Agency for Healthcare Research and Quality
Advancing Excellence in Health Care

NATIONAL GUIDELINE CLEARINGHOUSE

General

Guideline Title

Best evidence statement (BESt). Use of ultrasound guidance for peripheral intravenous access in the pediatric population.

Bibliographic Source(s)

Cincinnati Children's Hospital Medical Center. Best evidence statement (BESt). Use of ultrasound guidance for peripheral intravenous access in the pediatric population. Cincinnati (OH): Cincinnati Children's Hospital Medical Center; 2012 Dec 4. 5 p. [8 references]

Guideline Status

This is the current release of the guideline.

Recommendations

Major Recommendations

The strength of the recommendation (strongly recommended, recommended, or no recommendation) and the quality of the evidence (1aâ€'5b) are defined at the end of the "Major Recommendations" field.

It is recommended that the use of ultrasound be considered to obtain peripheral intravenous (PIV) access for patients with known difficult access history or current unsuccessful attempts to decrease the number of PIV catheter insertion attempts and improve patient satisfaction (Benkhadra et al., 2012 [2a]; Doniger et al., 2009 [2b]; Bair et al., 2008 [2b]; Costantino et al., 2005 [2b]).

Definitions:

Table of Evidence Levels

Quality Level	Definition
1a† or 1b†	Systematic review, meta-analysis, or meta-synthesis of multiple studies
2a or 2b	Best study design for domain
3a or 3b	Fair study design for domain
4a or 4b	Weak study design for domain
5a or 5b	General review, expert opinion, case report, consensus report, or guideline
5	Local Consensus

†a = good quality study; b = lesser quality study

Table of Language and Definitions for Recommendation Strength

Strength	Definition
It is strongly recommended that… It is strongly recommended that… not…	When the dimensions for judging the strength of the evidence are applied, there is high support that benefits clearly outweigh risks and burdens. (or visa-versa for negative recommendations)
It is recommended that… It is recommended that… not…	When the dimensions for judging the strength of the evidence are applied, there is moderate support that benefits are closely balanced with risks and burdens.
There is insufficient evidence and a lack of consensus to make a recommendation…	

Note: See the original guideline document for the dimensions used for judging the strength of the recommendation.

Clinical Algorithm(s)

None provided

Scope

Disease/Condition(s)

Diseases and conditions requiring peripheral intravenous (PIV) access

Guideline Category

Management

Clinical Specialty

Emergency Medicine

Family Practice

Nursing

Pediatrics

Intended Users

Advanced Practice Nurses

Hospitals

Nurses

Physician Assistants

Physicians

Guideline Objective(s)

To evaluate, among patients requiring peripheral intravenous (PIV) access, if the use of ultrasound for PIV catheter insertion, versus a non-ultrasound technique, decreases the number of PIV catheter insertion attempts

Target Population

Patients in any setting with a history of difficult venous access (DVA) or who are currently experiencing unsuccessful peripheral intravenous (PIV) access catheter insertion

Note:

> Difficult PIV access is also known as peripheral DVA. A consensus panel of experts in pediatric emergency medicine, nursing, hospital medicine, anesthesia, and critical care created the definition of DVA to describe a clinical condition in which multiple attempts and/or special interventions are anticipated or required to achieve and maintain peripheral venous access.
> Successful PIV catheter insertion is defined as the observation of blood return in the catheter and the absence of signs of extravasation when flushing.

Interventions and Practices Considered

Ultrasound guidance for peripheral intravenous (PIV) catheter insertion

Major Outcomes Considered

Number of peripheral intravenous (PIV) access catheter insertion attempts

Methodology

Methods Used to Collect/Select the Evidence

Searches of Electronic Databases

Description of Methods Used to Collect/Select the Evidence

Search Strategy

Databases

- OVID
- Cumulative Index to Nursing and Allied Health Literature (CINAHL)
- Medline
- National Association of Children's Hospitals and Related Institutions (NACHRI) list serve

Search Terms

- Peripheral IV insertion
- Ultrasound guidance
- Sonography
- Ultrasonography
- Difficult access

- Bedside ultrasonography
- IV access

Limits and Filters

- English
- Humans
- Date last literature search was completed: November 20, 2012; search dates were 2000-2012

Number of Source Documents

The recommendation is based on the synthesized evidence from seven studies.

Methods Used to Assess the Quality and Strength of the Evidence

Weighting According to a Rating Scheme (Scheme Given)

Rating Scheme for the Strength of the Evidence

Table of Evidence Levels

Quality Level	Definition
1a† or 1b†	Systematic review, meta-analysis, or meta-synthesis of multiple studies
2a or 2b	Best study design for domain
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4a or 4b	Weak study design for domain
5a or 5b	General review, expert opinion, case report, consensus report, or guideline
5	Local Consensus

†a = good quality study; b = lesser quality study

Methods Used to Analyze the Evidence

Systematic Review

Description of the Methods Used to Analyze the Evidence

Not stated

Methods Used to Formulate the Recommendations

Expert Consensus

Description of Methods Used to Formulate the Recommendations

Not stated

Rating Scheme for the Strength of the Recommendations

Table of Language and Definitions for Recommendation Strength

Strength	Definition
It is strongly recommended that… It is strongly recommended that… not…	When the dimensions for judging the strength of the evidence are applied, there is high support that benefits clearly outweigh risks and burdens. (or visa-versa for negative recommendations)
It is recommended that… It is recommended that… not…	When the dimensions for judging the strength of the evidence are applied, there is moderate support that benefits are closely balanced with risks and burdens.
There is insufficient evidence and a lack of consensus to make a recommendation…	

Note: See the original guideline document for the dimensions used for judging the strength of the recommendation.

Cost Analysis

A formal cost analysis was not performed and published cost analyses were not reviewed.

Method of Guideline Validation

Peer Review

Description of Method of Guideline Validation

This Best Evidence Statement has been reviewed against quality criteria by two independent reviewers from the Cincinnati Children's Hospital Medical Center (CCHMC) Evidence Collaboration.

Evidence Supporting the Recommendations

References Supporting the Recommendations

Bair AE, Rose JS, Vance CW, Andrada-Brown E, Kuppermann N. Ultrasound-assisted peripheral venous access in young children: a randomized controlled trial and pilot feasibility study. West J Emerg Med. 2008 Nov;9(4):219-24. PubMed

Benkhadra M, Collignon M, Fournel I, Oeuvrard C, Rollin P, Perrin M, Volot F, Girard C. Ultrasound guidance allows faster peripheral IV cannulation in children under 3 years of age with difficult venous access: a prospective randomized study. Paediatr Anaesth. 2012 May;22(5):449-54. PubMed

Costantino TG, Parikh AK, Satz WA, Fojtik JP. Ultrasonography-guided peripheral intravenous access versus traditional approaches in patients with difficult intravenous access. Ann Emerg Med. 2005 Nov;46(5):456-61. PubMed

Doniger SJ, Ishimine P, Fox JC, Kanegaye JT. Randomized controlled trial of ultrasound-guided peripheral intravenous catheter placement

versus traditional techniques in difficult-access pediatric patients. Pediatr Emerg Care. 2009 Mar;25(3):154-9. PubMed

Type of Evidence Supporting the Recommendations

The type of supporting evidence is identified and graded for each recommendation (see the "Major Recommendations" field).

Benefits/Harms of Implementing the Guideline Recommendations

Potential Benefits

Decreased number of attempts required for successful intravenous cannulation, decreased patient pain, and increased parent satisfaction

Potential Harms

Not stated

Qualifying Statements

Qualifying Statements

This Best Evidence Statement addresses only key points of care for the target population; it is not intended to be a comprehensive practice guideline. These recommendations result from review of literature and practices current at the time of their formulation. This Best Evidence Statement does not preclude using care modalities proven efficacious in studies published subsequent to the current revision of this document. This document is not intended to impose standards of care preventing selective variances from the recommendations to meet the specific and unique requirements of individual patients. Adherence to this Statement is voluntary. The clinician in light of the individual circumstances presented by the patient must make the ultimate judgment regarding the priority of any specific procedure.

Implementation of the Guideline

Description of Implementation Strategy

Applicability Issues

- Venous access specific ultrasound equipment may need to be purchased.
- The vascular access team (VAT) or other clinicians inserting peripheral intravenous (PIV) catheters would need unlimited access to ultrasound equipment.
- Education in the use of ultrasonography will need to be provided.
- Personnel will need to remain competent in ultrasonography skills.
- VAT and other clinicians inserting PIV catheters would need education regarding assessment of difficult venous access.
- Measurement of access attempts may not be available for comparison of ultrasound to non-ultrasound approaches.

Implementation Tools

Audit Criteria/Indicators

For information about availability, see the *Availability of Companion Documents* and *Patient Resources* fields below.

Institute of Medicine (IOM) National Healthcare Quality Report Categories

IOM Care Need

Getting Better

Living with Illness

IOM Domain

Effectiveness

Identifying Information and Availability

Bibliographic Source(s)

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Adaptation

Not applicable: The guideline was not adapted from another source.

Date Released

2012 Dec 4

Guideline Developer(s)

Cincinnati Children's Hospital Medical Center - Hospital/Medical Center

Source(s) of Funding

No external funding was received for development of this Best Evidence Statement (BESt).

Guideline Committee

Not stated

Composition of Group That Authored the Guideline

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Financial Disclosures/Conflicts of Interest

Conflicts of interest were declared for each team member. No financial or intellectual conflicts of interest were found.

Guideline Status

This is the current release of the guideline.

Guideline Availability

Electronic copies: Available from the Cincinnati Children's Hospital Medical Center Web site.

Print copies: For information regarding the full-text guideline, print copies, or evidence-based practice support services contact the Cincinnati Children's Hospital Medical Center Health James M. Anderson Center for Health Systems Excellence at EBDMInfo@cchmc.org.

Availability of Companion Documents

The following are available:

- Judging the strength of a recommendation. Cincinnati (OH): Cincinnati Children's Hospital Medical Center; 2009 May 7. 1 p. Available from the Cincinnati Children's Hospital Medical Center (CCHMC) Web site.
- Grading a body of evidence to answer a clinical question. Cincinnati (OH): Cincinnati Children's Hospital Medical Center; 2009 May 7. 1 p. Available from the CCHMC Web site.
- Table of evidence levels. Cincinnati (OH): Cincinnati Children's Hospital Medical Center; 2009 May 7. 1 p. Available from the CCHMC Web site.

Print copies: For information regarding the full-text guideline, print copies, or evidence-based practice support services contact the Cincinnati Children's Hospital Medical Center Health James M. Anderson Center for Health Systems Excellence at EBDMInfo@cchmc.org.

In addition, suggested process or outcome measures are available in the original guideline document.

Patient Resources

None available

NGC Status

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