

# Assessment Scoring System for Central-Line Insertion Site: Infection Prevention of Bloodstream Infections

Author: Beverly-Anne Levers

BACCN Conference 2024, 07-08 October Aberdeen

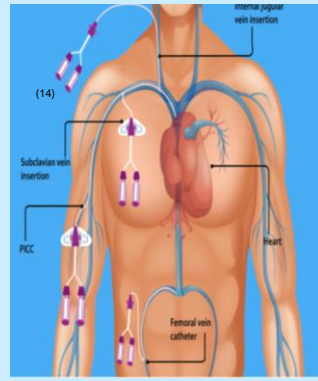


Student Number: 21903571

**Aim** To develop a multiracial central-line assessment scoring system to be used within critical care

## Rationale and Background

- CVC are an essential device – entry portal – pathogens = BSI (12).
- Central-line associated blood stream infections (CLABSI) is a positive laboratory blood culture (not with a common skin pathogen), with a central line present >2 ICU days/removed <2 days - signs and symptoms of an infection & no infection at another site. Peripheral IV catheters are not considered CVC (7).
- Preventable nosocomial infection – prolonged stays up to 8 days, increase risk of morbidity, mortality and hospital readmission (14;15;16; 30).
- CLABSI increases within chronic illness, immune-suppressed, malnutrition, TPN, burns and location (14).
- Historically focus on insertion techniques - insertion site monitoring to ameliorate CLABSI (13; 22).



## Evidence

Two quasi-experimental quality improvement studies (13; 15), 1 retrospective case control studies (17) and 1 quality improvement study (38) were included.

- Two quasi-experimental quality improvement studies (13;15):
  - Introduction of an electronic bundle found score of 2 or 3 decreased 78.2% (CL 95%,  $p < 0.001$ ) and CLABSI decreased 28% ( $p = 0.42$ ). However, found that a reduction in the assessment scores did not reduce CLABSI (13).
  - Introduction of an electronic bundle found compliance increased from 55% to 95% at 6 months and a reduction of CLABSI of 8.1 to 0.5 per 1000 CVC days ( $p < 0.05$ ) (15).
- One retrospective case control studies (17): the association between site inflammation and development of CLABSI. This study demonstrated that site inflammation and a confirmed CLABSI in 30.4% compared to 22.4% (95% CL,  $p = 0.36$ ).
- One quality improvement study (38): noted that multi racial skin was not inclusive in CVP scoring systems. Prior to the introduction of a new scoring system using photo scores were 3-4, following the intervention eradication of scores 3-4 (38).

## Method

An electronic database was used for the systematic literature review. The advance search methods and limiter allowed the use of Boolean operators. Inclusion and exclusion criteria were compiled for further screening. The brief limited the included articles. Preferred Reporting Items for systematic Reviews and Meta-Analyses guidelines were used to demonstrate the search. The critical Appraisal Kill Program tool was used to critical appraise the research.

## Key Messages

The use of an appropriate central-line assessment score has the potential to increase compliance, reduce CLABSI and therefore improve patient care and reduce our patients increase risk or morbidity mortality.

## Assessment Score for Central-Line Insertion Site

Adapted from:13;38

Description	Action	Score	White, Pale and Asian Skins	African, Caribbean and Asian Skins
<b>Normal skin colour</b> - no erythema, localised swelling, or drainage. Dressing intact	<b>No signs of infection</b> -Continue 12 hourly assessments. -Weekly dressing changes and when required	0		
<b>Erythema/ darker/ shiny/ dull skin at insertion site &lt;3mm radius</b> - drainage/ exudate, crusts or bleeding. No swelling at the site Pain or pyrexia If neutropenic- may not show any of these signs	<b>Possible or early signs of infection</b> -Continue 12 hourly assessments -Verbally communicate at nursing handover -Swab exit site -Await results	1		
<b>Erythema/ darker/ shiny/ dull skin at insertion site 3- 6mm</b> Or worsening present within 24hrs Drainage/ exudate/ Pus, crusts or bleeding. Skin localised swelling Pain or pyrexia	-Verbally communicate with medical team -swab exit site -Await results -Advise removal/ re-site -if not removed, document reason and a plan	2		
<b>Erythema at insertion site &gt;6mm</b> -worsening in size and brightness purulent (yellow pus) drainage and/ or crusting (erythema not required) Swelling present	-Urgently inform medical team -Prepare for line removal/ re-site	3		

**Conclusion:** ICU patients are at an increased risk of a CLABSI, a nosocomial infection which impacts patient care (13; 15; 16; 30). Peripheral IV catheters are not classified as a CVC (7) therefore using a scoring system which has been designed to recognise infection in a peripheral IV catheter is not appropriate. Through a change to the scoring system and empowering nurses with signposted actions, which has been adapted from Gohil et al., (13), to aim and reduce CLABSI and therefore better outcomes.

Full poster information:



References: 7) Centers for Disease Control and Prevention. (2023). *Bloodstream Infection Event (Central-Line-Associated Bloodstream Infection and Non-central Line Associated Bloodstream Infection)*. Atlanta, CDC. [Online] [Accessed on 20<sup>th</sup> June 2023]. [https://www.cdc.gov/nhsd/ncss/ncss\\_data\\_tools/13/index.html](https://www.cdc.gov/nhsd/ncss/ncss_data_tools/13/index.html)  
 10) Green, S. M., Mihalkova, M., Bion, J. F., Wilson, A. P. R., Chudisama, D., Johnson, A. P., Hope, R. (2020) 'Infection in Critical Care Quality Improvement Oversight Group: Surveillance of bloodstream infections in intensive care units in England, May 2016-April 2017: epidemiology and ecology', *Journal of Hospital Infection*, 106(1) pp.1-8. [Online] [Accessed on 20<sup>th</sup> May 2023] doi: 10.1016/j.jhin.2020.05.010. 13) Gohil, S. K., Yim, J., Quan, K., Espinoza, M., Thompson, D., Keng, A., Bahadori, B., Tjoa, T., Papp, C., Rudkin, S., Rashid, S., Hong, S. S., Drake, L., Alsharif, M. N., Wilson, W. C., Amin, A., Chang, J., Khushf, U. and Huang, S. S. (2020) 'Impact of a central-line insertion site assessment (CLUSA) score on localized insertion site infection to prevent central-line-associated bloodstream infection (CLABSI)', *Infection Control & Hospital Epidemiology*, 45(11), 1594-616. doi:10.1017/ice.2019.29. 14) Haskitsin, Y., Annamangiri, P. and Regunath, H. (2022) 'Central Line-Associated Blood Stream Infections', in Hauber, S. and Dubrovnik, S. (eds) *StatPearls*. Florida: StatPearls Publishing, pp.1-15. 15) Heimon, A., Pain, T., Becket, P., Jenett, H., Lewellyn, N., Lawrence, P., and Szakmany, T. (2015) 'Improving compliance with central venous catheter care bundles using electronic records', *Nursing in Critical Care*, 20 (4) pp. 196-203. doi: 10.1111/nicc.12186. 16) Khong, C. J., Baggs, J., Kleinbaum, D., Cochran, R. and Jernigan, J.A. (2015) 'The Likelihood of Hospital Readmission Among Patients With Hospital-Onset Central Line-Associated Bloodstream Infections', *Infection Control & Hospital Epidemiology*, 36(8) pp. 988-992. doi: 10.1017/ice.2015.117. Kobayashi, T., Choe, C. S., Kaku, M., Asanaka, M., Mima, A. R., Dekema, D. J., Edmond, M. B. and Salinas, J. L. (2021) 'Insertion site inflammation was associated with central-line-associated bloodstream infections at a tertiary-care centre, 2015-2018', *Infection Control & Hospital Epidemiology*, 42 (3) pp. 348-350. doi: 10.1017/ice.2020.445. 22) Memari, L. A. (2011) 'What is the predominant source of intravascular catheter infection?' *Clinical Infectious Diseases*, 52(2) pp. 211-212. doi: 10.1093/cid/ciq108. 30) Stevens, V., Geiger, K., Concannon, C., Nelson, R.E., Brown, J. and Dumay, G. (2014) 'Inpatient costs, mortality and 30-day re-admission in patients with central-line-associated bloodstream infections', *Clinical Microbiology and Infection*, 20(5) pp. 318-24. doi: 10.1111/1469-0959.12407. 38) Wainhouse, D. and Winterbottom, J. (2010) 'How a central venous catheter surveillance tool was developed for use with ethnic groups', *Nursing Times*, 106(8) pp. 12-14. <https://doi.org/10.1093/nt/106.8.12>