

PREVENTION/CONTROLLING TRANSMISSION

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PREVENTION MEASURES

- ▶ Hand hygiene
- ▶ Standard Precautions
- ▶ Transmission-based Precautions
- ▶ Aseptic Techniques
- ▶ Device Related Infection – CR-BSI, VAE, CA-UTI, SSI

HAND HYGIENE

Purpose

- ▶ Remove microbial contamination acquired by recent contact with infected or colonized patients or environmental sources
- ▶ Minimize counts of transient skin bacteria



HAND HYGIENE

▶ Terms:

- ▶ Alcohol-based hand rub
- ▶ Antimicrobial soap contains an antiseptic agent. FDA regulates
- ▶ Antiseptic hand wash is washing hands with water and soap containing an antiseptic agent
- ▶ Antiseptic hand rub is applying rub without rinsing
- ▶ Hand washing is washing with nonantimicrobial soap and water
- ▶ Surgical hand antisepsis is an antiseptic hand rub performed preoperatively by OR personnel

ASPECTS OF HAND HYGIENE

▶ Product Selection:

- ▶ Alcohol-based (60-95 percent alcohol) hand rub
- ▶ Antimicrobial or non-antimicrobial soap
- ▶ Hand lotions or creams

▶ Dispenser Location

- ▶ Alcohol-based product conveniently located at the entrance to patient care space
- ▶ Alternatively located inside rooms near door
- ▶ Within a single fire compartment, maximum amount: 10 gallons in dispensers and 5 gallons stored in cabinets.
- ▶ Check with local fire authorities

HAND HYGIENE

SOAP AND WATER

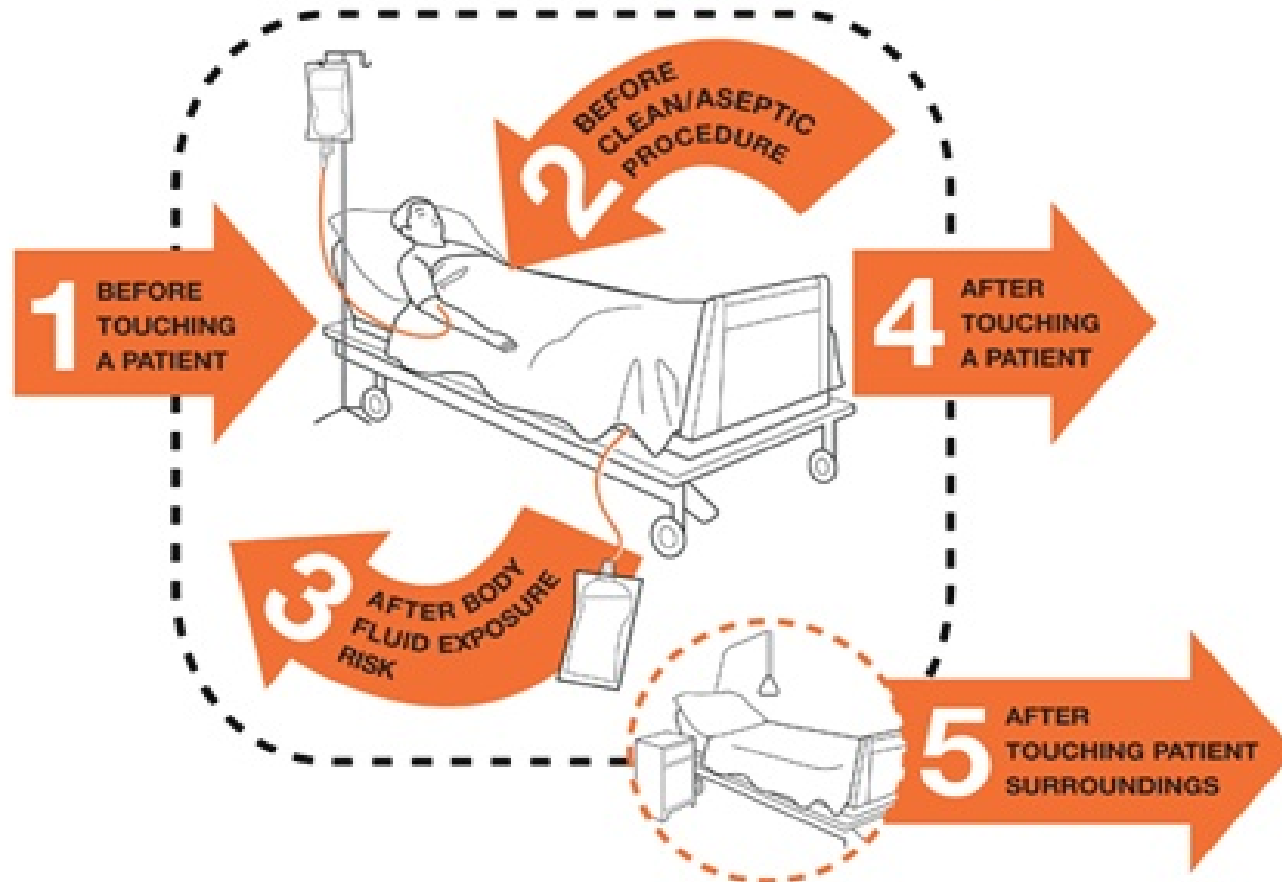
- ▶ Hands are visibly soiled
- ▶ After using the restroom
- ▶ Before eating
- ▶ When caring for patients with diarrhea
- ▶ If exposure to a bacterial spore is suspected (*B. anthracis*, *C. difficile*)
- ▶ In outbreak settings of norovirus and *C. difficile*



ALCOHOL BASED HAND RUB

- ▶ Hands are NOT visibly soiled but are contaminated
 - ▶ Before and after direct patient contact
 - ▶ Before donning sterile gloves
 - ▶ Before inserting invasive devices
 - ▶ After contact with a patient's intact skin
 - ▶ After removing gloves
 - ▶ After contact with equipment
 - ▶ When moving from contaminated to clean body site

Your 5 Moments for Hand Hygiene



ADDITIONAL COMPONENTS OF HAND HYGIENE PROGRAM

- ✓ Do not wear artificial fingernails or extenders when having direct contact with patients at high risk
- ✓ Keep natural nails tips less than 1/4-inch long
- ✓ Monitor for adherence to recommended hand hygiene practices
 - ✓ Direct Observation
 - ✓ Monitor volume of hand hygiene product used per 1,000 patient days
 - ✓ Video monitoring or sensing devices
- ✓ Feedback data to healthcare personnel

QUESTION 1

- ▶ Most healthcare-associated pathogens are transmitted from patient to patient via:
 - A. Improper isolation practices
 - B. Inadequate sterilization of medical instruments
 - C. Hands of healthcare personnel
 - D. Ineffective disinfection of medical devices

STANDARD PRECAUTIONS

- ▶ 1996, Healthcare Infection Control Practices Advisory Committee (HICPAC):
 - ▶ Incorporated Universal Precautions and Body Substance Isolation into Standard Precautions
- ▶ 2007, Guidelines revised:
 - ▶ To include respiratory hygiene, safe injection practices and special lumbar procedures

Implementation of Standard Precautions constitutes the primary strategy for the prevention of healthcare-associated transmission of infectious agents among patients and healthcare personnel

ESSENTIAL COMPONENTS (SP)

- ▶ Hand Hygiene
- ▶ Respiratory Hygiene/Cough Etiquette
- ▶ PPE
- ▶ Infection Control for Special Lumbar Procedures
- ▶ Safe Work Practices
- ▶ Environmental Cleaning
- ▶ Safe Injection Practices
- ▶ Patient Placement

TRANSMISSION-BASED PRECAUTIONS

▶ Contact:

- ▶ Used for diseases transmitted by contact with the patient or the patient's environment
- ▶ Examples: MRSA, VRE, C difficile

▶ Droplet:

- ▶ Used to prevent transmission of diseases caused by large respiratory droplets, generated by coughing, sneezing or talking
- ▶ Examples: Influenza, pertussis, *Neisseria meningitidis*

▶ Airborne:

- ▶ Used to prevent transmission of infectious organisms that remain suspended in the air and travel great distances due to their small size
- ▶ Example: TB, measles, chickenpox

PROTECTIVE ENVIRONMENT

- ▶ Recommended for allogeneic hematopoietic stem cell transplant (HSCT) recipients to reduce risk of invasive environmental fungal infections
 - ▶ Environmental Controls
 - ▶ HEPA filtration
 - ▶ Positive Pressure (monitor daily with visual indicators)
 - ▶ 12 ACH
 - ▶ Environmental Measures
 - ▶ Baths over showers
 - ▶ No dried and fresh flowers or potted plants
 - ▶ Clean in a manner to minimize dust (wet dust, no cloth furnishings, avoid carpet)

PROTECTIVE ENVIRONMENT

- ▶ Nutrition
 - ▶ No recommendation is made for restricted diets
- ▶ Patient transport
 - ▶ Construction place a N95 respirator on the patient (can medically tolerate and leaving PE)
 - ▶ Can not tolerate use barrier mask
- ▶ TBP in the protected environment
 - ▶ Contact/droplet as recommended
 - ▶ Airborne if anteroom present (HEPA unit in anteroom)
 - ▶ No anteroom use a portable unit in the room

FUNDAMENTALS OF ISOLATION

- ▶ Hand Hygiene
- ▶ Barriers: Gloves, Gowns, Mask, Eyewear
- ▶ Patient Placement
- ▶ Transportation
- ▶ Specimens
- ▶ Linen/Laundry
- ▶ Trash/Biohazard
- ▶ Waste/Sharp
- ▶ Environmental Cleaning
- ▶ Patient Care Equipment



MANAGEMENT OF MULTIDRUG-RESISTANT ORGANISMS IN HEALTHCARE SETTINGS, 2006

- ▶ Major point – all types of settings
 - ▶ Administrative support, adherence monitoring
 - ▶ MDRO education
 - ▶ Judicious Antimicrobial Use
 - ▶ Surveillance
 - ▶ Standard and Transmission based precautions
 - ▶ Environmental cleaning
 - ▶ Decolonization

QUESTION #2

Which of the following precautions should be used for a patient who is immunocompromised and suspected of having cryptococcal meningitis?

- A. Airborne Precautions for 24 hours after antibiotic is started if the patient is improving
- B. Mask worn when within 3 feet from the bed
- C. Standard Precautions for family and staff
- D. Contact Precautions for staff, family restricted from visiting other patients.

QUESTION # 3

- ▶ A patient is admitted to with pruritic lesions on the hands, webs of fingers, wrists, extensor surfaces of elbows and knees, and the outer surfaces of the feet, armpits, buttocks and waist. What type of isolation does this person require?
- A. Droplet
 - B. Contact
 - C. Airborne
 - D. None, just Standard Precautions

QUESTION # 4

▶ Respiratory hygiene/cough etiquette includes all but the following:

- A. Covering the mouth and nose with the hands when coughing and sneezing
- B. Offering a surgical mask to a coughing patient
- C. Discarding used masks and tissues appropriately and performing hand hygiene
- D. Posting signs in public areas in languages appropriate to the population served, educating healthcare staff, patients and visitors and leaving in place all year

QUESTION # 5

▶ An IP has been asked to provide infection prevention consultation to a long term care facility (LTCF). As a part of this consultation, she checks to make sure which of the following program components are in place?

- A. Decolonizing residents with MRSA
- B. Establishing an antimicrobial stewardship program
- C. Implementing an annual influenza vaccination program
- D. Collecting environmental cultures of high-touch areas

- A. A, B
- B. B, C
- C. C, D
- D. A, D

ASEPSIS

PROCESS FOR KEEPING AWAY DISEASE-PRODUCING MICROORGANISMS

▶ Medical:

- ▶ Also know as “clean technique”;
- ▶ Reduce number of microorganisms
- ▶ Reduce/prevent transmission

▶ Surgical:

- ▶ Also know as “sterile technique”
- ▶ Maintain the microbe count at an irreducible minimum

URINARY TRACT INFECTION



UTI RISK FACTORS

Host

- ▶ Female gender
- ▶ Older age (very young males as well),
- ▶ Underlying disease (diabetes)
- ▶ Meatal colonization

Hospital

- ▶ Type of catheter
- ▶ Duration of catheter
- ▶ Aseptic practices
- ▶ Type of drainage system
- ▶ Use of antimicrobials

UTI SOURCES OF CATHETER CONTAMINATION

- ▶ Insertion technique
- ▶ Catheter-meatal junction
- ▶ Catheter tubing junction
- ▶ Urine sampling port
- ▶ Reflux of contaminated urine
- ▶ Bag emptying port
- ▶ Urine collection container



MEASURES TO PREVENT UTI

- ▶ Avoid catheterization
- ▶ Consider less invasive alternatives
- ▶ Reduce duration
- ▶ Use closed drainage system
- ▶ Develop criteria for catheterization and removal protocols

ACCEPTABLE INDICATIONS FOR INDWELLING CATHETER

- ▶ Urine output measurement in critically ill patients
- ▶ Urinary outlet obstruction
- ▶ Surgery
- ▶ Open sacral/perineal wounds in incontinent patients
- ▶ Comfort care

QUESTION # 6

All of the following are methods of collecting a urine sample are correct **EXCEPT for?**

- A. Disinfection of foley catheter collection port with 70% alcohol
- B. Obtain 5-10 ml. of urine with syringe from the collection port after it has been prepped with 70% alcohol
- C. Collect from foley catheter bag
- D. Urine from a straight catheter, discard first 15 ml; collect the remainder

QUESTION # 7

Several measures to reduce urinary tract infections have been implemented at a long term care facility. The MOST important action that will reduce infections is:

- A. An appropriately trained person performing twice daily meatal care with a povidine-iodine solution
- B. Maintaining a sterile, closed drainage system
- C. Changing all indwelling catheters every 7 days and obtaining a urine culture on removal
- D. Administering continuous antibiotic bladder irrigation on all patients who must maintain a catheter

INTRAVASCULAR DEVICE INFECTION



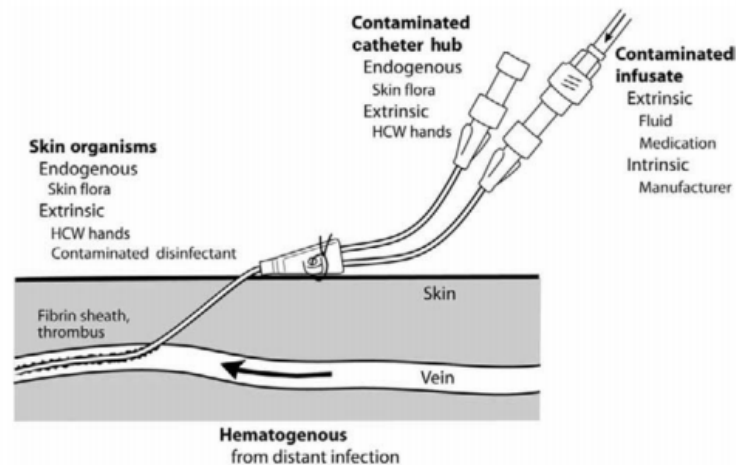
INTRAVASCULAR DEVICE INFECTIONS

Mechanisms:

- ▶ Colonization of the intravenous device or *catheter-associated infection*
 - ▶ Endemic
- ▶ Contamination of the fluid administered through the device or *infusate-associated infection*
 - ▶ Epidemic

PATHOGENESIS OF IVD- BSI

- ▶ Migration of skin organisms at site
- ▶ Hub and lumen contamination
- ▶ Contaminated infusate
- ▶ Hematogenous seeding from distant site of infection



RISK FACTORS FOR IVD-BSI

- ▶ Long LOS before catheter
- ▶ Long duration of catheter
- ▶ Heavy colonization of insertion site or hub
- ▶ Catheter insertion site
- ▶ Barrier precautions not used

PREVENTION OF CR-BSI

- ▶ Hand hygiene (IB)
 - ▶ Waterless, alcohol-based product or antimicrobial soap
- ▶ Maximum barrier for CVC (IB)
 - ▶ Cap, mask, sterile gown, sterile gloves, and
 - ▶ Full body sterile drape
- ▶ Site of insertion (IA)
 - ▶ Subclavian vs. IJ, vs. femoral
- ▶ Skin antisepsis (in order of most effective): chlorohexidine with alcohol, tincture of iodine, providone-iodine, alcohol (IA)

PREVENTION OF CR-BSI

- ▶ Catheter dressing and site care –
 - ▶ Sterile gauze or sterile transparent (IA)
- ▶ Patient Cleansing –
 - ▶ 2% chlorhexidine wash daily (II)
- ▶ Care of hubs and ports –
 - ▶ Scrub with appropriate antiseptic (chlorhexidine, povidone iodine, iodophor or 70% alcohol) before accessing system (IA)
- ▶ Education
 - ▶ Indications for use, procedures for insertion and maintenance and prevention (1A)
- ▶ Remove when no longer essential

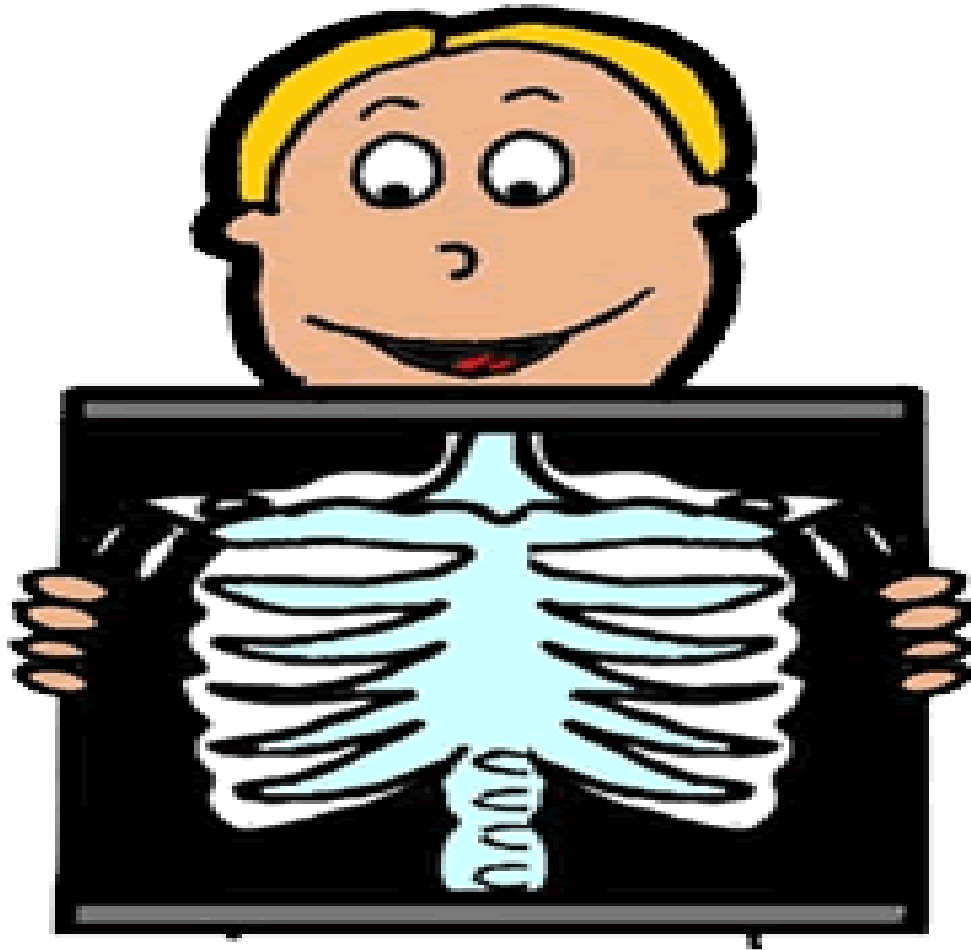
QUESTION # 8

- ▶ The CDC recommendations for decreasing CLABSI include all of the following ***except***:
- A. Educational programs
 - B. Routine replacement of catheters
 - C. The use of chlorhexidine for skin antisepsis
 - D. The use of maximal sterile barrier precautions

QUESTION # 9

- ▶ Which of the following statements is **true** regarding CVC's
 - A. Anticoagulant therapy can reduce the risk of catheter-related infection
 - B. Positioning at the insertion site minimizes catheter tip malposition
 - C. The CVC should be sutured in place
 - D. Stopcocks can increase the contamination rate

PNEUMONIA



RISK FACTORS FOR PNEUMONIA

- ▶ Terms: CAP, HCAP, HAP, VAP, VAE
- ▶ Patient-related
- ▶ Device-related
- ▶ People & procedure-related



PATIENT-RELATED RISK FACTORS FOR PNEUMONIA

- ▶ Extremes of age
- ▶ Chronic lung disease
- ▶ Immunosuppression
- ▶ Depressed consciousness



PATIENT-RELATED RISK FACTORS FOR PNEUMONIA

- ▶ Surgery (thoracic/abdominal)
- ▶ Obesity, malnutrition, smoking
- ▶ Diabetes, cardiopulmonary disease
- ▶ Severe underlying disease
- ▶ Current hospitalization of 5 days or more

DEVICE-RELATED RISK FACTORS FOR PNEUMONIA

- ▶ Endotracheal intubation
- ▶ Mechanical ventilator
- ▶ Nasogastric tube
- ▶ Enteral feeding



PEOPLE/PROCEDURE-RELATED RISK FACTORS FOR PNEUMONIA

- ▶ Cross contamination by hands
- ▶ Contamination equipment, supplies or environment



PATHOGENESIS OF HEALTHCARE ACQUIRED PNEUMONIA

- ▶ Aspiration of oral pharyngeal or gastric organisms*
- ▶ Inhalation of contaminated aerosols
- ▶ Large droplet deposition
- ▶ Hematogenous spread from remote site of infection

*Most important for HC-related and community

PREVENTION OF HAP, HCAP, VAP, VAE

- ▶ Immunization
- ▶ Hand Hygiene
- ▶ Avoid intubation
- ▶ Subglottic secretion drainage
- ▶ Reduction in the use of nasogastric tubes
- ▶ Isolate for MDRO
- ▶ Enteral feeding 24-48 hours after intubation
- ▶ Compliance with ventilator bundles

PREVENTION: INTERRUPT PERSON TO PERSON SPREAD

- ▶ Hand Hygiene before and after contact with mucous membranes and respiratory secretions
- ▶ Hand hygiene before and after contact with a patient with endotracheal tube or trach
- ▶ Gloves for contact with mucous membranes/secretions
- ▶ Change gloves between patients



RESPIRATORY THERAPY EQUIPMENT

- ▶ Change humidifiers and heat/moisture exchangers (HME) when visibly soiled or mechanically malfunctioning
- ▶ Prevent drainage of condensate into trachea
- ▶ Use sterile water for bubbling humidifiers
- ▶ Small volume nebulizers, clean, disinfect rinse with sterile water between treatments same patient
- ▶ Use sterile solutions in nebulizers
- ▶ Store nebulizers dry between use
- ▶ Nebulizers should not be reused between patients without HLD or sterilization

VENTILATOR BUNDLES

- ▶ Education
- ▶ Surveillance
- ▶ Equipment cleaning/maintenance
- ▶ Semi-recumbent position
- ▶ Antiseptic oral care
- ▶ Sedation “vacation”
- ▶ Promote use of noninvasive ventilation
- ▶ Leadership accountability



#2 tier:

- In line and subglottic suctioning
- Beds with build in monitoring of angle of incline

QUESTION # 10

- ▶ Which of the following is ***not*** part of the bundle practices to reduce VAP?
- A. Keeping the head of the bed raised to 30-45 degrees elevation unless medically contraindicated
 - B. Performing routine oral care on a ventilated patient
 - C. Taking sedation “vacations” to assess patients’ ability to breathe on their own
 - D. Changing ventilator circuits every 48 hours

SURGICAL SITE INFECTION



HOST RISK FACTORS OF SSIS

- ▶ Age
- ▶ Obesity
- ▶ Smoking
- ▶ Chronic disease & immune status
- ▶ Nasal carriage of *S. aureus*
- ▶ Duration of pre-op stay
- ▶ Nutritional status
- ▶ Mental status
- ▶ Presence of infection at another site
- ▶ Medications

PROCEDURE RISK OF SSIS

- ▶ Operative technique
- ▶ Hair removal technique
- ▶ Timing of antibiotic prophylaxis
- ▶ Duration of procedure
- ▶ Warmth of patient during procedure
- ▶ Blood glucose levels
- ▶ Use of flash sterilized instruments, esp. implants
- ▶ OR room traffic

HICPAC GUIDELINE

RECOMMENDED RANKINGS (2017)

- ▶ Category IA – A strong recommendation supported by high to moderate-quality evidence
- ▶ Category IB – A strong recommendation supported by low quality evidence
- ▶ Category IC- A strong recommendation required by state or federal regulation
- ▶ Category II – A weak recommendation supported by any quality evidence
- ▶ No recommendation/unresolved issue

PARENTERAL ANTIBIOTIC PROPHYLAXIS

- ▶ Use only when indicated & selected based on common pathogens causing SSI in specific operation (IB)
- ▶ Time administration of drug for adequate serum/tissue levels & maintain levels throughout procedure (IB)
- ▶ C. section – before skin incision (IA)
- ▶ In clean and clean-contaminated procedures do not administer additional doses after the surgical incision is closed (IA)

NON-PARENTERAL ANTIMICROBIAL PROPHYLAXIS

- ▶ Do not apply antimicrobial agents to surgical incision (IB)
- ▶ Application of autologous platelet-rich plasma not necessary (II)
- ▶ Consider use of triclosan-coated sutures (II)
- ▶ Antimicrobial dressings (No recommendation)

- ▶ Glycemic Control-blood glucose target levels less than 200mg/dl (IA)
- ▶ Normothermia-maintain perioperative normothermia (IA)
- ▶ Oxygenation-increased FIO2 during surgery and after extubation in immediate PO period (IA)
- ▶ Antiseptic Prophylaxis-
 - ▶ Shower or bathe with soap or an antiseptic agent night before surgery (IB)
 - ▶ Intraoperative skin preparation with an alcohol-based antiseptic (IA)
 - ▶ Microbial sealant after skin preparation not necessary (II)
 - ▶ Plastic adhesive drapes (with or without antimicrobial properties) not necessary (II)

PREPARATION OF PATIENT

- ▶ Identify and treat all infections
- ▶ Do not remove hair
- ▶ Use clippers
- ▶ Encourage tobacco cessation (30 days)
- ▶ Ensure skin is clean prior to antiseptic prep

SURGICAL HAND SCRUBS

- ▶ Perform a preoperative surgical hand/forearm antisepsis according to manufacturer's recommendations for product
- ▶ After performing the scrub keep hands away from body, elbows flexed, dry with sterile towel
- ▶ Keep nails short; no artificial nails
- ▶ No hand or arm jewelry
- ▶ Clean underneath fingernails

INTRA-OPERATIVE CONTROL MEASURES

- ▶ Surgical technique
- ▶ Barriers
- ▶ Limit people entering room
- ▶ Keep doors closed
- ▶ Equipment in room before surgery
- ▶ >15 air exchanges per hour – Positive pressure
- ▶ Relative humidity 50%-60%

QUESTION # 11

In reviewing the literature on risk for acquiring post-operative pneumonia, the ICP finds that the risk is greatest for patients undergoing what type of surgery?

- A. Total hip replacement
- B. Bowel resection
- C. Coronary artery bypass
- D. Esophagogastrectomy

