Central line-associated blood stream infection rates & compliance with bundle strategies in Pediatric ICUs

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BACKGROUND

Bundle strategies for insertion can decrease central line-associated blood stream infection (CLABSI) rates. The association between reported compliance with specific bundle elements and CLABSI rates in pediatric intensive care units (PICU) has not been studied.

METHODS

- A survey of infection prevention departments of non-governmental hospitals enrolled in the CDC's National Healthcare Safety Network (NHSN) CLABSI surveillance in the fall of 2011.
- Survey assessed:
  - ICU-specific policies related to central lines
  - PICUs' reported compliance with 6 bundle practices
- Participating sites provided assess to CLABSI rates reported to the NHSN from 2011 to mid-2012.
- Mean CLABSI rates per 1000 central line days were calculated with their standard deviations (SD), weighted by number of central line days.
- Bivariate analyses were performed to compare differences in rates by PICU characteristics, presence of CLABSI prevention policies, and $\geq$95% bundle practice compliance using negative binomial regression.

RESULTS

- 99 PICUs in 88 hospitals were studied
- 16 (18%) were stand-alone children's hospitals and 77 (88%) were affiliated with a medical school
- 30 (30%) PICUs had $\geq$16 beds

RESULTS

- The proportion of PICUs with written policies for each of the 6 specific bundle elements ranged from 86-95%.
- Among PICUs with policies, $\geq$95% compliance with specific bundle practices ranged from 47-61% of ICUs.
- 25 (35%) PICUs with all policies had $\geq$95% compliance in all practices.
- Weighted mean CLABSI rate for all PICUs was 1.42 (SD 1.07) per 1000 CL days.
- There were no statistical differences in CLABSI rates by PICU characteristics, presence of policies, or reported compliance.
- There were no statistical differences in rates between PICUs that had $\geq$95% vs. <95% compliance with all practices (1.3 vs. 1.41, P=0.59) or with specific practices.

Table 1. Presence of and compliance with policies for bundle practices

Policy	ICUs with written policy N (%)	ICUs reporting correct compliance[a] All the time[b] N (%)	ICUs reporting correct compliance[a] Usually[c] N (%)
Central line bundle insertion checklist	90 (91)	48 (53)	12 (13)
Optimal catheter site	88 (89)	45 (51)	15 (17)
Chlorhexidine skin disinfection	93 (94)	51 (55)	13 (14)
Barrier precautions	94 (95)	56 (60)	9 (10)
Monitoring hand hygiene practices	93 (94)	57 (61)	8 (9)
Checking for daily line necessity	85 (86)	40 (47)	16 (19)
All policies	72 (73)	25 (35)	5 (7)

[a] Percentiles based on the number of PICUs with that respective policy.
[b] All the time: 95-100%; [c] Usually: 75-94%

CONCLUSIONS

- In this cohort of PICUs, most had CL insertion policies, and CLABSI rates were relatively low.
- While reported $\geq$95% compliance with these practices was not associated with lower CLABSI rates, strict compliance was low.
- Future work should focus on increasing compliance with bundle practices and studying the impact on CLABSI rates.
- This work supported by a NINR grant (R01 NR 010107)

Table 2. CLABSI rates by PICU characteristic and policy compliance

ICU type	Mean (SD)	P value[a]
All	1.42 (1.07)	
Mandatory state reporting in place		0.93
Yes	1.38 (0.96)	
No	1.58 (1.44)	
ICU type		0.68
Medical/surgical or medical	1.40 (1.16)	
Cardiothoracic	1.52 (0.6)	
ICU size		0.65
<16 beds	1.56 (1.45)	
$\geq$16 beds	1.36 (0.85)	
Facility type		0.26
General hospital	1.58 (1.3)	
Stand-alone children's hospital	1.29 (0.82)	
Medical school affiliation		0.36
Affiliated	1.44 (1.09)	
Not affiliated	1.22 (0.79)	
Electronic surveillance of HAI		0.33
Yes	1.36 (0.98)	
No	1.57(1.25)	
Antibiotic stewardship/restriction		0.69
Yes	1.49 (1.16)	
No	1.36 (0.71)	
Central line bundle insertion checklist		0.18
Compliance all the time[a]	1.24 (0.96)	
Less than all the time	1.59 (1.1)	
Optimal catheter site		0.23
Compliance all the time[a]	1.21 (0.96)	
Less than all the time	1.68 (1.24)	
Chlorhexidine skin disinfection		0.98
Compliance all the time[a]	1.32 (1.07)	
Less than all the time	1.42 (0.96)	
Barrier precautions		0.48
Compliance all the time[a]	1.3 (0.97)	
Less than all the time	1.58 (1.17)	
Monitoring hand hygiene practices		0.44
Compliance all the time[a]	1.28 (0.96)	
Less than all the time	1.67 (1.19)	
Checking line for daily necessity		0.15
Compliance all the time[a]	1.27 (1.03)	
Less than all the time	1.66 (1.06)	
All policies		0.59
Compliance all the time[a]	1.30 (1.35)	
Less than all the time	1.41 (0.92)	

[a] All the time: 95-100%