Infection Prevention & Control (IPC) at Groote Schuur Hospital
A Practical Handbook

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This practical training manual is intended for distribution to all health care workers (HCW) undergoing an induction course at Groote Schuur Hospital. It is not meant to replace other forms of IPC education that HCWs may receive at the same time, but should act as a practical guide and aid memoire. The author receives support from the President’s Emergency Plan for AIDS Relief (PEPFAR)-USAID through the ANOVA Health Institute
I. Hierarchy of IPC interventions

Principles:

- The practice of Infection, Prevention and Control (IPC) requires a structured hierarchy of interventions that if put in place in a stepwise manner will provide optimal protection for patients and staff.

   - Administrative controls are the foundation of IPC and include:
     - Assessment of the risk of transmission in the facility
     - The development of an IPC Plan detailing the measures to be taken to prevent & control infections within the facility
     - Training of HCWs to implement the IPC Plan
     - Putting in place appropriate architectural design to support the functional and operational processes that will follow
     - Active case finding to identify infected patients

- Environmental controls relate to reduction of transmission by controlling environmental factors that determine transmission, e.g. controlling airflow to minimise spread of airborne pathogens

- Personal protective equipment (PPE) affords protection to the individual HCW. The impact of PPE on IPC in a health care facility as a whole is minimal. PPE includes the use of masks (surgical and N95), Aprons, Gloves, Goggles, Scrubs and boots
II. Hand Washing

Principles

- Hands are the most frequent route of transmission for pathogens in hospitals
- Non-compliance with hand washing recommendations is the major barrier to improving IPC

![Image](https://example.com/handwashing_principles)

Actions

1. Fingernails – keep short and clean. Chipped nail polish supports microorganism growth. Artificial nails are associated with outbreaks and should not be worn
2. Jewellery – kept to absolute minimum. Skin underneath heavily colonised
3. Lesions – cover any lesions on the hands with moisture-proof dressing
4. Gloves – Reduce transmission by 70-80% **but do not** remove need to wash hands
5. Washing technique
   a. Use of soap and water is only absolutely necessary when hands are:
      i. Visibly dirty
      ii. Contaminated with proteinaceous material, blood or body fluids
      iii. Exposed to spore-forming microorganisms
      iv. After using the restroom or toilet
b. The use of alcohol rub is acceptable at all other times
c. Use hand lotions frequently to reduce the risk of contact dermatitis

6. Ensure that at least 1 bottle of alcohol solution is at the beside or at the end of each patient’s bed. This is the responsibility of the Nurse Manager of the area.

7. Poster campaigns such as the World Health Organisation’s 5 moments for Hand Hygiene should be readily visible in all clinical areas.

- Frequent promotional campaigns and education sessions should be undertaken. If these are not ongoing in your area, contact the IPC Sister via switchboard
III. Preventing exposure to pathogens

Principles

- Hospital acquired infections (HAI) also termed ‘nosocomial’ infections that are transmitted person to person are transmitted either via the airborne route or through skin contact.
- Isolation of the patient and personal protective equipment is made available to protect you and prevent transmission of pathogens.
- Signs are available on the ward that indicate the type of precaution(s) that must be taken for a particular mode of transmission i.e.

<table>
<thead>
<tr>
<th>Mode of transmission</th>
<th>Signage</th>
<th>Pathogens / PPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Airborne Small droplet nuclei</td>
<td><img src="image" alt="Airborne Sign" /></td>
<td>Tuberculosis, Measles, Chickenpox (pneumonitis)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N95 Mask</td>
</tr>
<tr>
<td>Droplet Large droplets from upper respiratory tract</td>
<td><img src="image" alt="Droplet Sign" /></td>
<td>Meningococcal infections, Influenza</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Surgical Mask</td>
</tr>
<tr>
<td>Contact</td>
<td><img src="image" alt="Contact Sign" /></td>
<td>Drug-resistant pathogens on skin, wounds, GiT, Influenza</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Apron &amp; Gloves</td>
</tr>
</tbody>
</table>

Actions

1. When a patient is isolated and a sign is placed on the door of the cubicle or at the head of the bed, follow the instructions!
2. If a sign is not placed correctly, please inform the nursing staff and ensure that the correct sign is placed clearly in view.
IV. Prevention of Sharps Injuries

Principles

- >80% of sharps injuries are preventable, particularly those during blood taking
- Safety equipment should be used wherever possible. Use of safety devices for blood taking has been proven to reduce needlestick injuries
  - Groote Schuur Hospital employs the Vacutainer® system for blood taking
- Resheathing of needles markedly increases the risk of needlestick injury and should NOT be practiced
- Sharps bins are for disposal of sharp objects only. Syringes, other plastics and blunt instruments should be discarded in biohazard bins rather than sharps containers
Actions

1. Prior to performing a procedure, first ensure that
   a. the clinical area is clear of sharp objects
   b. that you have everything you need for the procedure
   c. a sharps bin is within reaching distance to facilitate sharps disposal.

2. Gloves should be used wherever contact with blood is anticipated.

3. For blood taking, use the Vacutainer® system whenever possible. If Vacutainer equipment is not available in your clinical area, ask the ward manager to order it.

4. If using a conventional needle and syringe, remove the needle using the allocated slot in the lid of the sharps bin and transfer blood to the specimen tubes having uncapped each beforehand

5. Ensure that you clean up properly and do not leave needles or other sharp objects in the bed or around the patient area.

6. If you have started a procedure and find that you do not have a sharps container nearby, never walk with an unprotected sharp to reach the nearest container. Rather, make every attempt to get someone to bring you a container, or halt the procedure and fetch one, ensuring that the sharp is clearly visible and not a danger to anyone whilst you fetch the container.

7. Only in extreme circumstances, should you consider resheathing a sharp, using a ‘safe’ technique whereby you do not hold the sheath in your hand while resheathing.

In the event of a percutaneous or mucocutaneous exposure to blood or potentially infectious material for blood borne viruses (HIV, HBV, HCV), apply first aid to the wound, report the event immediately to your manager on duty and follow the protocol detailed in the Western Cape Academic Hospitals Antimicrobial Recommendations latest edition.
V. Prevention of *Mycobacterium tuberculosis* transmission

Principles

- *M. tuberculosis* is transmitted by small aerosol nuclei generated by coughing.
- Due to small droplet size, aerosols remain suspended in the atmosphere for a long time before falling to the ground.
- Active case finding is critical to correct placement of patients either in a single cubicle, 4-bedded area or the open ward.

Actions

1. The following bed policy has been accepted at GSH

<table>
<thead>
<tr>
<th>Site</th>
<th>Criteria</th>
</tr>
</thead>
</table>
| Open ward                                                           | - Any patient with proven or suspected extrapulmonary tuberculosis, without pulmonary involvement.  
- Any patient with proven drug-sensitive pulmonary tuberculosis who has completed >2 weeks of uninterrupted intensive phase Rx.  
- Any patient suspected of having pulmonary tuberculosis on clinical and/or radiological grounds without microbiological confirmation, who has completed >2 weeks of uninterrupted intensive phase Rx.  
- Any patient with multi-drug resistant (MDR) pulmonary tuberculosis admitted for whatever reason, who has completed a minimum of 4 months intensive phase therapy and has had 2 negative sputum cultures 1 month apart (culture conversion). |
| Single bedded cubicle with extractor fan                           | - Any patient with drug-sensitive pulmonary TB who has failed 1st or 2nd line antituberculous therapy and is suspected of having MDR pulmonary tuberculosis.  
- Any patient with MDR pulmonary tuberculosis, who has either received < 4 months of appropriate therapy or has not yet had 2 negative sputum cultures 1 month apart, but in whom extensively-drug resistant (XDR) tuberculosis is not suspected.  
- Any patient with MDR pulmonary tuberculosis, who has failed to achieve 2 negative sputum cultures despite ≥4 months of uninterrupted intensive phase antituberculous therapy for MDR, or has become sputum culture positive after initial culture conversion and could therefore be at risk of having XDR tuberculosis.  
- Any patient with XDR pulmonary tuberculosis.  
- Any patient with XDR extrapulmonary tuberculosis, in whom pulmonary involvement has not been ruled out by 2 negative sputum cultures taken prior to the start of XDR therapy.  
- Any patient with a proven drug-sensitive pulmonary tuberculosis who has completed <2 weeks of uninterrupted intensive phase therapy. |
Each site represents the optimal position for patients within that category to be nursed from an IPC viewpoint in our resource-limited setting. If a side cubicle is unavailable, the default should be place the patient on the open ward, whilst efforts are made to make a cubicle available.

Bacteriologically proven tuberculosis due to infection with *Mycobacterium tuberculosis* resistant to rifampicin and isoniazid, with or without resistance to other first line antituberculous drugs.

Bacteriologically proven tuberculosis due to infection with *Mycobacterium tuberculosis* that is resistant not only to rifampicin and isoniazid (i.e. multidrug resistant), but is also resistant to any fluoroquinolone plus resistance to one or more of the following injectable antituberculous drugs: kanamycin, amikacin, capreomycin

These patients are arguably the lowest risk of those requiring a single-bedded cubicle. Hence other categories of patients in this group should be accommodated first.

2. An airborne precautions sign must be fixed to each single cubicle door:

   ![Image of a sign](image)

   **STOP! - WARNING**
   **AIRBORNE PRECAUTIONS**

   **ALL STAFF & VISITORS**
   **N95 MASK**

   **DISINFECT / WASH HANDS**
   **BEFORE YOU ENTER & WHEN YOU LEAVE!**

3. When entering the room of a patient with proven or suspected tuberculosis, an N95 mask must be worn. Each HCW must learn how to properly fit an N95 mask.
4. If a patient is moved from an isolation area e.g. to radiology, then he/she should wear a surgical mask, not an N95 mask. Visitors should be kept to a minimum i.e. one at a time, and should also wear an N95 mask.
VI. Prevention of Catheter-related Urinary Tract Infection

Principles

- Urinary tract infection (UTI) is the commonest HAI, most being associated with urinary catheters
- The risk of Catheter-associated UTI increases with duration of catheterisation
- Urinary catheters should only be used when there is a clear medical indication
- Intermittent catheterisation is associated with much lower risk of UTI.

Actions

1. **Before placing a catheter, ask the question:** ‘Is there a proper medical indication for catheterising this patient or is there an alternative?’
2. Catheters must only be placed by HCWs trained in aseptic bladder catheterisation
3. Indwelling catheters should be secured to the patient’s leg and the bag should be held on a urine bag stand. It should not be allowed to rest on the floor
4. **Every day**, the team responsible for the patient’s care must review whether the urinary catheter can be removed.
5. Whenever possible, the urinary catheter should be removed.
VII. Prevention of Drip-site Sepsis

Principles

- Drip site sepsis results from infection of an intravenous catheter, which acts as a foreign body resulting in a biofilm forming around the catheter which becomes colonized with microorganisms.
- Most infections are from the patient’s own skin, typically coagulase-negative staphylococci or *S. aureus*.
- Intravenous catheters should not be placed in a setting where oral medication, hydration or nutrition can be feasibly used.
- Infection rates are lowest with smaller needles. Use whenever possible.
- All manipulations of connections must be preceded by alcohol disinfection and use a non-touch technique for the sterile surfaces of the connections.

Actions

1. All indwelling catheters should be sited using aseptic technique
2. All vascular access should be examined daily for signs of inflammation/sepsis
3. Each day, the team looking after the patient should review whether the indwelling catheter can be removed
4. All peripheral intravenous catheters should be considered for removal at 72 hours
5. If the drip ‘tissues’, the line, giving set and fluid must be discarded and replaced.
6. Drip-site infections should reported to the nurse manager for reporting to the IPC nurse and Quality Assurance team.
VIII. Prevention of Surgical Site Infections (SSI)

Principles

- SSI are the 2nd commonest HAI
- SSI increase length of hospital stay, re-admission rates and mortality
- Pre-operative shaving **increases** the risk of SSI and should not be performed
- Poor diabetic control increases the risk of SSI
- Peri-operative hypothermia increases SSI rates in open abdominal surgery
- Antibiotic prophylaxis is not required for clean operations/procedures in patients with minimal risk of contamination. In all other situations, consider prophylaxis
  - Prophylaxis must be given within the time frame of 60 min pre-incision
  - Single dose should be used unless surgery is prolonged or there is massive blood loss

Actions

1. Where hair removal is necessary, use depilatory creams or clippers if absolutely necessary
2. Give a single dose of prophylactic antibiotic within 60 min pre-incision
3. Disinfect the skin immediately prior to the incision
4. Maintain good post-operative glucose control
5. Monitor and maintain normothermia in open abdominal surgery
6. Minimize handling of the wound post-operatively
IX. Correct waste disposal

Principles

- Proper segregation of waste will reduce the risk of transmission of pathogens.
- Potentially infectious waste includes
  - Sharps – any object that can cause percutaneous injury
  - Microbiological – culture plates, growth media etc
  - Pathological – human tissues
  - Swabs, dressings and bandages
  - Blood – and blood products

<table>
<thead>
<tr>
<th>Type</th>
<th>Sharps</th>
<th>Non-Sharps biomedical Solid &amp; semi-liquid</th>
<th>Non-Sharps Non-biological Solid &amp; semi-liquid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Example</td>
<td><img src="image" alt="Sharps Bin" /></td>
<td><img src="image" alt="Biomedical Bin" /></td>
<td><img src="image" alt="Non-Biomedical Bin" /></td>
</tr>
</tbody>
</table>
| Specifications | Puncture-resistant  
Leak-proof  
Durable  
Biohazard label  
Closable | Plastic bag should be placed inside a rigid container which is leak-proof. Distinctive colour | Ideally, plastic bag should be placed inside a rigid, leak-proof container |

Actions

1. Familiarize yourself with the type of waste disposal containers in your clinical area and which type of waste is to be put in which container
2. If a sharps bin is ≥ ¾ full, close the lid and replace it with a new container
3. Never try to fit a sharp object into a sharps bin that is full
X. Notification of Infectious Diseases

**Principles**

- Notification of notifiable diseases is a statutory obligation for all health care providers
- The doctor in charge of the case is responsible for reporting

**Actions**

<table>
<thead>
<tr>
<th>Category</th>
<th>Infections</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Priority Epidemiology</td>
<td>Polio/Acute Flaccid Paralysis</td>
<td>Report within 24 hours to Provincial Surveillance Officer <strong>021 483 3156</strong> (fax 021 483 2264)</td>
</tr>
<tr>
<td>Diseases under active surveillance</td>
<td>Measles</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Neonatal Tetanus</td>
<td></td>
</tr>
<tr>
<td>Diseases for urgent response</td>
<td>Cholera</td>
<td>Report immediately to <strong>021 424 7715</strong></td>
</tr>
<tr>
<td></td>
<td>Viral Haemorrhagic Fever</td>
<td>Inform GSH Infection Control Officer</td>
</tr>
<tr>
<td></td>
<td>Yellow Fever</td>
<td>Complete GW 17/5 form</td>
</tr>
<tr>
<td>Diseases for rapid response</td>
<td>Anthrax</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Diphtheria</td>
<td></td>
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<tr>
<td></td>
<td>Food Poisoning</td>
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<tr>
<td></td>
<td>Legionellosis</td>
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<tr>
<td></td>
<td>Meningococcal meningitis</td>
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<tr>
<td></td>
<td>Plague</td>
<td></td>
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<tr>
<td></td>
<td>Rabies</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Typhoid / Paratyphoid</td>
<td></td>
</tr>
<tr>
<td>Diseases for routine notification</td>
<td>Acute Rheumatic Fever</td>
<td>Complete GW 17/5 within 7 days.</td>
</tr>
<tr>
<td></td>
<td>Malaria</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tuberculosis</td>
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<tr>
<td></td>
<td>Viral Hepatitis</td>
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<tr>
<td></td>
<td>Whooping Cough</td>
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<tr>
<td></td>
<td>Brucellosis</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Haemophilus influenza B</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Leprosy</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Trachoma, Cong Syphilis</td>
<td></td>
</tr>
</tbody>
</table>
XI. Acknowledgements

I would like to acknowledge Dr Stephen Oliver and Sister Vida Morris for their critique of the handbook and helpful suggestions. Thanks too to members of the Infection Prevention and Control Advisory Committee at Groote Schuur Hospital.