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Catheter –Related Endocarditis prophylaxis and Treatment

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Introduction:

- ✓Long-term infusion of intravenous fluids,
- ✓ Broad-spectrum antibiotics,
- ✓Chemotherapeutic agents for cancer,
- ✓ Critical care therapies,
- ✓Antibiotics administered at home,
- ✓Total parenteral nutrition,
- ✓Hemodialysis.

Cont’

- ✓Central lines
- ✓Central line–associated bloodstream infection
- ✓Cost
- ✓Mortality
- ✓Prevention of CLABSI

Definition of CLABSI :

- ✓Laboratory-confirmed bloodstream infection in a patient who has had a central venous catheter in place for more than 48 hours before the date on which blood was drawn for culture, if no other source of bacteremia or fungemia is identified.

Cont’

- ✓This definition is based on surveillance rather than on a clinical presentation, with no requirement for signs or symptoms of infection.
- ✓Overestimation
- ✓Catheter-related bloodstream infection (CRBSI) is a clinical definition used for diagnosis and treatment(catheter as the source of the bloodstream infection).

CRBSI:

- ✓Signs and symptoms of infection (e.g., fever, elevated white-cell count, and erythema at the catheter exit site) when blood was drawn for culture.

- ✓CRBSI rates are not used for surveillance.

Pathogenesis:

- ✓1-Catheter contaminated at insertion site (by hospital staff) Extraluminal spread.
- ✓skin pathogens at the insertion site can enter the cutaneous catheter tract and migrate down the external surface of the catheter toward the tip.
- ✓This most commonly happens within the first 7 days after catheter placement.

Cont’

- ✓2-Catheter hub manipulation (by hospital staff) Intraluminal spread.
- ✓Biofilm
- ✓This contamination typically happens more than 7 days after catheter insertion and is related to the care and maintenance of the catheter, as well as the number of times the catheter is manipulated.

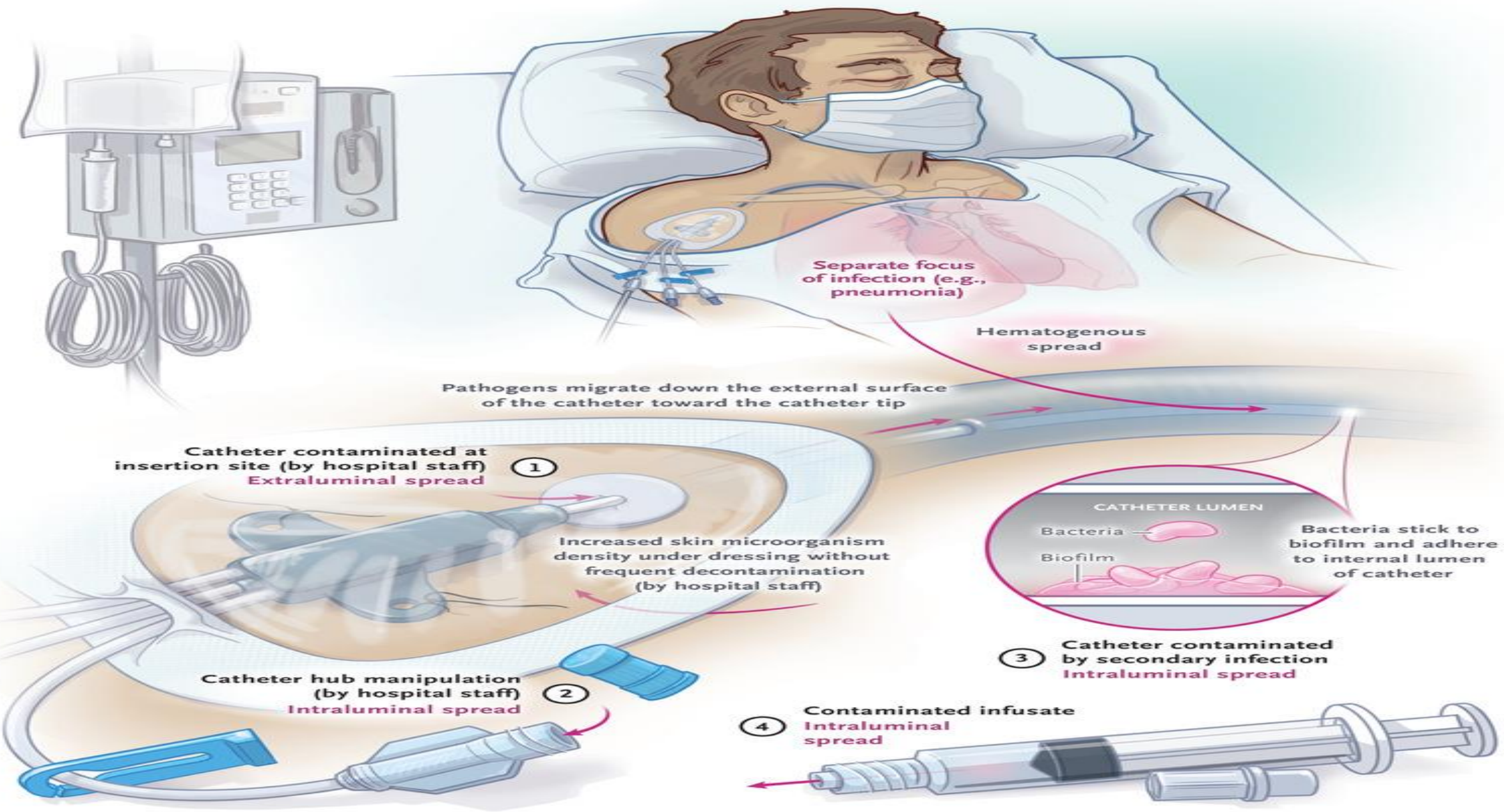
Cont’

- ✓3-Catheter contaminated by secondary infection, Intraluminal spread.
- ✓Catheters become contaminated hematogenously from a secondary bloodstream infection that develops from another focus of infection (e.g., pneumonia or a urinary tract infection).

- ✓Biofilm

Cont’

- ✓4-Contaminated infusate(rare)
- ✓ Knowledge of the pathogenesis of CRBSI has informed the development of strategies for prevention.


Separate focus of infection (e.g., pneumonia)
Hematogenous spread
Pathogens migrate down the external surface of the catheter toward the catheter tip
Catheter contaminated at insertion site (by hospital staff)
1
Extraluminal spread
Increased skin microorganism density under dressing without frequent decontamination (by hospital staff)
CATHETER LUMEN
Bacteria
Biofilm
Bacteria stick to biofilm and adhere to internal lumen of catheter
3
Catheter contaminated by secondary infection
Intraluminal spread
Catheter hub manipulation (by hospital staff)
2
Intraluminal spread
4
Contaminated infusate
Intraluminal spread

. Risk Factors:

✓Patient factors

Immunocompromise Neutropenia, Burns, Malnutrition, BMI >40

✓Prolonged hospitalization before catheter insertion

✓ Prematurity in infants

✓ Limited venous access

✓Provider factors

✓Emergency catheter insertion

✓ Incomplete adherence to aseptic technique

✓ Multiple manipulations of the catheter

✓ Low nurse-to-patient ratio

✓ Failure to remove unnecessary catheter

Cont’

- ✓Device factors
- ✓Catheter material
- ✓ Catheter insertion site
- ✓Indications for use (e.g., for hemodialysis)

Strategies and Devices for Preventing CLABSI:

- ✓Checklists
- ✓Catheter-insertion cart or kit
- ✓Hand hygiene
- ✓Maximal sterile barrier precautions
- ✓Alcoholic chlorhexidine skin antisepsis
- ✓Selection of subclavian catheter-insertion site (in patients in the intensive care unit)
- ✓Chlorhexidine dressings
- ✓ Chlorhexidine bathing
- ✓ Antibiotic- or antiseptic-impregnated catheters
- ✓Manual decontamination of catheter hubs and caps before catheter insertion
- ✓Antiseptic-containing hubs and caps

Proven Preventive Strategies and Devices:

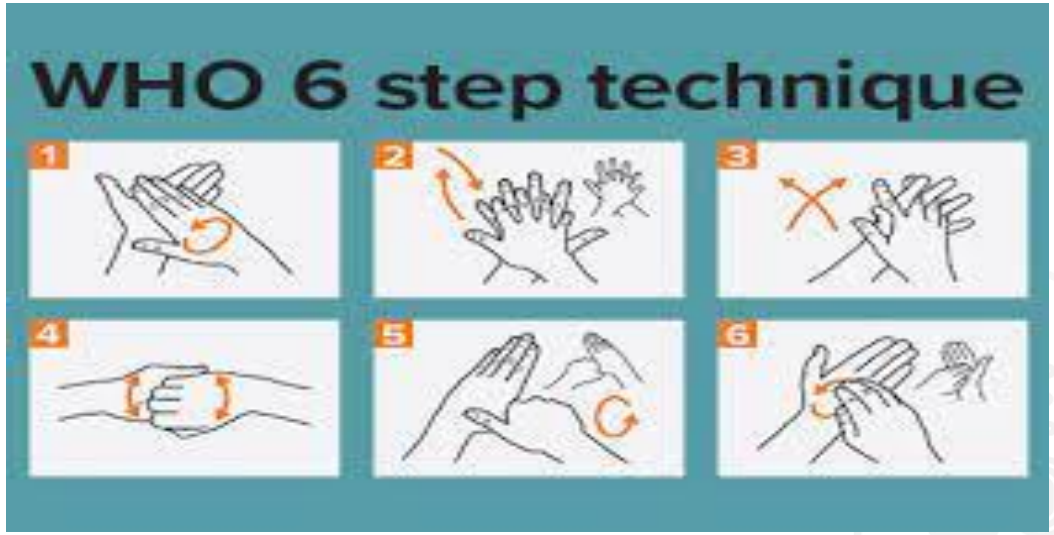
- ✓Checklists
- ✓Observer
- ✓hand hygiene
- ✓Gowning, gloving, masking, draping the patient, and applying antiseptic agents to the patient's skin.
- ✓Checklists have been shown to improve adherence to infection-control practices at the time of catheter insertion and to reduce the incidence of infection.

Hand Hygiene:

- ✓Hand hygiene before insertion of a central catheter is an essential part of an infection-prevention program.
- ✓ Washing with conventional soap and water or with an alcohol-based, waterless hand rub.
- ✓ An alcoholbased sanitizer is preferred for hands that are not visibly soiled.
- ✓Typically, 3 to 5 ml is applied to the palm, and the hands are rubbed vigorously and thoroughly so that all surfaces on both hands are covered.

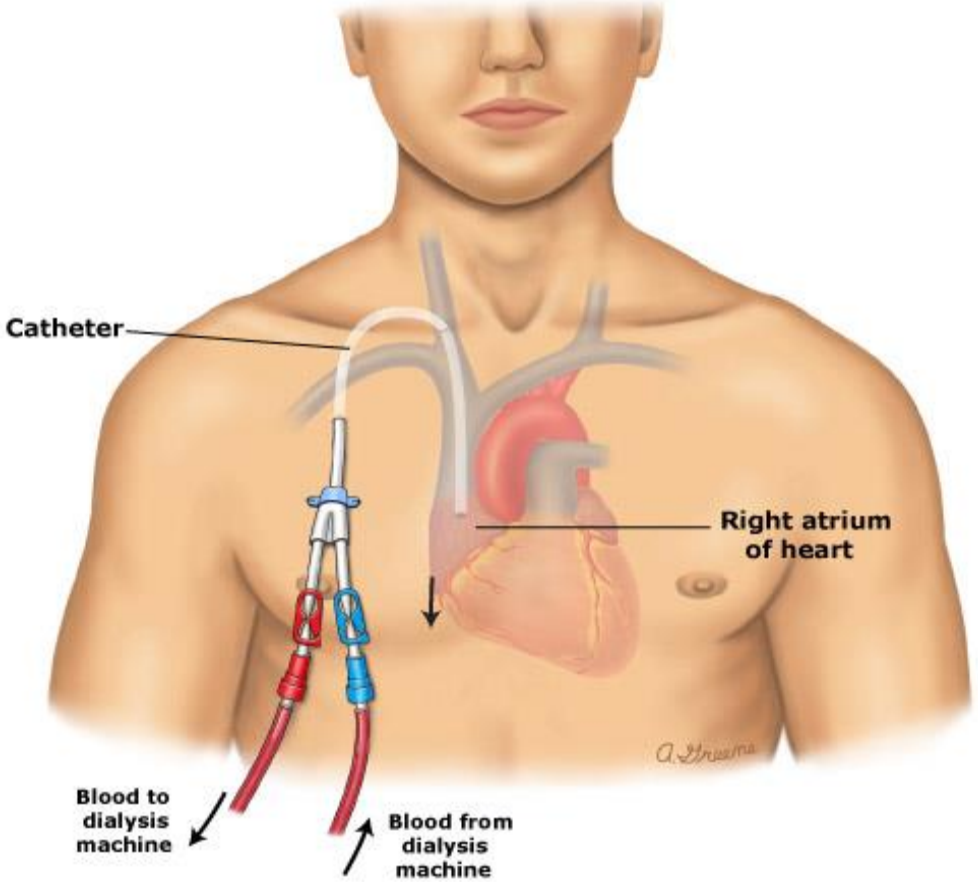
Cont’

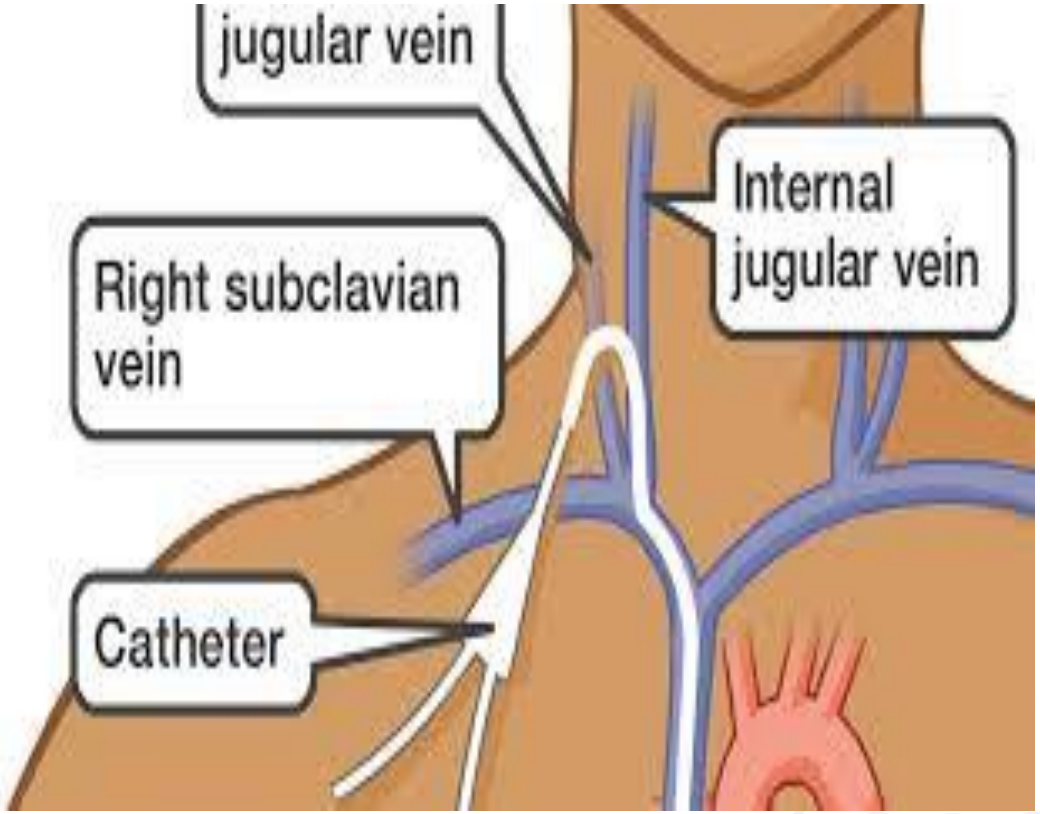
- ✓If hands are not cleaned before gloves are donned, any organisms on the hands may be transferred to the outside surface of the gloves.



Site selection:

- ✓The subclavian site is the preferred catheter insertion site for reducing the risk of CRBSI in the ICU.
- ✓In the non-ICU setting, the difference in infection risk among insertion sites is less clear.
- ✓Is related in part to the density of skin flora at the site.
- ✓Femoral catheters have higher colonization rates.
- ✓SUBCLAVIAN /INTERNAL JUGULAR VEIN/FEMORAL


Catheter
Right atrium of heart
Blood to dialysis machine
Blood from dialysis machine


jugular vein
Internal jugular vein
Right subclavian vein
Catheter

Cont’

- ✓subclavian-vein catheterization is associated with an increased risk of mechanical complications such as pneumothorax.

- ✓ Site selection should be guided by patient comfort, the ability to secure the catheter, and maintenance of aseptic technique, as well as by patient-specific factors such as coagulopathies, anatomical complexity, and preexisting catheters.

Cont’

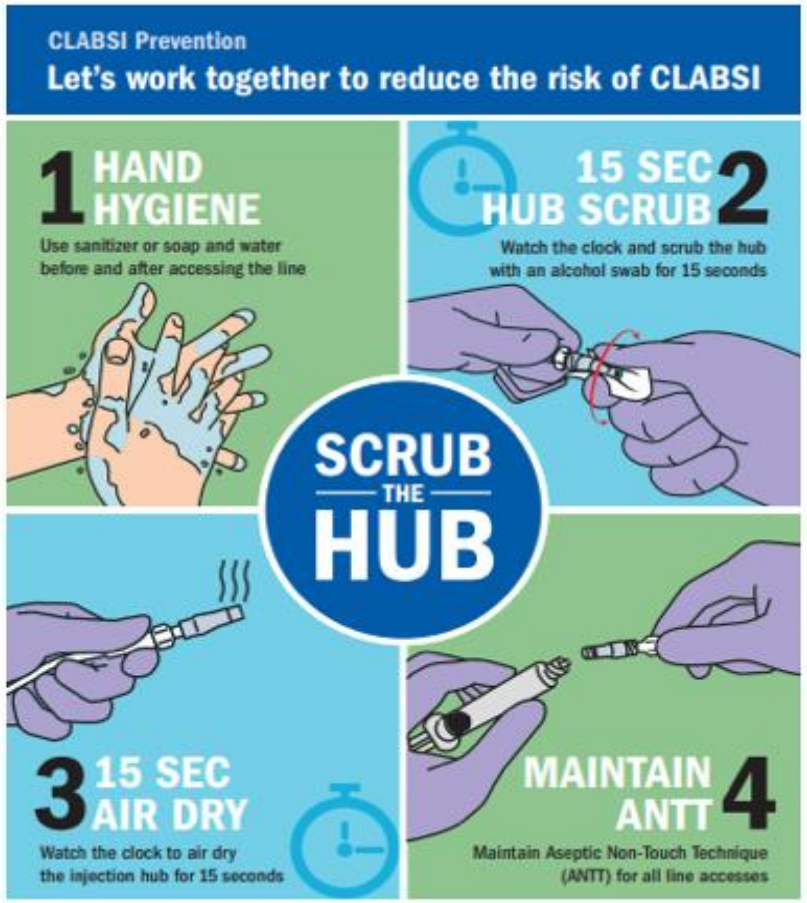
- ✓In patients for whom hemodialysis will probably be warranted, the subclavian site should be avoided because of the risk of subclavian stenosis.

Antibiotic and Antiseptic-Impregnated Catheters:

- ✓Data are lacking.

- ✓This lack of data has contributed to the reluctance to recommend antimicrobial-impregnated catheters for routine use in all patients.

Antiseptic-Containing Hubs and Caps



- ✓"scrub the hub"
- ✓scrubbing the catheter hub or cap with an antiseptic (alcohol or chlorhexidine) for 10 to 15 seconds and then allowing it to dry before insertion.

Cont’

- ✓Antiseptic containing hubs and caps.
- ✓Whether manual disinfection of the hub in accessing the catheter has any additional benefit when an antiseptic-containing protective cap has been used is unknown.

Conclusions:

- ✓Infection-prevention system.
- ✓