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417. Impact of a Standardized Central Line Insertion Site Assessment Score on Localized Inflammation and Infection

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Background. Progression of locally inflamed/infected insertion sites accounts for nearly 40% of central line-associated bloodstream infections (CLABSIs). We developed and implemented a central line insertion site assessment score (CLISA) to standardize assessment of insertion sites for early identification of localized infection and prompt timely removal of high-risk lines (Figure 1).

Methods. This pre- and post-intervention quality improvement study included inpatients with central lines at an academic medical center. Periodic photo surveys of insertion sites in all eligible patients in oncology and intensive care units was conducted at baseline (1 April 2014–31 March 2015) and post-intervention (1 April 2015–31 March 2016) after hospital-wide implementation of (1) electronic nursing documentation of CLISA cascaded into physician electronic progress notes (2) automated alerts prompting documentation and removal of lines with local inflammation/infection (CLISA ≥2). Logistic regression models compared frequency of localized insertion site infection pre- and post-intervention. Chi-square tests compared hospital CLABSI rates (2014 NHSN criteria).

Results. We evaluated 402 lines at baseline, including 271 peripherally inserted central catheters (PICCs) and 131 centrally inserted venous catheters (CVCs) and 322 lines post-intervention (178 PICCs, 140 CVCs). A total of 724 lines with 1763 insertion site assessments were completed. No significant differences were found in line type, site, or unit distribution between baseline and intervention (Table 1). The number of lines with no/minimal inflammation (CLISA 0-1) and moderate inflammation CLISA 2 did not change significantly ($p = 0.21$ and $p = 0.6$, respectively). Lines with CLISA 3 (severe erythema/purulence) decreased from 40 (10%) to 14 (4%) post-intervention ($p < 0.01$). CLABSIs decreased from 19 (0.52/1000 line-days) to 13 (0.37/1000 line-days) post-intervention ($p = 0.42$). Device utilization rates were unchanged.

Central Line Insertion Site Assessment (CLISA) Scoring

Score	Category	Description
0	Normal Appearance	- Skin is flesh-colored - No erythema, localized swelling, or drainage
1	Minimal Erythema	- Skin at insertion site with erythema < 3mm radius - Drainage/crusting scant and non-cloudy, if present* - No localized swelling at insertion site
2	Advancing Erythema	- Skin at insertion site with erythema 3-6mm radius (or increase in erythema over 24 hours) - Localized swelling at insertion site may be present - Drainage/crusting is non-cloudy, if present*
3	Severe Erythema OR Purulence	- Purulent (cloudy) drainage/crusting AND/OR - Erythema >6mm or rapid worsening in size/brightness - Focal swelling at insertion site (common, not required)** - Erythema common with purulence, but not required
NV	Insertion site not visible	Assessment not possible due to obscured line insertion site. Skin that is visible appears normal.

*Bleeding without erythema excluded
**Specifically related to insertion site. Not intended to refer to anasarca or limb swelling.

Figure 1: Central Line Insertion Site Assessment (CLISA) Score.

Table 1: Multivariate Logistic Regression Model: Localized Insertion Site Infection Before and After Intervention, Adjusted for Age, Line Site, and Unit

Variable	OR	CI	p-value
Age	1.0	0.9-1.0	0.09
Line Site			0.2
Brachial	--	--	
Internal Jugular	0.3	0.1-0.9	
Subclavian	0.7	0.2-2.1	
Femoral	0.8	0.2-3.7	
Unit			0.08
Neurosurgical Intensive Care Unit (ICU)	--	--	
Surgical ICU	1.9	0.6-6.0	
Medical ICU/Cardiac Care Unit	2.4	0.8-7.2	
Burn ICU	4.8	1.4-16.3	
Oncology	3.3	1.2-9.0	
CLISA 3 (Severe Erythema or Purulence)	2.3	1.2-4.4	0.01

Conclusion. The CLISA score enabled a programmable primary prevention strategy to standardize insertion site assessment across providers and to decrease localized infections that can progress to CLABSI.

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