trauma triage, and training staff
- Practising the management of disaster scenarios, including handling the arrival of a large number of patients at the same time
- Establishing a system for communication with other services, authorities and agencies and the media.

# Trauma Team Leader Responsibilities

- Perform the primary survey and coordinate the management of airway, breathing and circulation
- Ensure that a good history has been taken from the patient, family and/or bystanders
- Perform the secondary survey to assess the extent of other injuries
- Consider tetanus prophylaxis and the use of prophylactic or treatment doses of antibiotics
- Reassess the patient and the efforts of the team
- Ensure patient documentation is completed, including diagnosis, procedure, medications, allergies, last meal and events leading up to the injury
- Communicate with other areas of the hospital and staff members
- Communicate with other people and institutions outside the hospital
- Prepare the patient for transfer
- Liaise with relatives.
- Information should flow to and through the leader:
- Know and use the names of the other members of the team and ensure that they have heard and understood directions
- Check back with members of the team to make sure designated tasks have been completed: for example:
  - “How is the airway?”
  - “Are you having any trouble bagging?”
  - “Have you had to suction much?”
  - “Is the second IV started?”
- Ask for input from the team, but ensure that all directions come from only one person.

# War-related Trauma

## **Low velocity injuries**

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*For minor wounds caused by a missile speed less than 1500 feet/second:*

1. Debride the wounds superficially. This is usually done in the outpatient department.
2. Lavage the wound with fluid.
3. Do *not* close the skin.
4. Administer intravenous antibiotics for 1–3 days.
5. Give tetanus prophylaxis.
6. Treat fractures by closed means with a cast, traction or external fixation.
7. If bullet fragments remain in a joint cavity, arrange to have them removed within a few weeks.

## **High velocity injuries**

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*For major wounds caused by missile speeds greater than 1500 feet/second:*

1. Debride the wounds in the operating theatre, using adequate anaesthesia.
2. Lavage each wound after removing all dead tissue and foreign material as outlined in the section on open fractures (refer WHO manual " Surgical Care At district Hospital"- pages 5–10 to 5–11 for details).
3. Lavage between the entrance and exit wounds, passing gauze through the tract if necessary.
4. Do *not* close the wound. Re-debride in 2–5 days and close or skin graft when clean.
5. Administer antibiotics and tetanus prophylaxis as above.
6. Treat fractures with a cast or, preferably, external fixation or traction.



# Urinary Retention: Emergency Drainage

Emergency drainage of the bladder in acute retention may be undertaken by:

1. Urethral catheterization
2. Suprapubic puncture
3. Suprapubic cystostomy

## Key Points

1. Acute retention of urine is an indication for emergency drainage of the bladder.
2. The common causes of acute retention in the male are urethral stricture and benign prostatic hypertrophy.
3. Other causes of acute retention are urethral trauma and prostatic cancer.
4. If the bladder cannot be drained through the urethra, it requires suprapubic drainage.
5. In chronic retention of urine, because the obstruction develops slowly, the bladder is distended (stretched) very gradually over weeks, so pain is not a feature.
6. The bladder often overfills and the patient with chronic retention presents with dribbling of urine, referred to as “retention with overflow”
7. Treatment of chronic retention is not urgent, but drainage of the bladder will help you to determine the volume of residual urine and prevent renal failure, which is associated with retention. Arrange to refer patients with chronic urinary retention for definitive management.

# Abdominal Trauma

When a patient presents with abdominal injuries, give priority to the primary survey:

1. Establish a clear airway.
2. Assure ventilation.
3. Arrest external bleeding.
4. Set up an intravenous infusion of normal saline or Ringer's lactate.
5. Insert a nasogastric tube and begin suction and monitor output.
6. Send a blood sample for haemoglobin measurement and type and cross-match.
7. Insert a urinary catheter, examine the urine for blood and monitor the urine output.
8. Perform the secondary survey: a complete physical examination to evaluate the abdomen and to establish the extent of other injury.
9. Examine the abdomen for bowel sounds, tenderness, rigidity and contusions or open wounds
10. Administer small doses of intravenous analgesics, prophylactic antibiotics and tetanus prophylaxis.

# Diagnosis of Labour

## First stage:

### *Latent phase*

- Cervix less than 4 cm dilated.

### *Active phase*

- Cervix between 4 cm and 10 cm dilated
- Rate of cervical dilatation at least 1 cm/hour
- Effacement is usually complete
- Fetal descent through birth canal begins.

## Second stage:

### *Early phase (non-expulsive)*

- Cervix fully dilated (10 cm)
- Fetal descent continues
- No urge to push.

### *Late phase (expulsive)*

- Fetal presenting part reaches the pelvic floor and the woman has the urge to push
- Typically lasts <1 hour in primigravidae and <30 minutes in multigravidae.

- Carry out vaginal examinations at least once every 4 hours in the first stage of labour and plot the findings on the partograph.
- The partograph is very helpful in monitoring the progress of labour and in the early detection of abnormal labour patterns.

## Diagnosis of vaginal bleeding in early pregnancy

Presenting symptoms and other symptoms and signs typically present	Symptoms and signs sometimes present	Probable diagnosis
<ul style="list-style-type: none"> <li>• Light<sup>1</sup> bleeding</li> <li>• Closed cervix</li> <li>• Uterus corresponds to dates</li> </ul>	<ul style="list-style-type: none"> <li>• Cramping/lower abdominal pain</li> <li>• Uterus softer than normal</li> </ul>	<ul style="list-style-type: none"> <li>• Threatened abortion</li> </ul>
<ul style="list-style-type: none"> <li>• Light bleeding</li> <li>• Abdominal pain</li> <li>• Closed cervix</li> <li>• Uterus slightly larger than normal</li> <li>• Uterus softer than normal</li> </ul>	<ul style="list-style-type: none"> <li>• Fainting</li> <li>• Tender adnexal mass</li> <li>• Amenorrhoea</li> <li>• Cervical motion tenderness</li> </ul>	<ul style="list-style-type: none"> <li>• Ectopic pregnancy</li> </ul>
<ul style="list-style-type: none"> <li>• Light bleeding</li> <li>• Closed cervix</li> <li>• Uterus smaller than dates</li> <li>• Uterus softer than normal</li> </ul>	<ul style="list-style-type: none"> <li>• Light cramping/lower abdominal pain</li> <li>• History of expulsion of products of conception</li> </ul>	<ul style="list-style-type: none"> <li>• Complete abortion</li> </ul>
<ul style="list-style-type: none"> <li>• Heavy<sup>2</sup> bleeding</li> <li>• Dilated cervix</li> <li>• Uterus corresponds to dates</li> </ul>	<ul style="list-style-type: none"> <li>• Cramping/lower abdominal pain</li> <li>• Tender uterus</li> <li>• No expulsion of products of conception</li> </ul>	<ul style="list-style-type: none"> <li>• Inevitable abortion</li> </ul>
<ul style="list-style-type: none"> <li>• Heavy bleeding</li> <li>• Dilated cervix</li> <li>• Uterus smaller than dates</li> </ul>	<ul style="list-style-type: none"> <li>• Cramping/lower abdominal pain</li> <li>• Partial expulsion of products of conception</li> </ul>	<ul style="list-style-type: none"> <li>• Incomplete abortion</li> </ul>
<ul style="list-style-type: none"> <li>• Heavy bleeding</li> <li>• Dilated cervix</li> <li>• Uterus larger than dates</li> <li>• Uterus softer than normal</li> <li>• Partial expulsion of products of conception which resemble grapes</li> </ul>	<ul style="list-style-type: none"> <li>• Nausea/vomiting</li> <li>• Spontaneous abortion</li> <li>• Cramping/lower abdominal pain</li> <li>• Ovarian cysts (easily ruptured)</li> <li>• Early onset pre-eclampsia</li> <li>• No evidence of a fetus</li> </ul>	<ul style="list-style-type: none"> <li>• Molar pregnancy</li> </ul>

<sup>1</sup> Light bleeding: takes longer than 5 minutes for a clean pad or cloth to be soaked

<sup>2</sup> Heavy bleeding: takes less than 5 minutes for a clean pad or cloth to be soaked

# Severe Pre-Eclampsia and Eclampsia

	Mild pre-eclampsia	Severe pre-eclampsia
Diastolic blood pressure	<110	110
Proteinuria	Up to 2+	3+ or more
Headache	No	One or more of these conditions may be present
Visual disturbances	No	
Hyperreflexia	No	
Urine output <400 ml	No	
Epigastric or right upper quadrant pain	No	
Pulmonary oedema	No	

Severe pre-eclampsia and eclampsia are managed similarly, with the exception that delivery must occur within 12 hours of the onset of convulsions in eclampsia.

**All cases of severe pre-eclampsia should be managed actively. Symptoms and signs of “impending eclampsia” (blurred vision, hyperreflexia) are unreliable and expectant management is not recommended.**

## Eclampsia Management

Immediate management of a pregnant woman or a recently delivered woman who complains of severe headache or blurred vision, or if a pregnant woman or a recently delivered woman is found unconscious or having convulsions:

### **SHOUT FOR HELP**

1. Make a quick assessment of the general condition of the woman, including vital signs (pulse, blood pressure, respiration) while simultaneously finding out the history of her present and past illnesses from her or her relatives:
  - Check airway and breathing
  - Position her on her side
  - Check for neck rigidity and temperature.

Continued next page

# Eclampsia Management (continued)

2. If she is not breathing or her breathing is shallow:
  - Open airway and intubate, if required
  - Assist ventilation using an Ambu bag and mask
  - Give oxygen at 4–6 litres per minute.
3. If she is breathing, give oxygen at 4–6 litres per minute by mask or nasal cannulae.
4. If she is convulsing:
  - Protect her from injury, but do not actively restrain her
  - Position her on her side to reduce the risk of aspiration of secretions, vomit and blood
  - After the convulsion, aspirate the mouth and throat as necessary. Look in the mouth for a bitten tongue: it may swell.
5. Give magnesium sulfate. If a convulsion continues in spite of magnesium sulfate, consider diazepam 10 mg IV.
6. If diastolic blood pressure remains above 110 mmHg, give antihypertensive drugs. Reduce the diastolic pressure to less than 100 mmHg, but not below 90 mmHg.
7. Fluids:
  - Start an IV infusion
  - Maintain a strict fluid balance chart and monitor the volume of fluids administered and urine output to ensure that there is no fluid overload
  - Catheterize the bladder to monitor urine output and proteinuria

**If urine output is less than 30 ml per hour:**

  - Withhold magnesium sulfate until urine output improves
  - Infuse a maintenance dose of IV fluids (normal saline or Ringer's lactate) at 1 litres in 8 hours
  - Monitor for the development of pulmonary oedema.
    - Never leave the woman alone. A convulsion followed by aspiration of vomit may cause death of the woman and fetus.
8. Observe vital signs, reflexes and fetal heart rate hourly.
9. Auscultate the lung bases hourly for rales indicating pulmonary oedema. If rales are heard, withhold fluids and give frusemide 40 mg IV once.
10. Assess clotting status.

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# Eclampsia Management (continued)

## Anticonvulsant drugs

- Adequate administration of anticonvulsive drugs is a key factor in anticonvulsive therapy.
- Magnesium sulfate is the drug of first choice for preventing and treating convulsions in severe pre-eclampsia and eclampsia.

## Magnesium sulfate schedules for severe pre-eclampsia and eclampsia

### Loading dose

- Magnesium sulfate 20% solution 4 g IV over 5 minutes
- Follow promptly with 10 g of 50% magnesium sulfate solution, 5 g in each buttock, as deep IM injection with 1.0 ml of 2% lidocaine in the same syringe
- Ensure that aseptic technique is practiced when giving magnesium sulfate deep IM injection; warn the woman that a feeling of warmth will be felt when magnesium sulfate is given
- If convulsions recur after 15 minutes, give 2 g magnesium sulfate (50% solution) IV over 5 minutes

### Maintenance dose

- 5 g magnesium sulfate (50% solution) + 1 ml lidocaine 2% IM every 4 hours into alternate buttocks
- Continue treatment with magnesium sulfate for 24 hours after delivery or the last convulsion, whichever occurs last.
- Before repeat administration, ensure that
  - Respiratory rate is at least 16 per minute
  - Patellar reflexes are present
  - Urinary output is at least 30 ml per hour over the last 4 hours
- Withhold or delay drug if:
  - Respiratory rate falls below 16 per minute
  - Patellar reflexes are absent
  - Urinary output falls below 30 ml per hour over preceding 4 hours
- In case of respiratory arrest:
  - Assist ventilation (mask and bag; anaesthesia apparatus; intubation)
  - Give calcium gluconate 1 gm (10 ml of 10% solution) IV slowly until the drug antagonizes the effects of magnesium sulfate and respiration begins

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## **IV Diazepam schedules for severe pre-eclampsia and eclampsia**

### **Loading dose**

- Diazepam 10 mg IV (intravenous) slowly over 2 minutes
- If convulsions recur, repeat loading dose

### **Maintenance dose**

- Diazepam 40 mg in 500 ml IV fluids (normal saline or Ringer's lactate) titrated to keep the patient sedated but rousable
- Do not give more than 100 mg in 24 hours

***Use diazepam only if magnesium sulfate is not available.***

### **Antihypertensive drugs**

- If the diastolic pressure is 110 mmHg or more, give antihypertensive drugs.
- The goal is to keep the diastolic pressure between 90 mmHg and 100 mmHg to prevent cerebral haemorrhage. Avoid hypotension.
- Hydralazine is the drug of choice:
  1. Give hydralazine 5 mg IV slowly every 5 minutes until blood pressure is lowered. Repeat hourly as needed or give hydralazine 12.5 mg IM every 2 hours as needed.
  2. If hydralazine is not available:  
Give labetalol 10 mg IV:
    - If response is inadequate (diastolic blood pressure remains above 110 mmHg) after 10 minutes, give labetalol 20 mg IV
    - Increase dose to 40 mg and then 80 mg if satisfactory response is not obtained within 10 minutes of each dose

***Or***

Nifedipine 5 mg chewed and swallowed or injected into the oropharynx; may be repeated at 10-minute intervals

***Or***

Nicardipine 1–2 mg at one minute intervals until control is obtained. Then 1–2 mg every hour.

### **Rectal administration of drugs**

1. Give diazepam rectally when IV access is not possible. The loading dose of 20 mg is taken in a 10 ml syringe.
2. 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, instill the drug in the rectum through a urinary catheter.
3. If convulsions are not controlled within 10 minutes, inject an additional 10 mg per hour or more, depending on the size of the woman and her clinical response.

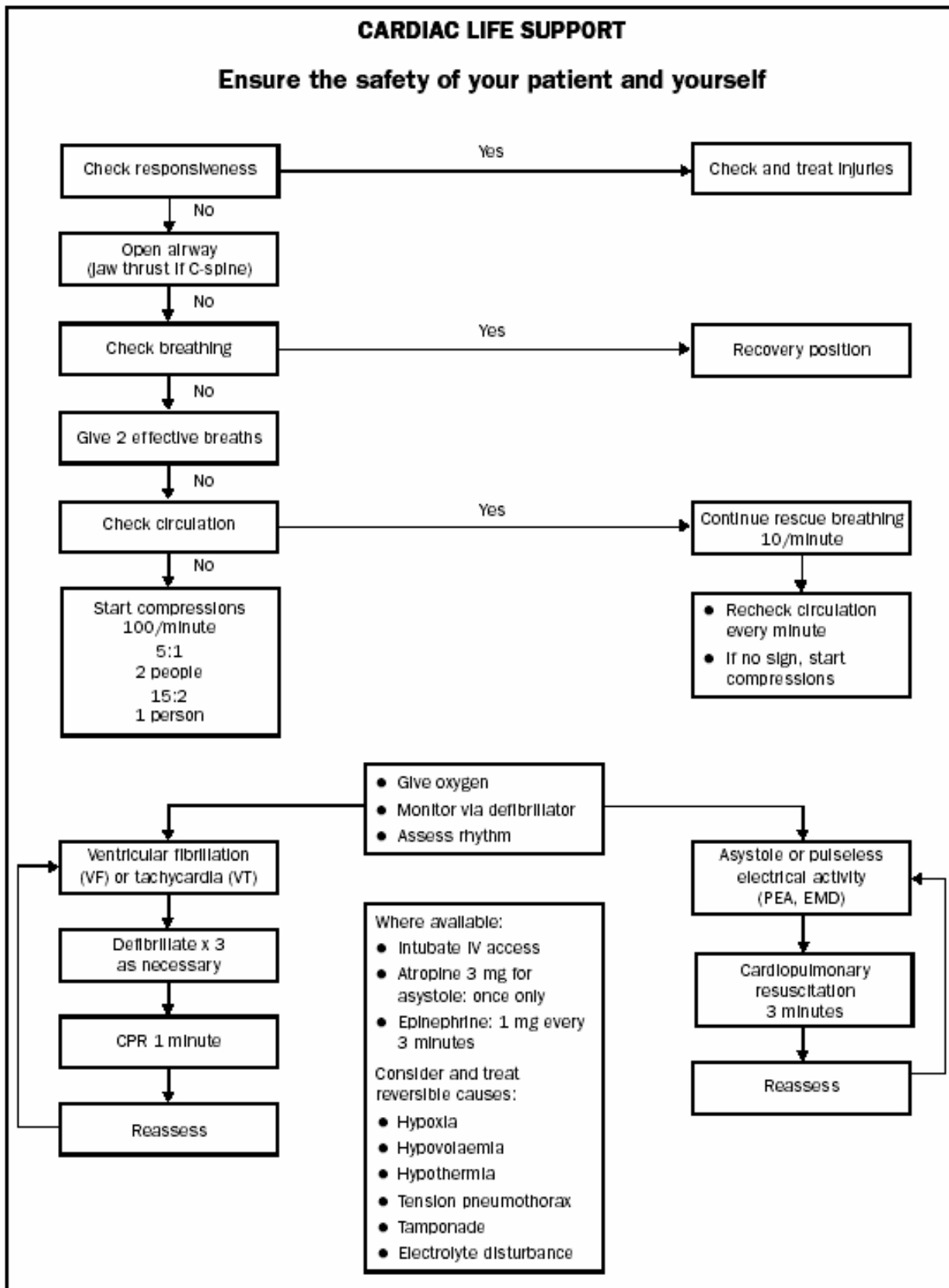


# Caesarean Section

## *Preparation Steps*

1. Review indications. Check fetal presentation and ensure that vaginal delivery is not possible.
2. Obtain consent from the patient after explaining the procedure and the reason for it.
3. Check the patient's haemoglobin concentration, but do not wait for the result if there is fetal or maternal distress or danger. Send the blood sample for type and screen. If the patient is severely anaemic, plan to give two units of blood.
4. Start an IV infusion.
5. Give sodium citrate 30 ml 0.3 molar and/or ranitidine 150 mg orally or 50 mg IV to reduce stomach acidity. Sodium citrate works for 20 minutes only so should be given immediately before induction of anaesthesia if a general anaesthetic is given.
6. Catheterize the bladder and keep a catheter in place during the operation.
7. If the baby's head is deep down into the pelvis, as in obstructed labour, prepare the vagina for assistance at caesarean delivery.
8. Roll the patient 15° to her left or place a pillow under her right hip to decrease supine hypotension syndrome.
9. Listen to the fetal heart rate before beginning surgery.

# CARDIAC LIFE SUPPORT



## **Before inducing anaesthesia check that:**

- An experienced and trained assistant is available to help you with induction.
- You have the *correct patient* scheduled for the *correct operation* on the *correct side*.
- The patient has been properly prepared for the operation and has had no food or drink for the appropriate period of time.
- The patient's progress through the hospital up to this moment and then check that your actions will be the right ones.
- Adequate intravenous access is obtained
- The patient is lying on a table that can be rapidly tilted into a head-down position in case of sudden hypotension or vomiting.
- Your equipment before you give an anaesthetic:
  - All the apparatus you intend to use, or might need, is available and working
  - If you are using compressed gases, there is enough gas and a reserve oxygen cylinder
  - The anaesthetic vaporizers are connected
  - The breathing system that delivers gas to the patient is securely and correctly assembled
  - Breathing circuits are clean
  - Resuscitation apparatus is present and working
  - Laryngoscope, tracheal tubes and suction apparatus are ready and have been decontaminated
  - Needles and syringes are sterile: never use the same syringe or needle for more than one patient
  - Drugs you intend to use are drawn up into labelled syringes
  - Any other drugs you might need are in the room.

# Managing unexpected effects of a spinal anaesthetic

## To Treat Hypotension

1. Increase the rate of fluid infusion as fast as possible, using a pressure bag, if needed.
2. Tilt the table to the left, if not already tilted.
3. Give a vasopressor: ephedrine 10 mg, repeated as necessary.

## To Treat the Respiratory Difficulty

- Give oxygen and IPPV, using an anaesthetic face mask and self inflating bag or bellows, or the anaesthetic machine patient circuit.
- At this point, it is possible that the situation will resolve itself: the heart rate and blood pressure may rise again, the patient breathes unassisted and you continue with spinal anaesthesia.
- Equally, however, the high spinal may progress further, or even become a “total spinal”. In this condition, there is no detectable cardiopulmonary activity. Start the following emergency measures without delay, as for any cardiopulmonary resuscitation:
  - Intubation
  - Ventilation with oxygen
  - Intravenous epinephrine.
- The question often arises: how should you intubate a mother who is clearly unable to breathe (and when inflation by mask is insufficient) but who is still conscious? Do you need to give thiopental and suxamethonium?

In the presence of hypotension:

- Avoid thiopental: give 10 mg of diazepam instead
- Judge the need for suxamethonium to intubate on the basis of the patient's the state of relaxation
- Give 0.2–0.5 mg of epinephrine intravenously if the blood pressure does not respond to ephedrine.
- A high or total spinal is a “pharmacological” cardiopulmonary arrest occurring in a healthy person. Every case should make a complete recovery. Death or cerebral damage from delayed recognition of the signs or poor management is inexcusable.

**A death or complication after spinal anaesthesia is usually due to neglect of vital signs.**

# **POSTOPERATIVE MANAGEMENT**

**If the patient is restless, something is wrong.**

Look out for the following in recovery:

- Airway obstruction
- Hypoxia
- Haemorrhage: internal or external
- Hypotension and/or hypertension
- Postoperative pain
- Shivering, hypothermia
- Vomiting, aspiration
- Falling on the floor
- Residual narcosis.

The recovering patient is fit for the ward when:

- Awake, opens eyes
- Extubated
- Blood pressure and pulse are satisfactory
- Can lift head on command
- Not hypoxic
- Breathing quietly and comfortably
- Appropriate analgesia has been prescribed and is safely established.

# Cast Application

To prepare plaster of Paris bandage, use dry cotton gauze (muslin) bandage, 500 cm long and 15 cm wide. Unroll a portion of the bandage on a dry table with a smooth top and apply plaster powder (anhydrous calcium sulfate or gypsum) evenly to the surface (Figure 17.21).

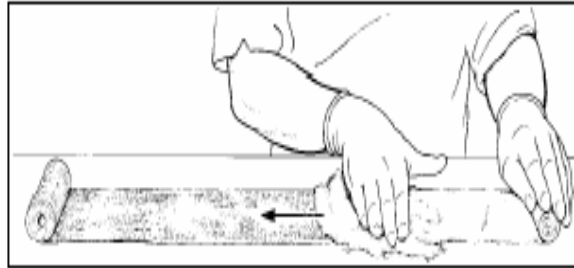


Figure 17.21

1. Clean the skin and apply dressings to any wounds. If available, apply stockinet to the extremity, avoiding wrinkles. Next, apply a uniform thickness of cotton padding over the stockinet and put extra padding over any bony prominence such as the patella, the elbow or the ankle (Figure 17.22).

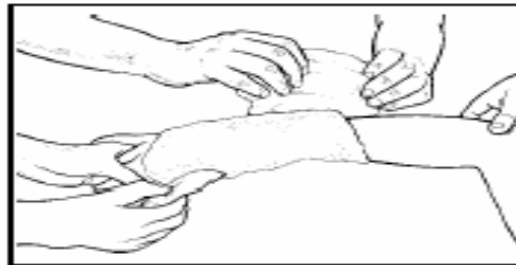


Figure 17.22

2 Soak the plaster roll in a pail containing water at room temperature. Do not use warm water as the heat given off by the plaster as it sets may burn the patient. Leave the plaster in the water until it is completely soaked and the air bubbles cease to rise.

3 Gently pick up the ends of the bandage with both hands and lightly squeeze it, pushing the ends together without twisting or wringing (Figure 17.23).

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Figure 17.23

## Cast Application (Continued)

4 While applying the plaster, hold the relevant part of the body steady in the correct position. Movement will cause ridges to form on the inside of the plaster. Work rapidly and without interruption, rubbing each layer firmly with the palm so that the plaster forms a homogenous mass rather than discrete layers.

5 Apply the plaster by unrolling the bandage as it rests on the limb. Do not lift it up from the patient or apply tension to the roll. Overlap the previous layer of plaster by about half the width of the roll (Figure 17.24).

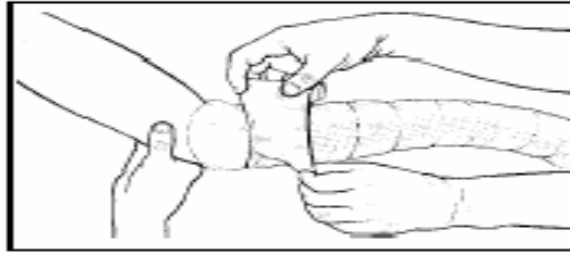


Figure 17.24

6 Mould the plaster evenly around the bony prominences and contours. Leave 3 cm of padding at the upper and lower margins of the cast to protect the skin from irritation by the edge of the cast. This can be folded back over the edge and incorporated in the last layer of plaster to provide a smooth edge (Figure 17.25).



Figure 17.25

7 Mould the cast until the plaster sets and becomes firm. Complete drying takes 24 hours so advise the patient to take care not to dent the cast or apply weight to it during this time.

8 The technique for application of a fibreglass cast is similar, but the fibreglass is slightly elastic and will contour to the body more easily. It sets firmly in about 30 minutes and will not be affected by water after that time.

## SPLINT APPLICATION

1 Measure the length of material needed to secure the limb. Place 3–5 layers of the measured padding on a flat surface and unroll 5–10 layers of plaster on to the padding (Figure 17.26).

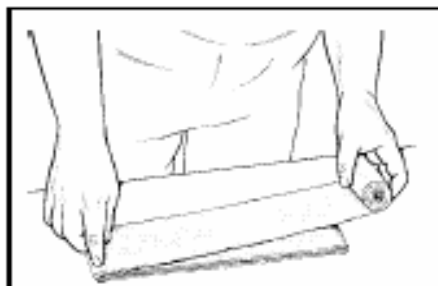


Figure 17.26

2 Grasp the plaster layer at each end, dip into the water and gently squeeze together without twisting. Place the wet plaster on the padding and smooth with the palm into a homogeneous layer.

3 Place the splint on the extremity, with the padding side toward the patient, mould it to the limb contours and secure with an elastic bandage or gauze wrap (Figure 17.27).

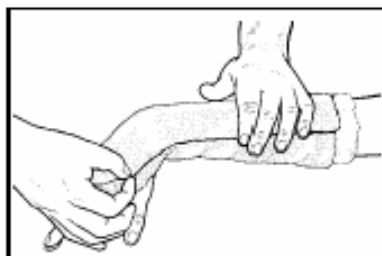


Figure 17.27

4 An alternative method is to split a circular cast lengthwise, remove the anterior half and secure it similarly with an elastic bandage.



# Caring for a cast or splint

- Keep the cast or splint dry at all times
- Do not try to scratch your skin under the cast or splint with a sharp or blunt object
- Allow the cast to dry for 24 hours before putting weight on it or resting it on a hard surface
- For acute injuries, elevate the injured part for 24–48 hours and wiggle your fingers or toes frequently
- Return to the health clinic immediately if:
  - Your cast or splint gets wet or becomes soft or broken
  - You have increasing pain
  - You experience numbness or tingling, or have difficulty moving your fingers or toes
  - You see a change in skin colour of the extremity
  - Your cast or splint has a foul odour.

# REMOVING A CAST

Remove the cast with an oscillating electric cast saw, if available, or with plaster shears (Figure 17.28).

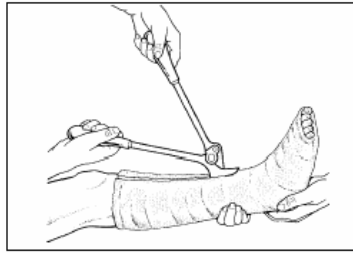


Figure 17.28

1 Make two cuts along opposing surfaces of the cast, avoiding areas where the bone is prominent. Begin cutting at an edge, then loosen the cast with a plaster spreader (Figure 17.29).

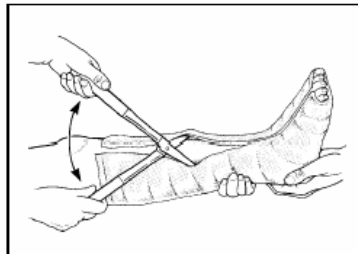


Figure 17.29

2 Complete the division of the plaster and the padding with plaster scissors, being careful not to injure the underlying skin (Figure 17.30).

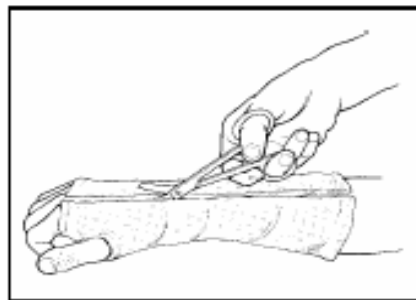


Figure 17.30

3 Under difficult conditions, or if the patient is a child, soften the plaster by soaking it in water, or water with vinegar added, for 10–15 minutes and then remove it like a bandage.

# Hand Lacerations

## Evaluation

- Treat open injuries of the hand promptly. Perform a local examination to check circulation, sensation and motor function.
- Gently examine the wound using aseptic technique to determine if it is clean or contaminated. A contaminated wound contains foreign material and crushed or dead tissue.

## Treatment

1. Debride and lavage all wounds in the operating room or emergency area. If a local anaesthetic is needed, use 1% lidocaine without epinephrine.
2. Administer tetanus toxoid and antibiotics.
3. Obtain X-rays to check underlying bones and joints.
4. Stop bleeding by compression with sterile gauze. If necessary, extend the wound, being careful not to cross skin creases in the palm or digits. Remove all foreign material and devitalized tissue, but *do not excise any skin unless it is dead*.
5. If the wound is clean, repair extensor tendons but not flexor tendons or nerves.
6. Close a clean wound over a drain using interrupted sutures if there is no tension on the skin. If the wound is contaminated, delay closure until after a second debridement. Wounds less than 1 cm square will granulate spontaneously. Use skin grafts for larger wounds, which will not close without skin tension.
7. Cover the hand with sterile gauze and a compression dressing.
8. Apply a plaster splint to hold the wrist in 20 degrees of extension, with the metacarpophalangeal joints in 90 degrees of flexion and the interphalangeal joints in full extension. Keep the fingertips exposed unless they are injured.
9. To control oedema, elevate the limb for the first week, either by attachment to an overhead frame or by the use of a triangular sling
10. Begin active exercises as soon as possible and inspect the wound in 2–3 days to remove drains.

# Airway Management

**The first priority is establishment or maintenance of airway patency.**

## **1. Talk to the patient**

A patient who can speak clearly must have a clear airway. Airway obstruction by the tongue in the unconscious patient is often a problem. The unconscious patient may require assistance with airway and/or ventilation. If you suspect a head, neck or chest injury, protect the cervical spine during endotracheal intubation.

## **2. Give oxygen**

Give oxygen, if available, via self-inflating bag or mask.

## **3. Assess the airway-** Signs of airway obstruction include:

- Snoring or gurgling
- Stridor or abnormal breath sounds
- Agitation (hypoxia)
- Using the accessory muscles of ventilation/paradoxical chest movements
- Cyanosis.

Be alert for foreign bodies. Intravenous sedation is **absolutely** contraindicated in this situation.

## **4. Consider the need for advanced airway management**

## **5. Indications for advanced airway management techniques include:**

- Persisting airway obstruction
- Penetrating neck trauma with haematoma (expanding)
- Apnoea
- Hypoxia
- Severe head injury
- Chest trauma
- Maxillofacial injury.

Airway obstruction requires *urgent* treatment.

# Surgical Cricothyroidotomy

Surgical cricothyroidotomy should be conducted in any patient where intubation has been attempted twice and failed and/or the patient cannot be ventilated.

## Technique

1. Hyperextend the neck, making the patient comfortable.
2. Identify the groove between the cricoid and thyroid cartilages just below the “Adam’s apple” (the protruding thyroid).
3. Clean the area and infiltrate with local anaesthetic.
4. Incise through the skin vertically with a 1.5 cm cut and use blunt dissection to ensure that you can see the membrane between the thyroid and cricoid (Figure 1).
5. With a #22 or #23 scalpel blade, stab through the membrane into the hollow trachea.
6. Rotate the blade 90° (Figure 2), insert a curved artery forceps alongside the blade, remove the blade and open the forceps side to side, widening the space between the thyroid and cricoid cartilages (Figure 3).

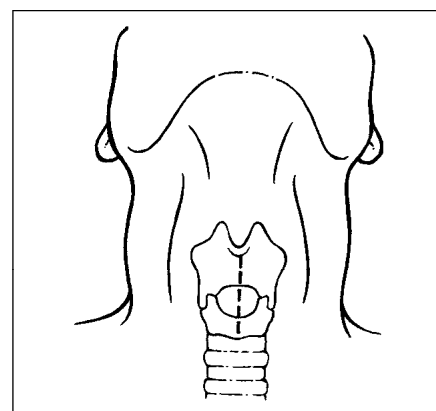


Figure 1

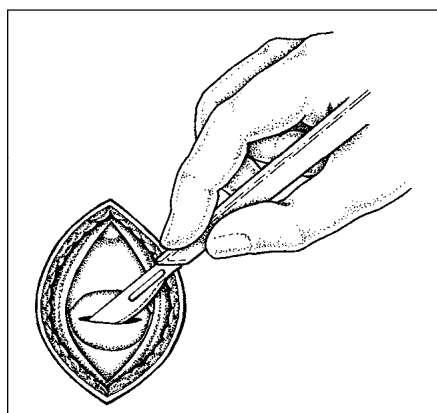


Figure 2

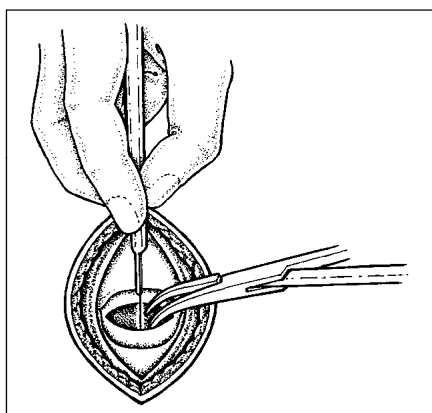


Figure 3

Continued next page

## Surgical Cricothyroidotomy (continued)

7. Pass a thin introducer or a nasogastric tube into the trachea if very small access (Figure 4) or proceed to 9.
8. Run a 4–6 endotracheal tube over the introducer and pass it into the trachea (Figure 5).
9. Remove the introducer, if used.

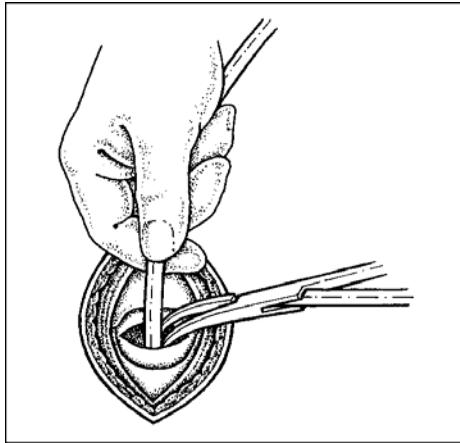


Figure 4

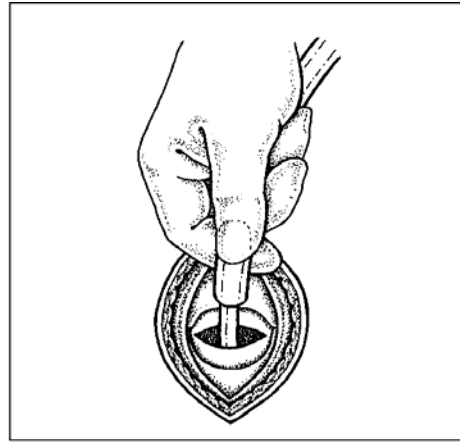


Figure 5

- This tube can stay in place for up to 3 days. Do not attempt this procedure in a child under the age of 10 years; passing several needles through the membrane will give enough air entry.
- This procedure should be performed by an experienced person, with prior knowledge of the anatomy and medical condition of the patient.
- This procedure should not be undertaken lightly, as wrong placement, bleeding and delay can cause death.

# Burns in Adults

The “Rule of 9’s” is commonly used to estimate the burned surface area in adults.

The body is divided into anatomical regions that represent 9% (or multiples of 9%) of the total body surface (Figure 7). The outstretched palm and fingers approximates to 1% of the body surface area.

If the burned area is small, assess how many times your hand covers the area.

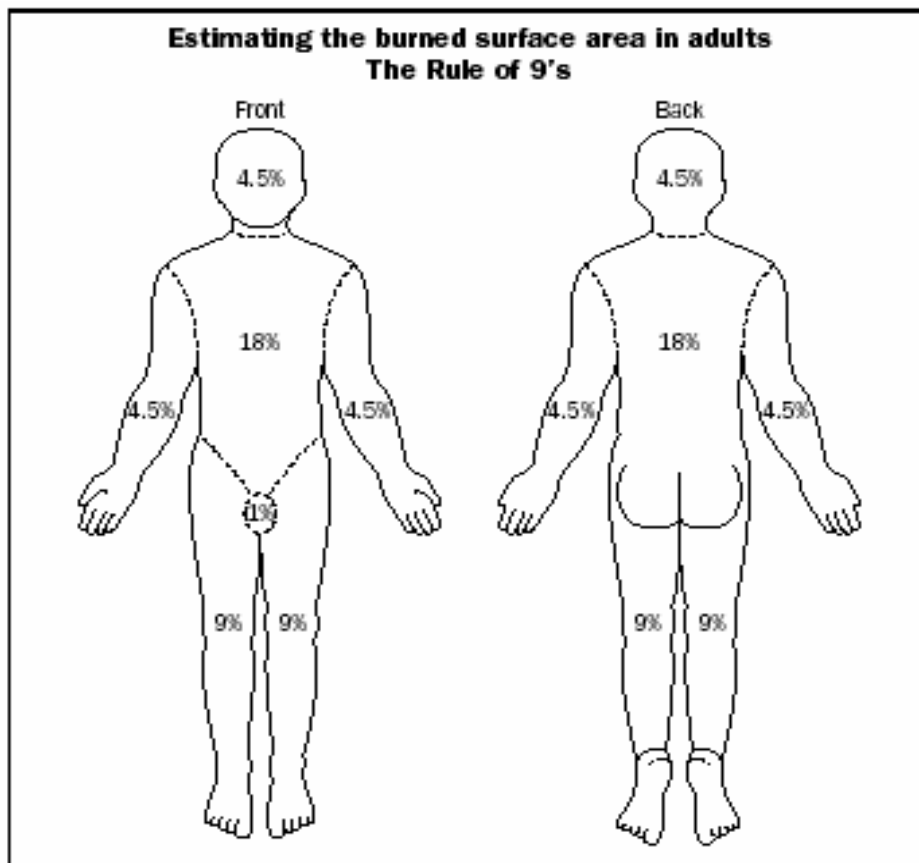


Figure 7

Morbidity and mortality rises with increasing burned surface area. It also rises with increasing age so that even small burns may be fatal in elderly people.

## Burns in Children

The 'Rule of 9's' method is too imprecise for estimating the burned surface area in children because the infant or young child's head and lower extremities represent different proportions of surface area than in an adult (see Figure 8).

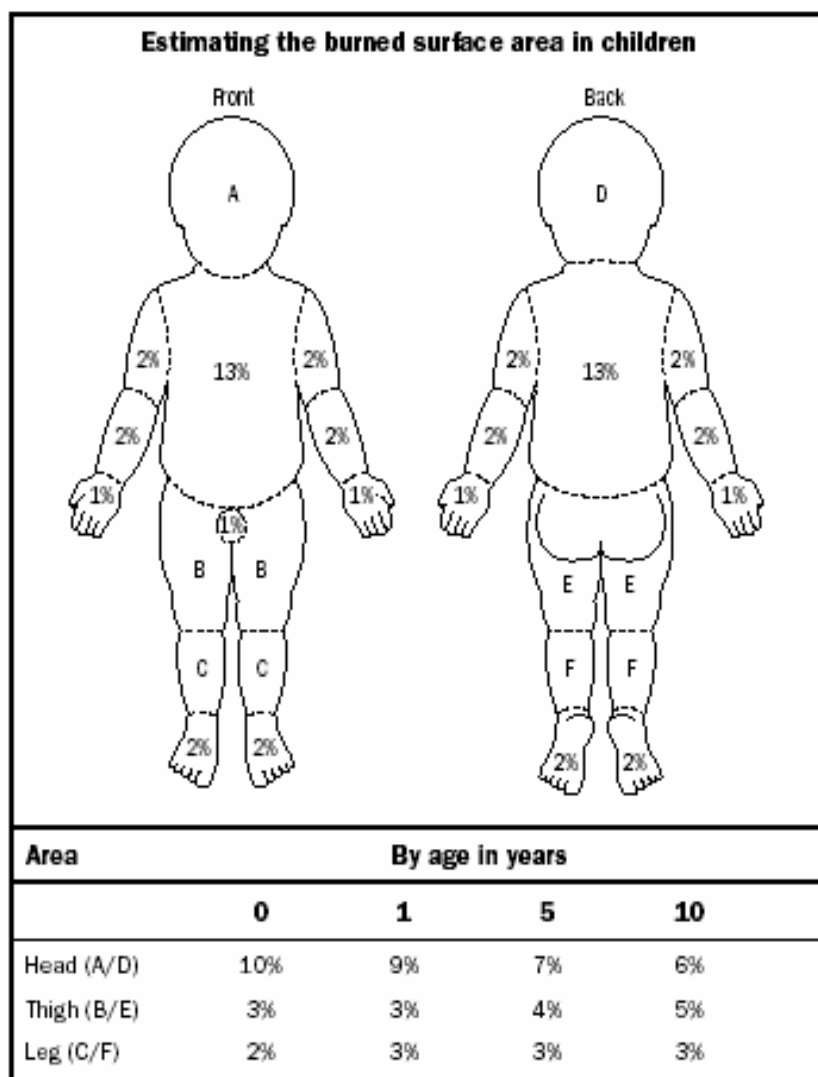


Figure 8

Burns greater than 15% in an adult, greater than 10% in a child, or any burn occurring in the very young or elderly are considered serious.



# Burns

## Depth of burn

It is important to estimate the depth of the burn to assess its severity and to plan future wound care. Burns can be divided into three types, as shown below.

<b>Depth of burn</b>	<b>Characteristics</b>	<b>Cause</b>
First degree burn	<ul style="list-style-type: none"><li>• Erythema</li><li>• Pain</li><li>• Absence of blisters</li></ul>	<ul style="list-style-type: none"><li>• Sunburn</li></ul>
Second degree (Partial thickness)	<ul style="list-style-type: none"><li>• Red or mottled</li><li>• Flash burns</li></ul>	<ul style="list-style-type: none"><li>• Contact with hot liquids</li></ul>
Third degree (Full Thickness)	<ul style="list-style-type: none"><li>• Dark and leathery</li><li>• Dry</li></ul>	<ul style="list-style-type: none"><li>• Fire</li><li>• Electricity or lightning</li><li>• Prolonged exposure to hot liquids/ objects</li></ul>

It is common to find all three types within the same burn wound and the depth may change with time, especially if infection occurs. Any full thickness burn is considered serious.

### **Serious burn requiring hospitalization**

- Greater than 15% burns in an adult
- Greater than 10% burns in a child
- Any burn in the very young, the elderly or the infirm
- Any full thickness burn
- Burns of special regions: face, hands, feet, perineum
- Circumferential burns
- Inhalation injury
- Associated trauma or significant pre-burn illness: e.g. diabetes

# Transportation of critically ill patients

- **Transporting patients is risky. It requires good communication, planning and appropriate staffing.**
- **Any patient who requires transportation must be effectively stabilized before departure.**
- **As a general principle, patients should be transported only if they are going to a facility that can provide a higher level of care.**
- **Planning and preparation include consideration of:**
  - Type of transport (car, lorry, boat, etc.)
  - Personnel to accompany the patient
  - Equipment and supplies required en route for routine and emergency treatment
  - Potential complications
  - Monitoring and final packaging of the patient.
- **Effective communication is essential with:**
  - The receiving centre
  - The transport service
  - Escorting personnel
  - The patient and relatives.
- **Effective stabilization necessitates:**
  - Prompt initial resuscitation
  - Control of hemorrhage and maintenance of the circulation
  - Immobilization of fractures
  - Analgesia.
- **Remember, if the patient deteriorates**
  - Re-evaluate the patient by using the primary survey
  - Check and treat life threatening conditions
  - Make a careful assessment focusing on the affected system.

**Be prepared: if anything can go wrong, it will – and at the worst possible time!**