

CENTRAL VENOUS CATHETER CARE FOR THE IMMUNOCOMPROMISED PATIENT

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INTRODUCTION

Cancer patients frequently require central venous catheters (CVCs) for cancer treatment, blood transfusion, and parenteral nutrition.

However, cancer patients are at particular risk of infections including CVC-related infections (CRIs) due to disease- and treatment-related immunosuppression



INTRODUCTION

The frequency of resulting central line–associated bloodstream infections (CLABSIs) in cancer patients is estimated at 0.5–10 per 1000 CVC-days.

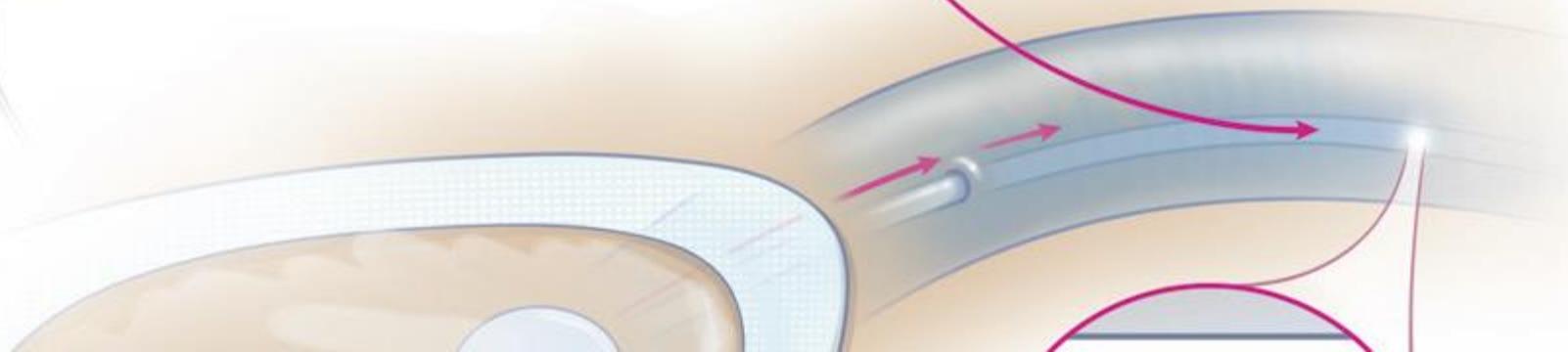
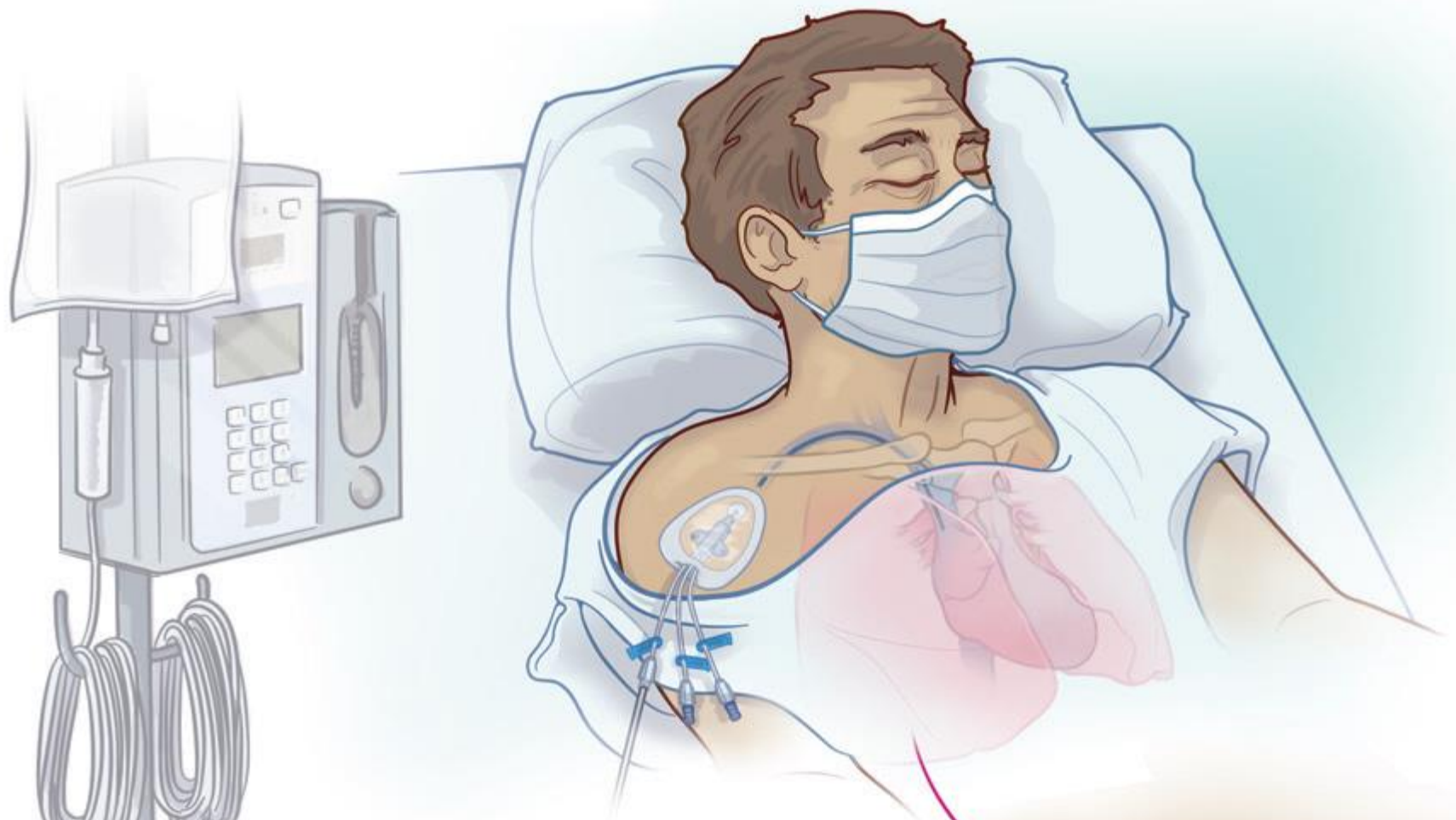
The associated mortality ranges from 12 to 40% depending on several factors, including patient comorbidities, CVC type, and microorganism causing the infection

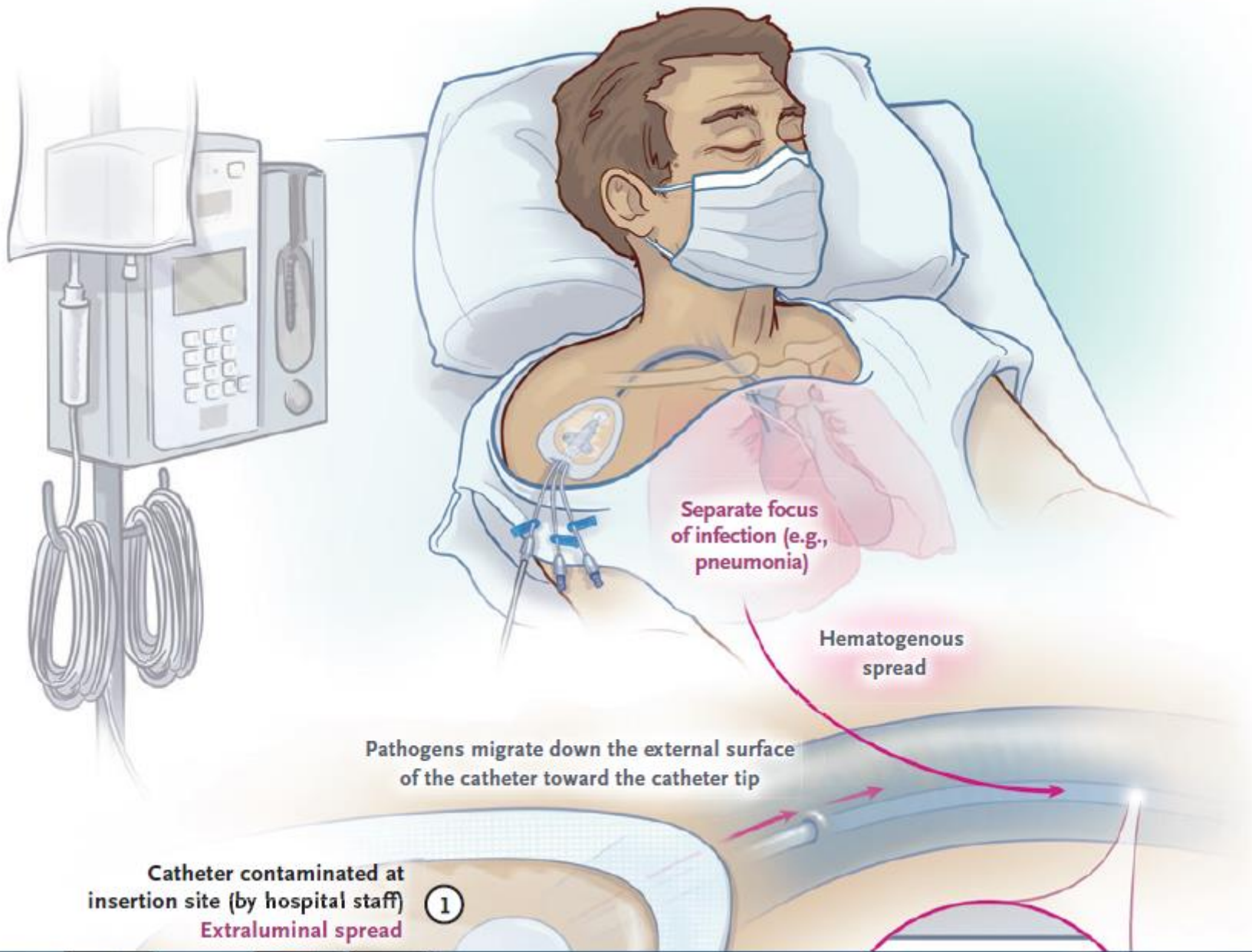


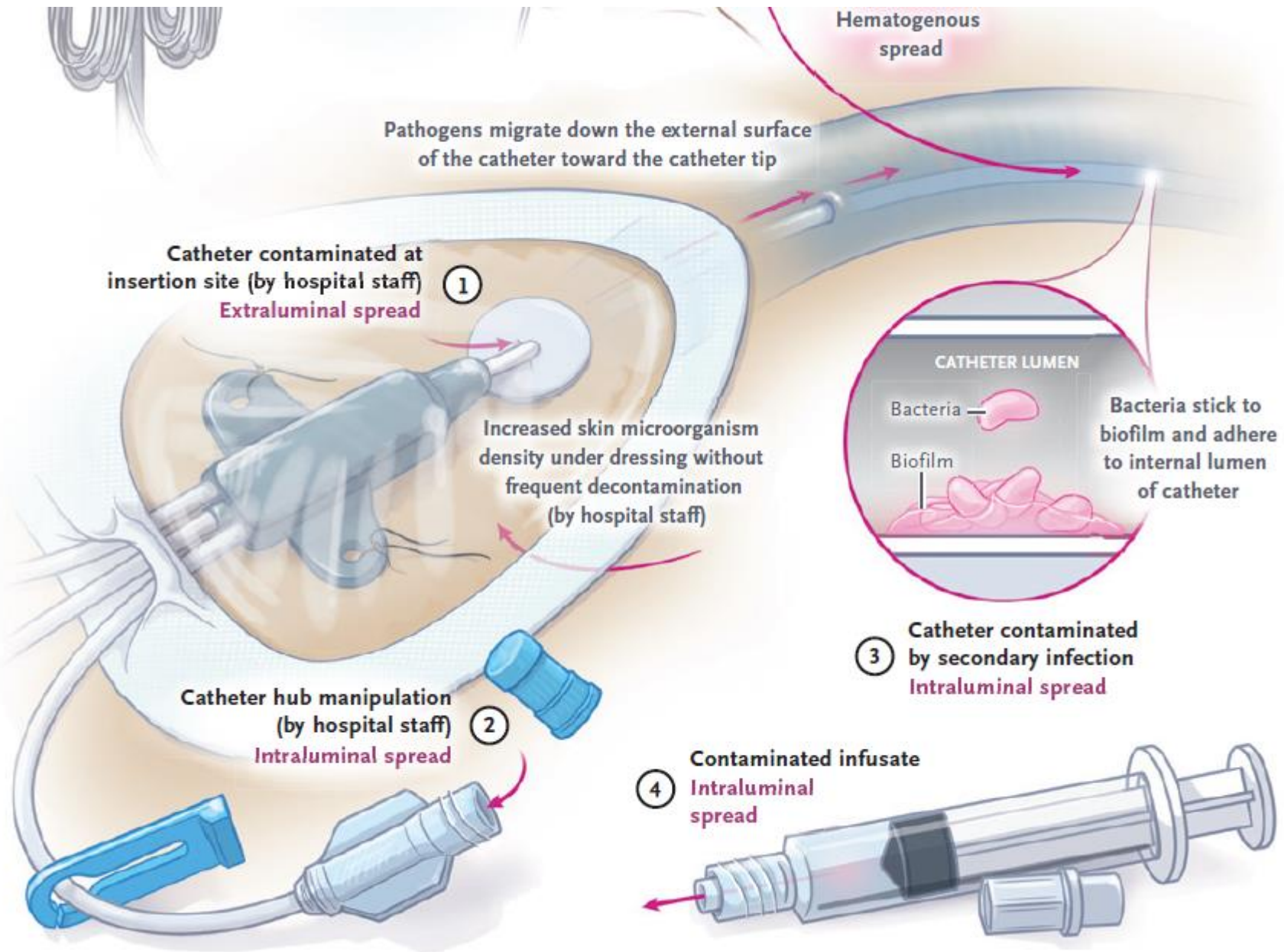
INTRODUCTION

Importantly, up to 70% of all CRIs may be preventable with current evidence-based strategies









RISK FACTORS FOR CENTRAL LINE- ASSOCIATED BLOODSTREAM INFECTION

Patient factors

Provider factors

Device factors



PROVIDER FACTORS

Emergency catheter insertion

Incomplete adherence to aseptic technique

Multiple manipulations of the catheter

Low nurse-to-patient ratio

Failure to remove unnecessary c



PATIENT FACTORS

Immunocompromise

Neutropenia

Burns

Malnutrition

BMI >40*

Prolonged hospitalization before catheter insertion

Prematurity in infants



DEVICE FACTORS


Catheter material

Catheter insertion site

Indications for use (e.g., for hemodialysis)



PROVEN PREVENTIVE STRATEGIES AND DEVICES

 **Table 2. Strategies and Devices for Preventing Central Line–Associated Bloodstream Infection.**

Checklists
Catheter-insertion cart or kit
Hand hygiene
Maximal sterile barrier precautions
Alcoholic chlorhexidine skin antiseptics
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

CHECKLISTS

Checklist for Prevention of Central Line Associated Blood Stream Infections

Based on 2011 CDC guideline for prevention of intravascular catheter-associated bloodstream infections:

<https://www.cdc.gov/infectioncontrol/guidelines/bsi/index.html>

Strategies to Prevent Central Line–Associated Bloodstream Infections in Acute Care Hospitals: 2014 Update

<http://www.jstor.org/stable/10.1086/676533>

For Clinicians:

Follow proper insertion practices

- Perform hand hygiene before insertion.
- Adhere to aseptic technique.
- Use maximal sterile barrier precautions (i.e., mask, cap, gown, sterile gloves, and sterile full body drape).
- Choose the best insertion site to minimize infections and noninfectious complications based on individual patient characteristics.
 - Avoid femoral site in obese adult patients.
- Prepare the insertion site with >0.5% chlorhexidine with alcohol.
- Place a sterile gauze dressing or a sterile, transparent, semipermeable dressing over the insertion site.
- For patients 18 years of age or older, use a chlorhexidine impregnated dressing with an FDA cleared label that specifies a clinical indication for reducing CLABSI for short term non-tunneled catheters unless the facility is demonstrating success at preventing CLABSI with baseline prevention practices.

Handle and maintain central lines appropriately

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Handle and maintain central lines appropriately

- Comply with hand hygiene requirements.
- Bathe ICU patients over 2 months of age with a chlorhexidine preparation on a daily basis.
- Scrub the access port or hub with friction immediately prior to each use with an appropriate antiseptic (chlorhexidine, povidone iodine, an iodophor, or 70% alcohol).
- Use only sterile devices to access catheters.
- Immediately replace dressings that are wet, soiled, or dislodged.
- Perform routine dressing changes using aseptic technique with clean or sterile gloves.
 - Change gauze dressings at least every two days or semipermeable dressings at least every seven days.
 - For patients 18 years of age or older, use a chlorhexidine impregnated dressing with an FDA cleared label that specifies a clinical indication for reducing CLABSI for short-term non-tunneled catheters unless the facility is demonstrating success at preventing CLABSI with baseline prevention practices.
- Change administrations sets for continuous infusions no more frequently than every 4 days, but at least every 7 days.
 - If blood or blood products or fat emulsions are administered change tubing every 24 hours.
 - If propofol is administered, change tubing every 6-12 hours or when the vial is changed.

Promptly remove unnecessary central lines

- Perform daily audits to assess whether each central line is still needed.

For Healthcare Organizations:

- Educate healthcare personnel about indications for central lines, proper procedures for insertion and maintenance, and appropriate infection prevention measures.
- Designate personnel who demonstrate competency for the insertion and maintenance of central lines.
- Periodically assess knowledge of and adherence to guidelines for all personnel involved in the insertion and maintenance of central lines.
- Provide a checklist to clinicians to ensure adherence to aseptic insertion practices.
- Reeducate personnel at regular intervals about central line insertion, handling and maintenance, and whenever related policies, procedures, supplies, or equipment changes.
- Empower staff to stop non-emergent insertion if proper procedures are not followed.
- Ensure efficient access to supplies for central line insertion and maintenance (i.e. create a bundle with all needed supplies).
- Use hospital-specific or collaborative-based performance measures to ensure compliance with recommended practices.

Supplemental strategies for consideration:

- Antimicrobial/Antiseptic impregnated catheters
- Antiseptic impregnated caps for access ports



Supplemental strategies for consideration:

- ❑ Antimicrobial/Antiseptic impregnated catheters
- ❑ Antiseptic impregnated caps for access ports



HAND HYGIENE

Hand hygiene before insertion of a central catheter is an **essential part** of an infection-prevention program.

Hand hygiene can involve washing with conventional soap and water or with an alcohol-based, waterless hand rub.

An alcohol based sanitizer is preferred for hands that are not visibly soiled

HAND HYGIENE

Hand hygiene is essential **before and after** inserting, replacing, accessing, repairing, or dressing an intravascular catheter.

Using gloves when manipulating central catheters does not preclude the need for hand hygiene.



MAXIMAL STERILE BARRIER PRECAUTIONS

Maximal sterile barrier precautions are defined as wearing a **mask, cap, sterile gown, and sterile gloves** and placing a large sterile drape that fully covers the patient's entire body.

The use of maximal sterile barrier precautions during catheter placement has been associated with a reduced incidence of CLABSI, as compared with the use of sterile gloves and a small drape alone.

ALCOHOLIC CHLORHEXIDINE SKIN ANTISEPSIS

Skin antiseptis with an **alcoholic chlorhexidine** preparation containing **at least 2% chlorhexidine gluconate** at the time of catheter insertion has become the standard of care, based on multiple randomized studies showing a reduced incidence of CLABSI with alcoholic chlorhexidine than with povidone iodine

ALCOHOLIC CHLORHEXIDINE SKIN ANTISEPSIS

the superior clinical protection provided by chlorhexidine is probably related to **more rapid action**, a **shorter drying time** owing to the combination with alcohol, **persistent activity despite exposure to blood and body fluids**, and a **longer residual effect at the site** of catheter insertion

SITE SELECTION

The association of catheterization site and CRI has been studied in several earlier studies and meta-analyses

Overall, the insertion in femoral sites has been associated with a higher risk of infections and thrombotic complications compared with subclavian and internal jugular CVCs.

SITE SELECTION

Therefore, **femoral catheterization should be avoided.**

Subclavian insertion might be preferable over internal jugular, as colonization risk and risk of CRBSI might be slightly lower at subclavian sites

SITE SELECTION

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**.

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

The availability of **bedside ultrasonography** and the **experience of the proceduralist** should be factored into the choice of insertion site, along with a consideration of infection risk.

DRESSINGS

Dang and colleagues reported that transparent dressings were associated with a lower risk of CRBSI



CHLORHEXIDINE DRESSINGS

Dressings containing chlorhexidine have been shown to reduce the risk of CLABSI and should be routinely used in **patients older than 2 months of age**.

These dressings are available in two forms: a **gel-based chlorhexidine coating** on a **transparent dressing** and a **chlorhexidine-impregnated sponge** dressing

CHLORHEXIDINE DRESSINGS

CHX dressings were well tolerated as the frequency of dressing intolerance with cutaneous and soft tissue abnormalities at the contact area was similar in both groups

Therefore, the use of CHX-containing dressings might be helpful for the prevention of CRIs in cancer patients, preferably transparent CHX impregnated gel dressings, as CHX sponges might conceal the insertion site and increase the risk of dressing detachment

CHLORHEXIDINE BATHING

Several randomized trials involving adults and children have established the role of daily chlorhexidine bathing to prevent CLABSI in critically ill patients.

However, the role of daily chlorhexidine baths is less clear in other patient populations.

One study, which involved patients on general medical and surgical wards, showed that daily chlorhexidine bathing was associated with a significant decrease in the incidence of CLABSI.

CHLORHEXIDINE BATHING

Chlorhexidine bathing has also been studied in patients with cancer.

Some studies in this patient population showed that daily chlorhexidine bathing **decreased** the incidence of CLABSI **among adults**

however, in children, similar benefits were not observed

ANTIBIOTIC- AND ANTISEPTIC-IMPREGNATED CATHETERS

Notably, in the largest trial exclusively including cancer patients, the intervention was tested **in long-term catheters with catheters used for more than 2 months**

In conclusion, the use of antimicrobial-impregnated CVCs may be useful in patients with long-term CVC in case of persisting high rate of CRI **despite implementation of educational programs and appropriate CVC bundles**

ANTISEPTIC-CONTAINING HUBS AND CAPS

Manual decontamination of these hubs and caps has been the subject of “**scrub the hub**” campaigns, which advocate scrubbing the catheter hub or cap with an antiseptic (i.e., alcohol or chlorhexidine) for **10 to 15 seconds** and then allowing it to dry before insertion.

Since **15 seconds plus drying** time may not be achievable if rapid insertion is required, antiseptic-containing connector or cap protectors have been developed.

ANTISEPTIC-CONTAINING HUBS AND CAPS

However, although the use of these devices is supported by high-quality evidence,

they have not been recommended for routine use because they are not viewed as superior to manual disinfection, which is considered to be an essential practice. 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

ANTIMICROBIAL LOCK SOLUTIONS

ALT should be limited to **persisting high baseline rates of CRI in high-risk patients with long-term catheters**, and the potential beneficial effects of ALT must be balanced against the potential for **allergic reactions, toxicity, and emergence of antimicrobial resistance**

TOPICAL ANTIBIOTICS

Use antimicrobial ointments for hemodialysis catheter insertion sites



ESSENTIAL PRACTICE

Remove nonessential catheters

Routine replacement of administration sets not used for blood, blood products, or lipid formulations can be performed at intervals up to 7 days

Use ultrasound guidance for catheter insertion

Do not use antimicrobial prophylaxis for short-term or tunneled catheter insertion or while catheters are in situ



THANK YOU FOR YOUR ATTENTION

