### Inclusion Criteria
- Patient meeting indicating criteria

### Exclusion Criteria
- Patients not meeting indication criteria

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- Summary of Version Changes
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For questions concerning this pathway, contact: CentralVenousCatheterPathway@seattlechildrens.org

If you are a patient with questions contact your medical provider, [Medical Disclaimer](#)
Central Venous Catheter Pathway v2.0 CVC Selection

Indications for Central Line*
- Prolonged infusion (>7 days)
- Prolonged antibiotics (>7 days)
- Dialysis
- (A)Pheresis
- Chemotherapy
- Stem Cell Collection

Inclusion Criteria
- Patient meeting indicating criteria*

Exclusion Criteria
- Patients not meeting indication criteria

Central Venous Catheter Maintenance

Patient meets indications for Central Line?*
- NO Peripheral IV (PIV)
- YES Expected duration of use?
  - Between 7 – 30 days
  - Greater than 30 days

Indication
- Fluids, central meds, nutrition, blood products; frequent blood draws
- Dialysis or (a)pheresis
- Temporary nontunneled central venous catheter
- Peripherally inserted central catheter (PICC) (Only placed by IR)

Recommended catheter type
- Temporary nontunneled dialysis/ (a)pheresis catheter
- Single lumen tunneled central venous catheter
- Double lumen tunneled central venous catheter
- Implanted central venous port
- Power injectable central venous catheters
- Tunneled dialysis catheter

Notes:
- Catheters are also placed by NICU, PICU, CICU, and Anesthesia providers. These do not require Interventional Radiology (IR) or General Surgery (GS) involvement nor this algorithm.
- The above chart is intended to be a guide. We realize that there are many variables involved in selection of a catheter.
- If assistance is required for decision making or timely placement, please page IR on-call OR GS on-call through 206-987-2000.

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Central Venous Catheter Pathway v2.0 CVC Maintenance

Inclusion Criteria
- Patient qualifies for Central Line Insertion and line has been placed

Exclusion Criteria
- Patients without Central Line

Catheter Recommendations

Peripherally inserted central catheter (PICC) (Only placed by IR)
- Replace femoral PICC after 30 days. If anticipated need for venous access will exceed 30 days consider other line type ie: tunneled central line or upper extremity PICC
- Remove PICC as soon as clinically indicated.

Implanted central venous port
- If port is being used for Parenteral Nutrition, use for as short a time as possible.

Tunneled central venous catheter (Hickman, Broviac)
- Repair line and lock one time with an antimicrobial lock post repair in a volume indicated by job aid.
- After 3 line failures, discuss with the primary service regarding best option balancing the risks for repairing a broken line vs replacement.
- For patients with intestinal failure, if the decision is to replace the catheter, consider accessing the same vein for vein preservation.

Any Central Venous Catheter
- If central venous catheter infection is suspected

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Stop and Review

Central Venous Catheter Selection

PICC Table

Consider Central Line Suspected Infection

Off Pathway

For questions concerning this pathway, contact: CentralVenousCatheterPathway@seattlechildrens.org

If you are a patient with questions contact your medical provider, Medical Disclaimer
### Central Venous Catheter Pathway v2.0 PICC Table

<table>
<thead>
<tr>
<th>Hospitalized term neonate</th>
<th>Duration of need for line: ≤7d</th>
<th>Duration of need for line: 8-14d</th>
<th>Duration of need for line: 15-30d</th>
<th>Duration of need for line: ≥31d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peripherally compatible infusedate</td>
<td>PICC</td>
<td>PICC</td>
<td>PICC</td>
<td>PICC</td>
</tr>
<tr>
<td>Nonperipherally compatible infusedate</td>
<td>PICC</td>
<td>PICC</td>
<td>PICC</td>
<td>PICC</td>
</tr>
<tr>
<td>Frequent blood draws (more than once per day)</td>
<td>PICC &lt;3F</td>
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</tr>
</tbody>
</table>

<table>
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<tr>
<th>Hospitalized infant (31d - 1y)</th>
<th>Duration of need for line: ≤7d</th>
<th>Duration of need for line: 8-14d</th>
<th>Duration of need for line: 15-30d</th>
<th>Duration of need for line: ≥31d</th>
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<tr>
<th>Hospitalized child / adolescent</th>
<th>Duration of need for line: ≤7d</th>
<th>Duration of need for line: 8-14d</th>
<th>Duration of need for line: 15-30d</th>
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</table>

<table>
<thead>
<tr>
<th>Stable critically ill patient</th>
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<th>Duration of need for line: 8-14d</th>
<th>Duration of need for line: ≥15d</th>
</tr>
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<td>Nonperipherally compatible infusedate</td>
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<td>PICC</td>
<td>PICC</td>
</tr>
<tr>
<td>Hemodynamic monitoring</td>
<td>PICC</td>
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</tr>
</tbody>
</table>

**Summary of Version Changes**

**Version 1.0 (9/9/2019):** Central Line Placement Go live.

**Version 2.0 (10/6/2020):** Created integrated guidance and standard work for selection and maintenance of central venous catheters, in all clinical areas of the hospital; provides consistent and accessible documentation of defined processes for selection, placement, maintenance, and removal of central venous catheters.
Approved by the CSW Central Venous Catheter Selection and Maintenance Pathway team for October 6, 2020, go-live

CSW Central Venous Catheter Selection and Maintenance Pathway Team:

Surgery, Owner Ken Gow, MD
Interventional Radiology, Stakeholder Kevin Koo, MD
Interventional Radiology, Team Member Ray Ramoso
Interventional Radiology, Team Member Wakara Wies

Clinical Effectiveness Team:

Consultant Lisa Abrams MS, NP
Project Manager Pauline Ohare, MBA, RN
Data Analyst Brendan Bettinger
EHR Informatician Mike Leu, MD, MS, MHS
EHR Informatician Rod Tarrago, MD
Librarian Sue Groshong, MLIS

Clinical Effectiveness Leadership:

Medical Director Darren Migita, MD
Operations Director Karen Rancich Demmert, BS, MA

Retrieval Website: https://www.seattlechildrens.org/pdf/central-venous-catheter-pathway.pdf

Please cite as:
Evidence Ratings

This pathway was developed through local consensus based on published evidence and expert opinion as part of Clinical Standard Work at Seattle Children’s. Pathway teams include representatives from Medical, Subspecialty, and/or Surgical Services, Nursing, Pharmacy, Clinical Effectiveness, and other services as appropriate.

When possible, we used the GRADE method of rating evidence quality. Evidence is first assessed as to whether it is from randomized trial or cohort studies. The rating is then adjusted in the following manner (from: Guyatt G et al. J Clin Epidemiol. 2011;4:383-94, Hultcrantz M et al. J Clin Epidemiol. 2017;87:4-13.):

Quality ratings are downgraded if studies:
- Have serious limitations
- Have inconsistent results
- If evidence does not directly address clinical questions
- If estimates are imprecise OR
- If it is felt that there is substantial publication bias

Quality ratings are upgraded if it is felt that:
- The effect size is large
- If studies are designed in a way that confounding would likely underreport the magnitude of the effect OR
- If a dose-response gradient is evident

Certainty of Evidence
四个意识符号
四个意识符号 High: The authors have a lot of confidence that the true effect is similar to the estimated effect
四个意识符号 Moderate: The authors believe that the true effect is probably close to the estimated effect
四个意识符号 Low: The true effect might be markedly different from the estimated effect
四个意识符号 Very low: The true effect is probably markedly different from the estimated effect

Guideline: Recommendation is from a published guideline that used methodology deemed acceptable by the team
Expert Opinion: Based on available evidence that does not meet GRADE criteria (for example, case-control studies)
Literature Search Methods:

A literature search was conducted in December 2019 to target synthesized literature on central lines or CLABSI for December 2018 to current and limited to English. The search was executed in Ovid Medline, Embase, Cochrane Database of Systematic Reviews (CDSR) and Turning Research into Practice (TRIP) databases.

Screening and data extraction were completed using DistillerSR (Evidence Partners, Ottawa, Canada). Two reviewers independently screened abstracts and included [guidelines and systematic reviews] that addressed the following questions. One reviewer screened full text and extracted data and a second reviewer quality checked the results. Differences were resolved by consensus.

1. In patients receiving a central line are there fewer central line infections in clean cases than in clean-contaminated cases?
2. In patients receiving a central line do antibiotic impregnated lines reduce the risk of central line infection?
3. In patients receiving central lines do heparin impregnated lines reduce the risk of central line infection?
4. In patients receiving central lines do the number of line days increase the risk of central line infection?
5. In patients receiving central lines do the number of line breaks increase the risk of central line infection?
6. In patients receiving central lines does location/environment of placement increase the risk of central line infection?
7. In patients receiving central lines are there specific vessels that increase the rate of central line infection?
8. In patients receiving central lines do the number of line accesses increase the risk of central line infection?
9. In patients receiving central lines does the type of central line impact the rate of central line infection?
10. In patients receiving central lines what factors are associated with catheter clot formation (in line or in vessel)?
11. Does TPN infused via a port increase risk of line infection?
12. What is the optimal duration of a PICC?
13. Is it optimal to repair or replace central lines particularly in intestinal failure and/or oncology patients?

Literature Search Results:
The searches of the 4 databases (see Electronic searches) retrieved 1229 records. Our searches of other resources identified 3 additional studies that appeared to meet the inclusion criteria.

Once duplicates had been removed, we had a total of 1107 records. We excluded 919 records based on titles and abstracts. We obtained the full text of the remaining 188 records and excluded 159.

We included 29 studies. The flow diagram summarizes the study selection process.
Literature Search Results (continued):

Identification
- Records identified through database searching (n=1229)
- Additional records identified through other sources (n=3)

Screening
- Records after duplicates removed (n=1107)

Eligibility
- Records screened (n=1107)
- Records excluded (n=919)

Articles excluded (n=159)
- Did not answer clinical question (n=32)
- Did not meet quality threshold (n=87)
- Outdated relative to other included study (n=39)
- Unable to find (n=1)

Included
- Records assessed for eligibility (n=188)

Studies included in pathway (n=29)

Flow diagram adapted from Moher D et al. BMJ 2009;339:b2535
Included Studies


Chopra, V., O’Horo, J. C., Rogers, M. A. M., Maki, D. G., & Safdar, N. (2013). The risk of bloodstream infection associated with peripherally inserted central catheters compared with central venous catheters in adults: A systematic review and meta-analysis. Infection Control & Hospital Epidemiology, 34(9), 908-918. doi:https://dx.doi.org/10.1086/671737


Included Studies


Included Studies


Medical Disclaimer

Medicine is an ever-changing science. As new research and clinical experience broaden our knowledge, changes in treatment and drug therapy are required.

The authors have checked with sources believed to be reliable in their efforts to provide information that is complete and generally in accord with the standards accepted at the time of publication.

However, in view of the possibility of human error or changes in medical sciences, neither the authors nor Seattle Children’s Healthcare System nor any other party who has been involved in the preparation or publication of this work warrants that the information contained herein is in every respect accurate or complete, and they are not responsible for any errors or omissions or for the results obtained from the use of such information.

Readers should confirm the information contained herein with other sources and are encouraged to consult with their health care provider before making any health care decision.