



衛生防護中心
Centre for Health Protection

Recommendations on Prevention of Intravascular Catheter Associated Bloodstream Infection

**Scientific Committee on Infection Control, and
Infection Control Branch, Centre for Health Protection,
Department of Health**



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Background

The Recommendations on Prevention of Intravascular Catheter Associated Bloodstream Infection (CABSI) represent the second accomplishment of The Scientific Committee on Infection Control (SCIC) in the promulgation of preventive measures for the four major systems of healthcare associated infections namely, surgical site infection, intravascular catheter associated bloodstream infection, ventilator associated pneumonia and catheter associated urinary tract infection. Joining the local parties in the development of the present recommendations, the SCIC has also brought in international renowned expert, Dr Victor D. Rosenthal to provide advice and up-to-date knowledge on closed infusion system during the process. It is believed that the recommendations will provide guidance for the hospital colleagues on good practice in the formulation of strategies, programmes and plans for the prevention of intravascular catheter associated bloodstream infection.

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References

Introduction

Use of vascular catheters has become an indispensable part of modern medicine practice, particularly in intensive care units. Their use may put patients at risk for local and systemic infectious complications such as local site infection or bloodstream infection. (1, 2)

2. The common causes of CABSIs are migration of micro-organisms from the skin at the insertion site into the cutaneous tract of the catheter and contamination of the catheter hub (1). This guideline provides health-care professionals with background information and specific recommendations to reduce the incidence of CABSIs and emphasizes strategies on minimizing these hazards when using different intravascular catheters.

Recommendations on Prevention of Intravascular Catheter Associated Bloodstream Infection

1 General Aspects

1.1 Hand hygiene

Perform hand antisepsis with water and antiseptic soap or with alcohol hand rub for catheter site care and accessing the system, including before and after catheter insertion, touching the catheter insertion sites, dressing and the infusion system. (1, 3, 4, 5)

1.2 Use aseptic technique for catheter insertion and catheter site care

1.2.1 Disinfect skin properly before catheter insertion, with sufficient contact time, (alcohol-based antiseptics require contact time about 30 seconds; non-alcohol-based antiseptics require longer contact time usually around 2 min) (6). For examples, 70% alcohol for peripheral line insertion. Chlorhexidine-based preparation is preferred for central line insertion (1, 7, 8)

1.2.2 Do not use arterial and venous cutdown as a routine method of catheter insertion. (1)

1.2.3 Use clean gloves and apply “non-touch” technique for peripheral intravascular catheter insertion after the application of skin antiseptics. Wear sterile gloves for the insertion of arterial and central venous catheters. (1)

1.3 Quality assurance, education and surveillance

1.3.1 Implementation of educational programs regarding the indications for intravascular catheter use, proper procedures for the insertion and maintenance of intravascular catheters, and appropriate infection control measures to prevent CABSIs. (1, 9, 10)

1.3.2 Ensure persons who insert or manage intravascular catheters are trained and competent for the procedure.

1.3.3 Well-organized surveillance program that can monitor and evaluate the performance of care is one of the tools for the prevention of the CABSIs. (1, 9). Both process and outcome measures on the care of intravascular catheter should be monitored. For the infection rate, it is preferable to express it by an incidence density such as “CABSIs per 1000 catheter patient days”. (11)

1.3.4 Do not routinely culture catheter tips unless the source of infection is likely to be the catheter. (1)

1.4 Catheter and site care

- 1.4.1 Use sterile gauze or transparent dressings to cover the catheter site. (1). The choice of materials of transparent dressings should prefer increased durability, improved security of the catheter, visibility of the wound site, provision of an effective barrier to micro-organisms or increase the rate of evaporation of fluid. (12, 13)
- 1.4.2 A gauze dressing is preferred if the site is bleeding, oozing or the patient is diaphoretic. (1, 14)
- 1.4.3 Change dressings at least weekly or when clinically indicated (removal or replacement of catheter; damp, loosened or visibly soiled dressings). (1)
- 1.4.4 Secure the catheter after insertion. (1)
- 1.4.5 Do not apply topical antibiotic ointment or creams to the catheter insertion site except for dialysis catheters. (1)
- 1.4.6 Remove the catheter when it is no longer used. (1, 13)

2 **Care of Specific Catheters**

2.1 Central venous catheters (CVCs), including peripherally inserted central venous catheters (PICCs), haemodialysis and pulmonary artery catheters

The central line bundle approach is a group of evidence-based interventions for patients with intravascular central venous catheters that, when implemented together, result in better outcomes than when implemented individually. The central line bundle consists of 5 key components:

- a) Hand hygiene
- b) Maximal barrier precautions
- c) 2% Chlorhexidine skin antisepsis
- d) Optimal catheter site selection, with subclavian vein as the preferred site for non-tunneled catheters
- e) Daily review of line necessity, with prompt removal of unnecessary lines.

This is not intended to be a comprehensive list of all elements of care related to central lines. Other elements of care, such as daily site care and selection of dressing material, are not excluded for any purpose other than to have a bundle that is focused. (15)

- 2.1.1 A subclavian site is preferred to a jugular or femoral site in adult. (16, 17, 18, 19) Use a jugular or femoral catheter rather than a subclavian one for haemodialysis or pheresis. (1)
- 2.1.2 Use maximal sterile barrier precautions (including the use of cap, mask, sterile gloves, sterile gown and one large sterile drape) for insertion of central line. (1, 19, 20)
- 2.1.3 Minimal numbers of ports and lumens of central venous catheters essential for management of patients should be used. (1, 21)
- 2.1.4 Designate a CVC line or one port of a multi-lumen CVC for exclusive use of parenteral nutrition. (1, 22)
- 2.1.5 Replace gauze dressing every 2 days and transparent dressing every 7 days for short-term CVC. The risk of catheter dislodging should be weighed for changing of dressing in paediatric patients. (1)
- 2.1.6 Routine replacement of intravascular catheters is not necessary if they are functioning and have no evidence of causing local or systemic complications. (1, 23)
- 2.1.7 Do not replace intravascular catheters over guidewire if CABSIs is suspected. (1, 23)
- 2.1.8 Prepare skin with antiseptic chlorhexidine 2% in 70% isopropyl alcohol which has been proven to provide better skin antiseptics than other antiseptic agents such as povidone-iodine solutions (1, 15)

2.2 Peripheral venous catheters

- 2.2.1 Use the upper extremity for catheter insertion in adults. (1)
- 2.2.2 Observe the catheter insertion site daily by palpation and inspection if transparent dressing is used. Visual inspection may be necessary for opaque dressing if patient has unexplained fever, pain, local tenderness, other signs of bloodstream infection or patients cannot communicate. (1, 14)
- 2.2.3 Replace short, peripheral venous catheter at least every 72-96 hours in adult and remove when no longer indicated. If sites for venous access are limited, catheter can be maintained for longer period but close monitoring of insertion site is necessary. Leave the catheter in place until the therapy is completed, unless a complication occurs in paediatric patients. (1)

2.2.4 Remove the peripheral intravascular catheter if there is sign of phlebitis or malfunctioning. (1)

2.2.5 Flush the peripheral intravascular lock or needle free device with normal saline for maintaining the patency and lowering the overall catheter-related complications though they are not necessarily infection related. (24)

2.2.6 Efficacy of normal saline solution as an alternative to heparin solution for the maintenance of peripheral IV devices is to eliminate the risk of heparin-induced thrombocytopenia, thrombus, haemorrhage and medication incompatibility which can provide a safer therapy for patient as well as cost savings. (24, 25, 26). Therefore, normal saline flush is superior and preferable.

2.3 Additional recommendations for peripheral arterial catheters (1)

2.3.1 Use disposable transducer assemblies when possible.

2.3.2 Replace the transducers assemblies at least every 96 hours together with other components of the system, including the tubing, continuous-flush device and flush solution.

2.4 Additional recommendations for pressure monitoring system (1)

2.4.1 Keep all components of the system sterile.

2.4.2 Use a closed (continuous) flushing system to maintain the patency of the system.

2.4.3 Do not infuse the dextrose-containing solution or parenteral nutrition fluids through the system.

2.5 Umbilical catheters (1)

Avoid tincture of iodine for disinfection of umbilical insertion site in newborn infants. Other iodine-containing preparation, for example, povidone iodine, is acceptable.

3 **Maintenance of Administration Sets**

3.1 Replace administration sets including extension tubings, add-on devices no more frequently than every 72 hours, unless CABS I is suspected or confirmed. (1, 27)

3.2 Replace administration sets transfusing blood, blood products or lipid containing solutions after administration or within 24 hours. (1)

- 3.3 Disinfect IV injection port, stopcocks, needleless intravascular device or heparin-block with 70% alcohol, 2% Chlorhexidine in alcohol or iodophor preparation before access. (1, 28, 29)
- 3.4 IV injection port: there have been reports of higher infection rate associated with the use of stopcocks (28, 29). When stopcocks are to be used, cap all stopcocks when not in use. (1)
- 3.5 Do not draw blood specimens through single-lumen peripheral or central venous lines intended for infusions except when catheter-associated bacteremia is suspected. Dedicate a specific lumen from a multi-lumen for blood-letting. (14)
- 3.6 Preferably, a single-lumen catheter should be used as it is associated with reduced risk of CABSI. Multi-lumen catheter should only be used when there is limited site for iv access.
- 3.7 Maintain a closed infusion system.
- 3.7.1 The closed infusion system has been shown to result in significant reduction in the incidence of CABSI. (30)
- 3.7.2 The closed infusion system is defined as:
- 1) the container of intravenous solution is fully collapsible (the residue after administration does not exceed 5% of the nominal volume), and hence does not require external air vent to allow the solution to empty AND
 - 2) the connecting administration set has no air-vent.
- The whole infusion system is maintained closed to the external environment while infusing except for the situation listed in para 3.7.3.
- 3.7.3 In the situation when intravenous solution or medication is delivered by a semi-rigid plastic or glass bottle, an air vent to empty the solution is allowed.
- 3.8 In-line filters: Do not use filters routinely for infection-control purposes. (1)

4 Care of Infusate, IV Medication and Admixture

- 4.1 Complete lipid-containing solutions within 24 hours of hanging the solution. For lipid emulsions alone, it should be completed within 12 hours, and maximum within 24 hours. (1)
- 4.2 Use single-dose vial of parenteral additive and medication as far as possible. Do not combine the leftover content of single-use vials for later use. (1)
- 4.3 Disinfect diaphragm of the multidose vials with 70% alcohol before insertion. Sterile device should be used. (1)
- 4.4 Discard multidose vial of parenteral additive and medication if contaminated. (1)
- 4.5 Do not use any parenteral fluid or admixture that has visible turbidity, containing particulate matter or container with leaks or cracks. Save and report the item for investigation. (1)
- 4.6 Do not adopt routine culture of parenteral fluids, as a check on sterility for infection preventive measure. (14)
- 4.7 Attach a distinctive supplementary label to each admixed parenteral fluid giving, stating the additive and dosage, the date and time of compounding, the expiration time and signature of the person who did the compounding. (14)

5 Needleless Intravascular Catheter Systems

- 5.1 Wipe the access port with an appropriate antiseptic and accessing the port only with sterile devices to minimize the risk of contamination. (1)
- 5.2 Replace caps or the needleless system no more frequently than at 72-hour intervals unless clinically indicated or follow the manufacturers' recommendations. (1)
- 5.3 Replace needleless components at least as frequently as the administration set and ensure the components are compatible to minimize the leaks and breaks in the system. (1)

6 Special Considerations for the Prevention of CABS I

- 6.1 There is no conclusive evidence to adopt any kinds of agents to be the lock solution for preventing CABS I. (31, 32, 33, 34)
- 6.2 Do not routinely use antibiotic lock solutions to prevent CABS I. Use prophylactic antibiotic lock solution only in special situations, such as in treating a patient with a long-term cuffed or tunneled catheter, or port who has a history of multiple infections despite optimal maximal adherence to aseptic technique. (1, 2)

- 6.3 The use of an antimicrobial- or antiseptic-bonded catheter should be based on the need to enhance prevention of CABSIs after maximizing the adherence of infection control measures (educating personnel, using maximal sterile barrier precautions and using 2% Chlorhexidine skin antiseptics). However, both of them only offer marginal benefit in reducing CABSIs.(1, 2)
- 6.4 Anti-septic coated catheter is more preferable as it does not carry the risk of anaphylactoid reactions, superinfection with yeast and promoting antibiotic resistant pathogen as in antibiotic one. (2, 35, 36, 37)
- 6.5 Prophylactic antimicrobials: Do not administer intranasal or systemic antimicrobial prophylaxis routinely before insertion or during use of an intravascular catheter to prevent catheter colonization or bloodstream infection. (1)

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