

## Office of Evidence Based Practice (EBP) – Critically Appraised Topic: Changing Central Line Adapters

### Specific Care Question

What job aids have increased nurses' recognition to change central line adapters (ICU Medical MicroClave Connector) to decrease the risk of CLABSI?

### Question Originator

Nurse Residency Program

### Literature Summary

**Background.** In nursing practice, differences in central line-care maintenance are common (Morrison, Laney, Foglesong, & Brennaman, 2016). Add-on devices to central lines include needleless adapters and are part of central line management. The Children's Mercy policy on central lines states that central lines adapter should be changed every 96 hours or every seven days if the central line is heparin locked (Central Line Care, 2018). Changing central line adapters is only part of central line care however the overarching goal is the reduction of central line-associated bloodstream infections (CLABSI).

Children's Mercy Policy on Central Line Care (2018)

#### Adapter Change Frequency

1. Change the adapter no more frequently than every 96 hours.
2. The adapter is changed more frequently in the following circumstances:
  - a. If the needleless connector is removed for any reason.
  - b. If there is residual blood or debris in the needleless connector.
  - c. Upon contamination.
3. Infusing or aspirating blood through the adapter is not an indication for an adapter change.

Circumstance	Adapter Change Frequency
Attached to bifuse/trifuse	Q 96 hours
Lipids/propofol administration	
Heparin locked	Q 7 days
Home Care	No more frequently than Q 4 days

**Study characteristics.** The search for suitable studies was completed on November 27, 2018. Jarrod Dusin, MS, RD, LD, CPHQ reviewed the three titles and abstracts found in the search and identified one article believed to answer the question.

**Key results.** No recommendation can be made for the use of job aids to increase nurses' recognition to change central line adapters. Only one study was found that tested job aids for nurses (Morrison et al., 2016). Morrison et al. (2016) were effective in implementing low-cost color-coded labelling to increase nursing compliance with the policy, but it was only one study of low quality (small sample size and selection bias). When there is lack of scientific evidence, standard work should be developed, implemented and monitored.

### Summary by Outcome

Morrison et al. (2018) studied nurses' adherence to policies regarding adapter changes using a day-of-the-week, color-coded label versus usual care that depends on technology (such as the electronic medical record (EMR)) to inform when adapters need to be changed. A convenience sample ( $N = 335$  observations) of adults with central line (number of patients not reported). The group with color-coded labels had 205 observations versus 130 observation for patients who received standard care. The addition of labels to the nursing units correlated with higher rates of documentation of



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connectors changed which adhered to the 3-day connector change policy,  $OR = 4.21$ , 95%  $CI [1.76, 10.10]$ ,  $p = 0.003$ . Although, the proportion of cases without EMR documentation of connector changes were not significantly different between the intervention, 30.7%, and the control group, 30.0% ( $p = 0.89$ ). The study was of low quality due to the small sample size, it was not randomized which could result in selection bias, and the number of subjects was not reported.

### Search Strategy and Results ([see PRISMA diagram](#))

S3	S1 AND S2	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	3
S2	"job aide" OR "Central Venous Nursing" OR (MH "Nursing Staff, Hospital") OR "Nursing Staff" OR "Hospital Psychosocial Factors" OR (MH "Practice Guidelines") OR (MH "Practice Acts+") OR (MH "Guideline Adherence") OR (MH "Cues") OR (MH "Catheterization, Central Venous+/NU") OR (MH "Nursing Staff, Hospital/PF") OR (MH "Advanced Nursing Practice+")	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	119,001
S1	"central line adaptor" OR "MicroClave" OR "line connector" R "catheter connector" OR "needleless connector"	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	45

### Studies Included in this Review (in Alphabetical Order)

Morrison et al. (2016)

### Method Used for Appraisal and Synthesis

The Cochrane Collaborative computer program, Review Manager (Higgins & Green, 2011)<sup>a</sup> was used to synthesize the one included study

<sup>a</sup>Higgins, J. P. T., & Green, S. e. (2011). *Cochrane Handbook for Systematic Reviews of Interventions [updated March 2011]* (Version 5.1.0 ed.): The Cochrane Collaboration, 2011.

### Medical Librarian Responsible for the Search Strategy

Keri Swaggart, MLIS, AHIP

### EBP Scholar's Responsible for Analyzing the Literature

Justine Edwards, RN, CPEN

### EBP Team Member Responsible for Reviewing, Synthesizing, and Developing this Document

Jarrold Dusin, MS, RD, LD, CPHQ

### Acronyms Used in this Document

Acronym	Explanation
CLABSI	Central line-associated bloodstream infection
Q	Every



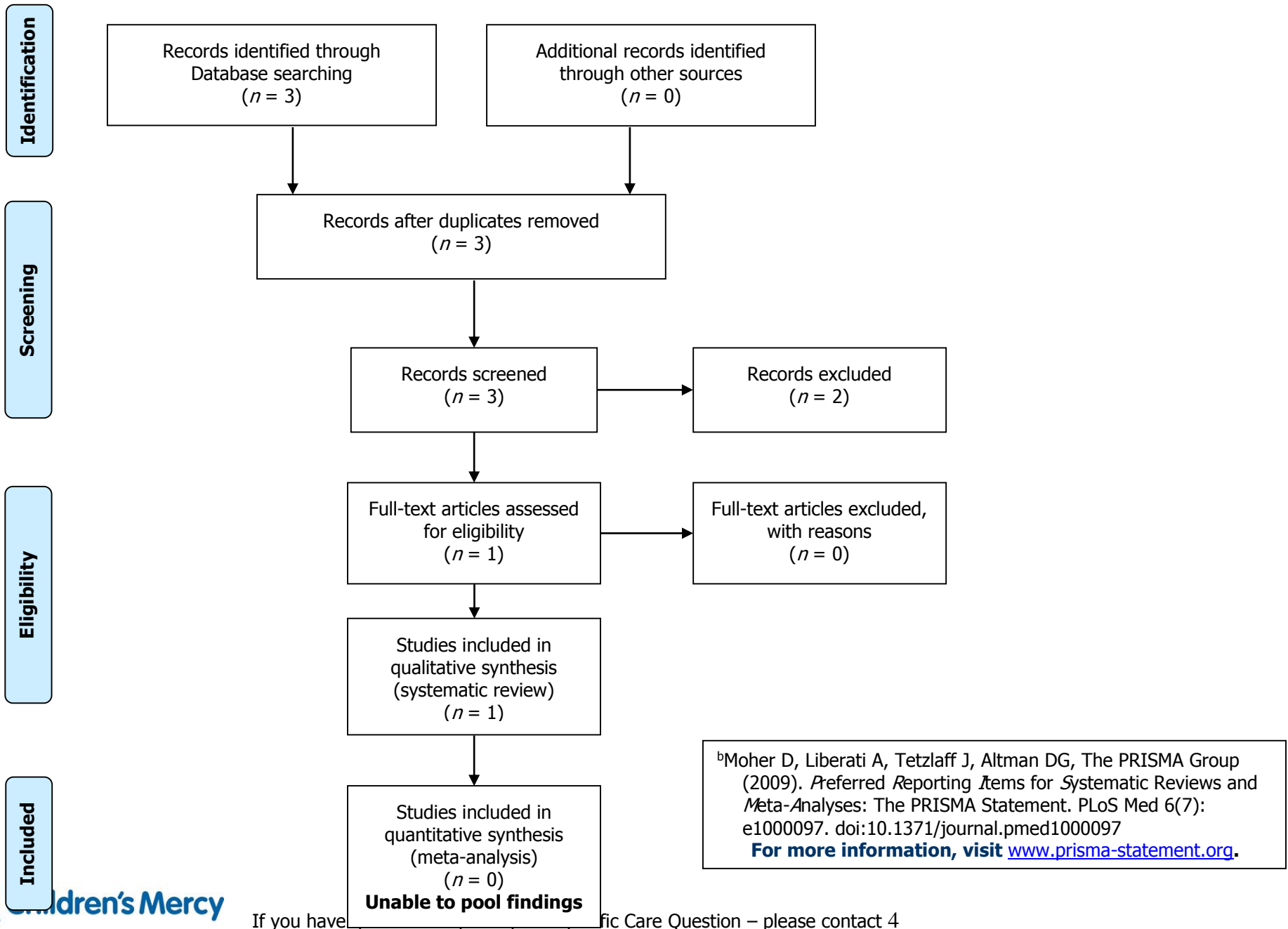
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**Date Developed/Updated December 2018**

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Figure 1. Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)<sup>b</sup>



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**Table 1**  
**Morrison 2016**

<b>Methods</b>	Prospective comparative study of connector change documentation by observation of central lines and EMR documentation from patients in adult facilities with central lines.
<b>Participants</b>	<p><b>Participants:</b> Adults (older than 18 years) with central lines hospitalized for 4 or more days.</p> <p><b>Setting:</b> Medical-surgical units in two community hospitals in Florida, U.S.A</p> <p><b>Number enrolled:</b> <math>N = 335</math> Observations</p> <ul style="list-style-type: none"> <li>• Intervention group: <math>n = 205</math> (61.2%)</li> <li>• Control group: <math>n = 130</math> (38.8%)</li> </ul> <p><b>Number completed:</b> <math>N = 335</math></p> <p><b>Gender, males:</b> Not provided</p> <p><b>Age, years/month (mean):</b> Not provided</p> <p><b>Inclusion Criteria:</b></p> <ul style="list-style-type: none"> <li>• Adults (older than 18 years)</li> <li>• Central line venous access</li> <li>• Located on study unit</li> </ul> <p><b>Exclusion Criteria:</b></p> <ul style="list-style-type: none"> <li>• Large-bore central lines</li> </ul>
<b>Interventions</b>	<p><b>Both Groups:</b></p> <ul style="list-style-type: none"> <li>• Standard Care</li> <li>• At 4-day intervals, investigators observed bedside label use and EMR needleless connector change documentation.</li> </ul> <p><b>Intervention Group:</b></p> <ul style="list-style-type: none"> <li>• Custom-designed, color-coded, precut, permanent adhesive labels in 7 bright colors printed with word "change" and 1 of 7 days of the week were added to IV tubing on intervention units.</li> <li>• Face-to-face education on label use and documentation.</li> </ul> <p><b>Control Group:</b></p> <ul style="list-style-type: none"> <li>• Standard Care</li> </ul>
<b>Outcomes</b>	<p><b>Primary outcome(s):</b></p> <ul style="list-style-type: none"> <li>• Connector change documented in the EMR at within 3 days (adherence to hospital policy)</li> </ul>
<b>Notes</b>	<p><b>Results:</b></p> <ul style="list-style-type: none"> <li>• Intervention group (with labels): <math>n = 205</math> (61.2%)</li> <li>• Control group (without labels): <math>n = 130</math> (38.8%)</li> <li>• Study used a convenience sample</li> <li>• It was not discussed how patients were placed in each group</li> <li>• Results are based on observation and not number of patients</li> </ul> <p>Connector change documented in EMR at within 3 days: <math>p = .001</math></p> <ul style="list-style-type: none"> <li>• Intervention group: 122 (59.5%)</li> </ul>

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	<ul style="list-style-type: none"><li>• Control group: 54 (41.5%)</li></ul> <p>Connector change documented in EMR &gt;3 days: <math>p = &lt;.001</math></p> <ul style="list-style-type: none"><li>• Intervention group: 20 (9.8%)</li><li>• Control group: 37 (28.5%)</li></ul> <p>Connector change not documented in the EMR: <math>p = .89</math></p> <ul style="list-style-type: none"><li>• Intervention group: 63 (30.7%)</li><li>• Control group: 3 (30.0%)</li></ul> <p>Connector labels increased the odds that EMR documentation of connector changes aligned with the 3-day change in policy.</p> <ul style="list-style-type: none"><li>• <math>OR = 4.21, 95\% CI [1.76, 10.10]</math></li></ul> <p>Adherence to policy was greater when a label was present on the connector that there was documentation of connector changes in EMR.</p> <ul style="list-style-type: none"><li>• <math>OR = 4.72, 95\% CI [2.02, 10.98]</math></li></ul>
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### References

Central Line Care, (January, 2018), *CHM Patient Care Services Standards Manual*. Children’s Mercy Hospital, Kansas City, Missouri.  
Morrison, T. L., Laney, C., Foglesong, J., & Brennaman, L. (2016). Color-coded labels cued nurses to adhere to central line connector change. *Clinical Nurse Specialist, 30*(2), 106-109.