NATIONAL INFECTION PREVENTION AND CONTROL GUIDELINES FOR PRIMARY CARE 2022

FOREWORD

The National Infection Prevention and Control Committee (NIPC) was appointed by the Singapore Ministry of Health in 2014 and charged with a number of tasks including consolidation of national guidelines to guide healthcare facilities in developing policies to meet national standards.

It is with pleasure that we present this first edition of 'National Infection Prevention and Control Guidelines for Primary Care'. The intent of this document is to provide evidence-based guidance for the prevention of healthcare-associated infections in all primary care settings (excluding dental clinics) i.e. polyclinics and general practitioner (GP) clinics. This set of guidelines was designed for use by those responsible for infection prevention in the primary care settings e.g. infection prevention and control (IPC) professional, clinic manager, nurse.

The recommendations in this guideline were developed by reviewing best available evidence and consulting with experts in the field and key stakeholders. To those people I pass my sincerest gratitude for their commitment to IPC in primary care. One of the key recommendations in this guideline is the practice of Standard Precautions for all patients including patients with known multi-drug resistant organisms (MDROs). This is because efforts at transmission control need to be a part of practice and not targeted toward any individual or organism. Furthermore, there is no routine active surveillance in outpatient settings (nor is it feasible).

We hope you find this helpful and welcome any feedback that will help improve the guideline moving forward. For any comments or feedback, please reach out to NIPC_Sec@moh.gov.sg.

Yours sincerely,
Prof Dale Fisher
Chairperson
National Infection Prevention and Control Committee (NIPC)

ACKNOWLEDGEMENT

The National Infection and Prevention Guidelines for Primary Care has been endorsed by the National Infection Prevention and Control Committee (NIPC). The composition of the NIPC is provided in Table 0.1.

Table 0.1: Composition of NIPC

S/N	Name	Role	Designation
1	Prof Dale Fisher (Chairperson)	Chairperson	Senior Consultant, Division of Infectious Diseases, University Medicine Cluster, NUH
2	Adj A/Prof Brenda Ang	Members	Clinical Director, Department of Infection Prevention and Control, TTSH & NCID
3	A/Prof Ling Moi Lin	Members	Director, Infection Prevention and Epidemiology, SGH
4	Adj Asst Prof Kalisvar Marimuthu	Members	Senior Consultant, Department of Infectious Diseases, TTSH & NCID
5	Adj Asst Prof Surinder Pada	Members	Director and Senior Consultant, Infectious Diseases, NTFGH
6	Dr Louisa Sun	Members	Consultant, Infectious Diseases, AH
7	Dr Tan Si Huei	Members	Consultant, Laboratory Medicine, CGH
8	A/Prof Thoon Koh Cheng	Members	Head and Senior consultant, Infectious Disease Service and Infection Control Committee Chair, KKH
9	Ms Sharon Wong	Members	Senior Nurse Clinician, Infection Prevention and Control, SKH
MOH Representatives and NIPC Secretariat			
10	Dr Kok Mun Foong	MOH Representative	Director, Patient Safety and Quality Improvement Branch, Clinical Quality, Performance and Value Division, MOH
11	Dr Adelina Young	MOH Representative	Deputy Director, Patient Safety and Quality Improvement Branch, Clinical Quality, Performance and Value Division, MOH
12	Ms Luisa Tan	Secretariat	Assistant Director, Patient Safety and Quality Improvement Branch, Clinical Quality, Performance and Value Division, MOH
1	Ms Ong Xin Yi	Secretariat	Senior Manager, Patient Safety and Quality Improvement Branch, Clinical Quality, Performance and Value Division, MOH

The MOH would like to acknowledge A/Prof Ling Moi Lin (Director, Infection Prevention and Epidemiology, Singapore General Hospital) for leading the group of experts in the writing of the guidelines. The members of the expert workgroup who contributed in their individual capacity to the drafting of the National Infection Prevention and Control Guidelines for Primary Care are listed in Table 0.2.

Table 0.2: Composition of the Expert Workgroup (in alphabetical order)

Name	Designation
Dr Christopher Chong Wen Siew	Chairperson, National Healthcare Group Polyclinics Infection Control Committee, National Healthcare Group Polyclinics
Ms Chew Geok Lan	Senior Nurse Manager, Nursing Services, National Healthcare Group Polyclinics
Dr Kwek Thiam Soo	Family Physician, Bukit Batok Medical Clinic
Ms Giselle Li	Infection Control Nurse, Nursing Administration, National University Polyclinics
Ms Nisha Menon	Senior Staff Nurse, Nursing Services, National Healthcare Group Polyclinics
Dr Ng Chung Wai Mark	Chairperson, SingHealth Polyclinics Infection Prevention and Infectious Diseases Workgroup, SingHealth Polyclinics
Ms Norizah Binte Ab Samad	Nurse Clinician, Nursing Department, SingHealth Polyclinics
Dr Shipra Lather	Senior Resident Physician and Vice-Chairperson, Infection Control Committee, National University Polyclinics
Dr Wee Wei Chieh Nelson	Deputy Head, Primary Care, Healthway Medical Group
Ms Yan Chau Chain	Assistant Director of Nursing, Nursing Administration, National University Polyclinics

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ABBREVIATIONS AND GLOSSARY

ABHR	Alcohol Based Hand Rub
APIC	Association for Professionals in Infection Control and Epidemiology
CDC	Centers for Disease Control and Prevention
CP-CRE	Carbapenemase Producing Carbapenem Resistant *Enterobacteriaceae*
DORSCON	Disease Outbreak Response, System Condition
FTE	Full-time Equivalent
HAI	Healthcare-associated infection
HCW	Healthcare Workers
HBV	Hepatitis B Virus
HCV	Hepatitis C Virus
HEPA	High Efficiency Particulate Air
HIV	Human Immunodeficiency Virus
HVAC	Heating, Ventilation and Air Conditioning
ICRA	Infection Control Risk Assessment
IPC	Infection Prevention and Control
KDIGO	Kidney Disease Improving Global Outcomes
MDRO	Multi-Drug Resistant Organism
MMR	Measles, Mumps, Rubella
MOH	Ministry of Health, Singapore
MRSA	Methicillin-resistant *Staphylococcus aureus*
NIPC	National Infection Prevention and Control Committee
NSI	Needle-Stick Injury
PEP	Post Exposure Prophylaxis
PPE	Personal Protective Equipment
QUATs	Quaternary Ammonium Compounds
TB	Tuberculosis
VRE	Vancomycin-resistant *Enterococcus*

CHAPTER 1 GOVERNANCE & MANAGEMENT

1.1 Introduction

Infection Prevention and Control (IPC) requires constant and regular review and attention. Practices are to identify and designate an IPC lead in each group practice / facility. The IPC lead should ideally be a doctor or a registered nurse with experience and knowledge in infection prevention and control. The IPC lead should report to the clinic / organisation's management to establish practice compliance. The IPC lead should be familiar with the physical environment and in the clinic and ideally should undergo IPC training so as to understand the basic aspects of IPC practices. The IPC lead is responsible for planning and executing implementation of the IPC program for the facility. The 4 key areas the IPC lead is responsible for include:

- Oversight of IPC practices and submission of annual IPC report to management
- Implementation and review of IPC policies
- Education of staff
- Audit, surveillance and reporting of IPC lapses/issues

1.2 IPC Policy

IPC policies should be created for the purpose of staff education and for reference in specific patient scenarios. Each clinic / primary care organisation should regularly review their IPC policies and update their staff at least once every 2-4 years. The IPC policy document should clearly state the review date and the document may be required during clinic licensing inspection. Ad-hoc reviews may also be conducted as and when required and the IPC policy may be updated accordingly.

Larger organisations / group practices should have a common master IPC policy (based on this guideline) for all their clinics. However, the IPC lead for each clinic is responsible for ensuring the implementation of the policy, customised to the clinic's environment.

1.3 Audit

Regular audits are required to ensure compliance to the IPC policy. The IPC lead should plan and schedule the audits annually in advance and review progress throughout the year. The audit can be conducted by the IPC lead or delegated to someone who is trained.

The audit should clearly document the date, name of auditor and details of the audit results. Audit records should be easily accessible by the management of the group practice / facility.

1.4 IPC Annual Report

The annual IPC report should contain the IPC plan for the year, performance reports as well as annual audit findings, highlight on IPC lapses / issues and address the various aspects detailed on the following chapters. This annual report should be prepared by the IPC lead and submitted to the clinic / organisation's management, wherever possible.

1.5 Recommendations

1. Primary care centres should ensure that strategic annual goals are set to enhance the IPC programme and budget is allocated for relevant resources needed to fulfil these goals.
2. The IPC program should be managed by the IPC lead(s) in consultation with relevant stakeholders and supported by the clinic / organisation's management.

1.6 References

PHMC Act Part 1A, Quality assurance activities *12B. The licensee of healthcare institution which is not a healthcare institution prescribed under Regulation 12A should, whenever required by the Director – Participate in such quality assurance activities as may be specified by the Director; and Furnish to the Director such information as the Director may require in relation to the quality assurance activities of the healthcare institution*.

CHAPTER 2 HUMAN RESOURCE

2.1 IPC Training

It is essential that all staff have the knowledge, skills and training required to consistently implement effective IPC practices, as appropriate. The training program should cover the following:

- Hand hygiene;
- Concepts of Standard and Transmission-based Precautions;
- Appropriate use of personal protective equipment (PPE);
- Safe management of sharps;
- Staff immunisation;
- Environment hygiene;
- Disinfection and sterilisation;
- How and when to report IPC-related incidents, injuries and issues of concern.

Patients and families should also receive messaging on basic hygiene, transmission precautions and hand hygiene during routine care. This can be in the form of online materials, posters or brochures describing expectations from patients and care givers. If possible, patient and family messaging should be incorporated in the staff orientation programme.

2.2 Staff Vaccination

Healthcare personnel (HCP) work in an environment where they are routinely at risk of being in contact with infected patients or infective materials. This includes risk of exposure to vaccine–preventable diseases and possible transmission of infectious agents to patients, their families and other HCPs. This risk can be significantly reduced with a combination of good infection prevention practices and vaccinations.

HCPs include (but are not limited to) doctors, nurses, dental personnel, medical, registration staff/clinic assistants, nursing and dental students, laboratory technicians, pharmacists, physiotherapists, occupational and speech therapists, medical social workers, radiographers and hospital volunteers, environmental services staff, catering staff, ambulance staff, patient-facing counter staff, whether employed directly or through contract. The benefits of vaccination in healthcare settings, have shown in different studies where high vaccination coverage among HCPs reduces the risk of outbreaks and disease transmission.

It is recommended that the following immunity be provided for all healthcare workers:

a) Tetanus, Diphtheria and Pertussis;
b) Hepatitis B;
c) Varicella;
d) Influenza;
e) Measles, Mumps and Rubella.

Clinics / Organisations should refer to the relevant prevailing MOH circulars for recommendations on immunisation of healthcare workers. To further tighten and augment the requirements for measles and diphtheria immunity among HCPs, this requirement will be mandated under the Licensing Terms and Conditions (LTCs) in the Private Hospital and Medical Clinics Act (PHMCA) and the Healthcare Services Act (HCSA).

2.3 Recommendations

1. IPC staff training programme should meet the IPC programme priorities of the primary care centre.
2. There should be an IPC orientation programme provided to all new staff, service providers and volunteers.
3. IPC education should be regularly evaluated for effectiveness and relevance, and education programme revised accordingly.
4. The clinic should communicate relevant information about minimising infection risks to patients and caregivers.
5. Resources are in place to protect HCPs from infectious diseases (e.g. PPE, hand hygiene, immunisation programme, and injection safety initiatives).

CHAPTER 3 INFECTION PREVENTION AND CONTROL PRECAUTIONS

3.1 Principles of Infection Prevention and Control

Healthcare associated infections (HAIs) can occur in any healthcare setting. While the specific risks may differ, the basic principles of IPC apply regardless of the setting. Microorganisms exist naturally everywhere in the environment and not all can cause infection. They can be involved in either colonisation or infection, dependent on the susceptibility of the host:

- Colonisation - where there is a sustained presence of replicating infectious agents on or in the body without the production of an immune response or disease.
- Infection - where invasion of infectious agents into the body results in an immune response with or without symptomatic disease.

3.2 Standard Precautions

Standard Precautions are practices to reduce HAIs, and are applied in all settings and patients, regardless of diagnosis or isolation status. Standard Precautions apply when there is exposure to blood, body fluids, secretions and excretions except sweat, regardless of whether they contain visible blood, non-intact skin and mucous membranes. The required elements include adequate hand hygiene, disinfection of surfaces and equipment between patient use, appropriate use of PPE, safe injection practices, and respiratory hygiene and cough etiquette.

3.3 Personal Protective Equipment (PPE)

Personal Protective equipment (PPE) use involves specialised clothing or equipment worn by facility staff for protection against infectious materials. The selection of PPE is based on the nature of the patient interaction and potential for exposure to blood, body fluids or infectious agents. A review of available PPE should be performed periodically (e.g. annually) due to new product developments and improvements.

3.4 Safe Injection Practices and Handling of Sharp Injuries and Body Fluid Splashes

3.4.1 *Safe Injection Practices*

Injection safety, or safe injection practices, refers to measures taken by healthcare professionals to perform injection safely, and this includes the following:

a) Used needles and syringes must be disposed as one single unit into the sharps bin immediately after they have been used;
b) Used needle must not be removed from the syringe, bent or broken by hand manipulation or removal device/port to prevent accidental needle sticks which may cause serious infections;
c) Used needles and syringes should not be left protruding out from the sharps bin; the sharps bin should not be more than ¾ full;
d) Sharps bins should be located in a safe and secure position such that they cannot be easily tipped over. Sharps bins should not be stored on the floor or above shoulder level;
e) There should not be any form of crossing over of hands/persons when disposing used needles and syringes into the sharps bin;
f) When the sharps bin is not in use, the temporary closure mechanism must be used;
g) If recapping of needles is necessary or required as part of the preparation workflow, the needle should be recapped with the aid of a pair of forceps or a cap-holding device or a "one-handed scoop" technique should be used to scoop the cap.

Healthcare professionals should adhere to the basic principles of aseptic technique in the preparation and administration of medications, and this includes the following:

a) Perform hand hygiene before handling medications or syringes;
b) Disinfect rubber septum of medication vials with alcohol before piercing;
c) Use each sterile needle and syringe once for one patient only;
d) Use single dose vials and/or dedication of each multi-dose vial to a single patient whenever feasible;
e) Discard used needles and sharps into the sharps disposal container immediately after use.

3.4.2 *Handling of sharps injuries*

"Sharps" include needles, as well as items such as scalpels, lancets, razor blades, scissors, metal wires, retractors, clamps, pins, staples, cutters, and glass items.

Sharps injuries are wounds caused by sharps that accidentally puncture the skin. When not disposed of properly, sharps can hide in linen or garbage and injure other workers who may encounter them unexpectedly. These injuries could transmit blood borne diseases, which include the Human Immunodeficiency Virus (HIV) that could lead to AIDS (Acquired Immune Deficiency Syndrome), Hepatitis B, and Hepatitis C.

After sustaining an injury from a needle contaminated with Hep B, Hep C viruses or HIV, the chance that an exposed person will be infected is 30% for Hep B, ~ 3% for Hep C and 0.3% for HIV per exposure.

Clean sharps are defined as no exposure or contact of the sharp with any blood, body fluids or contaminated / external surface. Contaminated sharps are defined as any medical items or devices that can penetrate the skin including, but not limited to needles, scalpels, broken glass, instruments used in procedures (e.g. blood sampling, surgery and dentistry) which are contaminated with blood, tissues and body fluids.

Effective infection prevention measures based on the principles of Standard Precautions should always be practiced to minimise the risk of transmission of blood borne infections. Healthcare workers should observe appropriate measures to handle needles and other sharps in a way that will prevent injury to the user and to others who may encounter the devices after they have been discarded. It is equally important that there is an established procedure to encourage the reporting to IPC and/or leadership and timely follow-up of all sharp injuries and/or splash incidents so as to encourage quality improvement initiatives and prevent any future recurrence.

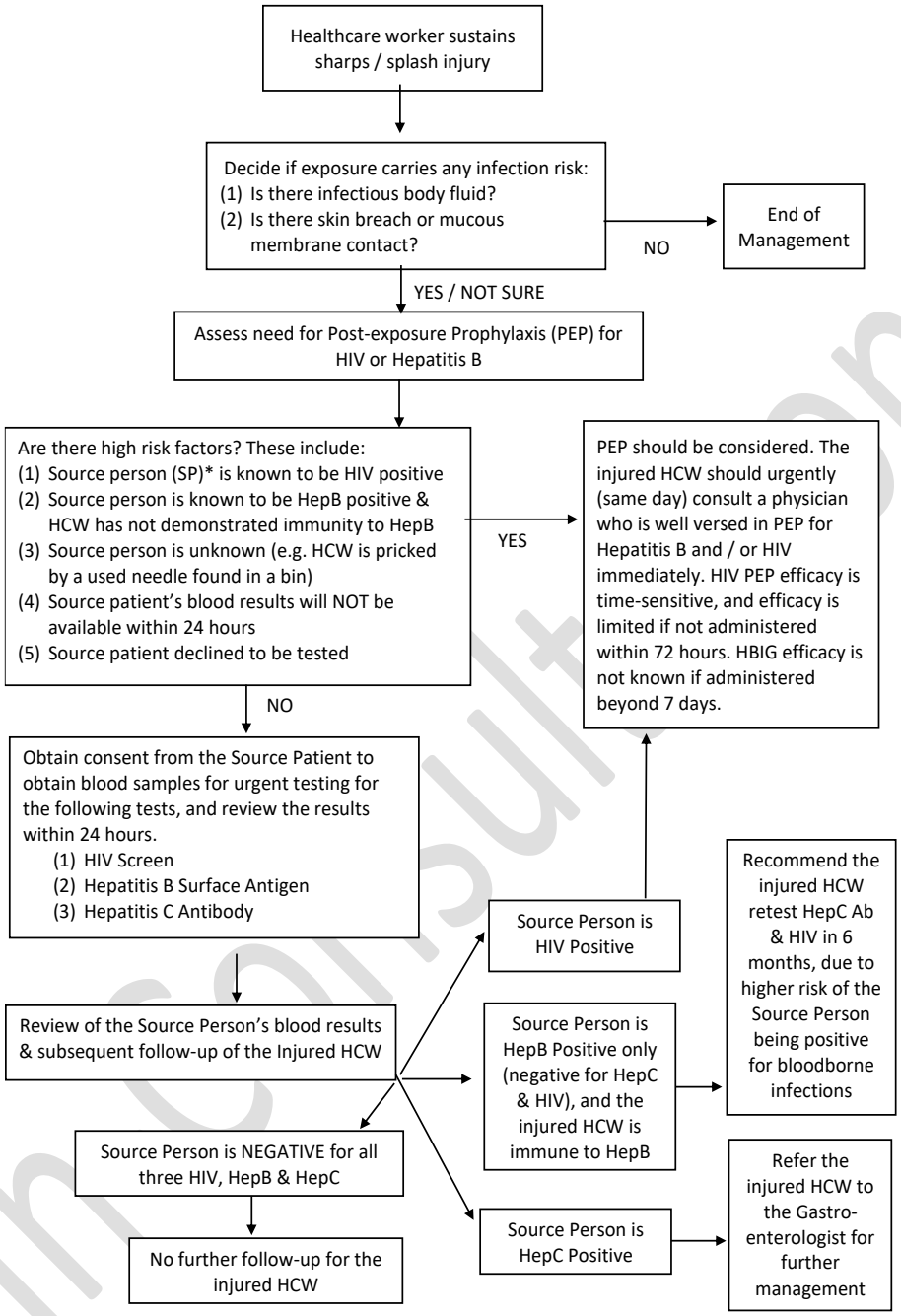
3.4.3 *Management of body fluids and body fluids splashes*

Blood borne infections such as HIV/HBV/HCV can be occupationally transmitted in the healthcare setting through percutaneous inoculation with a contaminated needle or sharps (i.e. needle stick or sharps injury) or contact of non-intact skin or mucous membranes with blood or body fluids (i.e. splash injury). Body fluids such as faeces, nasal secretions, saliva, sweat, tears, urine and vomitus are not considered potentially infectious for HIV/HBV/HCV unless they are visibly bloody.

If oral mucosa or eyes are exposed to any body fluids, they should be rinsed immediately with copious amounts of water or irrigating saline accordingly.

Refer to Figure 3.1 below for the Algorithm for Management of Sharps injuries and Splash incidents.

Figure 3.1: Algorithm for Management of Sharps injuries and Splash incidents



3.5 Wound Management

A wound is an injury to the skin or surrounding structures, and it usually involves a break in the integrity of the skin.

3.5.1 *Aseptic non-touch technique for wound care*

Wound care procedures are highly variable. Generally, an aseptic field is employed, and basic infection control guidelines should include the following:

a) Good hand hygiene practice before and after procedures to prevent potential cross infection;
b) Use of appropriate PPE according to risk assessment;
c) Use of sterile gloves if the wound requires direct contact with gloved hands;
d) Appropriate wound dressing using non-touch technique to protect wound from infection;
e) Clean trolley surfaces before and after use; and
f) Proper containment and disposal of equipment and waste according to policy. If fan is in use in the room, it should be switched off during the procedure.

3.6 Linen Management

For linen management, refer to Chapter 7 on '*Environment and Facilities Management'*.

3.7 Waste Management

For waste management, please refer to Chapter 7 on '*Environment and Facilities Management'*.

3.8 Spillage of Blood and Body Fluids

Spills of blood and other body fluids represent an infection risk and should be removed as soon as possible.

All staff dealing with spillages of blood or body fluids should be specifically trained and assessed to be competent regularly.

3.8.1 Precautions to be Taken for Blood Spills

A spill kit should be readily available in each clinical area and should include the following items:

- Gloves;
- Protective apron;
- Surgical mask and eye protection;
- Absorbent materials/agent;
- Clinical waste bags and ties;
- Appropriate disinfectant e.g. NADCC powder and cleaning instruments.

All items should be disposable and discarded after use to ensure that cross contamination does not occur.

Healthcare workers handling blood spillage should observe the following key points that include:

- Placing a warning sign "*cleaning in progress*" beside the contaminated area;
- Keeping other persons away from the contamination until it is effectively and appropriately dealt with;
- Preparing required requisites such as personal protective equipment (PPE) as appropriate to the task, and spillage kit;
- Assessing if there is potential of a splash to the conjunctiva or mucous membranes and use face protection such as a mask, visor or goggles as needed;
- Confining and containing spill, cleaning visible matter with disposable absorbent material and discard the used cleaning materials in appropriate waste container;
- Glass fragments should be picked up using a scoop and placed in a sharps bin. Eye protection should be worn when dealing with glass fragments.

Strategies for decontaminating spills of blood and other body fluids (e.g. vomit, urine) could differ based on the setting in which they occur and the volume of the spill. In patient care areas, healthcare workers should manage spills by cleaning with detergent solution. For spills containing large amounts of blood or other body substances, healthcare workers should contain and confine the spill by removing visible organic matter with absorbent material or soak up excess liquid using an absorbent clumping agent (e.g. absorbent granules). Alcohol should not be used to clean spillages.

3.9 Isolation of Infectious Patients in General Practice

3.9.1 Transmission-based Precautions

In addition to standard precautions, transmission-based precautions are applicable in the care of patients that are documented or suspected to be infected with epidemiologically important pathogens with specific modes of transmission. Based on the modes of transmission, there are three sets of precautions in transmission-based precautions:

1) Airborne Precautions;
2) Droplet Precautions;
3) Contact Precautions;

3.9.2 Airborne Precautions

In addition to Standard Precautions, Airborne Precautions are used for any patients known or suspected to be infected with micro-organisms transmitted by tiny airborne nuclei (≤5μm in size) where the infectious agent can be suspended in the air for long periods of time.

3.9.2.1 *Placement of Patient*

Any patient with fever or respiratory symptoms should be instructed to wear a surgical mask. In addition, patients who are suspected to or confirmed to have airborne infections (e.g. chickenpox, measles etc.), or novel respiratory infections (e.g. avian influenza and possibly severe acute respiratory syndrome (SARS) associated coronaviruses), should be issued a surgical mask and placed in a naturally ventilated area or segregation room which has open windows, or in a room from which the air does not circulate to other areas.

If there are several patients requiring segregation, cohorting of patients who are suspected to have the same implicating pathogen may be required.

3.9.2.2 *Respiratory Protection*

a) It is advisable to wear respiratory protection i.e. high filtration particulate mask (e.g. fit tested N95) when attending to these patients.
b) Appropriate PPE should be used when performing aerosol-generating procedures (AGP) associated with risk of pathogen transmission (e.g. nebulised medication via face mask etc).
c) Perform N95 mask or respirator fit seal check each time a N95 mask is donned to check leakage around the face piece. Avoid touching the mask once applied. Change the respirator if wet or soiled. Remove N95 mask or respirator after exiting the room. Discard the respirator into the appropriate waste bin and perform hand hygiene immediately.

3.9.3 Droplet Precautions

Droplet Precautions are observed for any patients known or suspected to be infected with micro-organisms transmitted by large particle droplets (>5μm in size) through close respiratory or mucous membrane contact. These large droplets can be generated by patients during coughing, sneezing, talking or during certain procedures (e.g. suctioning).

Transmission of droplet transmissible infections requires close contact between source and susceptible host as droplets get propagated during cough or sneezing to short distances

(1 metre) through the air. Patient should be provided with a surgical mask if they display respiratory symptoms e.g. coughing, runny nose.

In the ideal situation, a spatial separation of at least 1 metre would help to reduce the risk of droplet spread between the infected patient and other patients and visitors. If not able to maintain at least >1 metre, other patients or visitors should be offered surgical masks to reduce the risk of patient-to-patient transmission.

Use of a surgical mask by patient is recommended and staff should wear a surgical mask when working within 1 meter of the patient.

3.10 Recommendations

1. Standard precautions should be applied for all patients.
2. Apply transmission-based precautions to patients suspected or confirmed to be infected with agents transmitted by the contact, droplet or airborne routes.
3. The aim of instituting early transmission-based precautions is to reduce further transmission opportunities that may arise due to the specific route of transmission of a particular pathogen.
4. All staff should be trained in the practice of standard precaution and transmission-based precautions.

3.11 References

CDC 2007 Guideline for Isolation Precautions: https://www.cdc.gov/infectioncontrol/guidelines/isolation/index.html

CDC's tools for personal protective equipment: https://www.cdc.gov/hai/prevent/ppe.html

Guidelines for the Management of Occupational Exposures to HBV, HCV, and HIV and Recommendations for Postexposure Prophylaxis https://www.cdc.gov/mmwr/PDF/rr/rr5011.pdf

Susan, M. S. (2010). The Joint Commission Infection Control Prevention and Control Handbook for Hospitals. USA: Joint Commission Resources.

McLay, C. (2014). Laundry, patient linens, textiles, and uniforms. In Carrico, R. (ed.). APIC Text of Infection Control and Epidemiology, 3rd ed. Washington, DC

Environmental Cleaning Guidelines for Healthcare Settings 2013, MOH, Singapore

Epidemiology Department, Ministry of Health Singapore. Infection Control Manual

Guidelines for the disposal of pharmaceutical waste (Guide–Pharm–W 1004)

Guidelines for the Disposal of Biohazard Waste. Singapore (MOE 1998)

Control and Management of Toxic Industrial Waste. Singapore (National Environment Agency Singapore, 2002)

Guidelines for Preventing Transmission of Blood-borne Infections in a Health Care Setting, 2000 MOH, Singapore.

Guidelines for environmental infection control in health-care facilities: recommendations of CDC and the Healthcare Infection Control Practices Advisory Committee (HICPAC2003)

Centres for Disease Control and Prevention (2013). Blood/Body Fluid Exposure Option, January 2013. Available at: http://www.cdc.gov/nhsn/PDFs/HPS-manual/exposure/3-HPS-Exposure-options.pdf

Occupational Safety and Health Administration (2012). Occupational health and safety standards: Blood borne pathogens. Available at: https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10051

Soule, B.M, Memish, Z.A. & Malani, P.N (2012). Best practices in infection prevention and control: international perspectives (2nd Ed.). Joint Commission International, USA.

Slavish, S.M (2010). Medical Waste Management: departments that provide support services. In The Joint Commission (2010). Infection prevention and control handbook for hospitals. Oakbrook Terrace: Illinois.

West Virginia Department of Health and Human Resources (2013). What is infectious waste? Available at: http://www.wvdhhr.org/wvimw/definition.asp

Wideman, J.M (2013). Basic Principles. In Association for Professionals in Infection Control and Epidemiology (2013). Chapter 102- Waste Management. Available at http:// text.apic.org/item-108/chapter-102-waste-management/basic-principles

Wideman, J.M. (2013). Waste Management Plan. In Association for Professionals in Infection Control and Epidemiology (2013). Chapter 102- Waste Management. Available at http:// text.apic.org/item-108/chapter-102-waste-management/waste-management-plan/

World Health Organisation (2011). Definition and characterization of healthcare waste (Nov 2011). Available at: http://www.who.int/topics/medical_waste/en/index.html

National Environment Agency (1998). Classification of biohazard waste. Available at http://www.nea.gov.sg/cms/pcd/biowastes.pdf

Pate, W.J. (2014). Waste Management. APIC Text of Infection Control and Epidemiology.

Sehulster, L., Chinn, R.Y.W. and the Healthcare Infection Control Practice, Advisory Committee (HICPAC) (2003) Guidelines for Environmental Infection Control in Health-Care Facilities. http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5210a1.htm

Guidelines for Preventing Transmission of Bloodborne Infections In a Health Care Setting, Ministry of Health Singapore, 2000.

Updated U.S. Public Health Service Guidelines for the Management of Occupational Exposures to HBV, HCV, and HIV and Recommendations for Postexposure Prophylaxis in MMWR Recommendations and Reports June 29, 2001 / 50(RR11); 1-42

http://www.cdc.gov/MMWR/preview/MMWRhtml/rr5011a1.htm

Occupational Safety and Health Administration (2012). Bloodborne Pathogens 1910 – 1030. https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_id=10051&p_table=STANDARDS

Jane D. Siegel, MD; Emily Rhinehart, et al; the Healthcare Infection Control Practices Advisory Committee: CDC's Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings 2007

Infection Control Manual, MOH Year 2002

Wilsten, T. (2014). Standard Precautions: APIC TEXT of Infection Control and Epidemiology, USA.

Berends, C. & Walesa, B. (2014). Transmission Based Precautions: APIC TEXT of Infection Control and Epidemiology, USA.

Needlestick and Sharps Injuries. https://www.ccohs.ca/oshanswers/diseases/needlestick_injuries.html

Sharps Safety for Healthcare Settings. https://www.cdc.gov/sharpssafety/index.html

CHAPTER 4 CARE OF DEVICES

4.1 Introduction

Increasingly, minor procedures such as urethral catheterisation and nasogastric tube insertion are performed in outpatient settings. With the increase in demand of these procedures, there will be corresponding increased risk of healthcare-associated infections (HAI). HAIs may occur in patients in a healthcare facility while receiving medical care. These infections are often preventable through adherence to the principles of asepsis and clean technique.

4.1.1 Aseptic Technique

Asepsis is the state of being free from pathogenic (harmful) microorganisms. The goal of asepsis is to prevent contamination, which can be ensured using sterile devices, materials, and instruments and by creating an environment that is low in microbe volume.

Aseptic technique is vital in reducing the morbidity and mortality associated with procedural infections.

Aseptic technique refers to adoption of strictest rules to minimise the risk of introducing infection during clinical procedures. The aim is to prevent pathogenic microorganisms from being introduced to patients via contact with hands, surfaces or equipment.

4.1.2 Clean Technique

Clean technique is a non-touch technique. It aims to reduce the risk of contamination by pathogenic organisms. Clean technique involves meticulous hand hygiene, maintaining a clean environment by preparing a clean field and using clean gloves.

All staff should understand the above principles and achieve the optimal level of technical and aseptic practice when caring for their patients. Staff performing invasive procedures or managing wounds should receive appropriate training.

4.2 Basic Principles

Hand hygiene is the single most important step for prevention of cross infection. Transient bacteria can be removed by effective hand hygiene techniques. HCPs must wash their hands before and after touching each patient, every time. Protective devices such as

gloves should be worn for all contact with mucous membranes and invasive devices e.g. urinary catheters.

4.3 Wound Care

A surgical dressing change in the dressing room requires hand washing compliance with the 5 moments of hand hygiene, use of gloves, gown/apron, creation of a sterile field, opening and introducing packages and fluids in such a way to avoid contamination and ensuring avoidance of contact with non-sterile items.

In addition to hand hygiene, maintaining a clean clinical environment is important to help to reduce wound contamination or cross infection. Personnel should clean the dressing trolley with alcohol surface wipe or hospital grade disinfectant wipes in between each patient use and if debris is evident, cleaning from top to bottom and allowing it to dry thoroughly.

4.4 Urinary Catheter – Long-term urinary catheters

Replacement of indwelling catheters is common in outpatient settings. Urinary tract infections (UTIs) have been found to be the most common type of HAI among long term care facilities (LTCF) residents or homes. Hence, insertion of indwelling urinary catheters should be only carried out by qualified competent healthcare professionals using aseptic technique to minimise trauma and infection risk.

Catheter-associated urinary tract infections (CAUTIs) are caused by microbes being introduced into the urinary tract via several routes, such as:

- From urine becoming contaminated within drainage system e.g. from the drainage bag;
- Back–tracking up the system;
- Intraluminal ascent in the urinary catheter after contamination of the urinary catheter and/ or bag (such as via breaks in aseptic practice during the opening of urinary drainage bag taps, or disconnection of catheters from urinary bags);
- Extra-luminal route of ascent, along the external surface of the urinary catheter and the urethra.

The risk of developing bacteriuria correlates with duration of catheterisation. Long term catheterisation is defined as > 28 days. A Foley catheter should be changed at a frequency according to the manufacturer's recommendation.

Hence, primary healthcare providers and care personnel must be trained in catheter insertion and should educate patients and family members/caregivers on self-care of urinary

catheter to minimise the risk of cross infection. Education should include importance of hand hygiene, perineal cleansing and the positioning and care of the drainage bag.

The urine bag should be changed according to manufacturer's recommendation. Practise hand hygiene before and after, and ensure gloves are worn. Be mindful not to contaminate the tip of the bag and catheter port when reconnecting. Date of Change is to be written on the new urine bag in permanent ink. Old urine bag is to be emptied and discarded appropriately. Patient should be advised to keep the urethral meatus clean and free from debris and cleaning with soap and water once or twice a day is recommended during showering or bathing.

4.5 Nasogastric (NG) Tube

An NG tube is a long thin polyurethane, silicone tube. Insertion or change of NG tube should be carried out by a trained staff. The tube should be changed according to manufacturer 's instructions.

4.6 Point of Care Testing Devices

Increasing utilisation of health monitoring devices by patients is becoming an important aspect of self-care and preventive medicine. Minimise the risk of transmitting blood-borne pathogens by cleaning the devices with hospital-grade disinfectant wipes or 70% alcohol wipes. Commonly seen devices used by patients at primary care settings are as follows:

a) Glucometer – blood glucose monitoring device should be cleaned and disinfected with 70% Isopropyl alcohol wipes after use on each patient. A new auto single-use, auto disabling lancing device should be used for each patient and disposed of immediately in the sharp box. The glucometer and its case should always be maintained in a visibly clean manner. It should be stored in a designated clean area;

b) Portable HbA1c machine - cleaning and disinfection should adhere to manufacturer's recommendation.

4.7 Devices Used for Administration of Medications

4.7.1 *Intravenous therapy*

One of the major risks for intravenous therapy is phlebitis, hence strict adherence to aseptic technique should be carried out. Cannulation site should be cleansed with 70% alcohol

wipes. A single-use sterile IV cannula should be used, and once inserted, a sterile transparent semi-permeable membrane dressing should be used to cover the device insertion site.

4.7.2 *Nebulisers and spacer devices*

As a first option, a spacer device should be considered as it does not generate aerosols, and it is as effective as a nebuliser.

Nebuliser is a drug delivery device used to administer medication in the form of a mist inhaled into nebulising mask and tubing. The nebuliser mask set if used, should be discarded after each different patient use. If medication needs to be diluted with saline or water prior to administration, only sterile water or saline should be used. Nebuliser filters are one of the most essential accessories for the nebuliser machine. It filters and cleans the air that passes through the machine, eliminating unwanted particles from the air. Failure to change the filter can result in serious damage to the machine and the nebuliser treatment will become inefficient.

Filters should be changed according to the manufacturer's recommendation and providers should follow the manufacturer's instructions for cleaning of equipment.

4.8 Peak Flow Meters

A disposable mouthpiece should be used for each patient. Follow the manufacturer's instruction to clean the peak flow meter after each patient use. Wash the whole instrument in warm water and mild detergent / disinfectant weekly. Immerse in 1:50 dilution household bleach or sodium hypochlorite for 20 minutes. Rinse in tap water.

4.9 Monitoring Devices

Patient monitoring devices may include pulse oximeter probe and blood pressure cuff etc. Devices should be disinfected with 70% alcohol wipes or an hospital-grade disinfectant wipes in between each patient use.

4.10 Ultrasound Probes

Ultrasound probes, machines and conductive gel can be vehicles for transmission between patients. Ultrasound probes used in outpatients under the Spaulding classification would be non-critical devices, as it only interfaces with intact skin. These devices should be cleaned using low-level disinfection techniques such as hospital-grade disinfectant wipes. The use of alcohol–based disinfectant including 70% alcohol wipes (rubbing alcohol) is not recommended for the disinfection of transducers due to the potential of drying out and

destroying the rubber head transducers. All the gel and residues from previous scans should be removed from the transducer.

4.11 Tympanic Thermoscan

Single disposable probes should be used for each patient. Gently wipe the surface of the probe lens window with 70% alcohol wipes before being used for a new patient. To prevent damage to the sensor, only use gentle pressure when cleaning. With the probe facing down, wipe the probe with a 70% alcohol wipe. Tympanic Thermoscan should not be used if there is blood or drainage in the patient's external ear canal or if a patient exhibits symptom of an acute or chronic inflammatory condition of the external ear canal.

4.12 Stethoscope

Several studies have demonstrated that many physician stethoscopes are contaminated with pathogenic microorganism and could serve as a mode of transmission of infection. Stethoscopes and other devices should be disinfected with 70% alcohol wipes in between each patient use

4.13 Recommendations

1. All devices should be cleaned and disinfected in between each patient use unless they are disposable items.

4.14 References

Ministry of Health. (2018) National Infection Prevention Control Guidelines for Long Term Care Facilities

Guidelines on Infection Control Practice in the Clinic Settings of Department of Health (9201992019), Hong Kong

NHS, Southern Health 'Aseptic and Clean Technique Procedure, Version 4, November 2018 https://www.southernhealth.nhs.uk_resources>assets>inline>fullhttps://www.southernhealth.nhs.uk_resources>assets>inline>fullhttps://www.southernhealth.nhs.uk_resources>assets>inline>full

Centers for Disease Control and Prevention Guide to Infection Prevention for Outpatient Setting: Minimum Expectations for Safe Care (2016)

NHS Barnsley CCG Infection Prevention and Control Policy (2015)

Lawerence MW, Blanks J Ayala R,et al. Hospital wide survey of bacterial contamination of point-care ultrasound probe and coupling gel. J Ultrasound Med, 2014. 204;33(3):457. (Pub Med)

Hamid et al, Emergency department ultrasound probe infection control: challenges and solutions, Jan 2015(Open Access Emergency Medicine)

HA Bukharie. Bacterial Contamination of Stethoscopes, Journal of Family & Community Med, 2004. Jan-Apr;11(1) 31-33

CHAPTER 5 SURVEILLANCE AND OUTBREAK MANAGEMENT IN PRIMARY CARE

5.1 Infectious Diseases Surveillance

Surveillance is essential for the monitoring of infectious diseases (IDs) and the timely prevention and control of outbreaks. The public health surveillance system is composed of several components, including mandatory notification of individual cases, sentinel surveillance, and syndromic surveillance.

Local surveillance data is summarised into Weekly Infectious Diseases bulletins, which are accessible at the "*Weekly Infectious Diseases Bulletin*" page in Ministry of Health's website.

The bulletin informs the primary care practitioner of average daily polyclinic attendances of common infections such as upper respiratory tract infections, chickenpox, and hand, foot, mouth disease. It also provides a summary of the monthly influenza surveillance, weekly incidences of various infections from food and droplet-borne illnesses, to vector-borne infections. It is highly recommended that primary care practitioners access the MOH Weekly Infectious Diseases Bulletin and be alerted to changes in local surveillance data.

In addition, the Ministry of Health also monitors regional and global ID outbreaks (e.g. monkeypox, Nipah Virus, Ebola Virus Disease, Avian Influenza, MERS-CoV) and informs all medical practitioners periodically via MOH Circulars. MOH Circulars typically provide a brief clinical summary of the ID, the current disease situation locally or overseas, transmissibility and likelihood of importation into Singapore, and the impact on local community. Primary care practitioners may access these circulars via MOHAlert (https://mohalert.moh.gov.sg/welcome.do), which is also available on the Ministry of Health's Health Professionals Portal, as well as Primary Care Pages. Registered practitioners can receive the alerts by SMS or emails by updating contact details in the MOHAlert website.

Primary care practitioners should remain updated on local, regional and global ID situations by referring to the weekly bulletins and periodic MOH circulars.

5.1.1 *Notifiable IDs*

All medical practitioners and clinical laboratories are legally required to notify cases of IDs, as stipulated under the First Schedule of the Infectious Diseases Act (IDA) (accessible at

Singapore Statutes Online, https://sso.agc.gov.sg) (refer to section 5.1.4 for the mode of notification). The IDs listed in the Schedule have been assessed to be of public health importance in the local context. MOH reviews the list from time to time and will adjust the list as the risk assessment changes.

5.1.2 *Other Events of Public Health Significance*

Besides the IDs listed in the First Schedule of the IDA, primary care practitioners should also notify MOH of diseases/events of public health importance (refer to section 5.1.4 for the mode of notification).

Some of these diseases / events may be infrequently encountered but can present significant public health risk. For example, a suspect case of any emerging ID (e.g. Lassa Fever) or suspected bioterrorism agent (e.g. *Bacillus anthracis*) should be immediately reported to MOH through a phone call. Clusters of IDs in the community, notifiable or otherwise, should also be notified to MOH (e.g. cluster of diarrhoeal illness among school children detected at a primary care clinic).

5.1.3 *Clusters of Healthcare-Associated Infections*

Besides notifiable IDs and other events of public health significance, primary care practitioners should report clusters of healthcare-associated IDs to MOH early (see specific triggers below). Early reporting is crucial as it enables MOH to better monitor the situation and implement timely measures for the prevention and control of outbreaks.

When assessing whether to report an incident, the primary care facility should report the incident (which may involve Multidrug Resistant Organisms) to MOH as soon as possible (see below), if any of the following guiding criteria are met:

- Organism e.g. if it involves a pathogen or gene novel to the institution or country.
- Potential impact beyond the primary care facility e.g. if there is a:
    i. Common product used beyond the primary care facility. For instance, catheter-associated urinary tract infection following use of a particular brand of catheter.
    ii. Population of patient with significant healthcare contact outside the facility is affected e.g. renal dialysis.
- Media sensitivity e.g. any incident which potentially may be media sensitive.

Primary care practitioners should also report cluster (2 or more cases) of a highly infectious agent (e.g. measles) with suspected transmission to staff or patient in a vulnerable population e.g. neonates.

All IDs should be notified at the earliest opportunity, within 72 hours from time of clinical suspicion or laboratory diagnosis, except for some IDs which should be reported within 24 hours as urgent public health action is required for individual cases.

Some IDs require notification by medical practitioners based on clinical suspicion/ diagnosis. These are diseases that can often be diagnosed clinically and warrant the implementation of public health actions before laboratory confirmation. For the other IDs, doctors are to continue to request for laboratory testing where clinically indicated. The party performing the diagnostic test is best placed to notify the case to MOH in the event of a positive result. As such, laboratories will generally be responsible for doing so. Duplicate notification by doctors is no longer required for these IDs. Please refer to Table 5.1 for the list of diseases that are to be notified upon clinical suspicion and laboratory confirmation.

5.1.4 *Mode of Notification*

For urgent cases of IDs such as emerging IDs or suspected bioterrorism agents, primary care practitioners can call the surveillance duty officer of the Communicable Diseases Division (CDD), MOH directly. IDs that should be reported through immediate phone calls can be found in Table 5.1. These phone calls will be considered timely notifications and formal notifications can follow later for more complete data and documentation.

All formal notifications must be made on the "MD131 or MD532 (for Tuberculosis)" form via the online Communicable Diseases Live and Enhanced Surveillance System (CD-LENS) (www.cdlens.moh.gov.sg) or by fax. To simplify reporting, there is a single fax point for all hardcopy notifications, regardless of the type of ID with three fax numbers available (6221 5528, 6221 5538 and 6221 5567). All hardcopies will be received by MOH and routed to the relevant agencies' backend. Cases or clusters of IDs which are not currently listed in the First Schedule of the IDA that may present significant risk to human health should be notified under the category 'other significant disease' on the MD131 form.

Primary care practitioners can notify MOH of suspected clusters of IDs in the community, or healthcare acquired infections via email at ReportIDcluster@moh.gov.sg. The email should include the following information:

- name of primary care facility;
- address of primary care facility;

- point of contact number;
- number of cases as at date and time of reporting;
- sign and symptoms;
- onset date for the first case;
- onset date for the last case;
- current strength of staff;
- number of cases hospitalised, if such information is available.

Individual case details or further information will be requested separately, if necessary. In the event that any primary care practitioner wishes to report a suspected cluster for urgent action, particularly after office hours, he / she may contact the 24-hour surveillance duty officer directly. To encourage a culture of open reporting, MOH will also accept anonymous reports of ID outbreaks and incidents through the 24-hour duty hotline and conduct necessary investigations, if warranted.

5.1.5 *Recommendations*

1. Primary care practitioners should remain updated on local, regional and global ID situations by referring to the MOH Weekly Infectious Diseases bulletins and periodic MOH circulars.
2. Primary care practitioners should notify MOH of cases of IDs at the earliest given opportunity, as stipulated under the First Schedule of the Infectious Diseases Act (IDA). Notification may be done upon clinical suspicion.
3. Primary care practitioners should notify MOH of clusters of ID in the community (e.g. cluster of diarrhoeal diseases among school children) by emailing ReportIDcluster@moh.gov.sg.
4. Primary care practitioners should immediately notify MOH, by calling the 24-hour MOH surveillance duty officer of any diseases or events which can present significant public health risk (e.g. suspected bioterrorism such as anthrax)

<u>Table 5.1</u>: Broad categories of Notifiable Infectious Diseases Doctors/ Laboratories should notify [Adapted from MOH Circular No. 14/2019, 25 March 2019]

Category of IDs	IDs listed under IDA	IDs listed under IDA to be notified <u>by doctors</u> upon clinical suspicion	IDs listed under IDA to be notified <u>by laboratories</u> upon laboratory confirmation	Notification Timeline
Emerging IDs	Avian Influenza	√	√	Immediately via phone call
	[1]COVID-19		√	
	Ebola Virus Disease	√	√	
	MERS -CoV infection	√	√	
	Nipah Virus Infection	√	√	
	Plague	√	√	
	Poliomyelitis	√	√	
	Rabies	√	√	
	SARS	√	√	
	Yellow Fever	√	√	
Vector-borne IDs	Chikungunya Fever	√	√	Within 24 hours
	Dengue Fever	√	√	
	Dengue Haemorrhagic Fever	√	√	
	Japanese Encephalitis	√	√	
	Leptospirosis		√	
	Malaria	√	√	
	Murine typhus		√	
	Zika Virus Infection	√	√	
Food- borne IDs	Botulism	√	√	Within 24 hours
	Cholera		√	
	Paratyphoid		√	
	Typhoid Fever		√	
	Campylobacteriosis		√	Within 72 hours
	Hepatitis A, acute		√	
	Hepatitis E, acute		√	
	Salmonellosis (non-typhoidal)		√	
	Diphtheria	√	√	Within 24 hours

[1] For COVID-19 reporting, notification requirements may change from time to time; for the latest information, please refer to prevailing COVID-19 guidelines/circulars.

Category of IDs	IDs listed under IDA	IDs listed under IDA to be notified by doctors upon clinical suspicion	IDs listed under IDA to be notified by laboratories upon laboratory confirmation	Notification Timeline
Vaccine-preventable IDs	*Haemophilus Influenzae* Type b Disease		√	
	Measles	√	√	
	Rubella	√	√	
	Mumps	√	√	Within 72 hours
	Pertussis		√	
	Pneumococcal Disease (Invasive)		√	
	Tetanus	√		
Contact-transmissible and airborne IDs	Meningococcal Disease		√	Within 24 hours
	Legionellosis		√	Within 72 hours
	Leprosy		√	
	Melioidosis		√	
	Tuberculosis	√	√	
Bloodborne and sexually transmitted infections	Chlamydia Genital Infection		√	Within 72 hours
	Gonorrhoea		√	
	Hepatitis B, acute		√	
	Hepatitis C, acute		√	
	HIV infection		√	
	Syphilis	√	√	

5.2 Outbreak Management

An outbreak is said to occur if 2 or more cases of healthcare-associated infections are epidemiologically linked to a common source of infection OR when there is an increase in numbers above the baseline for a particular infection or infectious disease syndrome AND these are epidemiologically linked.

Unsafe injection practices can lead to outbreaks of blood borne infections. For example, “double dipping”, where a syringe that had been used to inject medication into a patient is then reused to enter a medication vial. This can lead to transmission of infections if the contents from that vial, which were contaminated through reuse of the syringe, are then used for subsequent patients. While healthcare investigation of single cases of hepatitis B Virus (HBV) or hepatitis C Virus (HCV) that are suspected to be related to healthcare delivery is an important public health response which can result in the prevention of an outbreak, it is beyond

the scope of the chapter. Primary care facilities may refer to US CDC's published toolkit, which details recommended steps for investigating single cases of HBV or HCV infections that are suspected to be related to healthcare delivery. Acute HBV and HCV notifications will also be reviewed by MOH and further investigations will be conducted should exposure due to healthcare delivery be suspected.

Airborne infections such as measles and chickenpox are infectious even before the onset of rash. Thus, a healthcare staff with these diseases can inadvertently spread the infection to patients. This chapter will discuss the broad principles of outbreak prevention and management in the primary care setting, from the perspective of airborne infections.

5.2.1 *Outbreak Preparedness (Peace-time) Activities*

The key to successful management of an outbreak is the readiness of the primary care centre. To prepare for an outbreak, the primary care centre should pre-empt, and prepare for the tasks involved in managing an outbreak, including:

- Alert and escalation;
- Contact tracing;
- Control Measures and Clinical Management of exposed persons;
- Furlough of exposed staff;
- Business continuity;
- Quality Improvement.

Preparation should be made before the outbreak occurs, i.e. during peace-time, and should include written protocols detailing standard procedures for the tasks listed, establishing parties / persons responsible for managing the outbreak, as well as training and drills to test out these protocols.

5.2.2 *Alert and Escalation*

The Primary Care Centre should establish a clear escalation procedure in the event of any outbreak or exposure to infectious diseases.

Any suspicion or confirmation of an exposure to, or an outbreak of an infectious disease, should be promptly escalated to the appropriate person-in-charge of IPC for the primary care centre, so that appropriate measures can be taken to prevent or contain the outbreak.

Apart from notifying the appropriate team internally, there may be a need to report the outbreak to the MOH as well. Depending on the severity and its capacity to disrupt of

healthcare delivery / access, security and patient safety, and/or the potential to affect public confidence in the Singapore healthcare system, an outbreak may be classified as a Category 1, 2, or 3 Reportable Incident (see Table 5.2).

The person-in-charge (e.g. the centre's Chief Operating Officer, or other designated officer) is to make an initial assessment and classify the outbreak in accordance with the criteria set out in the MOH Circular No. 29/2017, 1 November 2017, and report to the outbreak to MOH.

If the outbreak involves a notifiable infectious disease, the physician attending to the infected person should follow the notification procedure in the 'Guidelines on the Notification of Infectious Diseases in Singapore' for guidance on the reporting of infectious diseases (ID) cases, clusters and events of public health significance. A copy of this guideline is available online at the Communicable Diseases Live and Enhanced Surveillance System (CD-LENS) (www.cdlens.moh.gov.sg).

5.2.3 *Contact Tracing*

Contacts refer to persons who have had exposure to the person with an infection. Contact-tracing refers to the process of identifying persons, who have been exposed to an infectious disease, informing them of the exposure, and following them up in case they develop the infection.

Determining whether a person is a contact takes into account the following factors:

- Period of infectivity – for example COVID-19 is infectious prior to onset of any symptoms, so persons who came into contact with the person with COVID-19 2 days prior to onset of symptoms may be considered as contacts. In the case of measles, it is infectious 4 days prior to onset of the rash up to 4 days after onset of rash, so persons who came into contact with the person with measles as early as 4 days prior to onset of rash may be considered as contacts.
- Exposure – for example, a face-to-face conversation without adequate protection (an N95 respirator) or being in the same room as the infected person for 15 minutes or longer is counted as significant exposure to COVID-19.

Contact tracing is important as persons who have been exposed to someone with an infection, such as measles, COVID-19 or MERS-CoV are at higher risk of becoming infected themselves, and potentially further infecting others.

Contact-tracing facilitates early identification of persons at risk of developing the infection, which in turn allows:

- the option of post-exposure prophylaxis (e.g. vaccination, antibiotics) to exposed persons
- isolation precautions such as furlough period to prevent spreading to more people
- counselling exposed persons on symptoms of infection and to seek early treatment

Contact tracing requires mapping of the patient's journey within the primary care centre. For large primary care centres such as polyclinics with multiple service points (e.g. consultation room, dressing room, pharmacy etc.), the use of close-circuit television (CCTV) surveillance, and electronic time stamping at each service point is helpful for mapping the movement of the index patient, while records of time of visit may suffice for a small general practitioner (GP) clinic.

All persons considered to have exposure to the infected person should be listed as contacts.

(1) During contact tracing, contacts would be informed of potential exposure and the implications.

(2) Where applicable, contacts may need assessment to determine risk of being infected. For example, in the case of exposure to a patient with measles, a person without prior vaccination, or history of measles, who is unable to demonstrate measles antibodies is considered susceptible and is at risk of developing measles following exposure. Conversely, persons who are immune will not develop infection.

Contacts should be counselled on disease symptoms, and the importance of receiving early care if they develop symptoms, and where applicable offered post-exposure prophylaxis, such as post-exposure vaccination or medications.

In the case of measles exposure, this process of contact tracing is time-sensitive, as post-exposure vaccination is effective only if administered early enough. US CDC recommends that MMR vaccine be administered to susceptible persons within 72 hours of initial measles exposure, or immunoglobulin (IG) within six days of exposure, to potentially provide protection.

In some cases, e.g. COVID-19, quarantine is required for high-risk contacts. In other cases, e.g. measles, if a susceptible healthcare worker is exposed to a colleague with measles,

the exposed worker should avoid patient contact for a period, even if post-exposure vaccination had been administered. [See Section 5.2.5 on Furlough]

Logistics and manpower required to perform contact tracing need to be taken into consideration. A contact-tracing team (e.g. at polyclinics, primary care institution) is usually required, if the list of contacts is substantial. In this situation, the contact-tracing team is usually equipped with relevant training, scripted Q-and-A sheets as they may need to allay concerns of persons contacted. MOH may provide support or advice, where required.

In view of the potential logistic challenges, the primary care centre should review its contact tracing capabilities prior to the onset of any outbreak, with consideration of the following:

- Contact tracing standard operating procedures / protocols;
- Infrastructure (e.g. electronic or manual records to time-stamp various parts of the; patient journey, CCTV etc.) required to generate the list of contacts;
- Manpower, time and facilities (rooms, telephone) to call contacts;
- Training of staff delegated to call the contacts;
- Pre-scripted contact tracing info sheets, Q-and-A sheets;
    a) Contact-tracing drills.

5.2.4 *Control Measures and Clinical Management*

Depending on the type of ID, the primary care centre should institute the following measures where applicable:

- Quarantine exposed staff till the first incubation period is over;
- Offer post-exposure testing and administer chemoprophylaxis, active or passive immunisation as post-exposure prophylaxis.

5.2.5 *Furlough*

In the context of an outbreak, or exposure to infectious diseases, furlough refers to a leave of absence from work, to be taken by a healthcare worker, who is exposed to an infectious disease (for example, measles, or chickenpox). If the healthcare worker is not immune, he / she may acquire the infection, and can potentially pass the infection to patients or colleagues. In the interest of staff and patient safety, the healthcare worker should avoid contact with patients and colleagues for a stipulated period. As part of outbreak prevention, primary care centres should establish healthcare worker immunity, and furlough procedures for exposed healthcare workers through periods of potential communicability.

Table 5.3 summarises the period of infectivity, definitions of immunity, definitions of significant exposure, and the period of furlough for various infections.

5.2.6 *Business Continuity*

Pending subsequent epidemiological findings and the scale of the outbreak, primary care centres should determine which service points to scale down / close, and which ones to augment in the event of an outbreak. For example, health screening services and chronic disease management may need to be scaled down while dealing with clinical management of exposed patients in the aftermath of an outbreak.

5.2.7 *Closure of Outbreak*

The outbreak has to be monitored and followed up closely, and will only be considered closed until one of the following criteria is met:

- There is no new reported case for 2 weeks (disease of unknown incubation period) or
- 2 incubation periods from the last case.

5.2.8 *Quality Improvement*

Pending the subsequent epidemiological findings and the scale of the outbreak, the primary care centre should implement the following measures, where applicable:

- Evaluate practices and review policies and procedures;
- Review infection control practices in cases where breaches are likely to have occurred;
- Share learning, and
- Recommend improvement strategies.

For learning and improvement, a summary report with the following details is strongly recommended for record-keeping purposes:

- Date of outbreak identified;
- Date of the index case reported;
- Immediate control measures;
- Investigation carried out;
- Suspected or confirmed source of outbreak / reservoir and transmission mode;
- Date of the last affected case;
- Population affected including their characteristics, total number of cases;
- Date of outbreak closure and criteria used for the closure.

Table 5.2: Reportable Incident Category [Adapted from MOH Circular No. 29/2017, 1 November 2017]

Reportable Incident Category for Outbreak	Type of Outbreak	Examples
Category 1	Outbreak of diseases of high severity/ transmissibility in institutions or in the community; no treatment is available; immunocompromised/ vulnerable population at risk; hospital-wide/ community-wide spread;	Confirmed case of emerging infectious diseases (e.g. MERS-CoV)
Category 2	Outbreak of diseases of moderate severity/ transmissibility in institutions or in the community; some treatment is available;	Outbreak of an infectious disease in a critical facility in one centre resulting in closure of the facility.
Category 3	Cases or small clusters of diseases of low severity/ transmissibility in the community or in institutions; treatment is available	A small cluster of respiratory disease

Table 5.3: Definition of Immunity, definition of significant exposure, period of communicability and period of Furlough (Exemption from Patient-care Duties following Exposure) for various Infections

Type of Infectious Disease (ID)	Definition of Immunity	Definition of significant exposure	Period of Communicability (Source Patient is Infectious during this period)	Duration to be Exempted from Patient-care Duties		
				Infected HCW	Susceptible HCW* with significant exposure [Period of Furlough]	Immune HCW with significant exposure
Pertussis (Whooping cough)	While the recommendation for the HCW is to receive 1 dose of Tdap, immunity against pertussis wanes over time.	Unprotected face-to-face contact (<1m) for 5 min or more, irrespective of previous vaccination	People with pertussis are most infectious during the catarrhal period and during the first two weeks after onset of the cough (approximately 21 days).	Up till 5 days after starting antimicrobial treatment	Up till 5 days after starting antimicrobial prophylaxis	Up till 5 days after starting antimicrobial prophylaxis [i.e. there is no difference in post-exposure management regardless of Tdap vaccination]

Type of Infectious Disease (ID)	Definition of Immunity	Definition of significant exposure	Period of Communicability (Source Patient is Infectious during this period)	Duration to be Exempted from Patient-care Duties		
				Infected HCW	Susceptible HCW* with significant exposure [Period of Furlough]	Immune HCW with significant exposure
Measles (Rubeola)	Documented two valid doses of MMR Vaccine Serological evidence of immunity to measles [vaccination is more cost-effective than checking serology]	Unprotected (no mask) face-to-face contact (<1m); direct unprotected contact with respiratory secretions; or sharing of ambient air for 15 minutes or more while the source patient is infectious (see period of communicability)	4 days before the rash onset to 4 days after rash appearance, or, 9 to 10 days after exposure to onset of fever and lasts up to 10 days.	Up to 7 days after the rash onset.	Day 7 to day 21 after exposure.	Not required

Type of Infectious Disease (ID)	Definition of Immunity	Definition of significant exposure	Period of Communicability (Source Patient is Infectious during this period)	Duration to be Exempted from Patient-care Duties		
				Infected HCW	Susceptible HCW* with significant exposure [Period of Furlough]	Immune HCW with significant exposure
Mumps	As above	As above	9 days before to 9 days after the onset of parotitis (an inflammation of one or both parotid (salivary) glands that are inside each cheek over the jaw in front of each ear).	Up to 9 days after the onset of parotitis.	Day 12 to day 26 after exposure.	Not required
Rubella (German measles)	As above	As above	1 week before to 7 days after rash onset. (Note: Infants with congenital rubella syndrome can shed the virus for months).	Up to 5 days after rash onset.	Day 5 to day 21 after exposure	Not required

Type of Infectious Disease (ID)	Definition of Immunity	Definition of significant exposure	Period of Communicability (Source Patient is Infectious during this period)	Duration to be Exempted from Patient-care Duties		
				Infected HCW	Susceptible HCW* with significant exposure [Period of Furlough]	Immune HCW with significant exposure
Varicella	Two valid doses of Varicella Vaccine Documented physician diagnosis of Chickenpox / Herpes Zoster Serological evidence of Immunity [Serological testing is more cost-effective if	As above	48 hours before lesion onset until all lesions dried and crusted over	Until all lesions dried and crusted over	Day 7-21 after exposure, Or Day 7-28 after exposure if Varicella Immunoglobulins were given to the exposed staff.	Not required

Type of Infectious Disease (ID)	Definition of Immunity	Definition of significant exposure	Period of Communicability (Source Patient is Infectious during this period)	Duration to be Exempted from Patient-care Duties		
				Infected HCW	Susceptible HCW* with significant exposure [Period of Furlough]	Immune HCW with significant exposure
	there is doubt of vaccination history]					
Herpes Zoster	N. A	As above	24 hours before lesion onset until all lesions dried and crusted over	Until all lesions dried and crusted over	As above	

5.3 Recommendations

1. To prepare for an outbreak, the primary care centre should pre-empt, and prepare for the tasks involved in managing an outbreak, during peacetime. Preparation should be including written protocols, training and drills.
2. The primary care centre should identify a person or team-in-charge, who will helm outbreak management.
3. Where appropriate, depending on severity and impact, an outbreak should be escalated to the relevant authorities including MOH.
4. The primary care centre should establish contact tracing standard operating procedures / protocols, and ensure readiness in the following aspects: Infrastructure, manpower, staff training, and other materials required for contact-tracing such as pre-scripted contact tracing Q-and-A sheets.
5. Post-exposure testing, active or passive post-exposure prophylaxis should be offered to exposed persons.
6. To limit further transmission of infection, exposed staff who are vulnerable should be furloughed for a stipulated period.
7. Primary care centres should establish healthcare worker immunity, and furlough procedures for exposed healthcare workers through periods of potential communicability.
8. The outbreak must be monitored and followed up closely until the criteria for outbreak closure is reached.

5.4 References

Communicable Diseases Centre, US. Disease Outbreaks in Outpatient Settings. https://www.cdc.gov/hai/settings/outpatient/outbreaks-patient-notifications.html

Communicable Diseases Centre, US. Measles Post-exposure Prophylaxis. https://www.cdc.gov/measles/hcp/index.html#prophylaxis

Communicable Diseases Centre, US. Varicella Post-exposure Prophylaxis. https://www.cdc.gov/vaccines/vpd-vac/varicella/hcp-post-exposure.htm

Prevention of Occupationally Acquired Infections Among Health-care Workers Chia Yin Chong, Donald A. Goldmann, W. Charles Huskins. Paediatrics in Review Jul 1998, 19 (7) 219-231; DOI: 10.1542/pir.19-7-219

Evaluation of Syndromic Surveillance Systems in Singapore. Hishamuddin P. (2014). *Online Journal of Public Health Informatics*, *6*(1), e142. doi:10.5210/ojphi.v6i1.5100 Online, accessible at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4050847/ [accessed Sept 2019]

Ministry of Health, Singapore. Guidelines on the notification of infectious diseases in Singapore, 2019

Ministry of Health, Singapore. Weekly Infectious Diseases Bulletin. Online, accessible at: https://www.moh.gov.sg/resources-statistics/infectious-disease-statistics/2019/weekly-infectious-diseases-bulletin [accessed Sept 2019]

Ministry of Health, Singapore. Health Professionals Portal. Online, accessible at: https://www.moh.gov.sg/hpp/doctors/restricted-content-login [accessed Sept 2019]

Ministry of Health, Singapore. Form 131. Notification of Infectious Diseases

Ministry of Health, Singapore. Form 532. Notification of Tuberculosis

Ministry of Health, Singapore. Notification of Incidents / Clusters of Infectious Diseases Primary Care Pages. Online, accessible at: https://www.primarycarepages.sg/ [accessed Sept 2019]

Singapore Statutes. Infectious Diseases Act (chapter 137, original enactment: act 21 of 1976) Revised edition 2003. Online, accessible at: https://sso.agc.gov.sg/act/ida1976 [accessed Sept 2019]

CHAPTER 6 HAND HYGIENE

6.1 Introduction

Healthcare-associated infections (HAI) are a major cause of morbidity and mortality and have a significant impact on patients and health care systems throughout the world. To reduce the spread of infection, hand hygiene is key to preventing the spread of infection. This chapter aims to guide health care workers (HCW) in the primary care setting on the importance of performing hand hygiene to prevent the spread of infection to colleagues, patients and public.

According to the World Health Organisation (WHO), hand hygiene refers to any action of hand cleaning including the washing of hands using soap and water when hand is visibly soiled or rubbing the hands using alcohol-based hand rub (ABHR) solution.

6.2 Indication for Hand Hygiene

In the primary care setting, WHO recommends 4 Moments for Hand Hygiene (refer to Figure 6.1 for WHO diagramatic illustration).

- Moment 1: Before touching a patient
- Moment 2: Before performing clean / aseptic procedure (i.e. before handling an invasive device for patient care, regardless of whether gloves are used (including before the donning of PPE)
- Moment 3: After body fluid exposure risk (i.e. contact with body fluids or excretion, mucous membranes, non-intact skin, or wound dressing (including after the removal of PPE)
- Moment 4: After touching a patient

6.3 Methods of Hand Hygiene

Routine hand hygiene may be done either with alcohol-based handrub for 20 – 30 seconds or by washing with soap under a stream of water for at least 40 – 60 seconds.

Alcohol-based handrub is the preferred means for routine hand hygiene in most clinical situations as they have excellent in vitro germicidal activity against bacteria Gram-positive and Gram-negative vegetative bacteria (including multi- drug pathogens such as methicillin-resistant *Stapylococcus aureus* (MRSA), vancomycin-resistant *Enterococcus* (VRE), *Mycobacterium tuberculosis*, and a wide variety of fungi. However, they have virtually no

activity against bacterial spores of protozen oocysts, and very poor activity against some non-enveloped (non-lipophilic) viruses. Alcohol-based handrub with optimal antimicrobial efficacy usually contains 70% to 85% ethanol, isopropanol, or n-propanol, or a combination of these products.

Washing hands with soap and water is the preferred means for hand hygiene under the following circumstances:

a) Hands are visibly dirty or soiled with blood or other body fluids;
b) When exposure to spore-forming micro- organisms (e.g clostridium dificile, bacillus spores) is strongly suspected;
c) After use of the toilet;
d) Before preparation of food and medications.

6.4 Hand Hygiene Technique

Special attention should be given to the frequently overlooked areas where organisms thrive, such as under the fingernails, around the cuticles, thumbs, knuckles and side of hands. (See Figure 6.2 and Figure 6.3)

6.5 Other Aspects of Hand Hygiene

Nails should be kept short for effective hand hygiene. Most microbes on the hands come from underneath the nails. Keep natural fingernails tips <2mm long and pay attention to them when washing hands as microbes on hands come from beneath the fingernails.

Avoid wearing nail polish, artificial fingernails or extenders, rings, jewelry or wrist-watch and long sleeves when having direct contact with patient during care delivery. Hand hygiene is most facilitated with a bare below elbows approach.

Abrasions or cuts on the hand should be covered with occlusive dressing before performing hand hygiene.

Avoid donning gloves when hands are still wet with alcohol-based handrub as this promotes bacterial growth.

6.5.1 *Use of Gloves*

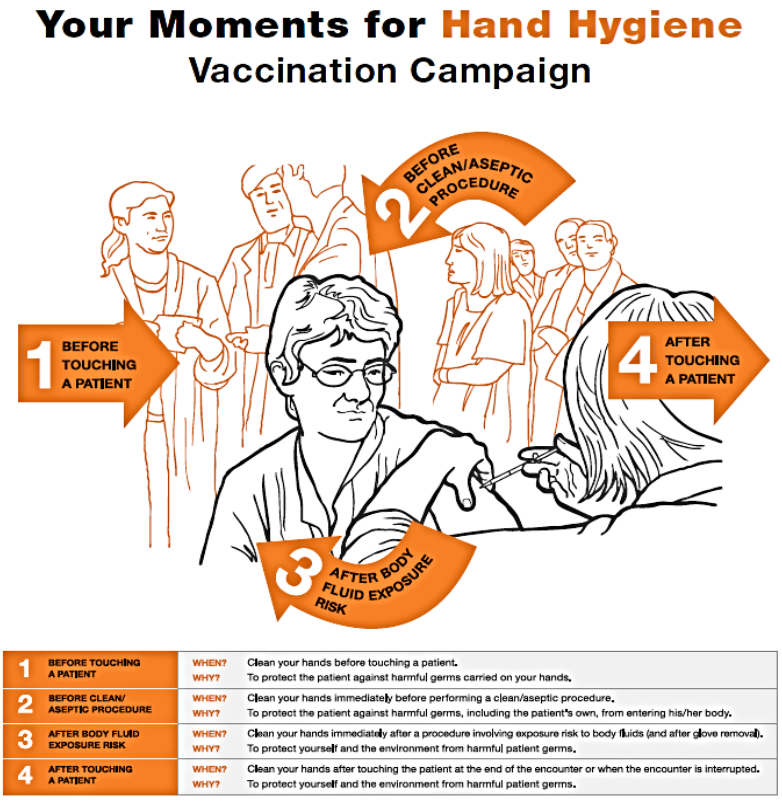
- Wear gloves when in contact with blood and body fluids and discard appropriately in a waste bin after use;
- Change gloves after each use. Do not use the same pair of gloves for another patient. Do not reuse;

- Hand hygiene must be performed before donning and after removing of gloves as hands can be contaminated by small, undetected holes on gloves and during removal.

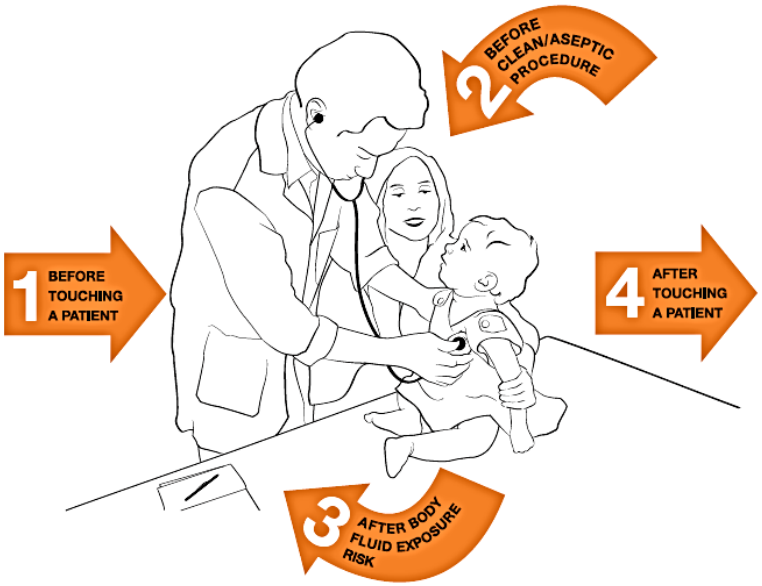
6.6 Recommendations

1. In the primary care setting, HCWs should perform hand hygiene according to WHO's 4 Hand Hygiene Moments.
2. Alcohol-based handrub is the preferred means for routine hand hygiene in most clinical situations.
3. Soap and water are the preferred means for hand hygiene when hands are visibly soiled with blood or other body fluids, when exposed or potentially exposed to spore-forming microorganisms, and after use of the toilet.
4. Hand hygiene should be performed after removal of gloves.

Figure 6.1: WHO's 4 Hand Hygiene Moments in Outpatient Setting



Your Moments for Hand Hygiene
Paediatric Consultation

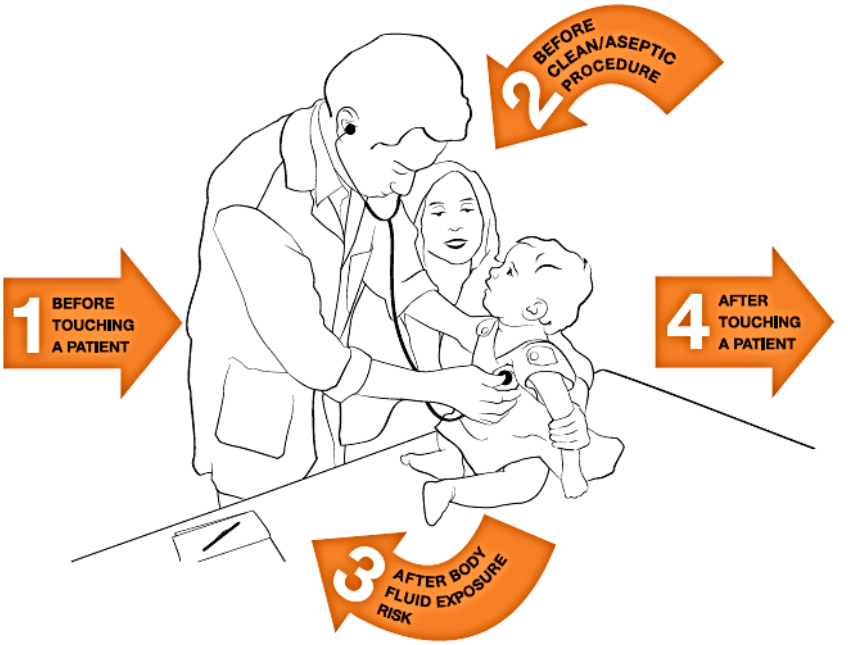


1	BEFORE TOUCHING A PATIENT	WHEN?	Clean your hands before touching a patient.
		WHY?	To protect the patient against harmful germs carried on your hands.
2	BEFORE CLEAN/ ASEPTIC PROCEDURE	WHEN?	Clean your hands immediately before performing a clean/aseptic procedure.
		WHY?	To protect the patient against harmful germs, including the patient's own, from entering his/her body.
3	AFTER BODY FLUID EXPOSURE RISK	WHEN?	Clean your hands immediately after a procedure involving exposure risk to body fluids (and after glove removal).
		WHY?	To protect yourself and the environment from harmful patient germs.
4	AFTER TOUCHING A PATIENT	WHEN?	Clean your hands after touching the patient at the end of the encounter or when the encounter is interrupted.
		WHY?	To protect yourself and the environment from harmful patient germs.

Your Moments for Hand Hygiene
Vaccination Campaign

1	BEFORE TOUCHING A PATIENT	WHEN?	Clean your hands before touching a patient.
		WHY?	To protect the patient against harmful germs carried on your hands.
2	BEFORE CLEAN/ ASEPTIC PROCEDURE	WHEN?	Clean your hands immediately before performing a clean/aseptic procedure.
		WHY?	To protect the patient against harmful germs, including the patient's own, from entering his/her body.
3	AFTER BODY FLUID EXPOSURE RISK	WHEN?	Clean your hands immediately after a procedure involving exposure risk to body fluids (and after glove removal).
		WHY?	To protect yourself and the environment from harmful patient germs.
4	AFTER TOUCHING A PATIENT	WHEN?	Clean your hands after touching the patient at the end of the encounter or when the encounter is interrupted.
		WHY?	To protect yourself and the environment from harmful patient germs.

Your Moments for Hand Hygiene
Paediatric Consultation



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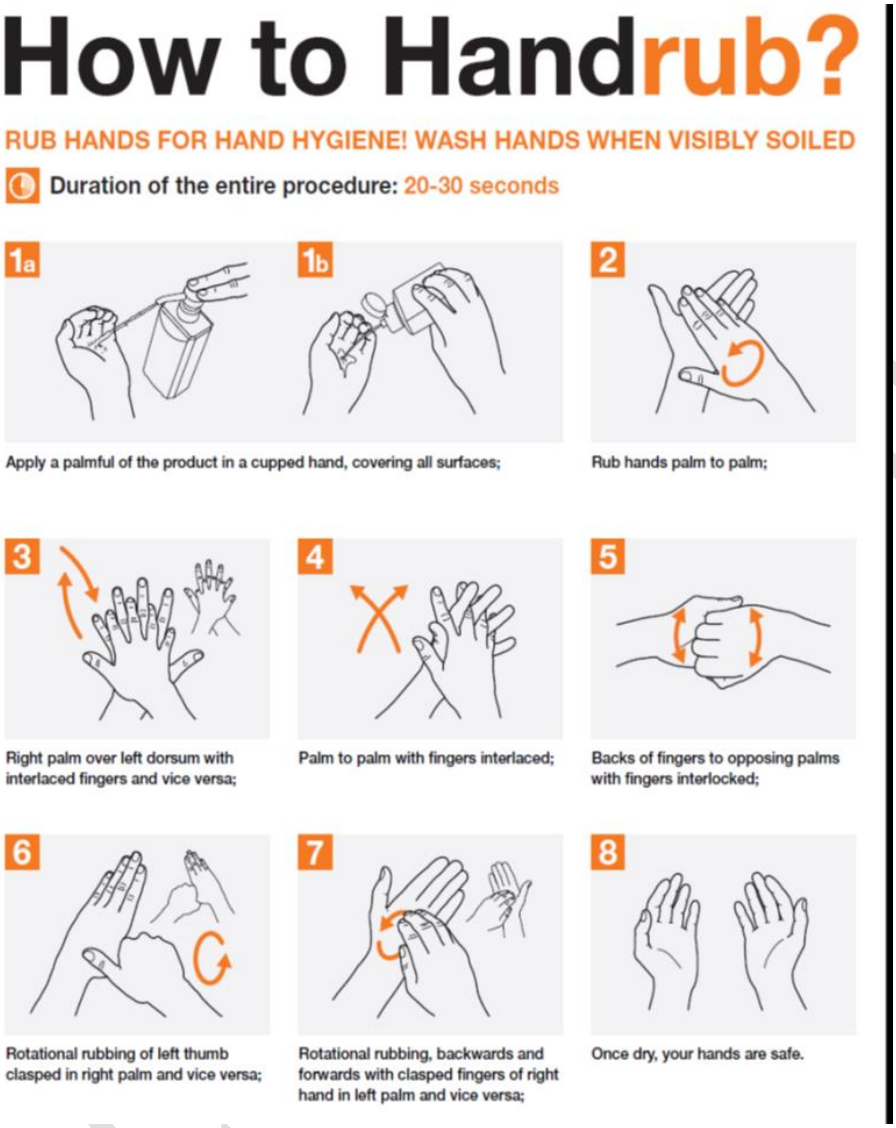
4 AFTER TOUCHING A PATIENT	WHEN?	Clean your hands after touching the patient at the end of the encounter or when the encounter is interrupted.
	WHY?	To protect yourself and the environment from harmful patient germs.

Reference: World Health Organization, 2009

<u>Figure 6.2</u>: HH technique using ABHR and the WHO "7-step process"



Reference: World Health Organization, 2009

Figure 6.3: HH techniques using soap and water or antimicrobial soap solution using WHO – 7 step process

Reference: World Health Organization, 2009Source; SGH Infection Prevention & Epidemiology. Used with permission.

6.7 References

World Health Organisation (2009) Guidelines on Hand Hygiene in Healthcare. Online available at: https//whqlibdoc.who.int/publications/20099789241597906 eng.pdf

World health Organisation FAQs. Clean Care is safe Care. Online available at: https//www.who.int/qpsc/tools/faqs/five_moments/en/

Guidelines to Infection Prevention for Outpatient Setting: Minimum expectations for safe care. Online available at: https//ww.cdc.gov/infectioncontrol/pdf/outpatient/guide.pdg

CHAPTER 7 ENVIRONMENT AND FACILITIES MANAGEMENT

7.1 Definitions

Cleaning is the physical removal of foreign material (e.g., dust, soil) and organic material (e.g. blood, secretions, excretions, microorganisms) from objects and surfaces. Cleaning physically removes rather than kills microorganisms. It is accomplished with water, detergents, and mechanical action. Cleaning must be performed *before* disinfection or sterilisation.

Decontamination refers to the process of cleaning that removes pathogenic microorganisms from objects so that they are safe to handle, use, or discard.

Disinfection describes a process that eliminates many or all-pathogenic microorganisms from inanimate objects, except for bacterial spores, e.g. disinfection of environmental surface with a sodium hypochlorite solution.

Sterilisation refers to a physical or chemical process that completely kills or destroys all forms of viable microorganisms from an object, including spores. This is usually carried out in an autoclave.

7.2 Disinfection and Cleaning

Routine cleaning and disinfection are necessary to maintain a standard of cleanliness, reduce microbial contamination and control or minimise the spread of infectious agents from infected/colonised patients to other patients or HCWs. Medical equipment also requires decontamination for safe patient care.

There are four categories of healthcare equipment (based on the method of cleaning and frequency of cleaning):

1) Single use (disposable): Items that are designed for one-time usage on one patient e.g. sterile syringes, dressing sets & urinary catheters;
2) Single patient use: Items that are reusable on the same patients e.g. NG feeding syringe (syringe to be replaced twice a week);
3) Reusable instruments: Instruments that can be decontaminated and reused;
4) Reusable equipment: Equipment that can be decontaminated and reused.

7.2.1 *Spaulding Classification*

The Spaulding Classification of medical devices is a clear and logical classification method that has been retained, refined, and successfully used by HCWs for assessment of the level of disinfection or sterilisation needed for medical devices according to critical, semi critical and non-critical items and type of cleaning required.

Refer to Table 7.1 below for Spaulding's classification of medical devices and required level of processing/reprocessing.

Table 7.1: Spaulding's Classification of Medical Devices and Required Level of Processing/Reprocessing

Classification	Definition	Level of Processing/ Reprocessing	*Examples
Critical	Equipment/device that enters sterile tissues, including vascular system	Cleaning followed by sterilisation.	Surgical instruments, biopsy instruments
Semi-critical	Equipment/device that comes into contact with non-intact skin or mucous membranes but do not penetrate them	Cleaning followed by high-level disinfection[2] (as a minimum). Sterilisation is preferred.	Respiratory therapy equipment, anesthesia equipment, Laryngoscope blade
Non-critical	Equipment/device that touches only intact skin and not mucous membranes, or does not directly touch the patient	Cleaning followed by low-level disinfection[3].	ECG machines, pulse oximeter, bedpans, urinals, commodes, blood pressure cuffs, crutches, computers, bed rails, bedside

[2] High-level disinfectants (HLD) are used for semi-critical medical equipment/devices that cannot be sterilised. HLD include 2% glutaraldehyde, 6% hydrogen peroxide, 0.2% peracetic acid, 7% accelerated hydrogen peroxide and 0.55% ortho-phthalaldehyde (OPA). The contact time required for high-level disinfection for each equipment differs. HLD is performed after the equipment/device is thoroughly cleaned, rinsed and excess rinse water is removed.

[3] Low-level disinfectants (LLD) are used for non-critical medical equipment/devices and some environmental surfaces. LLD include 3% hydrogen peroxide, 0.5% accelerated hydrogen peroxide, some quaternary ammonium compounds (QUATS), phenolics and diluted sodium hypochlorite (e.g. bleach) solutions. LLD is performed after the equipment/device is thoroughly cleaned; rinsed and excess rinse water is removed. The container used for disinfection must be washed, rinsed and dried when the solution is changed.

Classification	Definition	Level of Processing/ Reprocessing	*Examples
			tables, patient furniture and floors

* Examples listed in this table are not exhaustive.

7.2.2 *Disinfection of Healthcare Equipment*

A great number of disinfectants are used alone or in combination (e.g. hydrogen peroxide and peracetic acid) in the healthcare setting. These include alcohols, chlorine and chlorine compounds, glutaraldehyde, ortho-phtaladehyde, hydrogen peroxide, iodophors, peracetic acid, and quaternary ammonium compounds (QUATs). In most instances, a given product is selected for the intended use and applied in an efficient manner. Caution must be exercised when using on electronic medical equipment.

In general, shared items e.g. BP cuffs, thermometer should be disinfected in between each patient use.

7.2.3 *Detergents and Cleaning Agents*

"Detergents" or "soaps" are cleaning agents that make no antimicrobial claims. Their cleaning activity can be attributed to their detergent properties, which result in removal of dirt, soil and various organic substances. However, the use of a detergent solution improves the quality of cleaning.

7.2.4 *Disinfectants*

When using a disinfectant, it is important that an item or surface be free from visible soil and other organic items before applying disinfectant. Otherwise, the effectiveness of disinfectants will be reduced or eliminated. Use the disinfectant according to manufacturer's instructions on dilution and contact time.

Refer to Table 7.2 below for types of chemical disinfectants.

Table 7.2: Types of Chemical Disinfectants

Disinfectants	Recommended Use	Precautions
Alcohol E.g. Isopropyl, Ethyl alcohol, methylated spirit.	Rapidly bactericidal, tuberculocidal, fungicidal and virucidal but do not destroy bacterial spores. Smooth metal surfaces, tabletops and other surface on which bleach cannot be used. Effectively to disinfect non-critical items such as oral and rectal thermometers, hospital mobiles, BP cuffs and stethoscopes etc.	Flammable, toxic, to be used in cool and well- ventilated area, avoid inhalation. Observe fire code restrictions for storage of alcohol. To be kept away from heat sources, electrical equipment, flames, and hot surfaces.
Quaternary Ammonium Compounds (QUATs) E.g. Alkyl dimethyl benzyl ammonium chloride, Alkyl dimethyl ethylbenzyl ammonium chloride	Commonly used in general environmental cleaning of noncritical surfaces, such as floors, furniture, and walls	Relatively non-toxic and less corrosive. Dilutions in use may get contaminated and grow Gram negative bacteria. DO NOT use QUATs to disinfect instruments.
Chlorine /Sodium hypochlorite E.g. Sodium dichloroisocyanurate (NaDCC)]	Kills fast and has broad Spectrum actions against a wide range of Gram negative and Gram-positive bacteria and spores. Recommended for environmental surfaces, noncritical equipment, blood spills.	PPE are required while handling and using undiluted. Corrosiveness to metals. Flammable, toxic, to be used in cool and well- ventilated area, avoid inhalation. Low cost. Rapid action.

Disinfectants	Recommended Use	Precautions
		Readily available.
Hydrogen Peroxide Enhanced Action Formulation 0.5% (7% solution diluted 1:16)	Isolation room surfaces. Clinic and procedure room surfaces. Low-level disinfection is achieved after 5 minutes of contact at 20°C or according to manufacturer instruction.	Safe for environment. Non-toxic. Rapid action. Available in a wipe. Active in the presence of organic materials. Excellent cleaning ability due to detergent properties.
Hydrogen peroxide 3%	Noncritical equipment used for home healthcare. Floors, walls, furnishings. Disinfection is achieved with a 3% solution after 10 minutes of contact.	Low cost. Rapid action. Safe for the environment. Store in cool place, protect from light.

7.3 Sterilisation

Sterilisation is the elimination of all disease-producing microorganisms, including spores (e.g. *Clostridium* and *Bacillus* species) and prions that are not susceptible to routine sterilisation. Sterilisation is used on critical medical equipment/devices and various semi-critical medical equipment/devices.

Medical equipment / devices that have contact with sterile body tissues or fluids are considered critical equipment / devices. They must be sterilised because microbial contamination could result in disease transmission. Whenever possible, semi-critical equipment/devices should be sterilised. When sterilisation is not possible, semi-critical equipment/devices should be cleaned followed by high-level disinfection. The settings need to have written policies and procedures for sterilisation of medical equipment / devices processes.

Physical arrangements of processing areas are presented schematically in four references.

Selection of sterilisers should be done in consultation with the Infection Prevention Team in institutional practices. Good communication is required between the primary care centre and the manufacturer of the steriliser to ensure:

a) Manufacturers provide specific, written instruction on installation and use of equipment;
b) Storage and transportation practices maintain sterility to the point of use;
c) Manufacturers are specific as to which medical equipment/devices can be sterilised in their machines and the recommended sterilisation methods.

They must be installed according to the manufacturer's instructions and be commissioned and maintained appropriately in compliance with the manufacturer's instructions.

7.3.1 *Equipment Use and Preventive Maintenance*

Table-top sterilisers undergo frequent use, wear, and tear. The manufacturer's recommendations should be consulted for guidance on a preventive maintenance programme including regular inspection of gaskets and seals.

Sterilisation processes may be mechanical, chemical, or biological. Monitoring should be done when a steriliser is first installed before use and in routine performance assessments. The daily operation of every steriliser must be reviewed and documented. A logbook should be kept for this purpose. Any malfunction must be noted, and appropriate action taken.

7.3.2 *Physical monitors*

A physical monitor is a device that monitors the physical parameters of a steriliser such as time, temperature and pressure that are measured during the sterilisation process and recorded on completion of each cycle.

7.3.3 *Biological monitors*

Biological indicators (BIs) are the most accepted means for monitoring sterilisation because they directly assess the procedure's effectiveness in killing micro-organisms. Spores used are more resistant and present in greater numbers than common microbial contaminants found on patient care items. Therefore, an inactivated BI signifies that other potential pathogens in the load have been killed.

Conduct BI at least weekly for steam sterilisers. Follow the manufacturer's directions concerning the appropriate placement of the BI in the steriliser.

Alternatively, the use of disposable sterile instruments should be considered in situation where there is no feasibility of sterilisation to be done in ambulatory setting.

7.3.4 *Chemical Indicators (CI)*

A chemical indicator (CI) is a system that responds to a change in one or more predefined process variables with a chemical or physical change. There are six classes of chemical indicators.

Refer to Table 7.3 below for international types of steam chemical indicators.

Table 7.3: International types of Steam Chemical Indicators

Type	Definition type	Use	Examples
I	Process indicator to differentiate processed from non-processed items	To indicate that item has been directly exposed to sterilisation process, usually applied outside of packages.	Indicator tapes indicator labels
II	Indicator for use in specific tests	To evaluate steriliser performance	Bowie-Dick test
III	Single variable indicator to indicate when a stated value has been reached e.g. temperature at specific location in chamber	For pack control monitoring but not as useful as Class IV or V indicators; for exposure control monitoring	Temperature tubes
IV	Multi-variable indicator that reacts to 2 or more critical variables in sterilisation cycle	For pack control	Paper strips
V	Integrating indicator that reacts to all critical variables in the	For pack control or as additional monitoring tool to	

Type	Definition type	Use	Examples
	sterilisation process (time, temperature, presence of steam) and has stated values that correlate to a BI at 3 time/temperature relationships	release loads that do not contain implants	
VI	Emulating indicator that reacts to all critical variables (time, temperature, presence of steam) for specified sterilisation cycle (e.g. 10 min, 18 min, 40 min)	As internal pack control	

7.4 Storage

Sterile and single-use disposable items should be stored in an enclosed space, such as closed or covered cabinets that allow the packaged item to remain sterile. The storage area should be dedicated for storage only, be free of clutter and wiped clean at regular intervals. They should be stored above floor level away from direct sunlight and water in a secure dry and cool environment. They should not be stored under sinks or in other locations where they might become wet and contaminated.

Storage practices for packaged sterilised instruments may be either date or event related. Dating assists in the recall of instruments should concerns arise with the results of sterilisation tests. Some health care facilities date every sterilised package and use shelf-life practices (e.g. “first in, first out”). Others use event-related practices. The latter approach recognises that the packaged instruments should remain sterile indefinitely unless an event causes them to become contaminated (e.g. torn or wet packaging).

Packages containing sterile instruments should be inspected before use to verify barrier integrity and dryness. If packaging is compromised, the instruments should be cleaned, packaged, and sterilised again.

7.5 Monitoring and System Failures

Improper reprocessing includes, but is not limited to, the following situations:

- The load contains a positive BI;
- An incorrect reprocessing method was used on the equipment/device
- Reprocessing equipment indicators fail to reach correct parameters (e.g. temperature, pressure, exposure time);
- CI or monitoring tape has not changed colour;
- There is doubt about the sterility of medical equipment /devices.

Written procedures must be established for the recall and reprocessing of improperly reprocessed medical equipment / devices. All equipment / devices in each processed load must be recorded to enable tracking in the event of a recall. The recall procedure should include:

- Designation of department and staff responsible for executing the recall;
- Identification of the medical equipment/devices to be recalled; if recall is due to a failed BI, the recall should include the medical devices in the failed load as well as all other devices processed in the steriliser since the last successfully sterilised load;
- Assessment of patient risk;
- Procedure for subsequent notification of designated staff, patients.

7.6 Recommendations

1. Primary care facilities should have policies and procedures addressing IPC for environmental services, reprocessing of medical equipment, and facility design and construction.
2. The chemical disinfectant used for disinfecting medical equipment / devices must be compatible with both the equipment / device manufacturer's instruction for disinfection, and the cleaning products involved in the reprocessing of the equipment/device.
3. Reusable medical equipment / devices should be thoroughly cleaned before disinfection or sterilisation.
4. All sterilisers must be tested for performance using physical, chemical, and biological monitors and indicators. Chemical indicators do not replace the need to use a biological indicator.

5. The daily operation of every steriliser must be reviewed and documented. A logbook should be kept for this purpose. Any malfunction must be noted, and appropriate action taken.
6. Use of disposable sterile instruments should be considered in situation where there is no feasibility of sterilisation to be done in ambulatory setting.

7.7 Environmental Hygiene

All surfaces in health care settings have the potential to harbour pathogenic microorganisms. It is essential to maintain a routine and consistent basis of cleanliness and environmental hygiene in the primary care centre. Routine housekeeping can reduce or control the spread of infectious agents.

7.7.1 *Routine Cleaning*

Routine cleaning and disinfection regimens are based on:

- Whether surfaces are high-touch or low-touch;
- Type of activity taking place in the area and the risk of infection associated with it (e.g. isolation room vs meeting room);
- Vulnerability of patients in the particular area (e.g. immunocompromised). Frequent cleaning is highly recommended for vulnerable populations;
- Risk of contamination of body fluid on surfaces in the area.

7.7.2 *Contact with Surfaces*

The potential for exposure to pathogens is based on the frequency of contact with a contaminated surface and the type of activity involved. For example, a conference room table would have less potential for exposure to pathogens than the doorknob in a consult's room. High-touch surfaces will require more frequent cleaning, and this provides more effective disinfection.

7.7.3 *High-touch Surfaces*

High-touch surfaces require more frequent cleaning and disinfection than minimal contact surfaces. E.g. doorknobs, patient chair, light switches, computer keyboards, and countertop. Cleaning and disinfection are usually done at least daily and more frequently if the risk of environmental contamination is higher.

7.7.4 *Low-touch Surfaces*

Low-touch surfaces are those that have minimal contact with hands. Examples include floors, walls, wall clock, ceilings, mirrors, and windowsills. Low-touch surfaces require cleaning on a regular (but not necessarily daily) basis. However, prompt and appropriate cleaning is required when surfaces are visibly soiled, and when patient leaves the facility. Follow manufacturer's recommendations for equipment cleaning.

7.7.5 *Factors that will impact on environmental cleaning*

The probability that a surface, piece of equipment or care area will be contaminated is based on the activity in the area, the type of pathogens involved and the microbial load. Areas that are often soiled with blood or other body fluids will require more frequent cleaning and disinfection than areas that are not typically soiled, (e.g. lounges, offices). The frequency of cleaning can be determined according to the risk stratification matrix in Table 7.4.

Table 7.4: Risk Stratification Matrix to determine the frequency of cleaning: An example

Areas / Items	Probability of contamination	Potential for Exposure	Population	Total score	Cleaning Plan
	Light:1	High-touch: 3	Less susceptible: 0		
	Moderate: 2	Low touch:1	More susceptible: 1		
	Heavy: 3				
Clinic	2	3	0	5	clean at least once daily; clean additionally as required (e.g. gross soiling)
Diagnostic Radiology	1	3	1	5	clean at least once daily; clean additionally as required (e.g. gross soiling)
Lift lobby buttons, escalator belt	1	3	0	4	clean at least once daily; clean additionally as required (e.g. gross soiling)
Internal lifts	1	3	0	4	clean at least once daily; clean additionally as required (e.g. gross soiling)

Interpretation of total score
7 (High risk) - clean after each case/event/procedure and at least twice per day, clean additionally as required;
4–6 (Moderate Risk) - clean at least once daily, clean additionally as required (e.g. Gross soiling);
2–3 (Low risk) - clean according to a fixed scheduled, clean additionally as required (e.g. Gross soiling)

7.7.6 *Evaluation of Cleaning*

Cleaning is a vital component of an intervention package required to reduce facility related infections. However, insufficient cleaning, or the mistiming of a cleaning intervention, increases risk.

Regular cleaning inspections and auditing of surfaces with the use of fluorescent markers or kits for measuring organic soil will motivate staff to clean more thoroughly. Education, monitoring and feedback have been also shown to enhance performance by staff / housekeepers.

7.8 Recommendations

1. Primary care centre should have policies and procedures to address IPC processes for environmental services.
2. There must be adequate numbers of staff trained to provide a clean and safe environment, including extra environmental cleaning capacity during outbreaks.
3. Cleaning practices in primary care centre must be monitored and lapses in cleaning should be highlighted to the personnel in charge for rectification.
4. Cleaning frequencies should be appropriate for (a) frequency of touch i.e. high-touch versus low-touch, (b) potential for contamination (e.g. with blood or body fluids and (c) patient vulnerability (e.g. used by neonates, immunocompromised patients etc).
5. Evaluation of cleaning should include visual inspection and the use of surface markers, if possible.
6. Primary care centre should select appropriate detergents / disinfectants for environmental cleaning to reduce infection transmission risk.
7. Environmental cleaning agents should be safe for patients, and as much as possible be environmentally friendly.

7.9 Waste Management

Proper waste management in healthcare settings is vital in the prevention of potential healthcare associated infections.

7.9.1 *Classification of waste*

Healthcare waste includes all the waste generated in healthcare settings; including infectious waste, chemicals, expired pharmaceuticals and sharps. All healthcare waste is regarded as hazardous and is required to be disposed by incineration.

7.9.1.1 *Biohazardous waste*

Biohazardous wastes include:

a) Infectious waste;

b) Pathological waste;

c) Potentially infectious sharps.

7.9.1.2 *General waste*

General waste refers to waste that does not pose a hazard during handling and this includes:

a) Office administrative waste;

b) Food waste;

c) Packing material;

d) Dangerous substances and toxic industrial waste that have been treated and rendered harmless and safe for disposal;

e) Consumables used on patients that are not heavily soaked in blood and bodily fluids e.g. dressing set, used PPE (unless heavily soaked or dripping with blood or bodily fluids).

7.9.1.3 *Cytotoxic waste*

Cytotoxic waste refers to waste that has the capability to alter genetic material including:

a) Expired or unused cytotoxic drugs;

b) Waste material contaminated with cytotoxic drugs e.g. sachets;

c) Body fluids of patients during chemotherapy.

7.9.1.4 *Infectious waste*

Infectious waste refers to a type of biohazardous waste that is capable of causing disease. Examples include:

a) Sharps contaminated with blood;

b) Waste capable of transmitting diseases from patients with infectious disease e.g. norovirus, influenza;

c) Dressings or other waste dripping or caked with blood;

d) Faeces from patients with infectious diarrhoea.

7.9.1.5 *Pharmaceutical waste*

Waste generated from pharmaceutical products includes drugs that are expired or contaminated or are no longer required by the establishment.

7.9.2 *Waste Management Plan*

Management of healthcare waste in the primary care centre should take a multidisciplinary approach. Each setting should identify and establish proper procedures and describe the processes to eliminate or reduce hazard and risks associated with the disposal of waste.

Staff activities must be managed to reduce the risk of injuries and negative impact to the environment. Each healthcare setting should clearly define the roles and responsibilities of every HCWs in implementing these in policies and procedures.

The Waste Management Plan should include:

- Waste disposal holding area(s);
- Frequency of waste collection from each location;
- Duties and responsibilities for each of the different categories of staff who will generate healthcare waste and be involved in the management of the waste;
- Procedures for the management of waste requiring special handling before final disposal;
- Contingency plan for storage and disposal of hazardous waste in the event of disease outbreak or breakdown of collection arrangements;
- Training courses and programmes;
- Emergency procedures;
- The Waste Management Plan should be regularly monitored, reviewed, revised, and updated when necessary.

7.9.3 *Waste Labelling*

Primary care centre must use the colour-coded disposal bags to segregate waste that needs special handling and disposal:

- Yellow bags: Biohazardous wastes;
- Black bags: General wastes;
- Purple bags: Cytotoxic wastes (if applicable).

7.9.4 *Storage and Frequency of Collection*

Waste, in bags or containers should be stored in a separate area of a size that is appropriate to the quantities of waste produced and the frequency of collection.

The collection period should be scheduled and regular to ensure that odours from the waste does not cause nuisance. Waste receptacles may need to be stored before being transported to disposal sites. It should not be allowed to accumulate at corridors or other places accessible to unauthorized personnel or members of the public.

Waste from each area must be routinely transported to a storage collection area by the designated waste contractor of the respective primary care centre. Waste should be stored securely to prevent the escape, harm to the environment and harm to human health.

7.9.5 *Containers for Disposal of Wastes*

Plastic bags used for the collection and storage of clinical waste must be strong and durable enough to ensure containment. They should not be filled to more than 2/3 of their capacity to allow buffer for tying. Metal devices used to secure closure are not recommended.

Sharps must be placed in sharps disposal containers that are rigid. The containers should not be emptied or cleaned and must not be more than 2/3 full to minimise the risk of sharps injuries. They should be locked (closed tightly) before being sent to the disposal holding area.

Other rigid walled containers if being used should be resistant to leakage, impact rupture, corrosion and must be washable. It must be cleaned regularly and whenever the internal area has been accidentally contaminated by unsealed clinical waste.

7.9.6 *Transport*

All primary care centres should optimise the waste collection process to reduce handling and transportation. Waste should be segregated into different categories based on potential hazard and disposal route. Waste should be transported according to its category i.e. General Waste or Infectious Waste. Staff transporting the waste must be informed of potentially infectious waste and possible health and safety hazards. They must be trained in the appropriate handling and disposal methods and informed of the fixed planned route to the central storage area. Transportation routes should avoid food preparation and areas with heavy traffic. Staff transporting waste must wear appropriate PPE to minimise exposure risk.

Bulk storage (waste holding area)

Bulk storage areas may be situated within the healthcare premise or at a licensed or permitted transfer / disposal facility. Bulk storage should be:

- Reserved for healthcare waste;
- Ventilated and well-lit;
- Sited away from food preparation and general storage areas and routes used by the public;
- Enclosed and secured to prevent unauthorized access;
- Sited on a well-drained impervious hard standing;
- Readily accessible but only to authorized people;
- Kept locked when not in use;
- Secured from entry by animals and free from insect or rodent infestations;
- Provided with wash-down facilities;
- Provided with separate clearly labelled areas for waste that require different treatment / disposal options;
- Provided with access to first-aid facilities including hard washing facilities;
- Drained appropriately to a sewer;
- Cleaned regularly.

7.10 Training and Supervision

Training is required to ensure that all healthcare personnel know and understand the potential risks associated with healthcare waste and the procedures required for its safe management. Healthcare waste handlers should be trained and educated on:

- The different types of waste and the potential hazards from such waste;
- Safe waste-handling procedures;
- Knowledge of first aid and medical management in the event of a sharp's injury or mucous membrane exposure to blood or body fluid;
- The process for mandatory reporting of exposure and injuries;
- The use of PPE and competency assessment of donning and doffing of PPE;
- When technological change occurs;
- Update their knowledge of prevention and control measures annually.

7.11 Recommendations

1. All facilities should have their own policies and procedures addressing IPC for handling of waste.

7.12 Construction and Renovation

Construction and renovation projects in health care facilities are a risk for HCWs and patients, particularly those who are immunocompromised. Numerous outbreaks that occurred during construction or renovation projects have been reported. Fungi (e.g. Aspergillus) are the organisms most frequently associated with outbreaks. However, bacteria, in particular *Legionella* have also been associated with outbreaks during construction and renovation. A proactive approach must be taken to limit construction-related infections. This requires having a multidisciplinary team, supported by administration, to plan and implement preventive measures throughout the duration of the construction project. The IPC personnel should be an active team member in all phases of the project, providing education to all staff and ensuring that preventive measures are identified, initiated, and maintained. By ensuring that the appropriate preventive measures are in place and clear lines of communication exist among the personnel, patient safety will be enhanced.

A well-designed policy will ensure timely notification of the IPC personnel and designated committee(s) for early programme planning efforts. In addition, the policy calls for IPC personnel to evaluate the project from planning through completion and supports a systematic approach for project management. The Infection Control Risk Assessment (ICRA) matrix may be used in developing preventive measures – refer to Chapter 11 of the '*National IPC Guidelines for Acute Care Hospital*'.

7.12.2 *Preventive Measures*

The IPC team must be consulted to provide information on infection prevention measures and appropriate administrative / jurisdictional responsibilities delegated before construction begins.

IPC personnel should be given the administrative authority to stop construction if there is a significant breach in safety measures.

The project manager must identify essential services (i.e. water supply, electricity, ventilation systems) that may be disrupted and measures to compensate for the disruption and should communicate these to the personnel responsible.

IPC personnel in collaboration with nursing staff must identify patient population(s) that may be at risk and the appropriate preventive measures to ensure their safety.

All personnel involved in the construction or renovation activity should be educated and trained in the infection prevention measures. For example, the IPC personnel could

educate the project managers and contractors, who then ensure that the construction workers receive the appropriate education.

Methods for dust containment and removal of construction debris should be outlined and traffic patterns for construction workers should be established that avoid patient care areas.

7.13 Recommendations

1. Establish a multidisciplinary team that includes IPC personnel to coordinate demolition, construction, and renovation projects and consider proactive preventive measures at the inception; produce and maintain summary statements of the team's activities.
2. Primary care centres should Implement IPC measures as guided by the Infection Control Risk Assessment (ICRA) matrix before the start of construction and renovation.
3. IPC personnel should be an active team member in all phases of the project.

7.14 Linen Handling

7.14.1 *Clean linen*

There must not be contact between clean and soiled linen at the laundry area. Clean linen awaiting delivery to the care area should be stored in the clean and dry zone. Clean linen in the care area should be stored in a designated clean and dry location. The clean linen should not be stored in bathroom, sluice room or dirty utility room.

Disposable paper lining may be used as an alternative to cover examination couches as the linen used may act as potential fomites in spread of infection.

7.14.2 *Used linen*

Used linen should not be sorted. Used linen are to be contained in a white (or designated colour) plastic bag. Bed linen should not be shaken and must be removed with care to avoid dispersing dust and contaminants. Used linen or clothing should not be placed on the floor or any clean surface; these items should be placed directly into a designated laundry / plastic bag. Laundry / plastic bag must be strong enough to contain the linen. Bags must not be over-filled and should be securely tied. No extraneous items should be placed in the laundry bags, especially sharp objects as this may contribute to a health and safety risk for the laundry workers.

7.14.3 *Soiled linen*

Infected or soiled linen should not be sorted or agitated. Infected or soiled linen with urine or faeces, vomit, sputum is to be washed off into the toilet bowl or slop-hopper and excess water drained before putting them into the designated plastic bag which will be sent to the laundry. Alternatively, a dedicated sink or toilet bowl can be used to wash off contaminated or soiled linen if a slop-hopper is not available. Items that are not washable should be dry cleaned or destroyed if necessary. Double-bagged laundry should be handled carefully to reduce the risk of fluid contamination when placing the contaminated linen into the machine.

7.14.4 *Transport of Linen*

Soiled / contaminated linen and clean linen should be transported in different designated trolleys, bins, or bags. Double impermeable bags containing soiled / infected linen should be handled carefully to avoid damage and the release of possible contaminated aerosols into the air. Soiled / infected linen when unloaded in the laundry area should be placed away from the clean linen zone.

7.14.5 *Laundry Process*

Ideally, the linen should not be sorted before washing. If sorting is done, appropriate PPE is to be worn (i.e. gloves and apron). Masks are not required but any lesion on hands must be covered. Laundry staff should receive instruction in proper use of PPE and hand hygiene.

There must be a workflow which includes physical separation of dirty linen from that which has already been cleaned.

7.14.6 *Changing of Curtains*

There should be a schedule for the regular change of curtains used in the setting. Screen curtains should be changed immediately when it is visibly soiled. Alternatively, disposable curtains may be used.

7.15 Recommendations

1. Primary care centres should have policies and protocols to prevent the risk of infection in linen storage and distribution. Staff should be educated on the correct process for handling of linen i.e. use of clean linen, handling and storage of used and infected linen for transport to external or on-site laundry facilities.

2. All staff are responsible for their own standards of practice and must be aware of the role they have in the management of clean, used and infected linen. They have a duty to report issues in relation to linen management to their supervisor.
3. Facility management should be responsible to provide training for staff on handling infected linen.

7.16 References

A Strategy for the Control of Antimicrobial Resistance in Ireland (2013). Infection Prevention and Control for Primary Care in Ireland.

Centers for Disease Control and Prevention. (2003). Guidelines for environmental infection control in health-care facilities: recommendations of CDC and the Healthcare Infection Control Practises Advisory Committee (HICPAC).

Centers for Disease Control and Prevention. (2016). Guide to Infection prevention for Outpatient Settings: Minimum Expectations for Safe Care: recommendations of CDC and the Healthcare Infection Control Practises Advisory Committee (HICPAC)

Charles H. Griffin, C. (2015). Planning, Design, and Construction of Health Care Facilities: Addressing Joint Commission and JCI Standards and Other Considerations [eBook] (3rd ed.). USA: The American Institute of Architects. Retrieved from http://www.jointcommissioninternational.org/assets/1/14/EBPDC15Sample.pdf

Facility Guidelines Institute. (2010). Guidelines for Design and Construction of Healthcare Facilities. Washington DC, The Facility Guidelines Institute.

Ministry of Health, Singapore, (2013). Environmental Cleaning Guidelines for Healthcare Settings.

Ministry of Health, Singapore (2017). National Infection Prevention Control Guidelines for Acute Healthcare Facilities.

Ministry of Health, Singapore (2018). The National Infection Prevention Control guidelines for Long- Term Care Facilities

Ministry of Health, Singapore (2019). Infection Prevention and Control Specifications for New Healthcare Buildings

Ministry of Health and Long-Term Care/Public Health Division/Provincial Infectious Diseases Advisory Committee (2010). Best Practises for Cleaning, Disinfection and Sterilisation in All Health Care Settings, Toronto, Canada.

NHS (2015). Linen and Laundry Management - Infection Prevention and Control

The Newcastle upon Tyne Hospitals NHS Foundation Trust. (2015). Cleaning and Disinfection Procedure.

WHO. (2004). Practical Guidelines for Infection Control in Health Care Facilities.

CHAPTER 8 PATIENTS INFECTED WITH OR COLONISED BY MDROS

8.1 Introduction

Multi-drug resistant organisms (MDRO) are resistant to one or more classes antimicrobial agents. MDROs in Singapore typically refer to those of epidemiological concern viz. methicillin-resistant *Staphylococcus aureus* (MRSA), vancomycin-resistant *Enterococcus* (VRE), and carbapenemase producing carbapenem resistant *Enterobacteriace* (CP-CRE) and *Candida auris.* Although the name of the organism may suggest resistance to only one class of antibiotic (e.g. MRSA or VRE), they are often resistant to multiple classes of drugs.

Healthcare institutions worldwide are increasingly faced with the emergence and transmission of MDROs. Patients can be harmed by MDRO infections. Left unchecked, the spread of MDROs will also increase the burden on healthcare infrastructure e.g. isolation rooms, as well as increased healthcare costs.

Emergence of resistance can be prevented with prudent use of antibiotics, and its transmission controlled with stringent compliance to infection control measures. Patients may remain colonised with MDROs for prolonged periods; shedding of these organisms may be intermittent.

HCWs should differentiate between colonisation and infection:

- Colonisation is the presence of the microorganism (on skin, on mucus membranes, in open wounds or in excretions and secretions) that is not causing clinical signs or symptoms.
- Infection refers to the scenario where clinical signs and symptoms are caused by the organism.

The prevention and control of MDROs is a national priority. Leadership and coordinated response by the Ministry of Health (MOH) and all relevant national agencies are critical. All healthcare institutions must participate in national MDRO control efforts. The national objective in controlling emerging or new MDROs of low incidence should be to contain the spread of these organisms in all Singapore healthcare facilities and prevent them from becoming endemic. For MDROs already endemic, the national objective should be to control and reduce their incidence in all Singapore healthcare facilities.

8.2 Antimicrobial Management in Primary Care Centres

Primary care centres should develop and maintain antibiotic guidelines for prophylaxis and empiric treatment of infections commonly found in that facility. Acceptance by doctors practicing there and a system of monitoring of compliance is required. Such an audit and feedback programme would constitute an antimicrobial stewardship programme (ASP).

8.3 IPC Programme and Risk Assessment

An effective and comprehensive IPC programme in primary care is essential to control MDRO transmission. Ideally it should incorporate the following:

- A set of policies aligned to the core components of an IPC programme;
- Monitoring of infection prevention and control processes;
- Education of employees in IPC practices;
- Processes for development and updating of IPC policies and procedures;
- Access to microbiology or laboratory services;
- Policies for management of antimicrobial use in the primary care centres.

It is best to perform a risk assessment annually, whereby rates of clinical infections and implementation of IPC interventions can be considered, including the components above.

8.4 Infection Prevention and Control Measures for MDRO in Primary health care

8.3.1 *Standard Precautions*

Standard Precautions is adequate for management of MDRO patients in primary care settings. It includes the practice of good hand hygiene and the use of PPE as required. Mask and eye protection are recommended in anticipation of splashes from body secretions. Standard Precautions are applied in conjunction with routine environmental cleaning and wiping down of equipment in between each patient use.

The 4 moments of hand hygiene should be diligently followed. Appropriate PPE is used as and when required e.g. use of gloves when managing wounds, use of eye protection when anticipating splash to eyes.

8.5 Cleaning and decontamination of environment and equipment

8.5.1 *Dressing Room*

There should be policies in place to ensure routine cleaning and disinfection of environmental surfaces especially high touch surfaces in patient-care areas. All care

equipment or supplies should be effectively cleaned and disinfected before use on another patient. Consider disinfectant change for known spore-forming organisms (e.g. bleach for *C. difficile*).

It is recommended to use disposable instruments and materials whenever possible and to disinfect immediately after use if separate equipment is not available. Hospital-grade disinfectant wipes should be used for safe surface disinfection and cleaning of non-invasive medical devices. Refer to Chapter 7 on Sterilisation and Disinfection for further details.

8.6 Recommendations

1. Standard Precautions have an essential role in preventing MDRO transmission and should be used for all patient care regardless of their infection status.
2. Effective hand hygiene is the most important measure to prevent and control the spread of MDRO infections.

8.7 References

Management and Control of Nosocomial Infections in Hospitals. MH 34:20. Vol 7, dated 13 April 1999.

Abram S. Brenenson. 1995. Control of Communicable Disease Manual. Sixteen Editions.

Boyce J M, Jackson M M , Pugliese G. et al. 1994 Methicillin-Resistant Staphlococcus aureus (MRSA): A Briefing for Acute Care Hospitals and Nursing Facilities. Special Report Infection Control and Hospital Epidemiology, Vol.15 No. 2.

Centers for Disease Control and Prevention (2013). Antibiotic resistance threats in the United States, 2013.

Centers for Disease Control and Prevention (2014). Multidrug-resistant organism & clostridium difficle infection (MDRO/CDI) module.

Chapter 8. National Infection Control Guidelines for Long Term Care Facilities,2018

Infection Control Manual. 2000 Epidemiology Department, Ministry of Health.

Ministry of Health (2013). Environmental cleaning guidelines for health care settings

Ministry of Health (2013). Guidelines for control and prevention of multi-drug resistant organisms (MDROS) in healthcare facilities.

Rutala et al (2008). Guideline for disinfection and sterilization in healthcare facilities

Siegal, J. D., Rhinehart, E., Jackson, M. & Chiarello, L. (2007). CDC Guideline for Isolation Precautions:

Slavish, S. M. (2010). The Joint Commission: Infection prevention and control handbook for hospitals. USA: Joint Commission Resources.

Surveillance and Management of Multidrug resistant Microorganisms. Giovanni Battista Orsi; Marco Falcon; Mario Venditti. Expert Rev anti Infect Ther. 2011;9(8);653-679.Medscape

World Health Organisation (2002). Prevention of hospital-acquired infection: A practical guide (2nd Ed.).

CHAPTER 9 MANAGEMENT OF A PATIENT WITH A SUSPECTED / CONFIRMED INFECTIOUS DISEASE IN PRIMARY CARE

9.1 Introduction

As the first line of care in the community, primary care clinics are often the first point of contact with patients. While infections such as upper respiratory tract infections, chickenpox, and hand foot and mouth disease are more commonly seen at the primary care centre, it is important to be aware of emerging infectious diseases (EIDs), such as Middle Eastern Respiratory Syndrome Coronavirus (MERS-CoV), Avian Influenza (e.g. H7N9) and Ebola Virus Disease (EVD). Such pathogens are not normally present in Singapore and understanding travel exposure can help identify a threat early. EID-suspect patients should be quickly identified, isolated, and managed accordingly. In addition, some endemic infections such as varicella, should also be quickly identified and isolated in the primary care setting. Varicella is highly transmissible, and though in most cases, result in relatively mild illness, can cause severe sequelae in some categories of patients. They include pregnant women, neonates, elderly patients with comorbidities, and persons who are immunocompromised.

This chapter describes a process for primary care centres to manage patients with known or suspected infectious conditions during the non-pandemic period. Measures include the use of transmission-based precautions, to reduce the risk of transmission to staff and other patients.

This chapter will not address any specific issue related to COVID-19 response in pandemic care. While the same principles apply, the scale of the response required entails specific interventions. COVID-19 has been addressed in the outbreak response chapter. In the endemic phase it can be incorporated into this guideline.

9.2 The Use of Standard Precautions

Standard Precautions such as hand hygiene, use of PPE should be applied to all patients to minimise the risk of infection from known and unknown sources of infection. As such, all patients who report ARI symptoms should be given a surgical mask for source control.

9.3 Screening Point and Screening Point Criteria

The key to management of a patient with a suspected or confirmed infectious disease is early detection. To facilitate early detection, all patients who visit the primary care centre should be screened for the following conditions:

- Highly pathogenic respiratory infections such as MERS-CoV, and avian influenza;
- Any other infectious disease e.g. Ebola Virus Disease, as and when specified by MOH.

A list of infectious diseases to be considered for screening at the Screening Point is included in Table 9.1 below.

Screening point criteria refer to features such as fever and significant travel history, which alert the staff of the primary care centre to the possibility that the patient may have an infectious disease. Screening point criteria are different from suspect case definition. Suspect case definition refers to specific features spelt out by MOH, which defines the patient as a suspect case for a particular infectious disease. Patients who fulfil suspect case definition for infections e.g. MERS-CoV, will be referred to the hospital for isolation and appropriate management. Table 9.2 summarises the difference between screening point criteria and Suspect Case Definition. Suspect case definitions for specific diseases are described in Table 9.3.

Using screening point criteria, patients, as well as any accompanying persons, should be asked to declare any respiratory symptoms, fever and significant exposure history (e.g. travel to affected countries, close contact with infected persons, high risk occupations etc).

The staff assigned to perform screening should be formally trained and be familiar with the screening point criteria. The staff should ideally don appropriate PPE when attending to patients so that they are protected should an encounter with an infectious patient occur. The PPE requirements for staff managing infectious diseases are listed in Table 9.4.

Screening may be performed by direct questioning for symptoms (e.g. fever, or respiratory symptoms) as well as significant exposure history at the clinic entrance (screening point). The number of questions asked at the screening point depends on which diseases are of concern at that particular point in time. Tools which can aid the screening process would include posters and patient questionnaires.

Patients who report fever or respiratory symptoms should be issued a surgical mask and instructed to keep them on at all times. Any patient who has respiratory symptoms or fever, and significant exposure history and fulfils screening point criteria should be escorted to the Isolation Room (see next section) for further management

9.4 Isolation Area

Ideally, the primary care centre should have a predesignated area, which is used to temporarily isolate and manage any patient who is suspected to have certain infectious diseases. Depending on resources, the isolation room / area could simply be a separate area with natural ventilation, a separate room with a window, or a sophisticated set-up with air extractor fans providing at least 10 air changes per hour, and a negative pressure relative to the surrounding. The isolation room / area in a primary care centre is not intended for overnight patient stay, but rather to segregate a suspect patient and prevent mingling with other patients in the common waiting area, prior to proper assessment by the clinician.

Any patient who fulfils the screening point criteria should be quickly escorted to the isolation room and be attended to promptly by the clinician. The clinician should then assess the patient (via history, physical examination, and only if required, relevant investigations) to see if the patient fulfils suspect case definition.

The attending clinician should be familiar with the suspect case definition criteria, treatment and referral workflow for the management of specific infectious diseases, appropriate use of PPE, and other infection control measures required in the management of the suspect case.

9.5 Clinical Management and Referral to Hospital

All patients who fulfil the suspect case definition criteria are known as suspect cases, and transfer to hospital is warranted. Suspect cases should remain in the isolation room while awaiting transfer to hospital.

In general, medically stable suspect cases of MERS-CoV, avian influenza or EVD should be transferred via dedicated ambulance service (as per instructions from MOH), while medically unstable suspect cases will be transferred via 995 ambulance to the nearest hospital. In the case of the latter, the 995-ambulance operator should be informed that a medically unstable suspect case is being referred.

Primary care centre staff should ensure that they are familiar with the management algorithms and referral workflow of suspect cases for various infectious diseases. Algorithm chart are useful decision support tools.

9.6 Notification

Prior to calling the ambulance, the surveillance duty officer of the MOH Communicable Diseases Division (CDD) should be informed immediately regarding any suspect case.

In accordance with the ID Act, Suspect Cases will be reported immediately to MOH's Communicable Diseases Division by one of the following methods:

- Online submission using the online MD131 Notification of Infectious Diseases Form via the Communicable Diseases Live & Enhanced Surveillance (CDLENS) system at http://www.cdlens.moh.gov.sg
- Faxing the hard copy of the completed MD131 Notification of Infectious Diseases Form to 62215528 or 62215538 or 6221 5567.

9.7 Personal Protective Equipment (PPE)

The attending clinician who manages the patient in the isolation room should don appropriate PPE before entering the Isolation Room. The PPE requirements for staff managing infectious diseases are listed in Table 9.4. Safe doffing processes are also essential.

9.8 Fast Tracking

In principle, patients with infectious diseases who are not sent to hospital (e.g. chickenpox) will be managed quickly and fast-tracked to reduce waiting at subsequent service points (e.g. payment counter and pharmacy) to reduce the risk of infection to other patients or staff.

9.9 Cleaning of medical equipment and isolation room after use by an infectious patient

Patient care equipment such as stethoscopes, blood pressure cuffs etc. should be cleaned with disinfectant wipes. In addition, the immediate surface areas should also be wiped down using an appropriate disinfectant (e.g. NaDCC) or hospital grade disinfectant wipes.

If the room has been used to manage an infectious patient, the room should be disinfected using an appropriate disinfectant (e.g. NaDCC).

9.10 Waste Management

All waste from patients with suspected infectious diseases should be handled as described in Chapter 7 on Environment and Facilities Management.

9.11 Training of Healthcare workers

Clinical as well as non-clinical staff (e.g. registration counter staff, clinic assistants etc.) at primary care centres should be adequately trained with regards to the risks involved in managing a patient with infectious disease, and the use of PPE. They should understand the rationale behind the precautions taken and be familiar with the primary care centre's workflows for management of infectious patients. For example, to facilitate early detection and isolation of patients with possible chickenpox or measles, frontline staff may be trained to recognize patients with rash and fever.

Table 9.1: Examples of Infectious Diseases Requiring Early Identification at the Clinic Screening Point

Infectious Disease	Period of Vigilance	Comment
Coronavirus e.g. MERS-CoV, SARS-COV-2	All year round	There is a reservoir (camels) and sporadic cases of MERS-CoV still seen.
Avian influenza	All year round	Since June 2019, MOH had stood down the enhanced seasonal specific measures against avian influenza A/H7N9 (typically applied between 1 Dec and 30 Jun), that was implemented beyond on-going vigilance for all strains of avian influenza.
Chickenpox	All year round	Severe consequences on vulnerable persons who are immunocompromised, at extremes of age or pregnant.
Herpes Zoster where skin lesions cannot be adequately covered e.g. ophthalmic zoster	All year round	Infectious particles from skin lesions which cannot be covered are aerosolized and transmitted via airborne transmission
Measles	All year round	The virus is highly infectious, transmitted via the airborne route and vulnerable populations include all infants who have yet to complete both doses of MMR Vaccine

EVD	Only when specified by MOH	MOH Circular 231/ 2020, 14 Dec 2020 had notified that general travel from previously affected countries is no longer a criterion. Suspect cases are defined as a symptomatic person with exposure to a confirmed or suspect case of EVD, or his / her body fluids within the past 21 days.

Table 9.2: Comparing Screening Point Criteria and Suspect Case Definition

Screening Point Criteria	MOH Case Definition Criteria
Used by Clinic Screening Point Staff.	Used by attending doctor (who assesses the patient in the Isolation Room)
Needs to be sufficiently broad, and Clinic Screening Point staff are also non-medical.	More specific, as we don't want to send unwarranted cases to the hospital.
If positive, the patient is sent to the Isolation Room.	If positive, the patient is sent to the hospital.

Table 9.3: Example of Screening Point Criteria & Suspect Case Definition for Various Infectious Diseases

Infectious Disease	Screening Point Criteria (used by Screening Point Staff at Clinic Screening Point)	Suspect Case Definition (used by clinician, when assessing the patient in the Isolation Room)
MERS-CoV	Fever AND Travelled to Middle East in the past 2 weeks	(a) A person with clinical signs and symptoms suggestive of pneumonia or severe respiratory infection with breathlessness AND travel to or residence within the last two weeks in the Middle East; OR (b) A person with an acute respiratory illness of any degree of severity who, within two weeks before onset of illness,

Infectious Disease	Screening Point Criteria (used by Screening Point Staff at Clinic Screening Point)	Suspect Case Definition (used by clinician, when assessing the patient in the Isolation Room)
		had close contact with a confirmed case of MERS-CoV, while the case was ill; OR (c) A person who do not fulfil the criteria in (a) and (b) but have fever and respiratory symptoms AND recent exposure in a healthcare facility in the Middle East. MOH Circular 10/ 2016, 10 March 2016. Update on Management and Testing of Suspect Cases of Middle East Respiratory Syndrome (MERS)
Avian Influenza	Fever AND Travelled to areas with recently reported cases of Avian Influenza in the past 6 months	(a) Any individual with clinical signs and symptoms suggestive of pneumonia or severe respiratory infection with breathlessness AND travel to OR residence within the incubation period of the disease in areas with recently reported cases of Avian Influenza in the past 6 months; or (b) Any individual with an acute respiratory illness within the incubation period who had close contact with a confirmed case while the case was ill.
EVD	Reported fever (there is no need to check temperature to minimise physical contact) and exposure to confirmed / suspected case of EVD	A person with fever (>38C) or current history of fever AND has had exposure to a confirmed or suspect case of EVD, or the body fluids (i.e. blood, urine, faeces, tissues, laboratory cultures) of a confirmed or suspect case of EVD, within the past 21 days. MOH Circular 232/ 2020, 14 December 2020: Standing down of Measures for EVD

Table 9.4: PPE Requirements for Specific Infectious Diseases

Infectious Disease	Staff at Screening Point & Staff escorting patient to Isolation Room	Staff attending to patient in Isolation Room	Staff cleaning the Isolation Room after Use
Chickenpox (& other diseases spread via airborne route, e.g. untreated PTB, measles, exposed zoster e.g. ophthalmic zoster)	Surgical mask	AIRBORNE PRECAUTION (unless immune) i.e. Gloves N95 mask Gown / Eye Protection if needed	As per staff attending to patient in Isolation Room
MERS-CoV / Avian Influenza	Surgical Mask	N95 mask Gown Gloves Eye Protection (Visor or Goggles)	As per staff attending to patient in Isolation Room
EVD	Surgical Mask Gloves Avoid unnecessary contact (e.g. do not take temperature, accept verbal report of fever)	N95 mask Gown Gloves Eye Protection (Visor or Goggles)	As per staff attending to patient in Isolation Room

9.12 Recommendations

1. All patients who report a cough or fever should be given a surgical mask to minimise spread of any infection.
2. To facilitate early detection, all patients who visit the primary care centre should be screened for specific infectious diseases (such as MERS-CoV) by asking if they have a fever, respiratory symptoms, and significant travel exposure history.
3. Primary care centres should have a designated room or area, which is used to temporarily hold and manage any patient who is suspected to have certain infectious diseases, to minimise potential spread to other patients.
4. Primary care centre staff should ensure that they are familiar with the Suspect Case Definitions, Management algorithms and Referral workflow of suspect cases for various infectious diseases.
5. All suspect cases should be transferred to hospital, and the MOH Surveillance Duty Officer should be notified immediately followed by timely notification via CDLENS.
6. For patients with infectious diseases who are not sent to hospital (e.g. chickenpox), patient movement should be minimised, and management should be fast-tracked to minimise waiting.

9.13 References

Centers for Disease Control and Prevention. Sequence for PPE Removal. https://www.cdc.gov/hai/pdfs/ppe/ppe-sequence.pdf

MOH Circular 42/2014, 10 November 2014: Update on Ebola Virus Disease Activity and Infection Control Recommendations.

MOH Circular 232/ 2020 , 14 December 2020 : Standing down of Measures for EVD

MOH Circular 32/2019, 19 June 2019. Revision of Control Measures Against Avian Influenza

MOH Circular 10/ 2016 , 10 March 2016 . Update on Management and Testing of Suspect Cases of Middle East Respiratory Syndrome (MERS)

World Health Organisation. Natural ventilation for infection control in health-care settings. WHO guidelines 2009 Online: https://www.who.int/water_sanitation_health/publications/natural_ventilation/en/

WHO. PPE. http://www.who.int/csr/resources/publications/PPE_EN_A1sl.pdf

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