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Ministry of Health

الإدارة العامة لمكافحة عدوى المنشآت الصحية

General Directorate of Infection Prevention and Control in Healthcare Facilities

(GDIPC)

Infection Prevention & Control Guidelines for Adult Intensive Care Units (ICUs)

1st Edition

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In the name of ALLAH, Most Gracious, Most Merciful

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General Director's Message

It gives me immense pleasure to present the 1st Edition of Infection Prevention & Control Guidelines for the adult Intensive Care Units (ICUs) in healthcare facilities. This will serve as a guide for health care providers to ensure effective implementation of infection control measures to ensure the safety of patients & health care workers in the Intensive Care settings.

Critical patient care is one of the areas where improper infection control practices can significantly affect patient's outcomes in terms of morbidity & mortality. As the patients in ICUs are extremely vulnerable to Healthcare-associated Infections (HAIs) due to increased need for invasive devices, decreasing patient immunity & co-morbidities etc., therefore the strict implementation of appropriate infection prevention and control practices in the adult ICU should be emphasized.

These guidelines will serve as a useful guide for infection control practitioners and health care workers to understand & implement infection control standards for better patient's outcomes.

Dr. Khalid H. Alanazi
Director-General,
General Directorate of Infection Prevention & Control in Healthcare Facilities
Ministry of Health
Kingdom of Saudi Arabia

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Contributors:

Mr. Adel Alanazi
Adsualanazi@moh.gov.sa

Dr. Zohair Al Aseri
zohairalaseri@yahoo.com

Dr.Abdulmajid Almutairi
aalmutairi53@moh.gov.sa

Dr.Faizah Rasheed
Fshuja@moh.gov.sa

Mr. Rayed Asiri
raalasiri@moh.gov.sa

Mr. Abdullah Almoaddi
aalmoaddi@moh.gov.sa

Approved by:

Dr. Khalid H. Alanazi

KAI-Enazi@moh.gov.sa

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Table of Contents

Introduction:

The development of adult ICU made the care for more seriously sick patients possible. It allowed utilizing more technically oriented tools to monitor and get information instantly about any changes of the patient's physiological parameters and developed new strategies to save a life.

Simultaneously, with advancement in technology patients also became vulnerable to hospital-acquired infections due to certain risk factors that include impaired host defenses, extremes of age, nutritional status, the severity of illness or injury, underlying diseases such as diabetes, cancer, neutropenia, renal failure, and Invasive devices such as central venous catheters, mechanical ventilators, urinary catheters & emergence of antimicrobial resistance.

These guidelines were developed to provide evidence-based infection control guidelines to ensure the safety of patients & Health Care workers (HCWs) in the adult ICU. This includes a description of the basic components of Infection Prevention & Control (IP&C) program, including the roles and responsibilities of Infection Control (IC) staff, ICU health workforce and the clinical microbiology laboratory staff.

In addition, strategies to reduce Hospital Associated Infections (HAIs) in the ICU, including staff education, transmission-based precautions, and care bundle practices to reduce central line-associated bloodstream infections (CLABSIs) and Catheter-associated Urinary Tract Infections (CAUTI), ventilator-associated Events (VAE) & Multidrug resistance organisms (MDROs) have been described in detail. Reduction of HAIs must be accompanied by effective surveillance for HAIs and MDROs.

Applicability

Infection prevention & Control Team, healthcare epidemiologists, healthcare administrators, nurses & healthcare providers working in adult ICUs.

Responsibility:

Infection Control Team:

- Conduct surveillance of healthcare-associated and device-related infections.
- Monitor and supervise the implementation of Infection Control practices in the Intensive Care Unit.
- Provide ongoing education and training to HCWs.
- Conduct competencies annually as per protocol
- Improve awareness and work practices.

ICU staff:

- Strict adherence to Infection Control practices & care bundles implementation for best patient's outcomes.
- ICU staff must be well trained and competent enough to implement IC measures to ensure the prevention of cross-infection transmission & HAI outbreaks in the ICU setting.

Definitions

Intensive care unit (ICU)

Intensive care units (ICUs) are specialist hospital wards that provide treatment and monitoring for people who are very ill.

Normal Flora

Microorganisms that colonize the skin, mucous membranes, and gastrointestinal tract early in life. They are generally harmless and benefit the host by competitive exclusion of pathogenic organisms.

Colonization

Multiplication of microorganisms in a host without tissue invasion or injury.

Infection

Multiplication of microorganisms in the tissues of a host; infections can be asymptomatic or symptomatic.

Contamination

Presence of microorganisms on or in inanimate objects or transiently transported on body surfaces such as hands.

Precautions

Interventions are implemented to reduce the risk of transmission of microorganisms between individuals.

Isolation

separation of an infected patient from other patients

Cohort

Physical separation of a group of patients infected or colonized with the same organism from those who are not infected or colonized.

Antiseptics

A germicide with an antimicrobial activity designed for use on skin and body tissue.

Intensive Care Unit Design

Spacing in the Intensive Care Units:

- Intensive care units require special space and equipment considerations.
- Separate rooms or cubicles for single patient use shall be no less than 150 square feet (13.94 square meters)
- Multiple bed spaces shall contain at least 130 square feet (12.08 square meters) per bed.

Hand-Washing Stations:

- Handwashing stations shall be conveniently placed to nursing stations and patient bed areas.
- There should be at least one hands-free handwashing sink for every 2- 4 beds in the ICU.
- There should be one hands-free handwashing sink per patient's room.
- The handwashing station should be located near the entrance to the patient cubicle, or room.
- The handwashing station should be sized to minimize splashing water onto the floor
- The handwashing station should be equipped with hands-free operable controls.

Airborne Infection Isolation Room (AIIR):

- ICU should have at least one airborne infection isolation room for each 8 beds
- ICU AIIR should be compatible with the approved requirements and specifications with the exception that there is no need for a separate toilet, bathtub, or shower.

Notes:

- More details refer to MOH guidelines for Airborne Infection Isolation Room (AIIRs.)

Medical store

- The intensive care unit must have separated medical storage areas with adequate capacity.
- Medical storage areas have controlled ventilation with adjusted temperature and humidity (temperature ranges from 22 °C to 24 °C /relative humidity up to 70%).
- Storage shelves are at least, 40 cm from the ceiling, 20 cm from the floor, and 5 cm from the wall.
- Storage shelves are made of easily cleanable material.

- Sterile and clean items are completely separated from personal items.
- No Items are kept in the original shipping boxes, especially in the clinical area.

Medication Preparation Area / Room:

- Intensive care unit must have separated clean area maintained for preparation of medications
- Medication preparation area must be away from patients' treatment areas

Prevention Strategies in ICUs

- Staffing
- Staff immunization
- Staff training
- Standard precaution
- Isolation precautions
- Aseptic technique
- Multidrug-Resistant Organisms (MDROs) management
- Prevention of device-associated infections
- Antimicrobial Stewardship

Infection Prevention and Control in ICUs

Staffing:

- Nurse – to patient ratio must be (1:1 or 1:2) maximum.

Staff vaccination:

According to the CDC, all HCW must receive the following vaccinations (*see* Appendix A):

1. Hepatitis B Vaccine
2. MMR (Measles, Mumps, Rubella) Vaccine for HCW without serologic evidence of immunity or prior vaccination (Documented immunity)
3. Varicella(Chickenpox) vaccine for HCW who have no serologic proof of immunity, prior vaccination or history of varicella disease (Documented immunity)
4. Tdap (tetanus, diphtheria & pertussis) vaccine for HCW without documented immunity.
5. Meningococcal vaccine
6. Influenza vaccine annually
7. COVID -19 vaccine (2 Doses)

Staff Training:

- All HCW in the intensive care unit must have pre-employment training and education on the basics of infection control.
- All HCW in the intensive care unit must receive job-specific infection control training & education according to the nature of work.
- Training must undergo yearly competency assessments to ensure HCWs are competent enough to perform their assigned duties and skills.
- IC Training program must incorporate basic & specialized training for ICU staff. (Hand hygiene, environmental cleaning and disinfection, and use of personal protective equipment, aseptic technique and special care in the intensive care unit etc.)

Standard Precautions:

- Standard precautions are the first step in breaking the cycle of infection and preventing the transmission of microorganisms
- Standard precautions are utilized to protect both healthcare personnel and patients.
- ICU staff must use the standard precaution for all patients, even in the absence of a suspected or confirmed infectious process

Standard Precautions Elements:

1. Hand Hygiene:

- Hand hygiene involves antibacterial soap and water or alcohol-based hand rub and used to remove or kill microorganisms that colonize the hands.

Types of Hand Hygiene:

i. Simple handwashing:
   Washing hands with soap and water.

ii. Antiseptic handwashing:
   Washing hands with antimicrobial soap and water before aseptic techniques.

iii. Antiseptic hand rubbing (or hand rubbing) with 60–80 % alcohol:
   Applying an antiseptic hand rub to reduce or inhibit the growth of microorganisms

5 moments for HH:

- Before patient contact
- Before clean/aseptic tasks
- After body fluid exposure risk
- After patient contact
- After contact with patient surroundings/environment.

Notes:
- The steps of hands washing and hands rub *see* **Appendix B and C**.

- ICU staff should strictly adhere to the five moments of Hand Hygiene.
- Perform hand hygiene before wearing gloves and after removing gloves.
- Perform hand hygiene when moving from a contaminated body site to a clean body site during patient care.
- Perform hand washing when the hands are visibly soiled.
- Perform hand washing before and after examining any patient.
- Perform hand washing after caring for patients with an organism resistant to alcohol-based antiseptics such as **Clostridium Diffcile, Norovirus, & Anthrax etc.**
- Wearing gloves is not a substitute for proper hand hygiene.
- Nails should be short and clean.
- Artificial fingernails are not allowed.
- Jewelry should not be worn on hand or wrists by ICU staff.

2. Cough Etiquette / Respiratory Hygiene:

- All ICU staff must practice cough etiquette when coughing or sneezing.
- Cover nose and mouth with a tissue when coughing or sneezing
- Dispose of tissue after use in the waste receptacle and perform hand hygiene.

Notes:
- Cough Etiquette and Respiratory Hygiene *see* **Appendix D**.

3. Personal Protective Equipment (PPE):

- PPE must be available all times in the Intensive care unit in adequate amounts and proper qualities
- PPE must be available in all sizes to be suitable for all health practitioners in intensive care

3.1. Gloves:

- The type of gloves used depends on the procedure performed
- Should be used for all patients under contact precautions

- Should be used in contact with blood, other body substances or contaminated surfaces or items
- Should be changed between procedures on the same patient.
- Should be removed promptly after use and before contact with other patients
- Use the gloves as needed

3.2. Gown:

- The type of gown to be used depends on the procedure performed
- It should be used for all patients under contact precautions.
- It should be used for all patients when anticipating splashes of blood and body fluids.
- Change the gown between patients and procedures.
- Use the gown as needed
- Disposable gowns should be discarded after use

3.3. Surgical mask:

- Should be used for all patients under droplet precautions
- Use the surgical mask if you expect blood or body fluids splashing
- Change mask between patients
- Change mask if became solid or moist or torn
- Should be used as a part of universal masking during the COVID-19 pandemic.

3.4. High-efficacy respirator (N95):

- A high-efficacy respirator should be used with the patient under airborne isolation.
- A high-efficacy respirator should be used with critical MERS COV, COVID-19 cases.
- A high-efficacy respirator should be used during aerosol-generating procedures (AGPs) for MERS COV, COVID-19 cases and all airborne diseases regardless of the patient's condition, whether it is stable or critical.

3.5. Face Shield\Eye Protection:

- Face shield or goggle should be used if anticipating blood and body fluids to HCW mucous membrane of their eyes.

The Sequence of PPE Donning (*see* **Appendix E**):

- Gown
- Mask
- Goggles or Face Shield
- Gloves

The Sequence of PPE Doffing (*see* **Appendix F**):

- Gloves
- Goggle
- Gown
- Mask

4. Safe Injection Practices:

- Use aseptic technique when preparing and administering injectable medications
- use a sterile single-use disposable syringe and needle for each injection given
- All injection equipment and medication vials should be free of contamination, turbidity, or discoloration
- The sterile package should only be opened immediately before use on the patient and not before that.
- Disinfect the self-sealed rubber cap of a medication vial or an IV solution bottle with approved antiseptic wipes (e.g., alcohol wipes) before access.
- Don't administer medications from the same syringe to multiple patients, even if the needle is changed.
- Don't reuse a syringe to enter a medication vial or solution.
- Use a fluid infusion or administration set (i.e., intravenous tubing) for one patient only
- Used needles should never be recapped, bend, or broken.
- All used sharps should be placed immediately in a puncture-resistant container that is designated for sharp disposal.

5. Environmental Cleaning:

- Environmental cleaning is under housekeeping responsibilities
- In the cleaning procedure, dust should not be dispersed into the air (wet mopping is the only allowed method).
- Scrubbing with a mop and an approved MOH disinfectant/detergent solution should be performed
- Cabinet counters, work surfaces, and similar horizontal areas should be cleaned once a day with an approved MOH intermediate-level disinfectant/detergent
- Walls, windows, storage shelves, and similar non-critical surfaces should be scrubbed periodically with MOH approved low-level disinfectant/detergent solution as part of the general housekeeping program.
- Friction cleaning is important to ensure the physical removal of dirt and contaminating microorganisms.
- Patient room and bathroom should be cleaned daily and after patient discharge.

- Clean or change the curtains for patients not on isolation precaution in a routine schedule and when visibly soiled
- change the curtain for a patient on isolation precaution after the patient is discharged, transferred, or taken out of isolation
- In case of outbreaks, infection control practitioners should supervise all environmental cleaning and disinfection procedures.
- Environmental cleaning should be done according to the approved cleaning schedule and with a cleaning checklist to ensure the quality of the process.
- Environmental terminal cleaning equipment (H2O2 and ultraviolet) are preferred to be used in terminal cleaning.

Transmission-Based Precautions:

- Isolation precautions contain two tiers: Standard Precautions and Transmission-based Precautions
- Transmission-based precaution is designed for patients documented to be or suspected to be infected or colonized with highly transmissible or epidemiologically important pathogens for which additional precautions beyond Standard Precautions are required.

Types of transmission-based Precautions:

1. Contact Isolation Precautions:

- Contact isolation precautions must be used together with Standard Precautions.
- All health care workers in the ICU must be used the Contact isolation precautions when there is a suspected or confirmed diagnosis of an infectious disease that is transmitted by the contact route.
- The patient should be in a single room
- All health care workers in the ICU must wear the appropriate PPE (**Gown-Gloves**) and other PPE as needed when anticipating contact with the patient or the patient's environment
- All health care workers in the ICU must be followed the correct sequences of donning and doffing of PPE.

2. Droplet Isolation Precautions:

- Droplet Isolation Precautions must be used together with Standard Precautions
- All health care workers in the ICU must be used the Contact isolation precaution when there is a suspected or confirmed diagnosis of an infectious disease that is transmitted by the droplet route
- The patient should be in a single room

- All health care workers in the ICU must wear the appropriate PPE (**Surgical Mask**) and other PPE as needed. A surgical mask is required within three (3) feet of the patient
- All health care workers in the ICU must follow the correct sequences of donning and doffing of PPE.

3. Airborne Isolation Precautions:

- Airborne isolation precautions must be used together with Standard Precautions
- All health care workers in the ICU must be used airborne isolation when a patient is suspected or confirmed to have any of the diseases that are spread by the airborne route.
- The patient should be in a single room with a negative air pressure system
- All health care workers in the ICU must wear the appropriate PPE when anticipating contact with a patient or the patient's environment
- A fit-tested respirator particulate mask (**N95 or Higher**) is required for all HCWs who will potentially care for patients in respiratory isolation
- All health care workers in the ICU must follow the correct sequences of donning and define for PPE.

Aseptic technique

- Aseptic technique refers to practices designed to render and maintain objects and areas maximally free from microorganisms and aid in the prevention of surgical site, urinary tract, bloodstream, and pneumonia infections that may be device or procedure-related.
- Clean technique refers to medical aseptic practices that use clean and disinfected or sterile equipment and supplies to reduce the number of microorganisms and minimize the risk of transmission from personnel or the environment to the patient.

1. Components of Aseptic Technique:

A. Appropriate Attire:

- Appropriate attire is based on the risk of the procedure and the area of the hospital where the procedure is performed
- Scrubs are not considered personal protective equipment (PPE).
- HCW performing procedures resulting in splashed or potential exposure to body fluids should wear impervious or fluid-resistant barriers as well as face and eye protection.
- Depending on the aseptic procedure being performed, barriers may include gloves, gown, and hair covering or as per hospital policy on PPE

B. Hand Hygiene:

- Hand decontamination prior to any procedure is an integral step of the process that should be done by the team working in direct contact with the patient, equipment, instruments, and/or sterile field.

C. Skin Antisepsis:

- Use the appropriate recommended antiseptic for each procedure type as well as screening for contraindications such as allergies.
- Antiseptic agents should be used following the manufacturer's direction for use, including ensuring skin is clean before placement as well as antiseptic contact and drying time.

D. Single-use devices, Equipment, and Supplies:

- HCW should maintain the sterile packaging and/or container integrity to ensure an intact seal and confirm that sterilization indicators with an expiration date are verified
- Before use, sterile packages should always be inspected for signs of contamination such as moisture, tears, discoloration, and expiration.
- DO NOT reuse single-use items.

E. Environmental Cleaning:

- Clean and disinfect the environmental surfaces using MOH-approved disinfectants and the use of an efficacious germicidal agent for clean-up of blood or body fluid spills are recommended for controlling the environment to reduce the risk of contamination and microbial transmission in all patient care settings.
- Use clean equipment and supplies (i.e., mops, water, cleaning cloths) for environmental hygiene.
- Use a checklist for training and quality monitoring of operating room cleaning procedures.

2. Clean Technique:

- Wear clean gloves instead of sterile gloves after hand antisepsis where clean technique is indicated
- Use the "no-touch" dressing technique to prevent contamination of sterile dressings, depending on the type and extent of the procedure.
- Use clean gloves for routine changing of surgical site dressings, tracheostomy care, and maintenance of intravascular lines, as long as you use techniques that prevent the transfer of new organisms or movement from one site to another patient.

- Wear a clean gown to minimize contamination of clothing, following standard precaution guidelines (for more details *see* **Table 1 and 2**).

3. Surgical Aseptic Technique Outside the Operating Room (OR):

Settings outside the OR may not have the capacity to follow the same strict level of surgical asepsis applied in the OR. However, the goal to avoid infections remains in all clinical settings.

Using environmental controls to maximize the reduction of microorganisms during surgical procedures is essential.

Such strategies may include the following:

- Use of special treatment or operating rooms.
- Managing activities to reduce airborne transmission if procedures are performed at the bedside.
- Keeping doors closed during procedures.
- Using physical barriers such as screens.
- Diverting traffic in open units.
- Excluding visitors and unnecessary personnel.
- Avoiding cleaning activities in the area during invasive procedures.
- Providing environmental controls such as ventilation to further reduce contamination (for more details *see* **Table 1 and 2**).

Table 1: Examples of suggested techniques by procedure

Procedure/ Intervention	Hand Hygiene Indicated	Type of Personal Protective Equipment to Be Used*	Supplies Indicated	Instrumentation
Wound cleaning	Yes	Clean exam gloves and personal protective equipment as appropriate	Normal saline or prepared sterile wound cleanser. Sterile supplies such as 4 × 4 or cotton applicators	Irrigation performed with sterile device while maintaining clean technique
Routine dressing changes without debridement	Yes	Clean exam gloves and personal protective equipment as appropriate	Sterile supplies using clean technique	Sterile supplies using clean technique
Dressing change with mechanical, chemical, or enzymatic debridement	Yes	Clean exam gloves and personal protective equipment as appropriate	Sterile supplies using clean technique	Sterile supplies using clean technique
Dressing change with sharp, conservative bedside debridement	Yes	Sterile gloves and personal protective equipment as appropriate	Sterile supplies and sterile technique due to the potential for entering new, unaffected tissues	Sterile supplies and sterile technique
Central line dressing change	Yes	Sterile gloves for removing old dressing and new sterile gloves for dressing change procedure	Sterile dressing change kit and sterile technique; surgeon mask should be worn	Sterile supplies and sterile technique
Tracheal suctioning where the tracheal suction catheter is not within a closed sheath	Yes	Sterile gloves, use of personal protective equipment, including face shield or mask when suctioning	Sterile suction catheter	Sterile supplies using clean technique
Tracheostomy care or suctioning with a suction catheter within a closed sheath	Yes	Clean exam gloves and use or personal protective equipment, including face shield or mask	Sterile supplies using clean technique	Sterile supplies using clean technique

(APIC, 2017)

Table 2: Examples of suggested techniques by procedure.

Procedure	Example	Hand hygiene	Gloves	Preparation of patient's skin	Comment
A. Medical Asepsis (Clean Procedures)					
Procedures in which instruments come in contact with intact mucous membranes	1. Bronchoscopy, gastrointestinal endoscopy, tracheal suction	Antibacterial soap and water or alcohol-based hand rub**	Clean	None is required	
	2. Peripheral Intravenous Insertion	Antibacterial soap and water or alcohol hand rub**	Clean	Hospital-approved antiseptics* should be used. Select appropriately for the patient's site.	
	3. Urinary tract catheterization	Antibacterial soap and water or alcohol hand rub**	Sterile	Hospital-approved antiseptics* and rinse with sterile water	DO NOT use alcohol-containing antiseptic
B. Surgical Asepsis (Sterile Procedures)					
I. Procedures in which instruments go through sterile tissue or fluid	1. CVL insertion - CVL wire insertion - Cardiac pacemaker insertion	Surgical hand scrub with antibacterial soap and water or Alcohol surgical hand scrub**	Sterile	Hospital-approved antiseptics* should be used.	"Defatting" agents do not appear to decrease infections and can cause skin irritation
	2. Arterial line insertion	Surgical hand scrub with antibacterial soap and water or Alcohol surgical hand scrub**	Sterile	Hospital-approved antiseptics* should be used.	Most epidemics of infection associated with arterial pressure monitoring devices appear to be caused by hospital-associated contamination of components external to the skin, such as transducer heads or domes; "endemic" IV-related blood-stream infections are frequently associated with skin flora.

*Antiseptics available are:
1. 2% aqueous chlorhexidine gluconate swabs (for CVC insertion in neonates <2 wk and <1500 grams- avoid excessive skin exposure, remove excess CHG with sterile gauze & observe for skin reactions)
2. 2% chlorhexidine in 70% alcohol swabs
3. 10% povidone iodine (swabs or liquid)
4. 70% alcohol (swabs or liquid)

**Hand preparations available are:
1. Antibacterial soap
2. 62%-70% alcohol-based hand rub
3. 2% chlorhexidine in 70% alcohol surgical hand scrub (according to the manufacturer's recommendations)

(The GCC Infection Prevention and Control Manual, 2018)

4. Medication preparation:

- A separate clean area is available for the preparation of medications and away from patients' treatment areas.
- Use only ready-made single-dose sterile solutions for preparation & dilution of medications

- Single-dose or single-use vial is used for a single procedure/injection in a single patient
- single- dose or single-use vial is not stored for future use even on the same patient
- Whenever possible, a multi-dose vial is used for a single patient, with recorded patient's name and date of the first use (when it has been accessed for the first time), and discarded after 28 days unless the manufacturer specifies a different shorter or a longer date (i.e., reuse life).
- If a multi-dose vial is used for more than one patient, it is exclusively kept and accessed in the area specified for the preparation of medications
- Cartridge devices such as insulin pens are used for only one patient.
- The self-sealed rubber cap of a medication vial or an IV solution bottle is disinfected with approved antiseptic wipes (e.g., alcohol wipes) prior to any access.
- IV solution bottles are only accessed through the self-sealed rubber cap after being disinfected.
- IV sets that are used to administer blood, blood products will be replaced every 4 hours
- IV sets that are used to administer lipid emulsions, or dextrose/amino acid Total Parenteral Nutrition (TPN) solutions are replaced within 24 hours of initiating the infusion.
- Sterile solutions are used in nebulizers, humidifiers, or any aerosol-generating system and changed between patients and every 24 hours for the same patient unless the manufacturer of ready-made sterile solutions specifies different dates.
- A peripheral venous catheter must be properly fixed, with a clearly written date of insertion, and to reduce risk of infection and phlebitis, it is replaced - if still needed, but it is not replaced more frequently than every 72 to 96 hours.

Active Screening in the ICU

1. Multi Drug-Resistant Organisms (MDRO):

MDRO's are microorganisms that are resistant to one or more classes of antimicrobial agents.

A. Common MDRO in Intensive Care Units:

According to the Annual Report 2020 for Healthcare-Associated Infection Outbreaks the most infectious agent causing an outbreak were:

- Carbapenem-resistant Enterobacterales (CRE)
- Extended Spectrum Beta-Lactamase(ESBLS)
- Acinetobacter Baumannii complex
- Candida Auris

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B. Management of MDRO-Positive Patients:

- Use contact precautions in addition to standard precautions.
- A patient must be in a single room or can be cohorted with another patient with the same organism.
- Place contact isolation sign on the cubicle or curtain of the patient's bed
- Use dedicated patient-care equipment
- If common use of equipment for multiple patients is unavoidable, clean and disinfect such equipment before use on another patient
- Ensure easy access to PPE and alcohol-based hand rub.
- Notify receiving departments/wards (e.g., Radiology, Endoscopy, OR) of the patient's isolation status when the patient must be transported for treatment/tests, under Transporting Patients on Isolation Precautions
- Ensure that all staff understand and comply with the isolation precautions and hand hygiene protocol
- Ensure concurrent and terminal cleaning of the isolation room and equipment as per housekeeping procedure
- Handle/discard contaminated items as per Standard Precautions.
- If the patient is being transferred to another hospital or healthcare facility while still colonized or infected with an MDRO, the transferring hospital is obliged to inform the receiving hospital of the details of the MDRO in order to ensure proper isolation. EMS and other healthcare providers are involved in transferring.
- Discontinue isolation of MDRO-positive patients after (three) consecutive negative cultures from all previously positive sites. If the first set of samples, which was taken 3 days off antibiotics, is negative, repeat cultures 48 hours later and consultation with the IPs.

C. MRSA Screening

- Must be done for all patients admitted to ICU
- Must be done for all patient Patients undergoing liver or cardiac surgery, organ transplant, continuous ambulatory peritoneal dialysis, hemodialysis patients for creation of access, or orthopaedic prosthesis placement surgery
- Do not screen HCWs or the environment because it is not typically indicated and incurs unnecessary costs

D. Patient at risk of MRSA:

1. Recent hospitalization
2. Residence in a long-term care facility
3. Recent surgery
4. Hemodialysis
5. HIV infection or Immunocompromised.

6. Injection drug use
7. Prior Antibiotic use

E. Management of (MRSA) Positive Patients:

- Microbiology Laboratory should inform ICU for any MRSA-positive patients.
- Notified immediately the in Infection Preventions and control department for any new positive MRSA cultures
- Put the patient in a single room
- Put a contact precautions sign on the outside of the room door
- Apply standard precautions and contact precautions
- Wear (a gown and gloves) when entering the patient's room
- Specific HCW must be identified to provide the service to the patient
- When transferring the patient to another department (e.g., Radiology, OR) notify receiving departments
- Regular cleaning for the patient room.
- Terminal cleaning must be done after patient discharge

F. Discontinuation of Contact Isolation for (MRSA) Positive Patients:

GCC recommendations for discontinuation of contact isolation:

- Discontinue Contact Isolation for (MRSA) Positive Patients by consultation with infection control and physician.

- **Criteria for discontinuing isolation:**
  - Antibiotic therapy is completed at least three days prior to rescreening.
  - Vancomycin levels should be zero prior to rescreening.
  - Three consecutive negative cultures from all previously positive sites. If the first set of samples, which was taken 3 days off antibiotics is negative, repeat cultures 48 hours later.
  - The patient should not be receiving antibiotic therapy at any time during the screening process.

G. MRSA Decolonization Protocol:

Supplies:

1. Chlorhexidine Gluconate (CHG) 4%
2. Mupirocin / Bactroban (only if the organism is Mupirocin-sensitive) per MD orders
3. Clean linens for the bed and patient
4. Personal Protective Equipment (PPE).

Steps:

- Apply Chlorhexidine gluconate 4% solution to the body of the patient (from neck to toes),
- Ensuring coverage of underarms, groin, and between fingers and toes
- Rinse the body of the patient (from neck to toes) with warm water and dry skin with a clean towel
- Change the bed linens and the patient's clothing completely after each bath
- Repeat this process twice a day
- Shampoo hair with the Chlorhexidine solution for 3 days
- Apply Mupirocin/Bactroban ointment to anterior nares (inside nose) after Chlorhexidine treatment, when the patient is dry as ordered by the physician.
- Do not apply Mupirocin to open wounds
- Continue These treatments 7 consecutive days
- Take a complete set of cultures from nares and previously positive sites 72 hrs. after decolonization.
- If the first set of samples is negative repeat cultures 48 hrs. later
- Three negative cultures are required before the patient is cleared of MRSA and can be taken out of isolation.
- These results will be assessed by the IP.

Notes:

- The patient must not be on antibiotics at the time of screening.
- If any swab is positive, stop the screening process until further assessment.
- Please complete all documentation on this form

2. Management Vancomycin-Resistant Enterococci (VRE):

- Screen all patients who are known to be previously VRE positive within the past 6 months or more.
- Screen all patients who are Roommates to VRE-positive patients for more than 48 hours.
- But the suspected VRE patient in a single room
- Apply stander precaution and contact precaution for suspected VRE patient.

Patients at risk of VRE:

- Critically ill patients who have received lengthy courses of antibiotics.
- Solid-organ or bone marrow transplant recipients.
- Patients with hematologic malignancies.
- Health care workers.
- Intestinal colonization.

- Prior long-term antibiotic use
- Mucositis
- Neutropenia
- Indwelling urinary catheters
- Corticosteroid treatment.
- Chemotherapy
- Parenteral nutrition.

A. Sites to be screened:

- Peri-anal area.
- Wounds and catheter exit sites.

B. Management of Positive (VRE) Patients:

- Microbiology Laboratory must be informing the ICU for any VRE-positive patients.
- Inform immediately the Infection Preventions and control department for any new positive VRE cultures
- Put the patient in a single room
- Put a contact precautions sign on the outside of the room door
- Apply stander precaution and contact precaution
- Wear (a gown and gloves) when entering the patient's room
- Staff that will provide care to the patient must be determined.
- When transferring the patient to another department (e.g., Radiology, OR) notify receiving departments
- Regular cleaning for the patient room.
- Terminal cleaning must be done after patient discharge

C. Discontinuation of Contact Isolation for (VRE) Positive Patients:

- Discontinue the Contact Isolation for (VRE)Positive Patients by consultation with infection control and physician
- There must be three consecutive negative cultures from all previously positive sites and stool/peri-rectal swabs. If the first set of sample which was taken 3 days off antibiotics is negative, repeat cultures 48 hours later
- Patients should be off antibiotic therapy for a minimum of 72 hours before the screening.

3. Carbapenem-Resistant Enterobacteriaceae (CRE) Management:

- (CRE) Screening must be done for all patients who are admitted to ICU

  Sites to screen:

  - Peri-anal swabs or rectal.

- Skin sites, wounds or urine (if a urinary catheter is present).

Patient at risk of Carbapenem-Resistant:

1. Prolonged length of ICU stay
2. Previous use of aminoglycoside and carbapenems
3. Surgery
4. Dialysis during ICU stay
5. Mechanical ventilation
6. Malnourishment at ICU admission

A. Management of Positive (CRE) Patients:

- Microbiology Laboratory must be informed the ICU for any CRE-positive patients.
- Inform immediately the in Infection Preventions and control department for any new positive CRE cultures
- Put the patient in a single room
- Put a contact precautions sign on the outside of the room door
- Apply stander precaution and contact precaution
- Wear (a gown and gloves) when entering the patient's room
- Staff that will provide care to the patient must be determined.
- When transfer the patient to another department (e.g., Radiology, OR) notify receiving departments
- Regular cleaning for the patient room.
- Terminal cleaning must be done after patient discharge

4. Clostridium Difficile Infection (CDI) Management:

- Clostridium difficile infection (CDI) is caused by an anaerobic spore-forming gram-positive bacillus
- Microbiology Laboratory must inform ICU staff for any VRE-positive patients.
- Inform immediately Infection Preventions and control department for any new positive VRE cultures
- Put the patient in a single room
- Hand hygiene should be performed using soap and water at the point of care
- Put a contact precautions sign on the outside of the room door
- Apply stander precaution and contact precaution
- Wear (gown and gloves) when entering the patient's room
- Staff that will provide care to the patient must be determined.
- When transfer the patient to another department (e.g., Radiology, OR) notify receiving departments
- Regular cleaning for the patient room at least twice daily.

- Room and bed spaces should be cleaned and decontaminated by using a 1:10 hypochlorite solution agent or other sporicidal hospital approved disinfectant
- Terminal cleaning must be done after patient discharge.

5. Risk of Clostridium Difficile Infection:

1. Advanced age (>60 y)
2. Hospitalization (intensive care unit stays, and prolonged hospital stays)
3. Immune suppression
4. Gastric acid suppression
5. Inflammatory Bowel Disease (IBD)
6. Early emergency general surgery especially who receive 3 or more postoperative antibiotics and those who undergo bowel resections.

Care Bundles for Prevention of Device Associated Infections in ICUs:

A bundle is a structured way of improving the processes of care and patient outcomes. It is a small, straightforward set of evidence-based practices, generally, three to five — that, when performed collectively and reliably, have been proven to improve patient outcomes.

1. Type of Prevention Care Bundles:

- Central line Insertion bundle
- Central line maintenance bundle
- Ventilator bundle
- Urinary catheter bundle

i. Components of Central Line (Insertion) Bundle:

It is a group of evidence-based interventions for patients with intravascular central catheters that, when implemented together, result in better outcomes (reduce BSI) than when implemented individually.

1. Hand hygiene
2. Maximal barrier precautions
3. Chlorhexidine skin antisepsis
4. Optimal catheter site selection, with subclavian vein as the preferred site for non-tunneled catheters.
5. Appropriate draping.
6. Avoid femoral vein catheterization
7. Use ultrasound guidance central vein catheterization technique.

8. Daily review of line necessity, with prompt removal of unnecessary lines.
9. Remove central line if line sepsis is suspected.

A. Hand Hygiene:

Washing hands or using an alcohol-based waterless hand antiseptic helps to prevent contamination of central line sites and resultant bloodstream infections. When caring for central lines, indications for hand hygiene including:

- Before and after palpating catheter insertion sites (Palpation of the insertion site should not be performed after the application of antiseptic unless the aseptic technique is maintained)
- Before and after inserting, replacing, accessing, repairing, or dressing an intravascular catheter.

B. Maximal Barrier Precautions:

- A key change to decrease the likelihood of central line infections is to apply maximal barrier precautions in preparation for line insertion.
- For the operator placing the central line and for those assisting in the procedure.
- Maximal barrier precautions mean strict compliance with hand hygiene and wearing a cap, mask, sterile gown, and sterile gloves.
- The cap should cover all hair and the mask should cover the nose and mouth tightly.
- These precautions are the same as for any other surgical procedure that carries a risk of infection.
- For the patient, applying maximal barrier precautions means covering the patient from head to toe with a sterile drape, with a small opening for the site of insertion.

C. Chlorhexidine Skin Antisepsis:

Chlorhexidine skin antisepsis has been proven to provide better skin antisepsis than other antiseptic agents such as povidone-iodine solutions, the technique, for most kits, is as follows:

- Prepare skin with antiseptic/detergent chlorhexidine 2% in 70% isopropyl alcohol.
- Pinch wings on the chlorhexidine applicator to break open the ampule.
- Hold the applicator down to allow the solution to saturate the pad (sometimes there is no applicator only a swab stick impregnated with the antiseptics).

- Press sponge against the skin, and apply chlorhexidine solution using a back-and-forth friction scrub for at least 30 seconds, do not wipe or blot.
- Allow antiseptic solution time to dry completely before puncturing the site (2 minutes).

D. Optimal Catheter Site Selection:

- Several non-randomized studies show that the subclavian vein site is associated with a lower risk of CLABSI than the internal jugular vein.
- The bundle requirement for optimal site selection suggests that other factors (e.g., the potential for mechanical complications, the risk of subclavian vein stenosis, and catheter-operator skill) should be considered when deciding where to place the catheter.
- In these instances, teams are considered compliant with the bundle element as long as they use a rationale construct to choose the site.
- The physician must determine the risks and benefits of using any vein.

E. Daily Review of Central Line Necessity with Prompt Removal of Unnecessary Lines:

- Daily review of central line necessity will prevent unnecessary delays in removing lines that are no longer needed for the care of the patient. However, it is clear that the risk of infection increases over time as the line remains in place and that the risk of infection decreases if the line is removed when it is not required anymore.

ii. Components of Central Line Maintenance Bundle:

It is a group of evidence-based interventions for patients with intravascular central catheters that, when implemented together, result in better outcomes (reduce CLABSI) than when implemented individually.

a) Hand hygiene before catheter access/manipulation
b) Daily review of catheter necessity with prompt removal of unnecessary lines.

A. Proper Dressing Choice:

1. Use transparent semipermeable dressing
2. Use gauze only if the site is bleeding or oozing

B. Proper frequency of dressing change:

1. Replace transparent dressing every 7 days
2. Replace gauze dressing every 48 hours

3. Replace immediately any dressing that is soiled, dampened, or loosened.

C. Proper Replacement of Administrative Sets:

1. Unless used for blood, blood products or fat emulsions, replace administration sets no more frequently than at 72-hour intervals, but at least every 7 days.
2. If used for blood/blood products. replace administration sets every 4 hours.
3. If used for TPN/ intralipids, replace administration sets every 24 hours.
4. If used for chemotherapy, replace administration sets after each use.
5. Caps are changed no more often than 72 hours or whenever the administration set is changed.

D. Aseptic technique

1. It is for accessing and changing the needleless connector, catheter hubs and injection ports using chlorhexidine 2% (30-second scrub and 30-second air-dry).

E. Use a prepackaged dressing-change kit

F. Replacement of Central Venous Catheters (CVCs), Including PICCs and Hemodialysis Catheters:

1. Do not routinely replace CVCs, PICCs, hemodialysis catheters, to prevent catheter-related infections.
2. Use clinical judgment regarding the appropriateness of removing the catheter if the infection is evidenced.
3. Do not use guidewire exchanges routinely for non-tunnelled catheters to prevent infection.
4. Do not use guidewire exchanges to replace a non-tunnelled catheter suspected of infection.
5. Use a guidewire exchange to replace a malfunctioning non-tunnelled catheter if no evidence of infection is present.
6. Use new sterile gloves before handling the new catheter when guidewire exchanges are performed.

iii. Ventilator Bundle:

A ventilator bundle is a group of evidence-based interventions for patients with a ventilator that, when implemented together, result in better outcomes (reduce VAE including VAP) than when implemented individually.

a) Elevation of the head of the bed to 30-45 degrees if not contraindicated.
b) Daily spontaneous awakening trials and spontaneous breathing trials

c) Early mobility, and physiotherapy
d) Minimization of sedation and avoidance of neuromuscular blockers unless there is a clear indication.
e) Daily assessment of readiness to extubate
f) Daily oral care with chlorhexidine.
g) Deep venous thrombosis (DVT) prophylaxis (unless contraindicated)

iv. Components of Urinary Catheter Bundle:

A urinary catheter bundle is a group of evidence-based interventions for patients with a urinary catheter that, when implemented together, result in better outcomes (reduce CAUTI) than when implemented individually.

a) Avoid unnecessary urinary catheters, not all critically ill, immobile patients need Foley catheters.
b) Insert using the aseptic technique.
c) Maintain catheters based on recommended guidelines (daily care).
d) Review catheter necessity daily and remove promptly.

A. Indications for Placement of Urinary Catheters:

1. Perioperative use for selected surgical procedures
2. Urine output monitoring in critically ill patients
3. Management of acute urinary retention and urinary obstruction
4. Assistance in pressure ulcer healing for incontinent patients
5. As an exception, at patient request to improve comfort (SHEA-IDSA) or for comfort during end of life care (CDC).

B. Proper Placement of Urinary Catheters:

a. A urinary catheter is inserted only by trained personnel following aseptic technique:
   - Perform appropriate hand hygiene practice, immediately before insertion of the catheter.
   - Insert catheters using aseptic technique and sterile equipment, by using:
     - Gloves, a drape, and sponges;
     - Sterile or antiseptic solution for cleaning the urethral meatus; and
     - A single-use packet of sterile lubricant for insertion.
   - Use as small a catheter as possible that is consistent with proper drainage, to minimize urethral trauma.

C. Routine Maintenance of Urinary Catheter:

- Maintain a sterile, continuously closed drainage system.

- Keep catheter properly secured to prevent movement and urethral traction.
- Keep the collection bag below the level of the bladder at all times.
- Maintain unobstructed urine flow.
- Empty collection bag regularly, using a separate collecting container for each patient, and avoid allowing the draining spigot to touch the collecting container.
- Routine hygiene (e.g., cleansing of the meatal surface during daily bathing) is appropriate. Do not clean the per urethral area with antiseptics to prevent CAUTI while the catheter is in place.
- The collection of urine samples should follow the aseptic technique.

Surveillance:

- Surveillance is a systematic method of ongoing collection, consolidation, and data analysis concerning the distribution and determinates of a given disease or event, followed by the dissemination of that information to those who can improve the outcome.
- Surveillance of Healthcare-Associated Infections & MDROs must be conducted in the ICUs for prevention of device associated HAIs (CAUTI, CLABSI, VAEs) & Non-device associated HAIs such as BSI, Pneumonia and UTIs.
- ICU staff must ensure strict implementation of all elements of care bundles as part of process surveillance.

Notes:

- For more details about Surveillance refer to GDIPC, Surveillance Manual of Healthcare Associated infection (HAIs) 1st edition, (2021).

Outbreak Management:

- Outbreak management should be undertaken when there is a significant increase in the rate of infection at a certain body site or with a particular microbe, this involves the identification of common risk factors for transmission or acquisition of infection.
- A review of infection prevention procedures, including compliance with hand hygiene, aseptic techniques, and practices for sterilization and disinfection, should be performed.
- Infected or colonized patients should be rapidly identified and either isolated or cohorted.
- Cohorts should be maintained until all infected and exposed patients are discharged.

Notes:

- For more details about outbreak, refer to GDIPC, Outbreak Management of Healthcare Associated Infection, (2020).

Prevention of Transmission to /and from Health Care Workers:

- Standard Precautions should be applied to minimize the risk of potential infection with blood-borne viruses.
- HCWs should report acute infections; Consultation with staff health clinic should be done to assess the need for sick leave and contact screening and post-exposure management.
- HCWs with exudative or herpetic hand lesions should not have direct patient contact or handle patient care equipment.
- Wearing a mask can prevent the touching of oral lesions.
- HCWs with airborne infections should not work.
- Non-immune HCW with significant exposure to varicella, measles, rubella, or mumps should not work during the latter part of the incubation period because these infections can be transmitted before the onset of symptoms.

Dead Body Management

- All dead bodies must be handled using standard precautions
- Appropriate personal protective equipment should be worn when handling the bodies of the deceased (if exposer to body fluids).
- If the deceased patient was under transmission passed precautions, they should be continued after death.
- In the case of death from highly contagious infectious diseases, relatives should be prevented from direct contact with the dead body.

Sample Collection

- For a stable non-ventilated case, respiratory sampling (NP swab) can be safely performed in a well-ventilated single room equipped if available, with a portable certified HEPA filter
- For sever cases, respiratory sampling (lower respiratory or NP) must be performed in a negative pressure room OR a well-ventilated single room with Portable certified HEPA filter
- Health care worker must wear recommended PPEs (eye protection, isolation gown, clean gloves, N95 mask or PAPR ((If N95 or PAPR are not available use surgical mask with face Shield)

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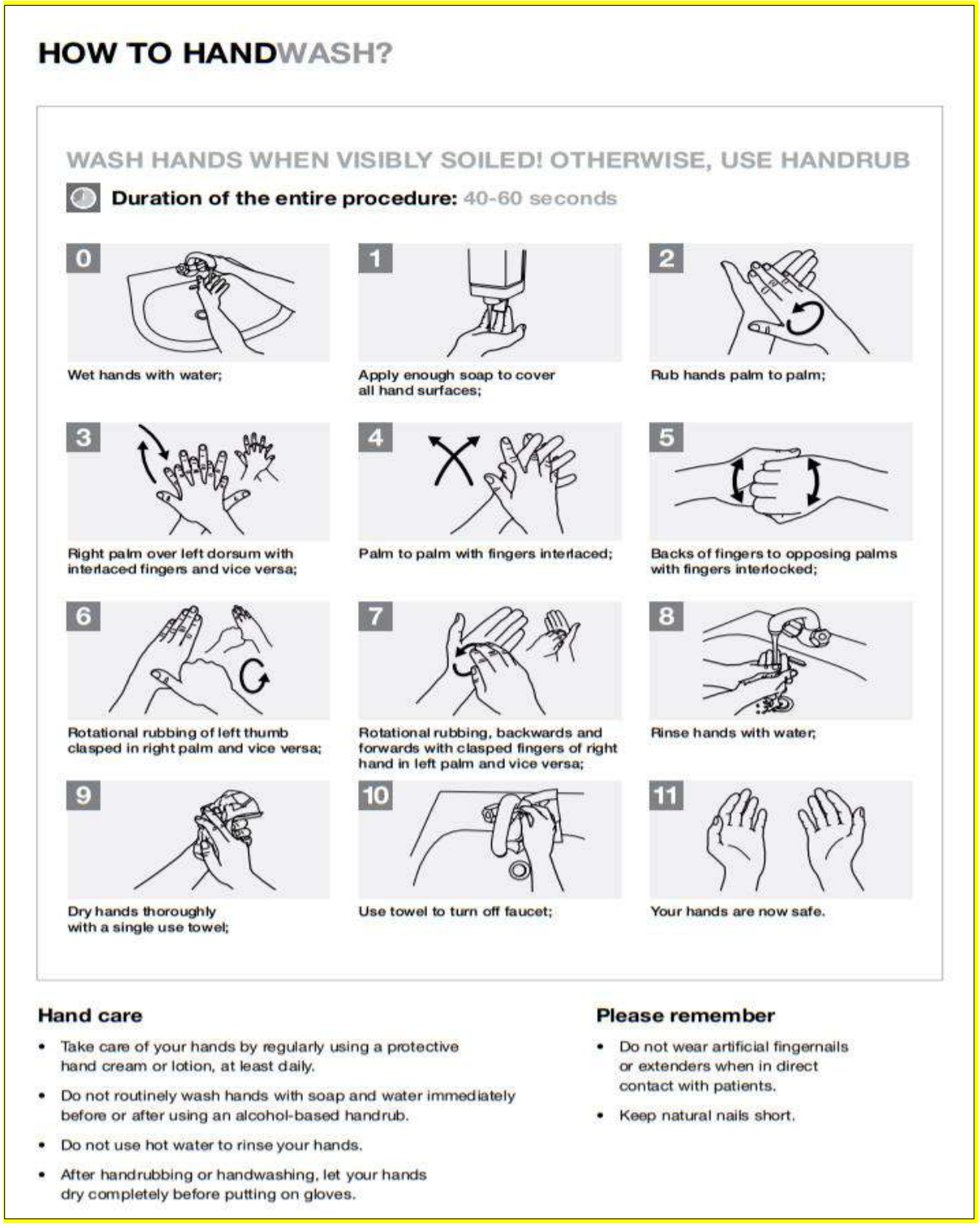
Appendix A: Immunization schedule for health care personal

Vaccine	Indications	Route/ Schedule	Booster dose
Hepatitis B	All health care staff	3 doses intra muscular (I.M) 0,1 month, 6 month	Not recommended
Influenza	All health care staff	1 I.M dose of inactivated injectable vaccine annually	Vaccine repeated annually
MMR (Measles, Mumps, Rubella)	HCP without serologic evidence of immunity or prior vaccination (Documented immunity)	2 doses of MMR 4 weeks apart are given Subcutaneous (S.C)	
Varicella (Chickenpox)	HCP who have no serologic proof of immunity, prior vaccination or history of varicella disease (Documented immunity)	2 doses of varicella vaccine 4 weeks apart are given S.C	
Tdap (tetanus, diphtheria & pertussis)	Persons without documented immunity.	3 doses I.M (0, 1-2 months, 6 months)	o Td booster doses every 10 years o If exposed to a dirty wound regardless of the last booster dose
Meningococcal	Microbiologists who are routinely exposed to isolates of N. meningitidis	Single dose	

Appendix B: WHO Hand wash steps

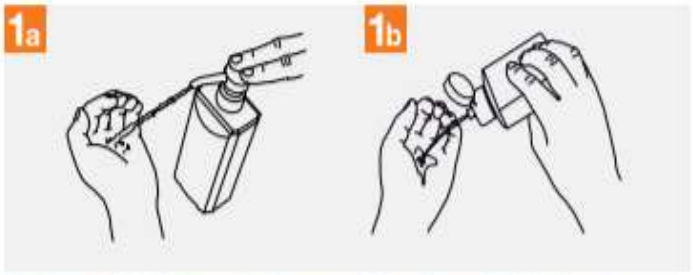


Appendix C: WHO Hand rub steps

HOW TO HANDRUB?

RUB HANDS FOR HAND HYGIENE! WASH HANDS WHEN VISIBLY SOILED

Duration of the entire procedure: 20-30 seconds



Apply a palmful of the product in a cupped hand, covering all surfaces;

Rub hands palm to palm;

Right palm over left dorsum with interlaced fingers and vice versa;

Palm to palm with fingers interlaced;

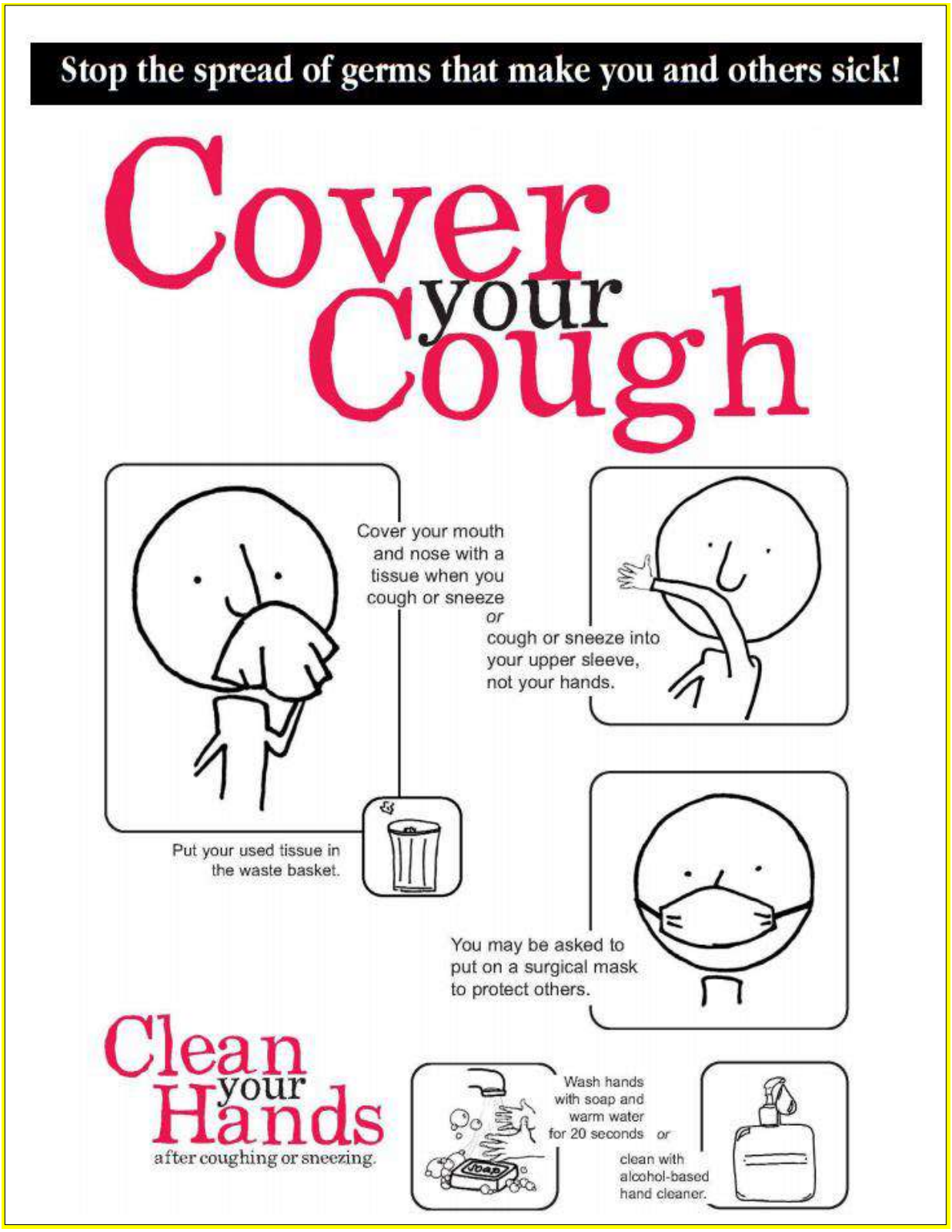
Backs of fingers to opposing palms with fingers interlocked;

Rotational rubbing of left thumb clasped in right palm and vice versa;

Rotational rubbing, backwards and forwards with clasped fingers of right hand in left palm and vice versa;

Once dry, your hands are safe.

Appendix D: Cough Etiquette / Respiratory Hygiene



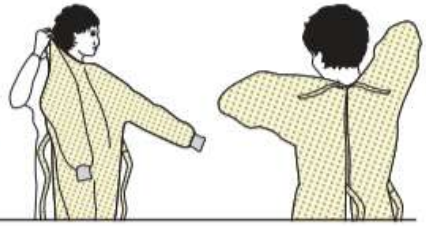
Appendix E: Sequence for putting on personal protective equipment (PPE)

SEQUENCE FOR PUTTING ON PERSONAL PROTECTIVE EQUIPMENT (PPE)

The type of PPE used will vary based on the level of precautions required, such as standard and contact, droplet or airborne infection isolation precautions. The procedure for putting on and removing PPE should be tailored to the specific type of PPE.

1. GOWN

- Fully cover torso from neck to knees, arms to end of wrists, and wrap around the back
- Fasten in back of neck and waist



2. MASK OR RESPIRATOR

- Secure ties or elastic bands at middle of head and neck
- Fit flexible band to nose bridge
- Fit snug to face and below chin
- Fit-check respirator

3. GOGGLES OR FACE SHIELD

- Place over face and eyes and adjust to fit

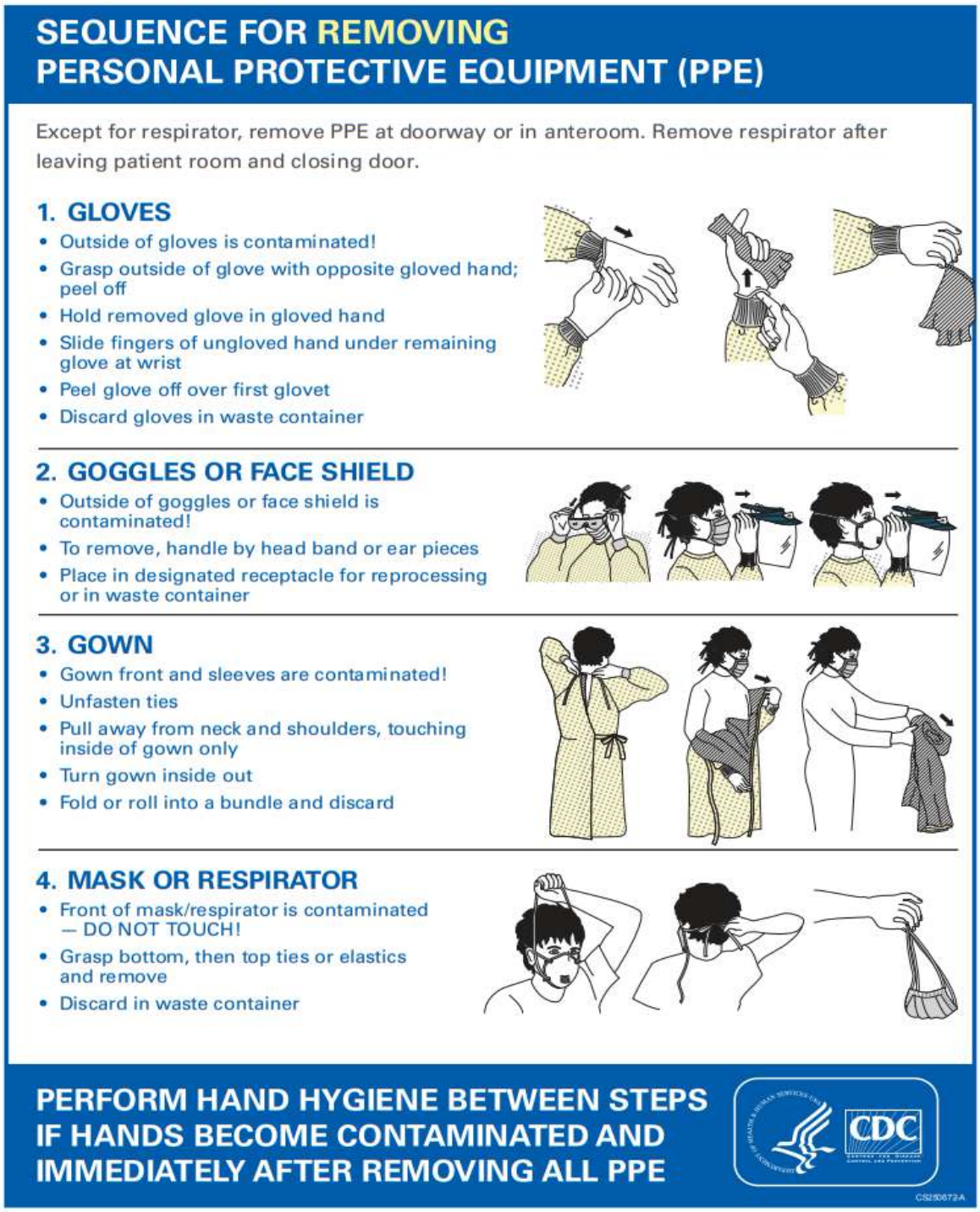
4. GLOVES

- Extend to cover wrist of isolation gown

USE SAFE WORK PRACTICES TO PROTECT YOURSELF AND LIMIT THE SPREAD OF CONTAMINATION

- Keep hands away from face
- Limit surfaces touched
- Change gloves when torn or heavily contaminated
- Perform hand hygiene

Appendix F: Sequence for removing Personal Protective Equipment (PPE)



Appendix G: MRSA decolonization record

MRSA Decolonization Record

START TIME: _____

TREATMENT TIME		CHLORHEXEDINE 4% WASH & SHAMPOO	MUPIROCIN / BACTROBAN OINTMENT	INITIALS
Day 1	AM			
	PM			
Day 2	AM			
	PM			
Day 3	AM			
	PM			
Day 4	AM			
	PM			
Day 5	AM			
	PM			
Day 6	AM			
	PM			
Day 7	AM			
	PM			

SCREENING 1: Day 11 DATE DUE: _____ DONE: _____

SCREENING 2: Day 14 DATE DUE: _____ DONE: _____

SCREENING 3: Day 17 DATE DUE: _____ DONE: _____

COMMENTS:

_____

_____

_____

_____

_____

وزارة الصحة

Ministry of Health

General Directorate of Infection Prevention and Control in Healthcare Facilities
Ministry of Health, Kingdom of Saudi Arabia
Email: gdipc@moh.gov.sa
Visit us at: www.gdipc.sa

Ministry of Health
Assistant Agency for Preventive Health
Ministry of Health Towers, Tower Three, Third Floor,
Riyadh