

Management of central venous catheters in intensive care units: Comparative study of guidelines versus practice

Sir,

An observational study was conducted on 100 nurses with minimum 6 months of experience in various intensive care units (trauma, swine flu, medical, and renal) of the hospital to assess their knowledge and clinical practice. A two-part questionnaire [Table 1] was filled by the nurses after every central venous catheter (CVC) insertion for a period of 2 months. Each correct response was scored 1; incorrect 0. Total number of catheter insertions was 148. Mean score for the study was 53%.

Results from Part A: Standardized equipment set, barrier precaution, filling of the checklist, and an assistant was available in 96%, 95%, 86%, and 98% of the insertions. Two-third were done on monitored beds with head low; only 1% on unmonitored beds. Povidone iodine, 70% alcohol, 2% chlorhexidine-based preparations were preferred in decreasing order for disinfection of skin (60%, 21%, and 19%, respectively). Eighty percent preferred sutures for catheter fixation and transparent bio-occlusive dressing.

Results from Part B: Subclavian, internal jugular and femoral vein were preferred by 66.6%, 25%, and 9%. One-fifth were not aware of use of ultrasound. 98% managed unintended arterial puncture by removal of needle/catheter and application of pressure. 90% opined that chest X-ray confirmed placement of CVC. 96% preferred heparin based solution; 4% used normal saline. Two inspections of CVC/day were made by 50%; one/day were made by 40%. One-fifth wiped access ports with antiseptic before drug administration. Removal of infected CVC was considered by 60%; 25% believed in giving an antibiotic and observing. Three-fourth marked 4 h as maximum infusion time for blood products; 24 h for change of intravascular catheters/sets. Tubings for blood products and lipid emulsions were changed by 80% 12 hourly. Three-fourth believed in no fixed duration for changing CVC; one-fourth believed in the weekly change.

Table 1: Questionnaire

Please tick the correct options for the following questions related to CVC

Part A

1. Standardized equipment set available for CVC placement in ICU
Yes
No
2. Use of CVC placement and maintenance protocol or check list in ICU?
Yes
No
Yes, but not followed
3. An assistant during placement of CVC
Yes
No
Yes, but not followed
4. Setting of bed for CVC placement
Unmonitored bed
Monitored bed
Monitored bed where head low is possible
5. Hygienic precautions followed before central line insertion
Hand wash and sterile gloves
Maximum barrier precaution including hand washing, sterile gowns, sterile gloves, caps, mask covering both mouth and nose and full – body patient drapes
Full body patient drapes
6. Disinfectant used to clean skin before catheter placement and during dressing changes
2% chlorhexidine-based preparation
Tincture of iodine, an iodophor (povidone iodine, betadine)
70% alcohol
7. Preferred catheter fixation technique to minimize catheter related infections
Suture
Staples
Tape
8. Dressing used for central line sites
Gauge dressing
Transparent bio occlusive dressing
Leaving it open with antiseptic and antibiotic solution
Betadine gauge occlusive dressing (sponge dressing)

Part B

1. Preferred site for CVC insertion in critical care set up
Internal jugular vein
Subclavian vein
Femoral vein
Peripheral vein
2. Should ultrasound be done to localize blood vessels before attempting CVC
Yes
No
Sometimes
Should be done but may not be possible in emergency situations
3. When unintended puncture of arterial vessel occurs by wide bore needle, dilator or catheter, what should be done?
Remove needle/catheter and apply pressure over the site and then retry from same site after 5 min
Remove needle/catheter and apply pressure over the site and then retry from another site after 5 min
Leave needle/catheter in place and consult a vascular surgeon for opinion
4. After final catheterization and before use of CVC, how do you confirm the presence of tip in venous system
Chest X-ray
Ultrasound
Transesophageal echocardiography
Pressure monometry

Contd...

Table 1: Contd...

Please tick the correct options for the following questions related to CVC

5. Solution used to flush CVC for maintenance
Heparin based solution
Normal saline
Not required
6. How often should the central line site be inspected-
Twice a day
Once a day
Once in 2 days
Once a week
7. When catheter site infection or catheter related infection is suspected what is done?
Change central catheter using guide wire and reinsert at same insertion site
Change central catheter using guide wire and reinsert at different insertion site
Give antibiotics and change dressing
8. Do you wipe catheter access ports with antiseptic solution before injecting or aspirating and cap them when not in use?
Yes
No
Should be done but not done routinely
Sometimes
9. Complete infusion of blood or other blood products should be within ____ h of hanging the blood
4 h
8 h
12 h
24 h
10. Administration sets and tubings are changed every ____ h?
12 h
24 h
48 h
72 h
11. Tubings used to administer blood, blood products, and lipid emulsions every ____ h?
12 h
24 h
48 h
72 h
12. Can emergency drugs or antibiotics be administered in the same tubing as TPN
Yes
No
Sometimes
13. How often is CVC changed?
Based on clinical judgment
Once a week
Twice a week
No change required
14. If a central line catheter was inserted in emergency without using aseptic precautions, what should be done?
Give antibiotics
Replace the catheter immediately within 48 h
Give antibiotics and observe for any signs of infection and replace catheter if required
Observe for signs of infection and replace if required
15. Should prophylactic antibiotics be administered before or during placement of central catheters to reduce bloodstream infection?
Yes
No
Not routinely but only in immune-compromised and high-risk neonates

CVC: Central venous catheter; ICU: Intensive care unit; TPN: Total parenteral nutrition

Half believed in administration of antibiotics for central lines inserted in emergency. Only 25% considered a replacement of the catheter within 48 h.

The remaining 25% considered replacement only on signs of infection. Routine prophylactic antibiotics was advocated by 36%.

Results show that awareness on the use of chlorhexidine, ultrasound, correct management of arterial punctures and protocol for CVC inserted in emergency departments needs to be increased. Regular training programs with the nursing staff on bundles of care related to insertion and maintenance of CVC are needed.^[1-3]

American Society of Anesthesiologists guidelines^[4] are focused on elective insertions of CVC's performed by anesthesiologists, but the Centers for Disease Control and Prevention guidelines^[5] also address emergency placements, peripherally inserted central catheters, pulmonary artery catheter and tunneled central lines. Safety or efficacy of chlorhexidine in neonates and infants aged <2 months remains an unresolved issue. Fluid administration sets need to be changed at 96 h intervals and tubings for blood products and lipid emulsions every 24 h. Routine replacement of CVCs on the basis of fever alone and prophylactic administration of systemic antimicrobial agents is discouraged. Mandatory replacement is to be done within 48 h for all catheters inserted in an emergency without aseptic precautions.

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