Central Venous Catheter Care Bundle

Manual

A quality initiative for the prevention of Central Venous Catheter-Related Blood Stream Infection (CVC-BSI)

April 2008

The National Audit on Adult Intensive Care Units (NAICU) & Quality in Medical Care Section, Medical Development Division, Ministry of Health
CENTRAL VENOUS CATHETER CARE BUNDLE

1. Hand hygiene
2. Maximal barrier precautions upon insertion
3. Chlorhexidine skin antisepsis
4. Optimal catheter site selection, with subclavian vein as the preferred site for non-tunneled catheters
5. Daily review of line necessity with prompt removal of unnecessary lines
CVC care bundle Task Force

Advisors:
Dr Kalsom bt Maskon
Deputy Director
Quality in Medical Care Section
Medical Development Division, Ministry of Health

Dr Ng Siew Hian
Head of Department of Anaesthesia and Intensive Care
Hospital Kuala Lumpur

Members:
Dr Tan Cheng Cheng
Consultant Intensivist
Department of Anaesthesia and Intensive Care
Hospital Sultanah Aminah, Johor Bahru

Dr Jenny Tong May Geok
Head of Department of Anaesthesia and Intensive Care
Hospital Tuanku Jaafar, Seremban

Dr Tai Li Ling
Consultant Intensivist
Department of Anaesthesia and Intensive Care
Hospital Kuala Lumpur

Secretariat
Dr Paa Mohamed Nazir bin Abd Rahman
Senior Principal Assistant Director
Quality in Medical Care Section
Medical Development Division, Ministry of Health

Dr Fakhruddin bin Amran
Principal Assistant Director
Quality in Medical Care Section
Medical Development Division, Ministry of Health

Matron Norhizan Othman
Sister Norwati Mohd
Quality in Medical Care Section
Medical Development Division, Ministry of Health
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Introduction

This manual is intended as a guide for health care providers to implement the central venous catheter care bundle as an effort to reduce central venous catheter-related blood stream infections (CVC-BSI).

Intravascular devices are indispensable in modern day medical practice with central venous catheters (CVCs) being commonly used in the intensive care units (ICUs). In the European Prevalence of Infection in Intensive Care (EPIC) study\(^1\), 78.3% of critically ill patients had some form of intravenous catheterisation while in the National Audit on Adult Intensive Care Units (NAICU) of Malaysia\(^2\), an average of 70% of patients in the intensive care unit (ICU) had CVCs inserted.

However, CVCs disrupt the integrity of the skin, making infections with bacteria and/or fungi a possibility. These infections may spread to the bloodstream (bacteremia) and haemodynamic changes and organ dysfunction (severe sepsis) may ensue, possibly leading to death. CVC-BSI have been shown to be responsible for about 62% of ICU acquired blood stream infections\(^3\) which added to the morbidity and mortality of ICU stay\(^4\). In addition, CVC-BSI have been shown to increase both ICU and hospital length of stay\(^5,6\).

Data from National Nosocomial Infections Surveillance System from January 1992 through June 2004 showed that the median rate of CVC-BSI in ICUs of all types ranged from 1.8 to 5.2 infections per 1000 catheter-days\(^7\). The only data available in Malaysia was from Hospital Sultanah Aminah Johor Bahru which showed an incidence of 9.43 infections per 1000 catheter in situ days\(^8\).

It is possible to decrease CVC-BSI rate and even achieve a zero CVC-BSI rate by implementing evidence-based interventions grouped in the form of a care bundle\(^9,10\). In the 103 ICUs in the state of Michigan which implemented this care bundle, the
median rate of CVC-BSI per 1000 catheter-days decreased from 2.7 infections at baseline to 0 at 3 months after implementation of the study intervention \( (p \leq 0.002) \), and the mean rate per 1000 catheter-days decreased from 7.7 at baseline to 1.4 at 16 to 18 months of follow-up \( (p < 0.002) \)\(^{10}\).

**The Central Venous Catheter Care Bundle**

The National Healthcare Safety Network (NHSN) of the US defined a central venous catheter (CVC) as a catheter with its tip terminating in a great vessel. The great vessels include the pulmonary artery, superior vena cava, inferior vena cava, brachiocephalic veins, internal jugular veins, subclavian veins, external iliac veins and common femoral veins. Hence, peripherally inserted central lines (PICC) and femoral lines are considered CVCs.

Care bundles, in general, are groupings of best practices with respect to a disease process that individually improve care, but when applied together, result in substantially greater improvement. The science supporting each bundle component is sufficiently established to be considered as the standard of care.

The central venous catheter care bundle is a group of evidence-based interventions for patients with CVCs that, when implemented together, result in better outcomes than when implemented individually.

The CVC care bundle consists of five evidence-based procedures recommended by the CDC (Center of Disease Control and Prevention) and identified as having the greatest effect on the rate CVC-BSI and the lowest barriers to implementation.
The five evidence-based components of the CVC care bundle are:

1. Hand hygiene
2. Maximal barrier precautions upon insertion
3. Chlorhexidine skin antisepsis
4. Optimal catheter site selection, with subclavian vein as the preferred site for non-tunneled catheters
5. Daily review of line necessity with prompt removal of unnecessary lines

Berenholtz et al. demonstrated that ICUs that have implemented multifaceted interventions similar to the CVC care bundle have nearly eliminated CVC-BSIs.\textsuperscript{11}

Figure: Rate of CVC-BSI per catheter days from 1998 to 2003 in ICU

The success of these interventions is perhaps due to a mindfulness that develops when regularly applying the elements of the bundle.
Preventing Central Venous Catheter-Related Bloodstream Infections

Five Components of Care

1. Hand Hygiene

The transmission of healthcare-associated pathogens most often occurs via the contaminated hands of healthcare workers. Accordingly, hand hygiene (i.e., handwashing with antimicrobial soap and water or use of a waterless, alcohol-based hand rub) is one of the most important infection control measures for preventing health-care-associated infections including CVC-BSI\textsuperscript{12}.

When washing hands with antimicrobial soap and water, one is to wet the hands first with water, apply an amount of product recommended by the manufacturer to hands, and rub hands together vigorously for at least 15 seconds to cover all surfaces of the hands and fingers. Rinse hands with water and dry thoroughly with a disposable towel.

When performing hand hygiene with alcohol-based hand rub, always use sufficient volume to cover all surfaces (palm, back of hand, fingers, fingertips, and fingernails) and rub till dry for at least 15 seconds.

Healthcare workers should clean their hands according to the recommendations listed in the CDC Guideline for Hand Hygiene in Healthcare Settings\textsuperscript{13}. When caring for CVCs, hand hygiene should be performed:

- Before and after palpating catheter insertion sites
- Before donning gloves and gown
- Before and after inserting, replacing, accessing, or dressing a catheter
• After removing gloves (Gloved hands can also become contaminated due to tiny punctures in the glove material or during glove removal; therefore, hand hygiene must be performed immediately after glove removal)

Some recommended measures to improve compliance to hand hygiene in relation to care of CVC are:

• Include hand hygiene as part of checklist for CVC placement
• Empower nurses to stop doctors from performing catheterisation if hand hygiene is not observed
• Create an environment where reminding each other about hand hygiene is encouraged.

2. **Maximal Barrier Precautions Upon Insertion**

Maximal barrier precautions during CVC insertion are the same as for any other surgical procedure that carries a risk of infection. They consist of the use of a cap, mask, sterile gloves and long-sleeved gowns by the operator and those assisting in the procedure. The cap should cover all hair and the mask should cover the nose and mouth tightly.

For the patient, applying maximal barrier precautions means covering the patient with a full-sized sterile drape, with a small opening for the site of insertion. The rationale for a large sterile drape is to ensure that sterile field is maintained and that the catheter is not exposed to contamination during the procedure.

In two studies, the odds of developing a CVC-BSI are increased if maximal barrier precautions were not used. For pulmonary artery catheters, the odds ratio for developing infection was more than two times greater for placement without maximal
barrier precautions\textsuperscript{14}. A study of similar design found that this rate was six times higher for placement of CVCs\textsuperscript{15}.

Some interventions that have been proven in studies to increase compliance with the use of full barrier precautions and decrease catheter-related infections are:

a. preparation of standardized procedure carts or kits that contain all supplies necessary for a sterile procedure\textsuperscript{16}

b. creation of a dedicated team for placement of CVCs\textsuperscript{17}

c. 1-day course on the prevention of vascular catheter infection, emphasising the use of full-size sterile drapes for physicians-in-training\textsuperscript{18}.

3. \textbf{Chlorhexidine Skin Antisepsis}

Microbial populations on the skin are routinely suppressed by the use of antiseptic agents prior to catheter insertion. Using an antiseptic solution for skin disinfection at the catheter insertion site helps to prevent catheter-related infections.

Both chlorhexidine gluconate and povidone-iodine have broad spectrum antimicrobial activity. Chlorhexidine works by disrupting bacterial cellular wall content while povidone-iodine acts by destroying microbial protein and DNA. Chlorhexidine has a rapid onset of bactericidal action and prolonged antimicrobial efficacy by binding to the protein of the skin and, thus, being available for residual activity over a relatively long period of time. Furthermore, chlorhexidine is not inactivated by blood or serum proteins. Alcoholic solutions are more effective than aqueous solutions of the same antimicrobial agents.

Several studies have compared the efficacy of povidone-iodine and chlorhexidine gluconate solutions in reducing vascular catheter-related infections. Chlorhexidine
skin antisepsis has been proven to provide better skin antisepsis than other antiseptic agents such as povidone-iodine solutions.

Maki et al. randomised skin preparation solution for 668 catheters comparing 2% chlorhexidine, 10% povidone-iodine, and 70% alcohol. Chlorhexidine 2% was associated with the lowest incidence of CVC-BSI (2.3 per 100 catheters, p=0.02). Alcohol 70% and povidone-iodine 10% were associated with 7.1 and 9.3 infections per 100 catheters respectively. In a recent meta-analysis, Chaiyakunapruk analyzed 8 studies involving a total of 4,143 catheters. This meta-analysis identified a risk reduction for CVC-BSI = 0.49 with 95% CI (0.28 - 0.88). Chlorhexidine gluconate decreased CVC-BSI by 50% compared with povidone-iodine (1% vs. 2%). The results in this same study also demonstrated expected cost savings when chlorhexidine gluconate was used as skin antiseptic.

The CDC Guidelines for the prevention of intravascular catheter-related infections recommends that the skin be disinfected with 2% chlorhexidine-based preparation before catheter insertion and during dressing changes.

The proper method of sterilising an insertion site with chlorhexidine 2% involves scrubbing in a back and forth motion for 30 seconds rather than prepping in a circle as this method may be more effective in reducing the bacterial burden prior to the puncture of the skin and subsequently under the dressing. Also, note that only one application of the chlorhexidine solution is necessary. The antiseptic solution must be allowed to dry completely before puncturing the site.

Irritation, sensitisation, and generalised allergic reactions have been reported with chlorhexidine-containing products, especially in the genital areas. Maki et. al found erythema at the insertion site in 28.3% of catheters in the povidone-iodine group and in 45.3% of catheters in the chlorhexidine gluconate group (p=0.0002).
Chlorhexidine 2% is **contraindicated for use near the meninges**, in the genital area, and near the eyes and ears. At the 2% concentration, it can cause serious and permanent injury on contact with the eye or if instilled through a perforated eardrum. As a scrub it is not recommended for persons under two months of age. Extensive skin burns after the use of alcoholic chlorhexidine as a skin antiseptic has been reported in a premature baby\textsuperscript{21}.

### 4. Optimal Catheter Site Selection, with Subclavian Vein as the Preferred Site for Non-Tunneled Catheters

The site of catheter placement influences the subsequent risk for CVC-BSI and phlebitis. The influence of site on the risk of catheter infections is related in part to the risk for thrombophlebitis and density of local skin flora\textsuperscript{12}.

The Cochrane Collaboration has recently published a review article on central venous access sites for the prevention of infection\textsuperscript{22}. The authors found only one high quality block randomized controlled trial\textsuperscript{23} comparing mechanical, infectious and thrombotic complications of femoral and subclavian venous catheterisation. The results of the study in relation to infectious complications were as follows:

- **a. infectious complication (colonisation with or without sepsis):** the relative risk (RR) was 4.57 (95% CI 1.95 - 10.71) favouring subclavian over femoral access.
- **b. major infectious complications (sepsis with or without bacteremia):** the RR was 3.04 (95% CI 0.63 - 14.82) favouring subclavian access.
- **c. colonised catheter (≥ 10\textsuperscript{3} colony-forming units/ml of gram positive microorganisms):** the RR was 3.65 (95% CI 1.40 - 9.56) favouring subclavian access.
d. colonised catheter (≥ 10³ colony-forming units/ml of gram negative microorganisms): the RR was 5.41 (95% CI 1.61 - 18.15) favouring subclavian access.

In a systematic review on complications of central venous catheters: internal jugular versus subclavian access²⁴, three trials (707 catheters) reported on bloodstream infection. The incidence was 8.6% with the jugular access and 4.0% with the subclavian access. (RR 2.24, CI 0.62 - 8.09).

Whenever possible, and not contraindicated, the subclavian approach is preferred to the jugular or femoral approach.

However, for the inexperienced clinician, the subclavian site may present a significant risk of pneumothorax, subclavian artery puncture, subclavian vein laceration, subclavian vein stenosis, haemothorax, thrombosis, air embolism and catheter misplacement¹². The subclavian approach may also be unavailable due to chest injury. In a meta-analysis of eight studies, the use of bedside ultrasound for the placement of subclavian CVCs substantially reduced mechanical complications compared with the standard landmark placement technique (RR 0.22, 95% CI 0.10 - 0.45)²⁵.

Hence, maintenance of asepsis, patient-specific factors (e.g. preexisting catheters, anatomic deformity and bleeding diathesis), relative risk of mechanical complications (e.g. bleeding and pneumothorax), the availability of bedside ultrasound and the risk for infection should guide site selection¹².

One may ask why are subclavian lines preferred over peripherally inserted central lines (PICC) if the standard is lowest infection risk? Data is still lacking on infection rates for PICC lines in acute care settings as opposed to chronic or home care settings. The most recent evidence suggests that infection rates rival those of subclavian or internal jugular catheters placed in the acute care setting²⁶. No head-to-head
comparison has yet been done to make a definitive conclusion. In addition, PICCs are more vulnerable to thrombosis and dislodgment\textsuperscript{27}, and are less useful for drawing blood specimens. Moreover, PICCs are not advisable in patients with renal failure and impending need for dialysis, in whom preservation of upper-extremity veins is needed for fistula or graft implantation given a possibly greater risk of subclavian vein stenosis.

5. **Daily Review of Line Necessity with Prompt Removal of Unnecessary CVCs**

Duration of catheterisation has been suggested as an important risk factor in the development of CVC-BSI in several studies\textsuperscript{8,28,29,30}. Any intravascular catheter that is no longer essential should be promptly removed.

Daily review of central line necessity will prevent unnecessary delays in removing lines that are clearly not needed for the care of the patient. Many times, central lines remain in place simply because they provide reliable access and because medical personnel have not considered removing them. Thus the daily review of line necessity should be included in multidisciplinary rounds.
Implementing Central Venous Catheter Care Bundle

1. Main objective:

To prevent CVC-BSI by implementing the five components of care called the “CVC care bundle”

Specific objectives:

- To determine the CVC-BSI rate of Ministry of Health ICUs
- To determine the organisms which commonly cause CVC-BSI
- To achieve 95% compliance with CVC care bundle i.e. 95% of all patients with CVCs should receive all 5 elements of the CVC care bundle
- To reduce the rate of CVC-BSIs by 50% within 12 months of implementation of the CVC care bundle

2. Getting Started

2.1 Formation of a multi-disciplinary team (doctors, nurses, pharmacist etc)

The Institute of Healthcare Improvement (IHI) recommends a multi-disciplinary team approach to patient care in the ICU. Improvement teams comprising of doctors, nurses and other allied health care providers should be heterogeneous in make-up, but homogeneous in mindset. The value of bringing diverse personnel together is that all members of the care team are given a stake in the outcome and can work to achieve the same goal. For example, teams without nurses are bound to fail. Teams led by nurses may be successful, but often lack leverage. Therefore doctors (MOs and specialists) must also be part of the team.

The team needs encouragement and commitment from an authority in the ICU. Identifying a champion in the unit increases a team’s motivation to succeed. When measures are not improving fast enough, the champion re-addresses the problems
with staff and helps to keep everybody on track toward the aims and goals. Eventually, the changes that are introduced become established.

2.2 Execution of all components of CVC care bundle
All components of the care bundle must be executed together, in an “all or none” strategy.

- Assess where you/your ICU stand presently. What precautions have been taken presently when placing CVC? Is there a need for change in the process?

- Ensure that all of the needed equipment and supplies for execution of the care bundle are available at the point of care. These include chlorhexidine 4% in 4% isopropyl alcohol scrub for hand antisepsis, sterile sets, drapes and gown, caps, masks, chlorhexidine 2% (chlorhexidine 2% in 70% alcohol preferable if available) for skin antisepsis.

- Organise a meeting for ICU nurses and all doctors of the department. Start with an educational program about CVC-BSI, incidence, outcomes, preventive strategies and then introduce the CVC care bundle to them. There may be a need for change in the process of placing CVCs.

2.3 Measurement of performance
Measurement is the only way to know whether a change represents an improvement. There are two measures of interest for CVC-BSI: the compliance to the components of CVC care bundle and the rate of CVC-BSI (Appendix 1).

For this purpose there are 2 forms.

(i) CVC care bundle compliance checklist
The first form is called the CVC care bundle compliance checklist. This must be filled up for the first 20 consecutive CVCs inserted in every month.

Each patient who receives a CVC, haemodialysis catheter, PA catheter and PICC will have the CVC care bundle compliance checklist form filled up by the attending nurse and medical officer/specialist who is inserting the line, at the time of insertion. The attending nurse will observe the doctor who is inserting the CVC and assess for compliance to individual component (indicate yes or no).

Nurses will be empowered to supervise the preparations using the checklist prior to line insertion, stop the process if necessary and fill in the form.

After insertion, the patient will be reviewed daily by the doctor (doing the morning rounds) for the necessity of continued CVC placement. The form is to be charted daily as to reasons for continued CVC placement till the CVC is removed. Indications for continued CVC placement include continued use of vasopressors/inotropes, parenteral nutrition, hypertonic solutions, dialysis, difficult peripheral venous access and the need for continued central venous pressure /cardiac output readings). Absence of these indications should prompt removal.

(ii) **Diagnosis of CVC-BSI form**

This form is for diagnosing CVC-BSI, determining the CVC-BSI rate per 1000 catheter days and identifying common infecting organism/s. The diagnosis of CVC-BSI will be based on the commonly used definition\(^1\) with modifications to accommodate local situations (Appendix 2)

Each form can accommodate up to 3 CVCs.
Conclusions

1. All ICU teams should make the CVC care bundle initiative an established daily practice. Doctors who insert CVC should question as to whether a CVC is truly necessary instead of being part of a “routine ICU procedure”.

2. If CVC is deemed necessary, the ICU team should make daily review of the continued need for the CVC and remove it when it is no longer necessary.

3. Measurement is important. However, do not be too pre-occupied with measurement. Assist your team if there are contraindications to bundle elements.

4. Emphasise compliance with all the elements of the bundle and not just few simple ones. Your aim should be 100% compliance with every bundle element for every patient. Partial compliance is non-compliance.

5. Post updates to results regularly and prominently.
   Enthusiasm for the project will wane over time. It is essential to update all ICU staff on their work on the monthly level of compliance and the monthly change in CR-BSI rates.
References:


2. SH Ng, LL Tai, CC Tan, Jenny MG Tong. The National Audit on Adult Intensive Care Units (NAICU) 2006 Report


22. Hamilton HC, Foxcroft DR. Central venous access sites for the prevention of venous thrombosis, stenosis and infection in patients requiring long-term intravenous therapy (Review). The Cochrane Library 2008 Issue 1


Appendix 1

Measurement

1. **Rate of central venous catheter-related bloodstream infection (CVC-BSI)**

   \[
   \text{Rate of CVC-BSI} = \frac{\text{No. of cases of CVC-BSI}}{\text{Total no. of catheter days for all patients with CVCs}} \times 1000
   \]

   The incidence will be reported as the number of CVC-BSI per 1000 catheter days.

2. **Central venous catheter (CVC) care bundle compliance rate**

   Compliance measurements are taken for the entire bundle of care components, not just parts of the bundle. Undertake the audit for all patients, to a maximum of 20 patients in the month with CVCs and assess their care for compliance with the CVC bundle.

   \[
   \text{% compliance} = \frac{\text{Number of patient receiving all components}}{\text{Number of patient with CVCs assessed}} \times 100
   \]
Appendix 2

The diagnosis of CVC-BSI

The commonly used definition\textsuperscript{31} of CVC-BSI is as follows:

Bacteremia or fungemia in a patient who has an intravascular device and 1 positive result of culture of blood samples obtained from the peripheral vein, clinical manifestations of infection (e.g., fever, chills, and/or hypotension), and no apparent source for bloodstream infection (with the exception of the catheter). One of the following should be present: a positive result of semiquantitative (15 cfu per catheter segment) or quantitative (10\textsuperscript{2} cfu per catheter segment) catheter culture, whereby the same organism (species and antibiogram) is isolated from a catheter segment and a peripheral blood sample; simultaneous quantitative cultures of blood samples with a ratio of 5:1 (CVC vs. peripheral); differential time to positivity (i.e., a positive result of culture from a CVC is obtained at least 2 h earlier than is a positive result of culture from peripheral blood).

As most microbiology laboratories do not do semiquantitative nor quantitative culture nor differential time to positivity, the task force of CVC care bundle decided to modify the diagnosis to be based on the following:

(i) there should be a suspicion of CVC-BSI
(ii) the CVC must be more than 48 hours in situ
(iii) the patient must have signs of sepsis / shock ie infection plus ≥ 2 of the following: Temp > 38\textdegree C or < 36\textdegree C
HR > 90 / min
RR > 20 / min or MV > 10 L / min in ventilated patient
PaCO\textsubscript{2} < 32 mm Hg
WCC > 12000 / ml or < 4000 / ml or >10\% immature forms
(iv) there is no apparent source for bloodstream infection with the exception of the catheter
(v) similar organism/s are grown from paired blood culture taken from the CVC lumen and the peripheral vein

A flow chart has been developed to help you diagnose CVC-BSI.
Flow chart for the Diagnosis of Central Venous Catheter-Related Bloodstream Infection (CVC-BSI)

?CVC-BSI

Yes

CVC in-situ > 48hrs

Yes

Signs of sepsis/shock

No

CVC-BSI unlikely

Yes

Other identifiable source of infection

Yes

CVC-BSI unlikely

No

Perform paired blood C&S
- From CVC lumen
- From peripheral vein

Likelihood of CVC-BSI

Highly likely

Remove CVC immediately

Less likely

Can keep CVC while awaiting paired culture results

Similar organism in paired blood cultures

No

CVC-BSI unlikely

Yes

Remove CVC immediately
Central Venous Catheter Care Bundle Compliance Checklist

Hospital ______________________________

No. : ………………….  Month : …………………………….  
Name of patient: …………………………….  R/N : …………………………….  
Name of Dr. : …………………………….  Name of attending SN:………………………….  

Indicate Yes/ No for each of the following:

1. Hand hygiene

   Did the doctor wash his/her hands with chlorhexidine 4% with 4% isopropyl alcohol?  Yes / No

2. Maximal barrier precautions

   Did the doctor doing the procedure, wear cap?  Yes / No
   wear mask to cover nose and mouth?  Yes / No
   wear sterile gown?  Yes / No
   wear sterile gloves?  Yes / No
   use large drapes to cover the site of insertion?  Yes / No

   Did the assistant dropping items onto the field, wear cap?  Yes / No
   wear mask to cover nose and mouth?  Yes / No

   Is there any other doctor assisting in the insertion?  Yes / No
   If ‘Yes’, did he/she follow all the above barrier precautions?  Yes / No

3. Chlorhexidine skin antisepsis

   Did the doctor clean the site of insertion with chlorhexidine 2% aqueous or chlorhexidine 2% in 70% alcohol?  Yes / No

4. Catheter site selection

   Is the subclavian route of insertion chosen?  Yes / No
   If ‘No’, doctor to fill the reason/s :-
   High risk of bleeding  Yes / No
   Failed subclavian insertion  Yes / No
   Infected insertion site  Yes / No
   Inexperience  Yes / No
   Distorted anatomy  Yes / No
   No more subclavian site  Yes / No
   Risk of subclavian vein thrombosis in dialysis catheters  Yes / No
   Risk outweighs benefit  Yes / No

5. Daily review of CVC (at 8pm everyday until the catheter is removed)

   Is there still an indication for CVC? Fill the box with ‘Y’ if Yes and ‘N’ if No

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### Diagnosis of Central Venous Catheter-Related Bloodstream Infection (CVC-BSI)

**ICU Hospital**

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<tr>
<td>Date &amp; Time of ICU admission</td>
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#### Central Venous Catheter Care Bundle

- **1.** Tip not in desired position
- **2.** Blocked / leaking lumen
- **3.** Not intravascular / slipped out
- **4.** Pus / inflammation at insertion site
- **5.** ? CVC-BSI
- **6.** Insufficient lumen
- **7.** No more indicated
- **8.** Others (please specify) ……………………

#### Reasons for removal:

- **□** 1  2  3  4  5  6  7  8

#### Causative organisms:

1. Pseudomonas aeruginosa
2. Pseudomonas non-aeruginosa
3. Acinetobacter spp
4. Klebsiella spp
5. Stenotrophomonas maltophilia
6. Burkholderia cepacia
7. Enterobacter spp
8. Escherichia coli
9. Methicillin-sensitive Staphylococcus aureus
10. Methicillin-resistant Staphylococcus aureus
11. Coagulase negative Staphylococcus
12. Enterococcus spp
13. Candida albicans
14. Candida non-albicans
15. Other gram negative organisms
16. Other gram positive organisms

#### Related Bloodstream Infection (CVC-BSI)

- **□** 1  2  3  4

#### Organism/s:

- **□** Y  N

#### Signs of sepsis / septic shock:

- **□** Y  N

#### Blood from CVC lumen sent:

- **□** Y  N

#### Blood from peripheral vein sent:

- **□** Y  N

#### Are both organisms the same?:

- **□** Y  N