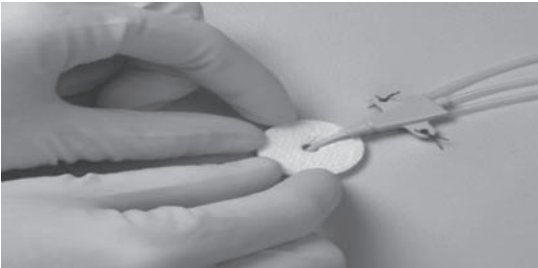


Infection Control in Critical Care

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A Type Questions (One best answer)

1. Which one of the following is NOT a key component of Institute of Healthcare Improvement (IHI) Central Line Bundle?
 - a. Hand washing
 - b. Dressing when soiled/damp
 - c. Aseptic handling
 - d. Early removal
 - e. Line listing
2. You have been looking after H1N1 patient admissions at your hospital amidst an outbreak. What is considered a safe distance for avoiding droplet infections?
 - a. 2 feet
 - b. 3 feet
 - c. 4.5 feet
 - d. 6 feet
 - e. 12 feet
3. You finished securing a central line in ICU. The correct order to remove personal protective equipment (PPE) is:
 - a. Apron first, eye protection second, mask and finally gloves
 - b. Eye protection, then mask if worn, then apron and finally gloves
 - c. Gloves first and after that any sequence
 - d. Gloves first, face shield next, gown and finally mask
 - e. It does not matter in what order they are removed
4. When using alcohol based hand rub, you should:
 - a. Apply the hand rub and wave hands until dry
 - b. Apply a sufficient quantity of hand rub and rub hands for 20–30 seconds, being sure to cover all areas: front, back, between fingers, nail beds and thumbs
 - c. Apply the hand rub and rub palms together for 10 seconds
 - d. Apply hand rub when you see an infected patient
 - e. You should rub for at least 60 seconds in all directions
5. Identify the device and grade the level of recommendation from Center of Disease Control (CDC) for infection prevention.



 - a. Alcohol impregnated sponge dressing -Category 1B
 - b. Impermeable dressing -Category 1A
 - c. Chlorhexidine-impregnated sponge dressing -Category 1A

- d. Chlorhexidine-impregnated sponge dressing-Category 1B
- e. None of the above
- 6. You are a visiting ICU consultant for a nursing home facility. Several of the patients have developed influenza like symptoms and the community is in the midst of influenza A outbreak. None of the nursing home residents have received the influenza vaccine. What course of action is most appropriate?**
- Give the influenza vaccine to all residents who do not have a contraindication to the vaccine (i.e. allergy to eggs)
 - Give the influenza vaccine to all residents who do not have a contraindication to the vaccine plus also give amantadine for 2 weeks
 - Give amantadine alone to all residents
 - Do not give any prophylactic regimen
 - Quarantine alone
- 7. You are asked to calculate attack rate for *Klebsiella pneumoniae* nosocomial infections for your neonatal intensive care unit (NICU). Which of the following formula correctly defines attack rate?**
- (Number of new nosocomial infections acquired in a period/number of patients observed in the same period) \times 100
 - (Number of new nosocomial infections acquired in a period/number of patients observed in the same period) \times 1000
 - Number of new nosocomial infections acquired in a period/number of patients observed in the same period
 - Number of new nosocomial infections acquired in a period/total patient days for the same period) \times 1000
 - None of the above
- 8. Which of the following is false regarding Coagulase negative staphylococci (CoNS) implicated bacteremia?**
- CoNS usually represent the contamination of blood culture bottles when blood cultures are obtained
 - CoNS continue to be frequently isolated in blood cultures and represent the most common cause of pseudobacteremia
 - Patients with CoNS bloodstream contaminants had longer hospital LOS and infection-related LOS
 - Coagulase-negative staphylococci (CoNS) are part of the normal flora of human skin
 - All of the above
- 9. For prevention of CLABSI one of the following is true:**
- Infusion tubing should be used for no longer than 96 hours
 - Tubing used to administer blood products or lipid emulsions should be changed every 48 hours
 - In-line filters should be used as they decrease the rate of infection
 - Central intravascular catheters should be routinely changed
 - Use CVC with maximum number of ports so that each port is used less frequently
- 10. While designing an ICU, following are the measures to be taken to prevent hospital acquired infections except:**
- The unit should be away from the ward areas
 - Air should be filtered to 99% efficiency down to 5 μ m
 - ICU is planned with 15 air changes per hour (5 fresh + 10 re-circulation)
 - Each bed should ideally have 8 sqm floor space
 - Provision for separate area for medication preparation
- 11. What is true about selective oropharyngeal decontamination (SOD) and selective digestive decontamination of digestive tract (SDD)?**
- Reduces mortality
 - Is recommended in ICU's with high anti-microbial resistance
 - Reduces mortality in ICU's with low anti-microbial resistance
 - SDD is part of VAP bundle
 - SDD reduces the risk of VAP but not HAP
- 12. You as an ICU Director are requested by Infection Control team to draft a cleaning policy for your unit. Which of the following will not be included by you in your policy?**
- High-quality cleaning and disinfection of all patient-care areas is important, especially surfaces close to the patient (e.g. bedrails, bedside tables, doorknobs, and equipment)
 - EPA-registered disinfectants or detergents that best meet the overall needs of the ICU should be used

- c. Routine surface cleaning only with alcohol
- d. Frequency of cleaning: surface cleaning (walls) twice weekly, floor cleaning two to three times per day
- e. Terminal cleaning (patient bed area) after discharge or death

13. Modes of transmission are numbered below as 1 to 5:

1. **Contact - fecal oral route**
2. **Contact - droplet transmission**
3. **Common vehicle - via fomites in the hospital**
4. **Sharp's injury**
5. **Airborne**

Which of the following methods is correct means by which rotavirus is commonly transmitted?

- a. 1 and 2 only
- b. 1 and 3 only
- c. 2 and 3 only
- d. 4 and 5 only
- e. 1 only

14. In the Six Sigma DMAIC format, the D represents:

- a. Document
- b. Develop
- c. Define
- d. Demonstrate
- e. Denominator

15. When a patient is on contact precautions for Methicillin-resistant *Staphylococcus aureus* (MRSA) cellulitis on hand, which of the following is correct?

- a. Wear gown and gloves whenever entering the room
- b. Enter the room without PPE if no patient contact planned
- c. Wear gloves only if anticipating patient contact
- d. Wear gown, gloves, and faceguard whenever entering the room
- e. Any one of the above

16. You as ICU Director approach infection control committee and recommend an educational campaign aimed at all ICU staff and attending physicians who insert and maintain catheters aimed at prevention bundles to reduce the HAI risk. Which of the following is correct?

- a. Infection control education and implementation of prevention bundles; Re: Catheter

insertion and maintenance cannot reduce the incidence of CRBSI

- b. Infection control education and implementation of prevention bundles; Re: Catheter insertion and maintenance can reduce the incidence of CRBSI, however CRBSI do not independently lead to increased ICU length of stay so such a program is unwarranted
- c. Infection control education and implementation of prevention bundles; Re: Catheter insertion and maintenance can reduce the incidence of CRBSI, since CRBSI do independently lead to increased ICU length of stay so such a program is warranted
- d. Infection control education is required only for dedicated vascular access teams
- e. None of the above

17. Your Human Resources Department wants to have a policy for influenza prophylaxis for ICU staff. Which of the following statements is NOT TRUE?

- a. Annual influenza vaccination is the best way to prevent influenza
- b. Vaccine is recommended for Health-care Provider (HCP) to protect not only themselves, but also their patients and vulnerable colleagues
- c. WHO guidelines state that individuals at high risk of severe disease who have been exposed to a patient with influenza may benefit from presumptive treatment with a full twice-daily 5-day course of antivirals, even if they do not show signs and symptoms of infection
- d. Stay at home until symptoms have resolved (at least 7 days after fever has defervesced)
- e. The best time to vaccinate is before the influenza season starts, but getting it later will still protect during the rest of the season

18. Which of the following is NOT TRUE regarding infection control policies for bronchoscopy suite?

- a. Store bronchoscope in a hanging position to prevent moisture accumulation
- b. Rinse with filtered tap water followed by 70% ethyl alcohol or sterile water after disinfection
- c. The bronchoscopy area should have engineering controls that will allow for negative air pressure, at least 6 air changes per hour

- d. N95 particulate respirator is a minimally acceptable alternative during bronchoscopy of a TB patient
- e. All of the above

19. A child is admitted to the PICU with a diagnosis of suspected meningococcal meningitis. Which of the following infection control measures should be instituted?

- a. Isolation of patients is recommended for at least 96 hours after adequate antibiotic treatment
- b. No isolation required
- c. Standard (universal) precautions alone be observed
- d. Respiratory droplet precautions (used in addition to standard precautions)
- e. None of the above

20. The ICU fellow gets needle stick exposure from an HIV infected patient in trauma bay. Which of the following is NOT TRUE regarding steps to be taken after exposure to HIV infected blood?

- a. Needle stick injuries should be washed with soap and water
- b. Splashes to the nose, mouth or skin should be flushed with water
- c. Postexposure prophylaxis (PEP) should be started after 96 hr of exposure
- d. Follow-up HIV testing is typically concluded 6 months after an HIV exposure
- e. PEP is recommended when occupational exposures to HIV occur

K Type Questions

[Marked True (T)/False (F)]

1. You are the champion for your ICU infection control program. There are other measures you must take to ensure hand hygiene is effective in minimising the spread of infection:

- a. Cover all cuts and abrasions with a water-proof plaster
- b. Bare your arms below the elbow and remove watches and bracelets
- c. Keep nails short and clean
- d. Do not wear nail varnish or nail extensions
- e. Wear no rings other than a plain band

2. Regarding body fluids which can cause contamination:

- a. Urine
- b. Vomit

- c. Feces
- d. Saliva
- e. Tears

3. Concerning prevention of CRBSI in your ICU:

- a. The use of the subclavian route carries the lowest risk of CRBSI
- b. CVC should be changed at 4 days before a threshold load of organisms is reached
- c. Current evidence suggests the universal use of antibiotic-coated catheters to reduce CRBSI
- d. A dry gauze dressing is acceptable over the CVC site
- e. Povidone iodine antiseptic ointment at the hemodialysis catheter exit site after catheter insertion and at the end of each dialysis session

4. Proper disposal technique as per Biomedical Waste Management Rules 2016 in India:

- a. Human tissues, organs, body parts—red colored non-chlorinated plastic bags
- b. Expired or discarded medicines—yellow colored non-chlorinated plastic bags or containers
- c. Broken or discarded and contaminated glass including medicine vials—Cardboard boxes with blue colored marking
- d. Wastes generated from disposable items such as tubing, bottles, intravenous tubes and sets, catheters, urine bags, syringes—red colored non-chlorinated plastic bags or containers
- e. Metallic body implants—cardboard boxes with red colored marking

5. Regarding ventilator-associated event (VAE):

- a. Groups all the conditions that result in a significant and sustained deterioration in oxygenation
- b. Only infectious conditions (such as tracheitis, tracheobronchitis, and pneumonia) are included
- c. Tier 1: ventilator-associated condition (VAC) —the patient develops hypoxemia (as defined above) for a sustained period of more than 2 days. The etiology of the hypoxemia is not infective
- d. Tier 2: infection-related ventilator-associated complication (IVAC)—hypoxemia develops in the setting of generalized infection or inflammation, and antibiotics are instituted for a minimum of 4 days

- e. Tier 3: probable or possible ventilator-associated pneumonia (VAP)—additional laboratory evidence of white blood cells on Gram stain of material from a respiratory secretion specimen of acceptable quality, or (=possible)/and (=probable) presence of respiratory pathogens on quantitative cultures, in patients with IVAC
- 6. Immunosuppressed transplant recipients should not have the following:**
- BCG vaccine
 - Raw salads
 - Varicella immune globulin
 - Influenza vaccine
 - Malaria prophylaxis
- 7. Preventing opportunistic infections in patients undergoing bone marrow transplantation (BMT):**
- Appropriately designed facilities that have rooms with more than 12 air exchanges per hour and point-of-use high-efficiency particulate air (HEPA) filtration
 - Laminar airflow rooms, in which air moves in one direction, have been shown to protect patients from *Aspergillus* infections during outbreaks
 - Rooms should have positive air pressure compared to the hallway unless it is housing a patient who has active disease with a pathogen that has airborne transmission; in that case, a negative pressure room is recommended
 - Granulocyte transfusion appears to be beneficial, in the presence of profound neutropenia
 - The advent of ganciclovir for prophylaxis has profoundly decreased severe CMV disease
- 8. Isolation facilities include the following types:**
- Neutral or standard room air pressure, e.g. standard air conditioning, also known as Class S
 - Positive room air pressure where an immune-compromised patient is protected from airborne transmission of any infection, Class P
 - Negative room air pressure, where others are protected from any airborne transmission from a patient who may be an infection risk, Class N
 - Class Q is type of positive room with ante-room
 - A negative pressure Isolation Room requires at least 80% outside air ventilation (i.e. no return air permitted), with low level exhaust ducts
- 9. The following are recognised strategies in the prevention of VAP:**
- Daily sedation holds
 - Head-up positioning of 30° to 45°
 - Prone positioning
 - Chlorhexidine mouth care
 - Daily ventilator tubing changes
- 10. Concerning CRBSI:**
- Any positive culture from a CVC should be interpreted as likely CRBSI
 - The “Matching Michigan” project showed a post implementation mean rate of CRBSI/1000 catheter days
 - Staphylococcus aureus* CRBSI should prompt a search for metastatic infection, including endocarditis.
 - CoNS CRBSI may get better without antibiotics
 - Guidewire exchange is encouraged as a routine at 14 days in ICU patients
- 11. Regarding CAUTI bundle implementation in your unit:**
- Maintain an open drainage system
 - Maintain unobstructed urine flow
 - Urinary catheter should be placed and taped below the thigh
 - Urinary bag should hang below the level of the bladder
 - The urinary bag should never have floor contact
- 12. According the National Nosocomial Infections Surveillance System (NNIS), an infection of a prosthetic hip requiring prosthesis removal can be reported as a surgical-site infection (SSI) if it occurs within:**
- 7 days of surgery
 - 30 days of surgery
 - 60 days of surgery
 - 90 days of surgery
 - 1 year of surgery
- 13. Postoperative CNS infection (PCNSI):**
- Staphylococcus species is rare cause
 - CSF leak is independent risk factor

- c. No antibiotic prophylaxis
- d. Shunt procedure is not a risk factor
- e. Duration of surgery is a risk factor

14. Which of the following is a risk factor for Vancomycin Intermediate *Staphylococcus aureus* (VISA)/Vancomycin Resistant Enterococci (VRE) acquired in ICU?

- a. Hemato-oncology patients
- b. Immunosuppressed patients
- c. Gut breach- GI surgery
- d. Mucosal barrier injury
- e. Liver transplant recipients

15. Regarding healthcare-associated aspergillosis:

- a. Do not perform routine, periodic cultures of the nasopharynx of asymptomatic patients at high-risk healthcare-associated aspergillosis
- b. Healthcare-associated aspergillosis is most commonly acquired via inhalation of airborne spores resulting in pulmonary aspergillosis
- c. Only few outbreaks have occurred as a result of airborne spores from non-water environmental sources
- d. Internal construction or renovation with failure to control spread of contaminated dust or debris can cause outbreaks
- e. Use seamless carpeting in hallways and rooms occupied by severely immunocompromised patients

16. You have a confirm patient with H1N1 pneumonia admitted under your care. Regarding the infection control practices:

- a. Articles like swabs/gauges, etc. are to be discarded in the yellow colored autoclavable biosafety bags after use, the bags are to be autoclaved followed by incineration of the contents of the bag
- b. Use phenolic disinfectants, quaternary ammonia compounds, alcohol or sodium hypochlorite
- c. Use N-95 masks during aerosol-generating procedures
- d. To avoid possible aerosolization of virus, sweeping should be performed
- e. Remove mask by pulling front side of mask

17. Concerning Ventilator Associated Tracheobronchitis (VAT) and VAP:

- a. Patients with VAT should receive antibiotic
- b. Noninvasive respiratory sampling refers to endotracheal aspiration

- c. Suspected VAP, we recommend including coverage for *S. aureus*, *Pseudomonas aeruginosa*, and other gram-negative bacilli in all empiric treatment
- d. All patients with VAP should receive at least 15 days of antibiotic therapy
- e. Discontinuation of antibiotic therapy be based on CPIS

18. Regarding infection control practices for a burns unit:

- a. Quantitative cultures of burn wound tissue biopsy with concomitant histological analysis are not preferred infection surveillance approach for burn areas that have not been or cannot be excised
- b. Strict infection control practices and appropriate empirical antimicrobial therapy are essential
- c. Invasive burn wound infections due to *Candida* spp., *Aspergillus* spp., and other opportunistic fungi are important emerging causes of early onset morbidity and mortality
- d. Herpesvirus group, particularly HSV and varicella-zoster virus but less commonly CMV, are rarely reported but increasingly recognized causes of wound infections in burns
- e. Laboratory surveillance as well as routine microbial surveillance cultures of the burn wound and other sources should be monitored to rapidly identify epidemic pathogens and/or antibiotic-resistant strains

19. Regarding to the results of HBV blood test in cases of needle stick injuries:

- a. Immediately following any exposure, whether or not the source is known to pose a risk of infection, the wound should be washed immediately and thoroughly with soap and water
- b. If HBV blood test of the patient is positive and the intensivist is non-vaccinated, intensivist must receive HB hyperimmune globulins and start an HB vaccine series
- c. Postexposure treatment should begin after 7 days
- d. If HBV blood test of the patient is negative and the intensivist is vaccinated, no further action can be done

- e. For a susceptible person, the risk from a single needle stick to HBV-infected blood ranges from 1–3%

20. Regarding CAUTI prevention interventions:

- a. Hand hygiene does not need to be performed if you are wearing gloves
- b. The periurethral area should be cleaned vigorously and with a special antimicrobial solution
- c. Data are insufficient to make a recommendation as to whether use of antibiotic coated catheters reduces CA-

bacteriuria or CA-UTI in patients with long-term catheterization

- d. A 3-day antimicrobial regimen may be considered for women aged ≤ 65 years who develop CA-UTI without upper urinary tract symptoms after an indwelling catheter has been removed
- e. Daily meatal cleansing with povidone-iodine solution, silver sulfadiazine, polyantibiotic ointment or cream, or green soap and water is not recommended for routine use in men or women with indwelling urethral catheters to reduce CA-bacteriuria

ANSWERS

A Type Answers

Q1. Answer e

Line listing is a table in which critical information from an outbreak is listed.

Each column represents an important variable (e.g. identifier, age, sex) and each row represents a different case. A line listing is produced by epidemiologists in outbreak investigations. A line listing allows information about time, person, and place to be organized and reviewed quickly. It is also a good way to keep track of different categories of cases.

How-to Guide: Prevent Central Line-Associated Bloodstream Infections (CLABSI). Cambridge, MA: Institute for Healthcare Improvement; 2012. Available from: www.ihl.org (Accessed 13 February 2018).

Q2. Answer b

During periods of increased prevalence of respiratory infections in the community, offer masks to coughing patients and other symptomatic persons (e.g. persons who accompany ill patients) upon entry into the facility and encourage separation, ideally by a distance of at least 3 feet, from others in common areas.

Siegel JD, Rhinehart E, Jackson M, et al. Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings. Available from: <https://www.cdc.gov/infectioncontrol/guidelines/isolation/index.html> (Accessed 13 February 2018).

Q3. Answer d

The sequence for removing PPE is intended to limit opportunities for self contamination. The gloves are considered the most contaminated pieces of PPE and are therefore removed first. The face shield or goggles are next because they are more cumbersome and would interfere with removal of other PPE. The gown is third in the sequence, followed by the mask or respirator.

Sequence for putting on personal protective equipment (PPE). Available From: <https://www.cdc.gov/hai/pdfs/ppe/ppe-sequence.pdf> (Accessed 8 December 2017).

Q4. Answer b

When using an alcohol-based hand rub, apply a coin sized amount of product into the palm of one hand and rub hands together, covering all surfaces of hands and fingers, until hands are dry. This complete procedure takes 20–30 seconds.

Pittet D, Allegranzi B, Boyce J, et al. The WHO guidelines on hand hygiene in health care and their consensus recommendations. *Infection Control and Hospital Epidemiology*. 2009;30:611-22.

Q5. Answer c

For patients aged 18 years and older: Chlorhexidine-impregnated dressings with an FDA-cleared label that specifies a clinical indication for reducing catheter-related bloodstream infection (CRBSI) or catheter-associated bloodstream infection (CABSBI) are recommended to protect the insertion site of short-term, non-tunneled central venous catheters (Category I A recommendation).

Updated Recommendations on the Use of Chlorhexidine-Impregnated Dressings for Prevention of Intravascular Catheter-Related Infections. (<https://www.cdc.gov/infectioncontrol/guidelines/bsi/c-i-dressings/index.html>).

Q6. Answer b

Influenza A is a potentially lethal disease in the elderly and chronically ill patients. This calls for prophylaxis in this setting. All residents should receive the vaccine unless they have known egg allergy. Since protective antibodies to the vaccine will not develop for 2 weeks, amantadine can be used for protection against influenza A during the interim 2-week period.

Interim Guidance for Influenza Outbreak Management in Long-term Care Facilities. Available from: <https://www.cdc.gov/flu/pdf/professionals/interim-guidance-outbreak-management.pdf> (Accessed 13 February 2018).

Q7. Answer a

Attack rate is another type of incidence rate expressed as cases per 100 populations (or a percentage). It is used to describe the new and recurrent cases of disease that have been observed in a particular group during a limited time period in special circumstances, such as during an outbreak.

Richards C, Alonso-Echanove J, Caicedo Y, Jarvis W. *Klebsiella pneumoniae* Bloodstream Infections Among Neonates in a High-Risk Nursery in Cali, Colombia. *Infection Control & Hospital Epidemiology*. 2004;25(3):221-5.

Q8. Answer c

CONS isolated from blood culture are usually contaminants but are also a significant cause of bacteremia. False positive blood culture leads to additional laboratory tests, unnecessary antibiotic use and longer hospitalization of patients that increases the patients care costs.

Becker K, Heilmann C, Peters G. Coagulase-negative staphylococci. *Clin Microbiol Rev*. 2014;27:870.

Q9. Answer a

In patients not receiving blood, blood products or fat emulsions, replace administration sets that are continuously used, including secondary sets and add-on devices, no more frequently than at 96-hour intervals, but at least every 7 days (Category IA).

Replace tubing used to administer blood, blood products, or fat emulsions within 24 hours of initiating the infusion (Category IB).

For reducing the risk for CRBSI, no strong recommendation can be made in favor of using in-line filters.

Guidelines for the Prevention of Intravascular Catheter-Related Infection. Available from: <https://www.cdc.gov/infectioncontrol/guidelines/bsi/index.html> (Accessed 13 February 2018).

Q10. Answer d

Each bed should ideally have 14 sqm of floor space. Separation of critical areas like OT, ICU from general traffic and avoidance of air movement from areas like laboratories and infectious diseases wards towards ICU.

Recommendations for the prevention of hospital acquired infection. *Am J Infect Control*. 1996;22:267-92.

Q11. Answer c

SOD or SDD is not a new concept. Recent studies demonstrated that SDD and, to some extent, SOD suppress the load of antibiotic resistant bacteria in the gut, reduce mortality and reduce transmission.

Muskiet ERR. Development of antibiotic resistance related to selective decontamination of the digestive tract. *Neth J Crit Care*. 2014;1:4-9.

Q12. Answer c

Select EPA-registered disinfectants use them in accordance with the manufacturer's instructions. Do not use high-level disinfectants/liquid chemical sterilants for disinfection of either noncritical instruments or devices or any environmental surfaces. Clean noncritical medical equipment surfaces with a detergent/disinfectant followed by application of EPA-registered hospital disinfectant. Do not use alcohol to disinfect large environmental surfaces.

Favero MS, Bond WW. Chemical disinfection of medical and surgical materials. In: Block SS (ed). *Disinfection, Sterilization, and Preservation*, 5th edition. Philadelphia, PA: Lippincott Williams and Wilkins, 2001.

Q13. Answer b

Rotavirus is highly infectious and shed in the feces of infected individuals. These infective particles can spread onto contaminated surfaces by infectious excreta and can then infect multiple patients from a single contaminated source.

Q14. Answer c

The Six Sigma DMAIC (Define, Measure, Analyze, Improve, and Control) methodology can be thought of as a roadmap for problem solving and product/process improvement. Six Sigma "DMAIC" approach is effective in reducing the HAI rate.

Eldridge NE, Woods SS, Bonello RS, et al. Using the Six Sigma process to implement the centers for disease control and prevention guideline for hand hygiene in 4 Intensive Care Units. *J Gen Intern*. 2006;21 Suppl 2:S35-42.

Q15. Answer a

Modes of spread of MRSA- Patients “colonized” with MRSA may carry the bacteria on skin or in nose. MRSA may spread from person to person by: touching the skin or contaminated surface (such as a countertop, door handle, or phone). Other patients admitted in the ICU may have risk factors for MRSA infection such as a surgical wound and/or intravenous (IV) line, being hospitalized for a prolonged period of time, recent use of antibiotics, having a weakened immune system due to a medical condition or its treatment, being in close proximity to other patients, family members, etc.

In addition to Standard Precautions, Contact Precautions are needed for specified patients known or suspected to be infected or colonized with epidemiologically important microorganisms that can be transmitted by direct contact with the patient (hand or skin-to-skin contact that occurs when performing patient-care activities that require touching the patient’s dry skin) or indirect contact (touching) with environmental surfaces or patient-care items in the patient’s environment (Category IB).

Precautions to Prevent Spread of MRSA. Available from: <https://www.cdc.gov/mrsa/healthcare/clinicians/precautions.html> (Accessed 13 February 2018).

Q16. Answer c

The problem of CLABSI has gained increasing attention in recent years. They cause a great deal of morbidity and deaths, and increase healthcare costs. Central venous catheters (CVCs) are increasingly used in hospitals to manage critically ill patients. CRBSIs occurring in the intensive care unit (ICU) are common, costly and potentially lethal. CRBSIs are considered among the first and most “preventable” classes of nosocomial infections. Patients with CVCs are at risk of developing local as well as systemic infectious complications like local insertion-site infection, CRBSI, septic thrombophlebitis, endocarditis and other metastatic infections. The most serious complications are bacteremia, sepsis and death. The definitive diagnosis of catheter infection can be made by using a combination of clinical signs and symptoms together with the quantitative culture techniques. CVC catheterization is often associated with serious infectious complications, mostly CRBSI, resulting in significant morbidity, increased duration of hospitalization and additional medical costs. The majority of CRBSIs are associated with CVCs, and the relative risk for CRBSI is significantly greater with CVCs than with peripheral venous catheters. CRBSI is associated with high rates of morbidity and mortality in critically ill patients.

Pronovost PJ, Berenholtz SM, Goeschel CA. Improving the quality of measurement and evaluation in quality improvement efforts. *Am J Med Qual.* 2008;23:143-6.

Q17. Answer d

Annual flu vaccine is the first and best way to protect against influenza. This recommendation is same even during years when the vaccine composition remains unchanged from the previous season. Vaccination of HCP reduces the risk that HCP will become infected with influenza, thus reducing the risk of transmission to susceptible patients and co-workers. HCP excluded from work until at least 24 hours after they no longer have a fever or respiratory symptoms.

WHO Guidelines for Pharmacological Management of Pandemic Influenza A(H1N1) 2009 and other Influenza Viruses. Available from: http://www.who.int/csr/resources/publications/swineflu/h1n1_guidelines_pharmaceutical_mngt.pdf?ua=1 (13 February 2018).

Q18. Answer c

The bronchoscopy area should have engineering controls that will allow for negative air pressure, at least 14 air changes per hour.

Infection Control in the Bronchoscopy Suite. *American Journal of Respiratory and Critical Care Medicine.* 2003;167(8):1050-56.

Q19. Answer d

Isolation of patients is recommended for at least 24–48 hours after adequate antibiotic treatment (for elimination of carriage) and patients should not be admitted into an overcrowded ward. Respiratory droplet precautions (used in addition to standard precautions).

Guidelines for the management, prevention and control of Meningococcal Disease in south Africa. Available from: www.doh.gov.za/2011 (Accessed 13 February 2018).

Q20. Answer c

PEP is recommended when occupational exposures to HIV occur and the HIV status of the exposure source patient should be determined, if possible, to guide need for HIV PEP. PEP medication regimens should be started as soon as possible after occupational exposure to HIV, and they should be continued for 4 week duration. Follow-up HIV testing is typically concluded 6 months after an HIV exposure. Patients with an occupational exposure should seek treatment as soon as possible, as studies have shown the efficacy of postexposure HIV prophylaxis is highest when initiated within the first 72 hours of exposure.

Kuhar DT, Henderson DK, Struble KA, et al. Updated US Public Health Service guidelines for the management of occupational exposures to human immunodeficiency virus and recommendations for postexposure prophylaxis. *Infect Control Hosp Epidemiol.* 2013;(9):875-92.

K Type Answers**Q1. Answer TTTTT**

Nails should be short and clean and no nail polish or extensions. Wrist watches must not be worn. No other jewellery should be worn around the wrist. No rings with stones should be worn however one plain band is permitted. Sleeves must be short or rolled securely up to the elbow.

'Bare Below the Elbow' Supplementary Policy for Hand Hygiene 2.0

'Bare Below the Elbow' Supplementary Policy for Hand Hygiene. Available from: <http://www.tamesidehospital.nhs.uk/documents/barebelowtheelbowssupplementpolicy.pdf> (Accessed 13 February 2018).

Q2. Answer FFFTF

Blood and body fluids, such as saliva, semen and vaginal fluid, can contain viruses that can be passed on to other people. Body fluids, like sweat, tears, vomit or urine have very low risk.

Semen and vaginal secretions should also be considered potentially contagious. Similarly, CSF, amniotic fluid, pleural fluid, synovial fluid, peritoneal and pericardial fluids carry a significant risk.

Lohiya GS, Tan-Figueroa L, Lohiya S, Lohiya S. Human bites: bloodborne pathogen risk and postexposure follow-up algorithm. *J Natl Med Assoc.* 2013;105(1):92-5.

Q3. Answer TFFTT

Use a subclavian site, rather than a jugular or a femoral site, in adult patients to minimize infection risk for nontunneled CVC placement (Category IB).

There is no need to replace peripheral catheters more frequently than every 72–96 hours to reduce risk of infection and phlebitis in adults (Category IB).

Use a chlorhexidine/silver sulfadiazine or minocycline/rifampicin -impregnated CVC in patients whose catheter is expected to remain in place >5 days if, after successful implementation of a comprehensive strategy to reduce rates of CLABSI, the CLABSI rate is not decreasing (Category IA).

Use either sterile gauze or sterile, transparent, semipermeable dressing to cover the catheter site (Category IA).

Use povidone iodine antiseptic ointment or bacitracin/ gramicidin/polymyxin B ointment at the hemodialysis catheter exit site after catheter insertion and at the end of each dialysis session (Category IB).

Guidelines for the Prevention of Intravascular Catheter-Related Infections. Available from: www.cdc.gov/infectioncontrol/guidelines/bsi/recommendations.html (Accessed 13 February 2018).

Q4. Answer FTTTF

(1) Human tissues, organs, body parts—Yellow colored non-chlorinated plastic bags (2) Metallic body implants—Cardboard boxes with blue colored marking.

Biosafety manual for public health laboratories Edition: July 2016

National Centre for Disease Control Directorate General of Health Services Ministry of Health and Family Welfare.

Q5. Answer TFFTT

VAE includes all the conditions that result in a significant and sustained lowering of oxygenation, including both infectious and non-infectious etiology.

Tier 1: Ventilator-associated condition (VAC)—the patient develops hypoxemia for a sustained period of more than 2 days. The etiology of the hypoxemia is not considered.

Tier 2: Infection-related ventilator-associated complication (IVAC) —hypoxemia develops in background of generalized infection or inflammation, and antibiotics are given for a minimum of 4 days.

Tier 3: Probable or possible VAP —additional laboratory evidence of WBC or Gram stain of a respiratory specimen of acceptable quality, or (=possible)/and (=probable) presence of pathogens on quantitative cultures, in patients with IVAC.

Lilly CM, Ellison RT 3rd. Quality measures for critically ill patients: where does ventilator-associated condition fit in? *Chest*. 2013;144(5):1429-30.

Q6. Answer TTFFF

Immunosuppressed patients in general should not receive live vaccines like BCG, MMR, oral polio, oral typhoid or rubella vaccine. Inactivated vaccines, such as influenza, hepatitis A or B, pneumococcal and adsorbed tetanus vaccine are permitted. Varicella immune globulin is used in immunosuppressed patients who have come into contact with chicken pox. Patients are advised to avoid eating foods likely to be contaminated like salads.

Walter EA, Bowden RA. Infection in the bone marrow transplant recipient. *Infect Dis Clin North Am*. 1995;9:823-47.

Rhame FS, Streifel AJ, Kersey JH, McGlave PB. Extrinsic risk factors for pneumonia in the patient at high risk of infection. *Am J Med*. 1984;76(Suppl 5A):42-52.

Q7. Answer TTTFT

Granulocyte transfusion does not appear to be beneficial, even in the presence of profound neutropenia.

Rhame FS, Streifel AJ, Kersey JH, McGlave PB. Extrinsic risk factors for pneumonia in the patient at high risk of infection. *Am J Med*. 1984;76(Suppl 5A):42-52.

Hassan IA, Chopra R, Swindell R, Mutton KJ. Respiratory viral infections after bone marrow/peripheral stem-cell transplantation: the Christie hospital experience. *Bone Marrow Transplantation*. 2003;32:73-77.

Q8. Answer TTTFF

Negative room air pressure with additional barriers including an anteroom (also known as Class Q) for quarantine isolation.

A negative pressure Isolation Room requires 100% outside air ventilation (i.e. no return air permitted), with low level exhaust ducts.

Isolation Rooms.

Available from: http://healthfacilityguidelines.com/Guidelines/ViewPDF/iHFG/iHFG_part_d_isolation_rooms (Accessed 13 February 2018).

Q9. Answer TTFTF

Daily sedation holds helps reduce patient time spent on the ventilator, and thus reduce the incidence of VAP. Head-up positioning of 30 to 45° reduces micro-aspiration, and thus VAP. Prone positioning impact on VAP rates per se is as yet unclear. Daily changes of ventilator tubing may increase the VAP risk due to cross-contamination from excess handling of equipment.

Hunter JD. Ventilator-associated pneumonia. *Br Med J*. 2012;344:e3325.

Guerin C, Reignier J, Richard JC, et al. Prone positioning in severe acute respiratory distress syndrome. *Now Engl J Med*. 2013;368(2):159-68.

Q10. Answer FFTTF

Positive culture from CVP could represent contamination, luminal colonization or CRBSI. The “Matching Michigan” project showed a post implementation mean rate of 1.4 CRBSI/1000 catheter days. Wire exchange not recommended for CRBSI.

Bion J, Richardson A, Hibbert P, et al. ‘Matching Michigan’: a 2-year stepped interventional programme to minimise central venous catheter-blood stream infections in intensive care units in England. *BMJ*. 2012.

Q11. Answer FTFTT

For CAUTI prevention maintain closed drainage system. Urinary catheter should be placed and taped above the thigh.

Lo E, Nicolle LE, Coffin SE, et al. Strategies to prevent catheter-associated urinary tract infections in acute care hospitals: 2014 update. *Infect Control Hosp Epidemiol.* 2014;35:464-79.

Q12. Answer e

A deep incisional infection is diagnosed if the deep tissues around an implant are infected within one year.

Protocol for surveillance of surgical site infection. Health Protection Agency. Available from: http://www.hpa.org.uk/web/HPAwebFile/HPAweb_C/1194947388966 (Accessed 13 February 2018).

Q13. Answer FTFTT

PCNSI *Staphylococcus aureus* is a common etiology.

Shunt is an independent risk factor.

In a case of a shunt infection the early appropriate antibiotics and the removal of the shunt should be contemplated.

McClelland S, Hall WA. Postoperative central nervous system infection: incidence and associated factors in 2111 neurosurgical procedures. *Clin Infect Dis.* 2007;45:55-59.

Q14. Answer TTTTT

Moore ZC, Eden S, et al. Factors associated with acquisition of vancomycin-resistant enterococci (VRE) in roommate contacts of patients colonized or infected with VRE in a tertiary care hospital. *Infection Control and Hospital Epidemiology.* 2008;29(5):398-403.

Q15. Answer TTFTF

Establish and maintain surveillance for airborne environmental disease (e.g. aspergillosis) as appropriate during construction, renovation, repair, to ensure safety of immunocompromised patients. *Aspergillus* spp has been isolated from hospital water supply and implicated in outbreaks.

Thio CL, Smith D, Merz WG. et al. Refinements of environmental assessment during an outbreak investigation of invasive aspergillosis in a leukemia and bone marrow transplant unit. *Infect Control Hosp Epidemiol.* 2000;21:18-23.

Q16. Answer TTTF

Damp sweeping is done to avoid possible aerosolization of virus Mask is removed by grasping elastic behind ears and front portion of mask should not be touched.

World Health Organization. Seasonal influenza. In. WHO website 2016, Available from: <http://www.who.int/mediacentre/factsheets/fs211/en/> (Accessed 13 February 2018).

Q17. Answer FTTF

Patients with VAT, we suggest not providing antibiotic therapy (*weak recommendation, low-quality evidence*).

For patients with VAP, we recommend a 7-day course of antimicrobial therapy rather than a longer duration (*strong recommendation, moderate-quality evidence*).

For patients with suspected HAP/VAP, we suggest not using the CPIS to guide the discontinuation of antibiotic therapy (*weak recommendation, low-quality evidence*).

Management of Adults With Hospital-acquired and Ventilator-associated Pneumonia: 2016 Clinical Practice Guidelines by the Infectious Diseases Society of America and the American Thoracic Society. Available at: [www.idsociety.org/Guidelines/Patient_Care/IDSA_Practice_Guidelines/Infections_by_Organ_System/Lower/Upper_Respiratory/Hospital-Acquired_Ventilator-Associated_Pneumonia_\(HAP/VAP\)/#recommendations](http://www.idsociety.org/Guidelines/Patient_Care/IDSA_Practice_Guidelines/Infections_by_Organ_System/Lower/Upper_Respiratory/Hospital-Acquired_Ventilator-Associated_Pneumonia_(HAP/VAP)/#recommendations) (Accessed 13 February 2018).

Q18. Answer FTFTT

Invasive burn wound infections due to *Candida* spp., *Aspergillus* spp., and other opportunistic fungi (including *Alternaria* spp., *Fusarium* spp., *Rhizopus* spp., and *Mucor* spp.) are important emerging causes of late onset morbidity and mortality in patients with major burns.

Weber JM. Epidemiology of Infections and Strategies for Control. In: Carrougher GJ (Ed). *Burn Care and Therapy*. St. Louis, MO: Mosby, Inc; 1998: pp. 185-211.

Q19. Answer TTFTF

HCP who have received hepatitis B vaccine and developed immunity to the virus are at virtually no risk for infection. For a susceptible person, the risk from a single needle stick or cut exposure to HBV-infected blood ranges from 6–30% and depends on the hepatitis B antigen (HBeAg) status of the source individual. HBsAg positive individuals who are HBeAg positive are more likely to transmit HBV than those who are HBeAg negative. While there is a risk for HBV infection from exposures of mucous membranes or non-intact skin, there is no known risk for HBV infection from exposure to intact skin.

Hepatitis B immune globulin (HBIG) alone or in combination with vaccine (if not previously vaccinated) is effective in preventing HBV infection after an exposure. The decision to begin treatment is based on several factors.

Postexposure treatment should begin as soon as possible after exposure, preferably within 24 hours, and no later than 7 days.

Exposure to Blood What Healthcare Personnel Need to Know

Information from the Centers for Disease Control and Prevention National Center for Infectious Diseases Division of Healthcare Quality Promotion and Division of Viral Hepatitis. Available from: www.cdc.gov/hai/pdfs/bbp/exp_to_blood.pdf (Accessed 13 February 2018).

Q20. Answer FFTT

Gloves play a key role in preventing hand contamination, but glove use does not replace proper hand hygiene. Hand hygiene should always be performed both before and after any contact with patient, handling an indwelling catheter or the drainage system. Periurethral care should be gently performed using only soap and water.

Tambyah PA. Catheter-associated urinary tract infections: diagnosis and prophylaxis. *Int J Antimicrob Agents*. 2004;24 (Suppl 1):S44-S8.