

Hospital Acquired Infections (HAI) & Concepts in Infection And Prevention Control

Objectives:

- ★ Know different types of HAI and how to prevent them
- ★ Highlight the crucial importance of Hand Hygiene
- ★ Understand different types of Isolation Precautions and how to comply with them.

Color index:

Original text Females slides Males slides
Doctor's notes Textbook Important Golden notes Extra

General Information

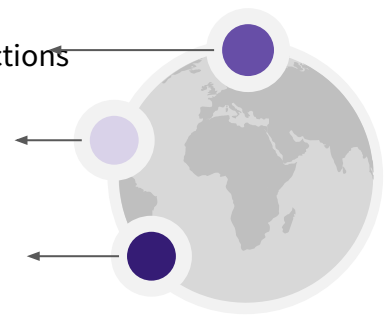
- Also known as Nosocomial infections or Health Care Associated Infections.
- Between 5% and 10% of patients admitted to hospitals acquire one or more HAI
- Causes more serious illness
- Prolonged hospital stay
- Long-term disability
- High personal burden on patients and their families
- High additional financial burden
- Deaths

Estimated Rates of HAI Worldwide

In the developed world; 5–10% of patients acquire one or more infections

In developing countries; It can exceed 25%

In intensive care units; affects about 30% of patients and the attributable mortality may reach 44%



Source of Infection

Endogenous Sources

Such as the skin, nose, mouth, GI tract, or vagina that are normally inhabited by microorganisms (normal flora¹) which are related to the patient himself, like skin and vagina and airway colonisation.

Exogenous Sources

External to the patient such as health care workers (HCW), visitors, patient care equipment, medical devices, or the healthcare environment
The best method to prevent it is washing hands.

Types of HAI



Catheter Associated Urinary Tract Infections (CAUTI)

The most common type.



Surgical site infections (SSI)

2nd most common.



Ventilator Associated Pneumonia (VAP)

3rd most common.



Central line Associated Bloodstream Infections (CLABSI)

4th most common

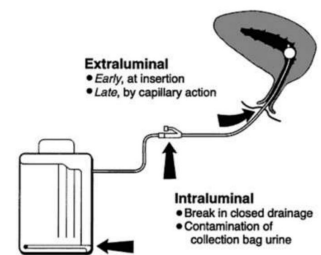
¹: but after admission by 48H it changes to more serious microbes, Clostridium difficile, Staphylococcus aureus (especially MRSA), vancomycin-resistant enterococci and multiresistant Gram-negative organisms are all strongly associated with healthcare contact and are an increasing problem in hospitals worldwide.

◀ Epidemiology

- Most common type of HAI: > 30%
 - Estimated > 500,000 of hospital UTIs annually
- Increased morbidity & mortality
 - Estimated 13,000 attributable deaths annually
 - Leading cause of secondary bloodstream infection with ~10% mortality **through Bacteremia via a focus**.
- Excess length of stay: 2-4 days

◀ Causes

1. **Indwelling urinary catheter**
 - 15-25% of hospitalized patients **have urinary catheter**
 - Often placed for inappropriate indications
 - Physicians frequently unaware:
 - > 50% did not monitor which patients catheterized
 - 75% did not monitor duration and/or discontinuation
2. **Urinary invasive procedures (NOT the routine procedures)**



◀ Risk Factors

Advanced age

Diabetes Mellitus

Pregnancy

Urolithiasis

Severe underlying disease

◀ Pathogenesis of CAUTI

- **Endogenous** (meatal, rectal, or vaginal).
- **Exogenous;** usually via contaminated hands of HCW during catheter insertion or manipulation of the collecting system.

- Formation of biofilms (layers of bacterial colonies that develop resistance for the bacteria) by urinary pathogens is common on the surfaces of catheters and collecting systems
- Bacteria within biofilms are resistant to antimicrobials and host defenses
- Must remove catheter for cure

◀ Diagnostic Criteria

Symptomatic UTI must meet at least 1 of the following criteria:

Fever¹ (38.0C or above), urgency, frequency, dysuria, or suprapubic tenderness

Positive urine culture, that is more than 10⁵ CFU (colony forming unit) per ml, with no more than 2 species of microorganisms, **if it's more than 2 it means that the collection of specimen was not appropriate and there has been contamination of the specimen**



A positive culture of a urinary catheter tip is not an acceptable laboratory test to diagnose UTI

1: fever is important for upper UTI (kidney or ureters) but not lower why? Because sometimes in lower UTI (cystitis) you don't have fever

Prevention: CAUTI Bundle

1	Insert catheters only for appropriate indications	7	Daily revision of need of catheterization
2	Leave catheters in place only as long as needed	8	Hand hygiene
3	Ensure that only properly trained persons insert and maintain catheters	9	Minimize use in all patients, particularly those at higher risk of CAUTI and mortality (Women, elderly and impaired immunity)
4	Insert catheters using aseptic technique and sterile equipment (acute care setting)	10	Avoid its use for management of urinary incontinence
5	Following aseptic insertion, maintain a closed drainage system	11	Use catheters in operative patients only as necessary
6	Maintain unobstructed urine flow	12	Remove catheters ASAP postoperatively, preferably within 24 hours, unless there are appropriate indications for continued use

Surgical Site Infection (SSI)

- **Burden**
 - 17% of all HAI; second to UTI
 - 2%-5% of patients undergoing inpatient surgery
- **Mortality**
 - 3 % mortality
 - 2-11 times higher risk of death
 - 75% of deaths among patients with SSI are directly attributable to SSI
- **Morbidity**
 - long-term disabilities

Causes



1 Inadequate antibiotic prophylaxis *before the surgery.*



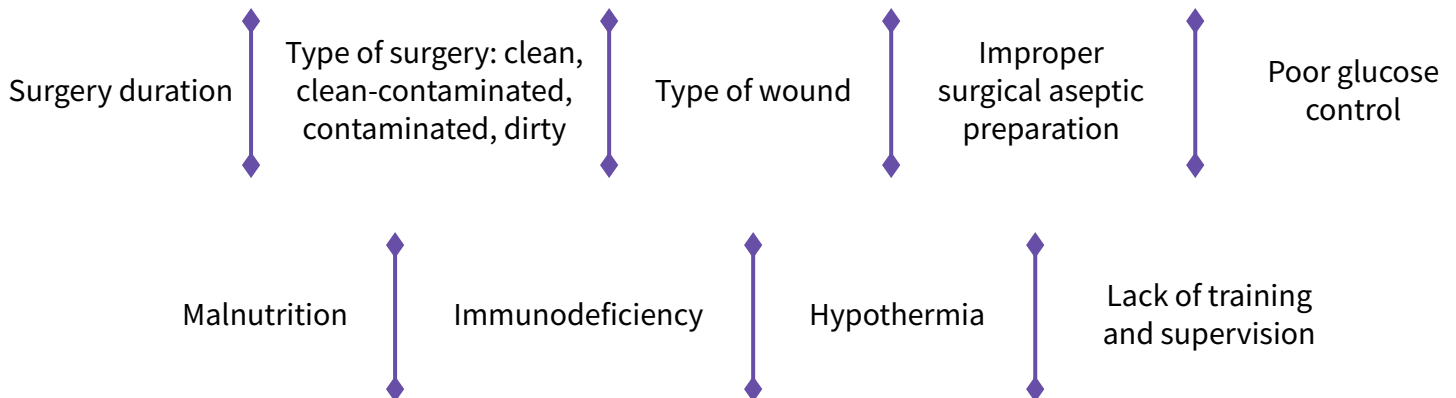
2 Incorrect surgical skin preparation



3 Inappropriate wound care

Surgical Site Infection (SSI)

Risk Factors



Surgical Wound Classification

1

Clean

- Uninfected, no inflammation
- Resp, GI, GU tracts not entered
- Closed primarily
- **Examples:** Ex lap, mastectomy, neck dissection, thyroid, vascular, hernia, splenectomy

2

Clean-contaminated

- Resp, GI, GU tracts entered but controlled
- No unusual contamination
- **Examples:** Chole, SBR, Whipple, liver txp, gastric surgery, bronch, colon surgery, **cholecystectomy.**

3

Contaminated

- Open, fresh, accidental wounds
- Major break in sterile technique
- Gross Spillage from GI tract
- Acute non purulent inflammation
 - **Examples:** Inflamed appendix, bile spillage in chole, diverticulitis, Rectal surgery, penetrating wounds.

4

Dirty

- Old traumatic wounds, devitalized tissue
- Existing infection or perforation
- Organisms present BEFORE procedure
 - **Examples:** Abscess I&D, perforated bowel, peritonitis, wound debridement, positive cultures pre-op.

Surgical Site Infection (SSI)

Superficial SSI

- Infection occurs **within 30 days** after the operative procedure and involves only skin and subcutaneous tissue of the incision
- Purulent drainage from the superficial incision
- Organisms isolated from an aseptically obtained culture of fluid or tissue from the superficial incision
- Often Clinical diagnosis: pain or tenderness, localized swelling, redness, or heat, lack of systemic symptoms (e.g. fever)
- **A negative culture does not rule it out**

VS

Deep SSI

- Infection occurs **within 30 days** after the operative procedure if no implant is left in place **or within 1 year** if implant is in place and the infection appears to be related to the operative procedure
- Involves deep soft tissues (eg, fascial and muscle layers) of the incision
- Clinically may have **abscess** and **fever**.

Pathogenesis of SSI

Endogenous

1. Patient flora **at the operation site.**
 - Skin
 - Mucous membrane
 - GI tract
2. Seeding from a distant focus of infection

Exogenous

1. Surgical Personnel (surgeon and team)
 - Soiled attire
 - Breaks in aseptic technique
 - Inadequate hand hygiene
2. O.R. physical environment and ventilation
3. Tools, equipment, materials brought to the operative field

Microorganisms causing SSI

Important

Staphylococcus aureus	30%	Enterobacter spp	4.2%
Coagulase-negative staphylococci	13.7%	Klebsiella pneumoniae	3.0%
Enterococcus spp	11.2%	Candida spp	2.0%
Escherichia coli	9.6%	Klebsiella oxytoca	0.7%
Pseudomonas aeruginosa	5.6%	Acinetobacter baumannii	0.6%

SSI Epidemiology

- Important Modifiable Risk Factors:
 - Antimicrobial prophylaxis: Inappropriate choice (procedure specific), Improper timing (pre-incision dose) and Inadequate dose based on body mass index, procedures >3h
- Skin or site preparation ineffective
- Colorectal procedures; Inadequate bowel prep/antibiotics
- Inadequate wound dressing protocol
- Improper glucose control
- Colonization with preexisting microorganisms

Surgical Site Infection (SSI)

SSI Prevention Strategies



Preoperative Measures:

Administer antimicrobial prophylaxis in accordance with evidence based standards and guidelines:

- Administer within 30-45 minutes to incision (1-2hr for vancomycin and fluoroquinolones)
- Select appropriate agents on basis of:
 - Surgical procedure
 - Most common SSI pathogens for the procedure
 - Published recommendations
 - Consider increasing dose in obese patients and redosing in long procedures (>3h procedures).

1

Nasal screen and decolonize only **Staphylococcus aureus (MRSA)** carriers undergoing:

- Elective cardiac surgery
- Orthopaedic surgery
- Neurosurgery procedures with implants

Using preoperative mupirocin ointment therapy known as decolonisation.

2

SSI Prevention Bundle

- Shower night before surgery
- Skin preparation in the O.R. by alcohol-based agent
- Good glycemic control during surgery
- Normothermia should be maintained throughout surgery
- Administration of FIO₂ during surgery and after extubation

- Antimicrobial prophylaxis should be administered only when indicated:
 - Certain surgeries only
 - Single preoperative dose 30-45 min before incision
 - Topical antibiotics should not be applied to the surgical site
 - *In clean and clean-contaminated surgery:* No additional prophylactic antimicrobial doses should be given even in the presence of a drain

Central line Associated Bloodstream Infections¹

Definition of CLABSI:

Central line is a line inserted in one of the major vessels that delivers essential fluids to the body.

-Direct: in IJV or femoral or subclavian veins.

-Tunneled: for dialysis and chemotherapy.

- Laboratory-confirmed bloodstream infection by a positive blood culture that's not secondary to any infection.
- Not related to an infection at another site
- Develops at least after 48 hours of a central line placement

The most common site is the **femoral central lines**²

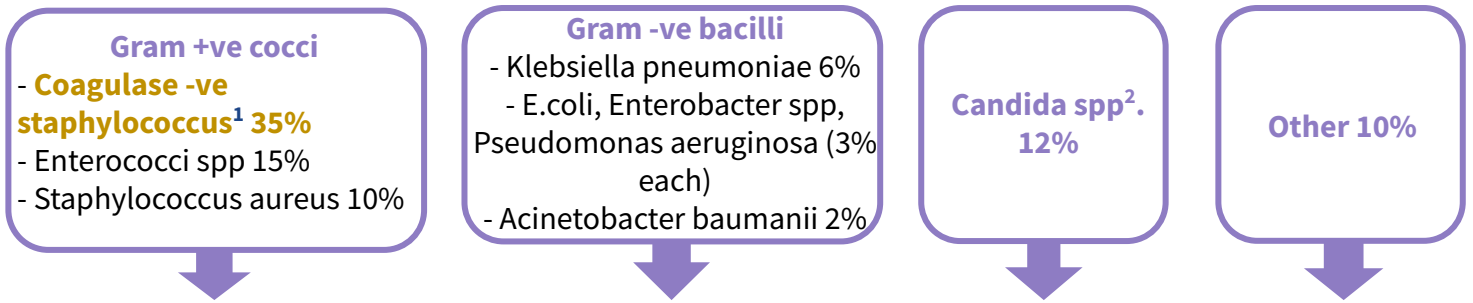


1: Infection is more common in temporary catheters inserted into the groin or jugular vein than in those in the subclavian vein. Tunnelled catheters, e.g. Hickman catheters, may also develop tunnel site infections.

2: Femoral has the highest risk for infection compared to other sites, because the groin area is close to the genitals and the presence of skin folds which normally is dirtier than other flat skin. However, it has less risk for pneumothorax and is much easier to insert.

CLABSI

CLABSI Microorganisms



CLABSI Treatment

- Removal of central line (especially in cases of MDRs, candida, MRSA.) We can keep the central line in some cases of noninvasive infections (e.g. CoNS in patients with bleeding tendency) but we have to give “antibiotic lock”, which are the same concept as flushing with saline but this one with antibiotics. But as a general rule you have to remove the central line. What if he needs it? Insert it in another site (Don’t change the guide wires).
- Antimicrobial therapy
 - Type and duration depends on culture results, type of organism, complicated disease
 - **e.g. of antibiotics used:** Vancomycin, cloxacillin, cefazolin, piperacillin/tazobactam, cefepime, ceftazidime, carbapenems, Aminoglycosides, colistin,

CLABSI Prevention Bundle

1. Prevention Guidelines During Insertion:

- Hand hygiene before wearing gloves
- Strict aseptic technique by maximal sterile barrier precautions including a full-body drape
- Use of 2% chlorhexidine skin preparations for disinfecting/ cleaning skin before insertion
- Ultrasound guidance by an experienced personnel and reduce the number of attempts
- Avoid the femoral vein, prefer the subclavian vein
- Promptly remove any central line that is no longer required
- Replace central lines placed during an emergency (asepsis not assured) as soon as possible or at least within 48 hours
- Use a checklist

2. Prevention Guidelines During Maintenance:

- Disinfect catheter hubs injection ports, and connections before accessing line
- Replace administration sets other than sets used for lipids or blood products every 96 hours
- Assess the need for the central line daily

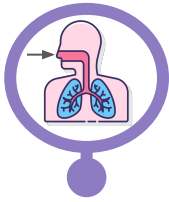
1: Treated by removing the line and providing 5-7 days therapy OR in case of tunneled catheters treat empirically e.g. vancomycin with or without the use of antibiotic-containing lock therapy to the catheter for approximately 14 days. For other organisms treatment involves catheter removal, followed by 14 days of antimicrobial therapy.

2: Common cause of line infections, particularly in association with total parenteral nutrition.

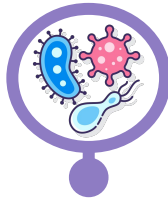
- VAP is one of the most common infections acquired by adults and children in intensive care units **that's 48 hours after intubation.**
- Affects critically ill patients
- VAP is a cause of significant morbidity and mortality, increased utilization of healthcare resources
- The mortality attributable to VAP exceed 15%

Pathogenesis and Risk Factors for VAP

The 3 common mechanisms:



Aspiration of secretions
From upper airways or GI reflux.



Colonization of the aerodigestive tract



Use of contaminated equipment

VAP Prevention Bundle



1. Prevent Aspiration of Secretions:

Maintain elevation of head of bed (HOB) 30-45 degrees

- Avoid gastric over distention
- Avoid unplanned extubation and re-intubation
- Use cuffed endotracheal tube with in-line or subglottic suctioning
- Encourage early mobilization of patients with physical/occupational therapy

2. Reduce Colonization of Airway and Digestive Tract:

- Use cuffed Endotracheal Tube with inline or subglottic suctioning
 - Minimizes secretions above cuff; prevents contamination of lower airway.
- Avoid acid suppressive therapy for patients not at high risk for stress ulcer or stress gastritis
 - Increases colonization of the digestive tract.

3. Reduce Duration of Ventilation:

- Conduct "sedation vacations"
- Assess readiness to wean from vent daily
- Conduct spontaneous breathing trials

4. Prevent exposure to contaminated equipment **by using closed-circuit for ventilator.**

Most Frequent Sites of Infection and Their Risk Factors

URINARY TRACT INFECTIONS 34%

- **Urinary catheter**
- **Urinary invasive procedures**
- Advanced age
- Severe underlying disease
- Urolithiasis
- Pregnancy
- Diabetes

LOWER RESPIRATORY TRACT INFECTIONS 13%

- **Mechanical ventilation**
- **Aspiration**
- **Nasogastric tube**
- Central nervous system depressants
- Antibiotics and antacids
- Prolonged healthcare facilities stay
- Malnutrition
- Advanced age
- Surgery
- Immunodeficiency

SURGICAL SITE INFECTIONS 17%

- **Inadequate antibiotic prophylaxis**
- **Incorrect surgical skin preparation**
- **Inappropriate wound care**
- Surgical intervention duration
- Type of wound
- Poor surgical asepsis
- Diabetes
- Nutrition state
- Immunodeficiency
- Lack of training and supervision

BLOOD INFECTIONS 14%

- **Vascular catheter**
- **Neonatal age**
- **Critical care**
- Severe underlying disease
- Neutropenia
- Immunodeficiency
- New invasive techniques
- Lack of training and supervision



All have a common risk factor: lack of hand hygiene

Prevention of Hospital Acquired Infections

Validated and standardized prevention strategies have been shown to reduce HAI

At least 50% HAI could be prevented

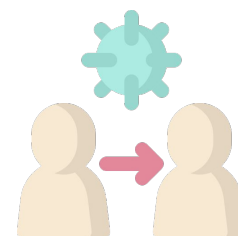
Most solutions are simple and not resource-demanding and can be implemented with ease by all HCW

- Hand hygiene
- Bundles
- Compliance with isolation precautions
- Annual influenza vaccination
- Annual TB screening: TST, IGRA
- UpToDate with vaccinations: HBV Ab titre above 10, MMRV, Td

SEQUENCE FOR PUTTING ON PERSONAL PROTECTIVE EQUIPMENT (PPE)	SEQUENCE FOR REMOVING PERSONAL PROTECTIVE EQUIPMENT (PPE)
<p>The use of PPE will only be based on the level of precautions required, such as contact and contact. Always use appropriate infection control procedures. The procedure for getting in and removing PPE should be followed to the specific level of PPE.</p> <p>1. GOWN</p> <ul style="list-style-type: none"> • Fully cover torso from neck to knees, arms to end of wrists, and wrap around the back • Fasten in back of neck and waist <p>2. MASK OR RESPIRATOR</p> <ul style="list-style-type: none"> • Secure ties or elastic bands at middle of head and back • Fit flexible band to nose bridge • Fit snug to face and below chin • Fit check respirator <p>3. GOGGLES OR FACE SHIELD</p> <ul style="list-style-type: none"> • Place over face and eyes and adjust to fit <p>4. GLOVES</p> <ul style="list-style-type: none"> • Extend to cover wrist of isolation gown 	<p>Except for respirator, remove PPE at doorway or in anteroom. Remove respirator after leaving patient room and closing door.</p> <p>1. GLOVES</p> <ul style="list-style-type: none"> • Outside of gloves is contaminated • Grasp outside of glove with opposite gloved hand, peel off • Hold removed glove in gloved hand • Slide fingers of ungloved hand under remaining glove at wrist • Peel glove off over first glove • Discard gloves in waste container <p>2. GOGGLES OR FACE SHIELD</p> <ul style="list-style-type: none"> • Outside of goggles or face shield is contaminated • To remove, handle by head band or ear pieces • Place in designated receptacle for reprocessing or in waste container <p>3. GOWN</p> <ul style="list-style-type: none"> • Gown front and sleeves are contaminated • Untie or unfasten • Pull away from neck and shoulders, touching inside of gown only • Turn gown inside out • Fold or roll into a bundle and discard <p>4. MASK OR RESPIRATOR</p> <ul style="list-style-type: none"> • Front of mask/respirator is contaminated • DO NOT TOUCH • Grasp bottom, then top ties or elastics and remove • Discard in waste container
<p>USE SAFE WORK PRACTICES TO PROTECT YOURSELF AND LIMIT THE SPREAD OF CONTAMINATION</p> <ul style="list-style-type: none"> • Do not touch your face • Avoid surfaces touched • Change gloves when seen or heavily contaminated • Perform hand hygiene 	<p>PERFORM HAND HYGIENE BETWEEN STEPS IF HANDS BECOME CONTAMINATED AND IMMEDIATELY AFTER REMOVING ALL PPE</p>

A microorganism may be spread by a single or multiple routes.

- Contact, direct or indirect
- Droplet
- Airborne
- Vector-borne (usually arthropod) and
- Common environmental sources or vehicles includes:
 - food-borne and waterborne, medications e.g., contaminated IV fluids



Hand Transmission

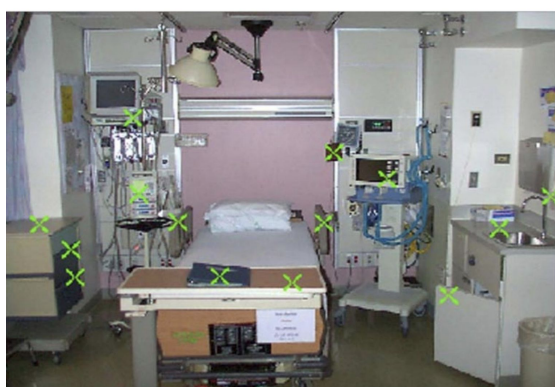
- Hands are the most common vehicle to transmit healthcare associated pathogens
- Transmission of microbiological organisms from one patient to another via HCW hands

Why Should You Clean Your Hands?

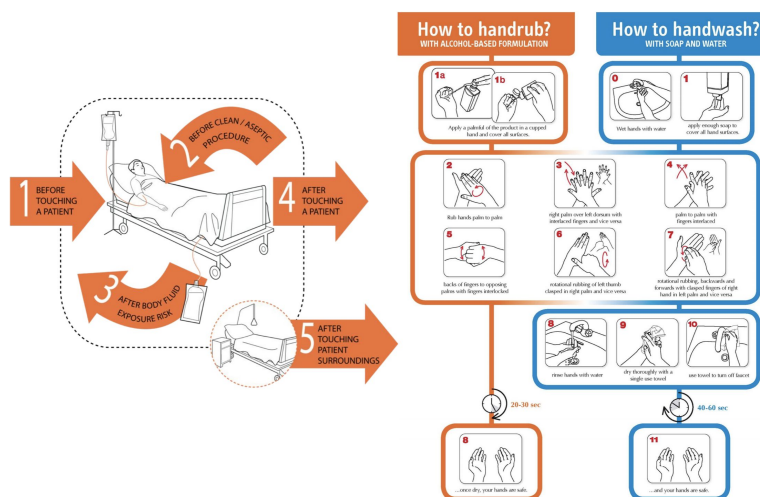
- Any HCW involved in health care needs to be concerned about hand hygiene
- Other HC workers (e.g. your colleagues and seniors) hand hygiene concerns you as well
- You must perform hand hygiene to:
 - protect the patient against harmful microbes in your hands or present on your skin
 - protect yourself and the healthcare environment from harmful microbes



Bacteria Isolated Everywhere (e.g. VRE)



Five Moments of Hand Hygiene¹ (Important)



How to Clean Your Hands?

1. Handrubbing with alcohol-based handrub is the preferred routine method of hand hygiene if hands are not visibly soiled
2. Handwashing with soap and water – essential when hands are visibly dirty or visibly soiled (following exposure to body fluids) and after certain diseases e.g. *C. difficile* as they are spore forming bacteria that don't get disinfected by alcohol.

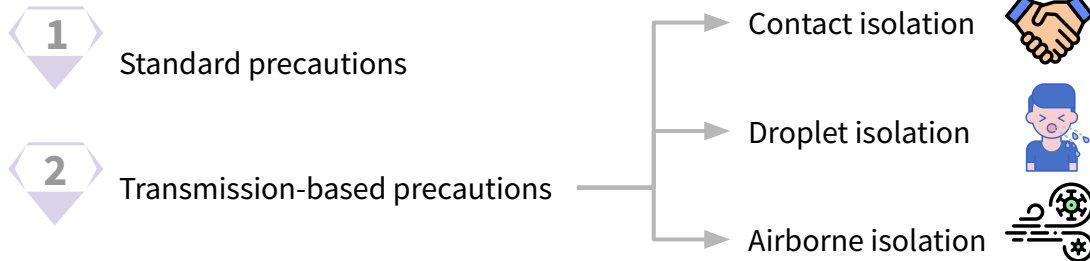
Hand Hygiene and Glove Use

- The use of gloves does not replace the need to clean the hands and one glove is only for one patient.
- Remove gloves to perform Hand hygiene, when an indication occurs while wearing gloves
- Wear gloves only when indicated, otherwise they become a major risk for germ transmission

¹ Decontamination with alcohol gel is equal to hand-washing with soap but hand-washing is required after any procedure that involves more than casual physical contact, or if hands are visibly soiled. Also in cases where *C. difficile* is high (e.g. a local outbreak), alcohol gel decontamination between patient contacts is inadequate as it does not kill *C. difficile* spores, and hands must be washed.

Types of Isolation Precautions

Types of Isolation Precautions



Contact Precautions

- Infections spread by direct or indirect contact with patients or patient-care environment –C. difficile, MRSA, vancomycin-resistant enterococci (VRE), extended-spectrum β -lactamases (ESBL), carbapenemase-producing Enterobacteriaceae (CRE) and MDR GNR and some viruses e.g. COVID-19.
- Limit patient movement
- Private/single room or cohort with patients with same infection
- Wear disposable gown and gloves when entering the patient room
- Remove and discard used gown and gloves inside the patient room
- Wash hands immediately after leaving the patient room
- Use dedicated equipment if possible (e.g., stethoscope)

CONTACT PRECAUTIONS
 Visitors must report to Nursing Station before entering.

- Perform hand hygiene before entering and before leaving room.
- Wear gloves when entering room or cubicle, and when touching patient's intact skin, surfaces, or articles in close proximity.
- Wear gown when entering room or cubicle and whenever anticipating that clothing will touch patient items or potentially contaminated environmental surfaces.
- Use patient-dedicated or single-use disposable shared equipment (BP cuff, thermometer) between patients.

PRECAUCIONES DE CONTACTO
 Los visitantes deben presentarse primero al puesto de enfermería antes de entrar. Lávese las manos. Póngase guantes al entrar al cuarto.

CONTACT PRECAUTIONS

To prevent the spread of infection, ANYONE* ENTERING THIS ROOM **MUST WEAR**:

- Gloves ✓
- Gown ✓

Applies whether or not contact with the patient or the patient's environment is anticipated.
 *Patient-visitors do not need to wear gloves and a gown, but must wash hands upon entering and leaving this room.

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Droplet Precautions

DROPLET PRECAUTIONS
 Visitors must report to Nursing Station before entering.

- Perform hand hygiene before entering and before leaving room.
- Wear mask when entering room (nose and mouth can be visible).
- Distance (stay, not enter). No debe entrar al espacio.

PRECAUCIONES DE GOTAS DIMINUTAS
 Los visitantes deben presentarse primero al puesto de enfermería antes de entrar. Lávese las manos. Póngase máscara al entrar al cuarto. No debe entrar al espacio.

DROPLET PRECAUTIONS

To prevent the spread of infection, ANYONE ENTERING THIS ROOM **MUST WEAR**:

- Surgical Mask ✓

N-95 Respirators should **not** be used for personal protection of patients in droplet precautions.

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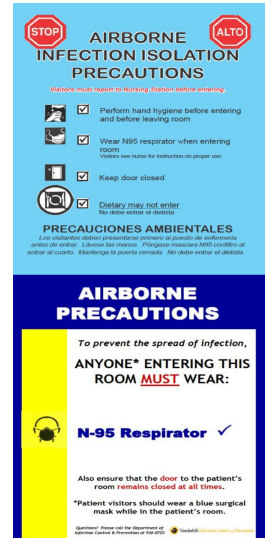
- Reduce the risk of transmission by large particle droplets (larger than 5 μ in size)
- Requires close contact between the source person and the recipient
- Droplets usually travel 3 feet or less
- E.g. MERS-CoV, SARS-CoV-2 (non severe and no aerosol generating procedures AGP) influenza other respiratory viruses, adenovirus, RSV, rubella, parvovirus B19, mumps, H. influenzae, and N. meningitidis
- A private/single room or cohort with patient with active infection with same microorganism
- Use a mask when entering the room especially within 3 feet of patient
- Limit movement and transport of the patient. Use a mask on the patient if they need to be moved and follow respiratory hygiene/cough etiquette

Types of Isolation Precautions

Airborne Precautions



- **Tuberculosis**, measles, varicella, MERS-CoV (severe), COVID-19 or AGP
- Place the patient in an **airborne infection isolation room (AIIR)**
- **Negative Pressure** should be monitored with visible indicator
- Use of respiratory protection (e.g., fit tested N95 respirator) or powered air-purifying respirator (PAPR) when entering the room
- Limit movement and transport of the patient.
- Use a mask on the patient if they need to be moved
- Keep patient room door closed, do not open anteroom door till other door closed



Summary of precautions for patients with COVID-19

Personal Protective Equipment	Close patient contact (within 2m)	Enter room but no contact with patient or environment	Cleaning room/area (Domestic staff)	Aerosol generating procedures
Gown	✓	✗	✓	✗
Surgical mask	✓	✓	✓	✗
Long sleeved disposable gown	✗	✗	✗	✓
Fit Tested N95 respirator	✗	✗	✗	✓
Eye protection (goggles, face shield)	Risk assess	✗	✗	✓
Gloves	✓	✗	✓	✓

Safe injection practices

1

Safe needle practice

2

Reporting of needle stick and sharp injuries to infection control department

Serologies and Vaccination

- HBSAB titre (above 10)
- VZV
- MMR
- Td
- Seasonal Influenza Vaccine
- COVID-19 vaccine

Summary



Endogenous Sources



Such as the skin, nose, mouth, GI tract, or vagina that are normally inhabited by microorganisms (normal flora)

Exogenous Sources



External to the patient such as health care workers (HCW), visitors, patient care equipment, medical devices, or the healthcare environment

Source of Infection

Types of HAI

Catheter Associated UTI (CAUTI)

Causes : indwelling urinary catheters , invasive urinary procedure

Risk factors : age , DM , pregnancy , urolithiasis , severe underlying disease

Diagnostic criteria : symptomatic UTI has to meet at least 1 of the following :

- Fever (38C or above), urgency, frequency, dysuria, or suprapubic tenderness
- Positive urine culture, that is $>10^5$ CFU/ml, with no more than 2 species of microorganisms

Central line Associated Bloodstream Infections (CLABSI)

Laboratory-confirmed bloodstream infection by a positive blood culture That is not related to an infection at another site

★ Develops at least after 48h of a central line placement

The most common site is the **femoral central lines**

Treatment : removal of central line + antibiotics

Prevention : Use of 2% chlorhexidine skin preparations before insertion

+ Replace central lines placed during an emergency within 48h + US guidance + replace with new set every 96h

Surgical site infections (SSI)

Causes : Inadequate antibiotic prophylaxis , Incorrect surgical skin preparation , Inappropriate wound care

Risk factors : surgery duration , types of surgery & wound , malnutrition , immunodeficiency , poor glucose control

Surgical wound classification :

- Clean → lap, mastectomy, neck dissection, thyroid, vascular, hernia, splenectomy
- Clean-contaminated → Chole, SBR, Whipple, liver txp, gastric surgery, bronch, colon surgery.
- Contaminated → Inflamed appendix, bile spillage in chole, diverticulitis, Rectal surgery, penetrating wounds.
- Dirty → Abscess , perforated bowel, peritonitis, wound debridement.

Preoperative preventative measures :

- antimicrobial prophylaxis 30-45 min prior to surgery (1-2h for vancomycin & fluoroquinolones)
- decolonize staph aureus in cardiac , orthopedic and neuro surgeries Using preoperative mupirocin ointment therapy

Ventilator associated Pneumonia (VAP)

3 common mechanisms :

- Aspiration of secretions
- Colonization of the aerodigestive tract
- Use of contaminated equipment

Prevention :

- prevent aspiration : Maintain elevation of head of bed (HOB) 30-45 degrees
- Reduce colonization : Use cuffed endotracheal tube with subglottic suctioning
- Reduce duration of ventilation
- Prevent exposure to contaminated equipment

Lecture Quiz

Q1: A 64-year-old woman presents to the emergency room with flank pain and fever. She noted dysuria for the past 3 days. Blood and urine cultures are obtained, and she is started on intravenous ciprofloxacin. Six hours after admission, she becomes tachycardic and her blood pressure drops. Her intravenous fluid is normal saline (NS) at 100 mL/h. Her current blood pressure is 79/43 mm Hg, heart rate is 128/min, respiratory rate is 26/min, and temperature is 39.2°C (102.5°F). She seems drowsy yet uncomfortable. Extremities are warm with trace edema. What is the best next course of action?

- A. Administer IV hydrocortisone at stress dose.
- B. Begin norepinephrine infusion and titrate to mean arterial pressure greater than 65 mm Hg.
- C. Add vancomycin to her antibiotic regimen for improved gram-positive coverage.
- D. Administer a bolus of NS.
- E. Place a central venous line to monitor central venous oxygen saturation

Q2: A 48-year-old man is admitted to your service after an inhalational chemical exposure. He develops respiratory distress and requires endotracheal intubation and mechanical ventilation. Which of the following is the best way to decrease his risk of developing ventilator-acquired pneumonia?

- A. Daily interruption of sedation to assess respiratory status
- B. Nasopharyngeal rather than oropharyngeal endotracheal intubation
- C. Institution of protocol to keep bed flat during ventilation
- D. Intermittent nasopharyngeal suctioning
- E. Prophylactic broad-spectrum intravenous antibiotics

Q3: You are covering a busy hospital service at night when you are paged to evaluate a 78-year-old man with sudden onset of dyspnea. A review of the patient's chart reveals that he was diagnosed with small cell lung cancer 2 months earlier. He was subsequently treated with radiation therapy and chemotherapy. He was admitted to the hospital 3 days earlier with a suspected pathologic fracture of the right femur. He has no other known metastases. Thirty minutes ago he became acutely short of breath. Current vital signs include a heart rate of 115 beats/min, blood pressure of 92/69 mm Hg, and respiratory rate of 32/min. Oxygen saturation is 94% on 4 L of oxygen via nasal cannula. He is anxious and tachypneic, but lung sounds are clear and symmetric. The heart rhythm is regular and no murmurs are appreciated. What is the best next step in the management of this patient?

- A. Immediately administer empiric antibiotics for coverage of hospital-acquired pneumonia.
- B. Immediately administer therapeutic dose of intravenous heparin.
- C. Arrange for synchronized electrical cardioversion.
- D. Order a ventilation/perfusion (V/Q) scan of the chest.
- E. Administer a benzodiazepine.

THANKS!!

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*Send us your feedback:
We are all ears!*



اللهم ارحم مي بابعير ونجود المطيري واغفر
لهم وأنس وحشتهم ووسع قبورهم، اللهم اجعل
عيدهم في الجنة أجمل، اللهم اجعل قبورهم
روضةً من رياض الجنة، ولا تجعلها حفرةً من
حفر النار. اللهم ارحمهم رحمةً تسع السماوات
والارض، اللهم اجعل قبورهم في نور دائم لا
ينقطع واجعله في جنتك آمنًا مطمئنًا يارب
العالمين. اللهم افسح لهم في قبرورهم، مدّ
ابصارهم، وافرش قبورهم من فراش الجنة،
اللهم ارحمهم. يا الله أنت المحيي وأنت كذلك
المميت، اللهم إنا لا نعترض على قضائك
ونسألك أن تجعله نورا وضياءا على موتانا و
من يسكنون قبورهم من قبله، اللهم أرهم منازلهم
بجنتك، وأكرمهم بحسن الصحبة والعمل الصالح
الذي ارتضيته منهن في حياتهن وسرهن
وعلنهن