World Health Organization

Best Practice Guidelines on Emergency Surgical Care in Disaster Situations

These guidelines have been extracted from the WHO manual *Surgical Care at the District Hospital (SCDH),* which is a part of the WHO *Integrated Management on Emergency and Essential Surgical Care* (IMEESC) tool kit.

The following materials relevant to country's disaster situation should be taken from the IMEESC tool:

- Best practice protocols for Clinical Procedures Safety (disaster planning, trauma team responsibilities, hand hygiene, operating room, and anaesthesia check list, postoperative management, application of cast and splints, cardiac life support, airway management),
- Needs assessment
- Essential Emergency Equipment List
- Details of anaesthesia, gunshot and landmine injuries in chapters 13, 14, 17 and 18, in SCDH

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Antibiotic Prophylaxis

- Antibiotic prophylaxis is different from antibiotic treatment.
- Prophylaxis is intended to prevent infection or to decrease the potential for infection. It is not intended to prevent infection in situations of gross contamination.
- Consider using prophylaxis:
  - For traumatic wounds which may not require surgical intervention
  - When surgical intervention will be delayed for more than 6 hours.

Use therapeutic doses if infection is present or likely:

- Administer antibiotics prior to surgery, within the 2 hours before the skin is cut, so that tissue levels are adequate during the surgery
- More than one dose may be given if the procedure is long (>6 hours) or if there is significant blood loss.
- The use of topical antibiotics and washing wounds with antibiotic solutions are **not recommended**.
- Use antibiotic prophylaxis in cases where there are:

1. Biomechanical considerations that increase the risk of infection:
   - Implantation of a foreign body
   - Known valvular heart disease
   - Indwelling prosthesis
2. Medical considerations that compromise the healing capacity or increase the infection risk:
   - Diabetes
   - Peripheral vascular disease
   - Possibility of gangrene or tetanus
   - Immunocompromised state
3. High-risk wounds or situations:
   - Penetrating wounds
   - Abdominal trauma
   - Compound fractures
   - Wounds with devitalized tissue
   - Lacerations greater than 5 cm or stellate lacerations
   - Contaminated wounds
   - High risk anatomical sites such as hand or foot
   - Biliary and bowel surgery.

- Use intravenous (IV) antibiotics for prophylaxis in clean surgical situations to reduce the risk of postoperative infection, since skin and instruments are never completely sterile.
- For the prophylaxis of endocarditis in patients with known valvular heart disease:
  - Oral and upper respiratory procedures: give amoxicillin 3 g orally, 1 hour before surgery and 1.5 g, 6 hours after first dose
  - Gastrointestinal and genitourinary procedures: give ampicillin 3 g, 1 hour before surgery *and* gentamicin 1.5 mg/kg intramuscularly (IM) or IV (maximum dose 80 mg), 30 minutes before surgery.

Antibiotic Treatment

- When a wound is extensive and more than 6 hours old, you should consider it to be colonized with bacteria, and use therapeutic doses and regimens.
- Penicillin and metronidazole provide good coverage and are widely available.

- Monitor wound healing and infection regularly.
- Make use of culture and sensitivity findings if they are available.
- Continue therapeutic doses of antibiotics for 5–7 days.

Tetanus Prophylaxis

Active immunization with tetanus toxoid (TT) prevents tetanus and is given together with diphtheria vaccine (TD). Women should be immunized during pregnancy to prevent neonatal tetanus. Childhood immunization regimes include diphtheria, pertussis and tetanus.

- Individuals who have not received three doses of tetanus toxoid are not considered immune and require immunization.
- A non-immune person with a minor wound can be immunized if the wound is tetanus prone; give both TT or TD and tetanus immune globulin (TIG).
- A non-immunized person will require repeat immunization at six weeks and at six months to complete the immunization series.
- Examples of tetanus prone wounds include:
    - Wounds contaminated with dirt or faeces
    - Puncture wounds
    - Burns
    - Frostbite
    - High velocity missile injuries.
- Give prophylactic antibiotics in cases of wound contamination
- Immunize the non-immune patient against tetanus with tetanus toxoid and give immune globulin if the wound is tetanus prone.

Tetanus prophylaxis regime

	Clean wounds	Moderate risk	High risk
Immunized and booster within 5 years	Nil	Nil	Nil
Immunized and 5–10 years since booster	Nil	TT or TD	TT or TD
Immunized and >10 years since booster	TT or TD	TT or TD	TT or TD
Incomplete immunization or unknown	TT or TD	TT or TD and TIG	TT or TD and TIG

Do not give TIG if the person is known to have had two primary doses of TT or T

Failure of Normal Methods of Sterilization

Failure of an autoclave or a power supply may suddenly interrupt normal sterilization procedures.
If an extra set of sterile equipment and drapes are not available, the following “antiseptic technique” will allow some surgery to continue.

1. Immerse towels and drapes for 1 hour in a reliable antiseptic such as aqueous chlorhexidine, wring them out and lay them moist on the skin of the patient.
2. Treat gauze packs and swabs similarly, but rinse them in diluted (1: 1000) chlorhexidine solution before using them in the wound. From time to time during the operation, rinse gauze in use in this solution.
3. Immerse instruments, needles, and natural suture materials in strong antiseptic for 1 hour and rinse them in weak antiseptic just before use

Cleaning, Disinfection and Sterilization

Disinfection

- Disinfectant solutions are used to inactivate any infectious agents that may be present in blood or other body fluids.
- They must always be available for cleaning working surfaces, equipment that cannot be autoclaved and non-disposable items and for dealing with any spillages involving pathological specimens or other known infectious material.
- Needles and instruments should routinely be soaked in a chemical disinfectant for 30 minutes before cleaning.
- Disinfection decreases the viral and bacterial burden of an instrument, but does *not* clean debris from the instrument or confer sterility.
- The purpose of disinfection is to reduce the risk to those who have to handle the instruments during further cleaning.
- Reusable needles must always be used with great care. After use, they should be placed in a special container of disinfectant before being cleaned and sterilized.
- Thick gloves should be worn when needles and sharp instruments are being cleaned.
- There are many disinfectant solutions, with varying degrees of effectiveness. In most countries, the most widely available disinfectant is sodium hypochlorite solution (commonly known as bleach or *chloros*), which is a particularly effective antiviral disinfectant solution.
- To ensure effective disinfection, follow the manufacturer's instructions or any other specific guidelines that have been given and dilute the concentrated solution to the correct working strength.
- It is important to use all disinfectant solutions within their expiry date as some solutions, such as hypochlorite, lose their activity very quickly.
- All disinfectants have what is known as a "contact time", which means that they must be left in contact with an infectious agent for a certain period of time to ensure that it is completely inactivated. However, some disinfectants are themselves inactivated by the presence of organic material and so higher concentrations of disinfectant and longer contact times must be used in certain situations, such as a large spill of infected blood.
- Linen soiled with blood should be handled with gloves and should be collected and transported in leak-proof bags.
- Wash the linen first in cool water and then disinfect with a dilute chlorine solution. Then wash it with detergent for 25 minutes at a temperature of at least 71°C.

Sterilization

The methods of sterilization in common use are:

1. Autoclaving or steam sterilization
2. Exposure to dry heat
3. Treatment with chemical antiseptics.

1. Autoclaving

- Autoclaving should be the main form of sterilization at the district hospital.
- Before sterilizing medical items, they must first be disinfected and vigorously cleaned to remove all organic material. Proper disinfection decreases the risk for the person who will be cleaning the instruments.
- Sterilization of all surgical instruments and supplies is crucial in preventing HIV transmission. All viruses, including HIV, are inactivated by steam sterilization (autoclaving) for 20 minutes at 121°C–132°C or for 30 minutes if the instruments are in wrapped packs.

- Appropriate indicators must be used each time to show that sterilization has been accomplished. At the end of the procedure, the outsides of the packs of instruments should not have wet spots, which may indicate that sterilization has not occurred.

2. Dry heat

- If items cannot be autoclaved, they can be sterilized by dry heat for1–2 hours at 170°C. Instruments must be clean and free of grease or oil.
- However, sterilizing by hot air is a poor alternative to autoclaving since it is suitable only for metal instruments and a few natural suture materials.
- Boiling instruments is now regarded as an **unreliable means of sterilization** and is not recommended as a routine in hospital practice.

3. Antiseptics

- In general, instruments are no longer stored in liquid antiseptic. However, sharp instruments, other delicate equipment and certain catheters and tubes can be sterilized by exposure to formaldehyde, glutaral (glutaraldehyde) or chlorhexidine.
- If you are using formaldehyde, carefully clean the equipment and then expose it to vapour from paraformaldehyde tablets in a closed container for 48 hours. Ensure that this process is carried out correctly.
- Glutaral is a disinfectant that is extremely effective against bacteria, fungi and a wide range of viruses. Always follow the manufacturer's instructions for use.

Waste disposal in clinical procedures at resource limited health care facility

It is essential for the hospital to have protocols for dealing with biological waste and contaminated materials. All staff must be familiar with them and follow them.

- All **biological waste** must be carefully stored and disposed of safely.

- **Contaminated materials** such as blood bags, dirty dressings and disposable needles are potentially hazardous and must be treated accordingly.

- If biological waste and contaminated materials are not disposed of properly, staff and members of the community could be exposed to infectious material and become infected.

- The disposal of **bio hazardous materials** is time consuming and expensive, so it is important to separate non-contaminated material such as waste paper, packaging and non-sterile but not biologically contaminated materials.
- Only 15% to 20% of medical waste is considered infectious.

- Make **separate disposal containers** available where waste is created so that staff can sort the waste as it is being discarded. **A three colour coding system** with **black** for non infectious waste, **red or yellow** for infectious and **yellow** for sharps is recommended.

- **Organize things** in a way to discourage the need for people to be in contact with contaminated waste.

- All infected waste should then be treated of by **steam sterilization or high temperature incineration** equipped with emission control devices. Whenever feasible plastic material such as syringes or blood bags should not be incinerated.

- Burying waste is the only option in some areas where not controlled landfill exists. If this is the case, you should do as much as possible to protect the burying site to prevent access and to avoid environmental pollution, especially for underground water sources.

- Prior to burying for safety **infected waste can be disinfected** by soaking in a 0.5% hypochlorite solution for at least 30 minutes.
- Do not mix waste **chemicals**, unless you are certain that a chemical reaction will not take place. This is essential to prevent any unwanted or dangerous reactions between the chemicals, which could endanger laboratory staff. Always follow local guidelines on the disposal of waste chemicals to ensure that chemical contamination of the surrounding land or water supply does not occur.

- Provide a **safe system for getting rid of disposable items** such as scalpel blades or needles. The risk of injury with sharp objects increases with the distance they are carried and the amount they are manipulated.

- A container for the **safe disposal of sharp objects** should be:
- Well labelled
- Puncture proof
- Watertight
- Break resistant (a glass container could break and provide a serious hazard to the person cleaning up the mess)
- Opening large enough to pass needles and scalpel blades, but never large enough for someone to reach into
- Secured to a surface, such as a wall or counter, to ensure stability during use
- Removable for disposal.

- These containers must then be disposed of safely. *(They can be steam sterilized, then shredded and disposed of to a controlled land fill with municipal waste, encapsulated in a pit or any other options according to national protocols approved by the public health department and ministry of environment.)*

- Health-care workers and waste handlers should wear protective equipment such as gloves, apron, mask and be immunized against HBV.

- A budget line for a safe waste management should be systematically included when planning a medical activity.

References

- WHO Surgical Care at the District Hospital Manual 2003
- WHO Management of Solid Health-Care Waste at Primary Health-Care Centres : a decision-making guide 2005

Resuscitation

Haemorrhage

- External bleeding can be controlled, usually with pressure.
- Bleeding into body cavities may be apparent only later; for example, when the circulation has been restored and the rise in blood pressure causes more bleeding and a second fall in blood pressure.

Shock

Shock is a pathological, life threatening condition in which the oxygen supply to the tissues of the body fails. The cause is usually one of the following:

- Hypovolaemia (bleeding)
  - the circulating volume is reduced by loss of blood or other fluid (e.g. burn transudate).
  - Rapid fluid replacement, starting with normal saline or Hartmann's solution, should restore the circulation towards normal.
- Sepsis
  - the circulating volume may be normal, but blood pressure is low and tissue circulation is inadequate.
  - Support the circulation with volume infusion, but it may not respond as in hypovolaemic shock.
- Acute anaphylaxis: from allergy or drug reaction
  - give epinephrine and intravenous fluids.
- Neurogenic (after spinal trauma)
  - the heart rate is often low and atropine and fluids will be helpful.
- Heart failure (left ventricular failure).

Recognize shock by:

- Tachycardia (may be the only sign in a child)
- Thready pulse
- Narrow pulse pressure: e.g.110/70 becomes 95/75
- Cold hands and feet
- Sweating, anxious patient
- Breathlessness and hyperventilation
- Confusion leading to unconsciousness

Unconsciousness

Unconsciousness may have many causes including:

- Head injury
- Hypoglycemia
- Ketoacidosis
- Cerebrovascular event
- Hypoxia
- Hypotension
- Hypertension and eclampsia
- HIV infection
- Drug intoxication.

- Assess the response to stimuli, look at the pupils initially and re-examine them later to follow progress. Look for unequal pupils or other localizing signs that may show intracranial haematoma developing.

- In many instances, you may attend to and stabilize other systems first and await the return of consciousness as cerebral perfusion and oxygenation improves.

- After cardiac arrest, a patient who initially had fixed dilated pupils may show smaller pupils after effective CPR. This indicates that a favourable outcome may be possible.

- The supine unconscious patient with a full stomach is at grave risk of regurgitation and aspiration due to the unprotected airway. However, if a comatose patient has a clear airway and vital signs are normal:
  - Avoid intubation as this will involve drug administration and complicate the subsequent diagnosis
  - Nurse the patient in the recovery position
  - Monitor the airway and await progress and diagnosis (Figure 13.4).

- During CPR, ask yourself: is the patient responding? If not, why not?

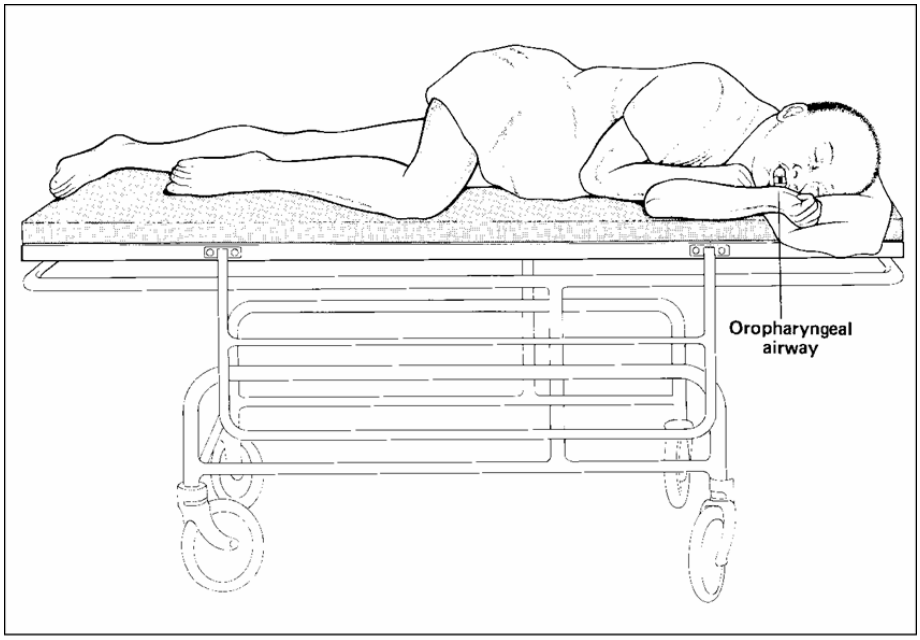

Figure 13.4

Wound Management

Surgical wounds can be classified as follows:

- Clean
- Clean contaminated: a wound involving normal but colonized tissue
- Contaminated: a wound containing foreign or infected material
- Infected: a wound with pus present.
- Close clean wounds immediately to allow healing by primary intention