Children's Hospitals' Solutions for Patient Safety
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OPERATIONAL DEFINITION

MEASUREMENT: Peripheral Intravenous Infiltration and Extravasations (PIVIEs)

I. Description and Rationale

This measure answers the question: How often do patients experience peripheral intravenous infiltrations and extravasations (PIVIEs) and how often do PIVIEs cause serious harm?

The Infusion Nurses Society (INS)[1] will serve as the guide for defining peripheral intravenous infiltrations and extravasations. Each SPS hospital will identify local subject matter experts responsible for classifying injury severity and identifying PIVIEs with Serious Harm based on criteria noted in this document.

II. Population Definition

The patient population for this measure is defined per the inpatient population operational definition.

Inclusion criteria

- Patients with short PIVC, long PIVC or midline catheters

Exclusion criteria

- Patients with a PIVIE injury present on admission
- Patients with wounds from devices (e.g., pressure injury caused by catheter hub)
- Patients with vascular access devices that terminate in a great vessel
- Patients with saline or heparin-locked PIV device NOT receiving either fluids or medications

III. Definitions

Peripheral IV catheters (PIVCs) are inserted into and reside in veins of the periphery that includes all extremities, the external jugular vein, and scalp veins in neonates. PIVCs are inserted into superficial veins located just under the skin in the superficial tissue, as well as deep veins located under the muscle tissue.[2]

- Short peripheral intravenous catheter (short PIVC): An over-the-needle catheter with a hollow metal stylet (needle) positioned inside the catheter, generally inserted in superficial veins

- Long peripheral intravenous catheter (long PIVC): Inserted in either superficial or deep peripheral veins and offers an option when a short PIVC is not long enough to adequately cannulate the available vein. A long PIVC can be inserted via traditional over-the-need technique or with more advanced procedures, such as Seldinger and accelerated Seldinger techniques.

[1] Gorski LA, Hadaway L, Hagle ME, et al. Infusion therapy standards of practice. J Infus Nurs. 2021;44(suppl 1):S1-S224. doi:10.1097/NAN.0000000000000396

- Midline catheter: Inserted into a peripheral vein of the upper arm via the basilica, cephalic, or brachial vein with the terminal tip located at the level of the axilla in children and adults; for neonates, in addition to arm veins, midline catheters may be inserted via a scalp vein with a distal tip located in the jugular vein above the clavicle or in the lower extremity with the distal tip located below the inguinal crease.

Vascular access devices that terminate in a great vessel:

- Central venous catheters (refer to the NHSN central line-associated bloodstream infection (CLABSI) list of great vessels): aorta, pulmonary artery, superior vena cava, inferior vena cava, brachiocephalic veins, internal jugular veins, subclavian veins, external iliac veins, and common femoral veins.)
- Umbilical artery/vein catheters
- Peripherally inserted central catheters (PICC)

An infiltration is defined as the inadvertent administration of a non-vesicant solution or medication into surrounding tissue.

An extravasation is defined as the inadvertent administration of vesicant solution or medication into surrounding tissue.

IV. Measures & Calculation

All PIVIEs Measure

Any PIV within the inclusion population that experiences an infiltration or extravasation, regardless of the extent of harm severity

All PIVIEs Calculation:

Numerator: Total number of PIVIEs
Denominator: Total number of patient days

Total number of PIVIE injuries per 1000 patient days

$$\frac{Total\ number\ of\ PIVIEs}{Total\ number\ of\ patient\ days} * 1000$$

PIVIEs with Serious Harm Measure

A PIVIE that results in significant harm to the patient by causing temporary or permanent impairment, disfigurement, loss/reduction of function or loss of limb. ***POSSIBLE*** *outcomes of a PIVIE with Serious Harm* ***MAY*** *include,* ***BUT ARE NOT LIMITED TO****:*

- *Fasciotomy*
- *Skin graft or tissue transfer*
- *Amputation*
- *Surgical debridement*

PIVIEs with Serious Harm Calculation:

Numerator: Number of PIVIEs with Serious Harm
Denominator: Total number of patient days

Number of PIVIEs with Serious Harm per 1000 patient days

$$\frac{Total\ number\ of\ PIVIEs\ with\ Serious\ Harm}{Total\ number\ of\ patient\ days} * 1000$$

***Note re: Reporting**: PIVIEs with Serious Harm are a subset of All PIVIEs. If a PIVIE is identified and reported in the All PIVIEs measure but later progresses to one with serious harm, the PIVIE would be reported in both the All PIVIEs and PIVIEs with Serious Harm categories and attributed to the month that the injury initially occurred.*

V. Data Source(s)

Each hospital will collect data using methods they believe will capture the vast majority of PIVIEs. Possible collection methods include:

- Electronic Health Record (EHR): An EHR (e.g., EPIC) generates an automatic notification or report whenever a PIV injury is entered
- Safety Incident Reporting: Bedside RN inputs the PIV injury into the institutional safety incident reporting system
- Other methods identified by local leadership as reliable sources of data collection

Each hospital will identify local subject matter experts responsible for classifying PIVIEs with Serious Harm based on criteria noted in this document.

VI. Sampling and Data Collection Plan

PIVIE injuries are assigned to the month the PIVIE event occurred.

VII. Data Quality Audit Procedures

Hospitals should develop their own procedures for assuring data quality and adopt SPS best practices as they become available.

VIII. Notes

N/A

IX. Experts/Resources

- Gorski LA, Hadaway L, Hagle ME, et al. Infusion therapy standards of practice. J Infus Nurs. 2021;44(suppl 1):S1-S224. doi:10.1097/NAN.0000000000000396
- NDNQI Staff, "Guidelines for Data Collection and Submission on Peripheral Intravenous (PIV) Infiltration Indicator," NDNQI, p. 2, June 2014.
- NDNQI Staff, "Guidelines for Data Collection and Submission on Peripheral Intravenous (PIV) Infiltration Indicator," NDNQI, pp. 5-6, June 2014.
- Wound Care Centers, "www.woundcarecenters.org," Home | Articles | Wound Types | Partial Thickness Burns, [Online]. Available: http://www.woundcarecenters.org/article/wound-types/partial-thickness-burns. [Accessed 15 October 2014].

X. Attachments

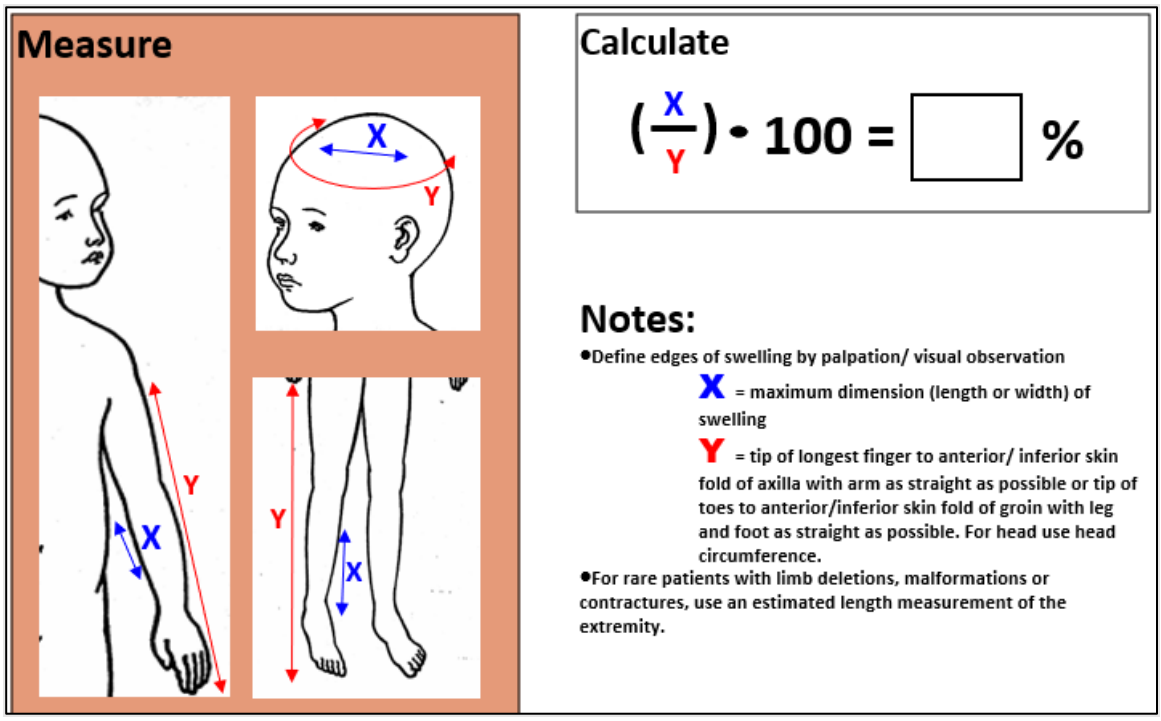
Appendix A – Measurement Based Assessment Tools

XI. Revision History

Version	Primary Author(s)	Description of Version	Date Completed
Version A	Karen Zieker	New HAC definition	Sep 15, 2014
Version B	Co-Leaders	• Denominator will be patient days • Clarified injuries definitions in Appendix A	Oct 15, 2014
Version C	Co-Leaders	Changed: IV added clarity that the injury is recorded when the event is identified Appendix A	Oct 20, 2014
Version D	Co-Leaders	Appendix A clarifications	Oct 27, 2014
Version E	Co-leaders	Appendix A clarifications regarding moderate swelling	Nov 14, 2014
Version F	Co-leaders	Appendix A clarification that meeting any will trigger of the event Section I. added PIV description and locations Added 'References' section	Dec 01, 2014
Version G	Co-leaders	Appendix A – changed swelling calculation for severe > 60% and moderate to	Dec 10, 2014
Version H	Co-leaders, Measurement Team	Section I, exclusions– removed "within the past hour" from the saline/heparin exclusion	Dec 15, 2014
Version I	Co-leaders	Section I, exclusions: Wounds from devices relating pressure ulcers	Dec 17, 2014
Version J	Co-leaders	Excluded scalp site location	Jan 8, 2015
Version K	Co-leaders	Removed "*The skin is moist and painful*" from Appendix A as an attribute of injury	Mar 10, 2015
Version L	Melissa Whitehead	Added minor clarity to the two-limb drawing to measure swelling	May 7, 2015
Version M	Chris Kramer	Added Serious Harm PIVIE as a measured category, removed "discontinued PIVs"	Mar 22, 2017
Version N	Co-leaders	Added collection methods and updated injury categories	Oct 9, 2017
Version O	Co-Leaders	Removed "Cap refill >8 seconds" from Distal Arterial Compromise symptom	Mar 2, 2018
Version P	Mike Adamson; Co-Leaders	Combined two severe categories into one serious category and moved Swelling >60% from severe to moderate.	Jul 29, 2019
Version Q	Mike Adamson; Co-Leaders	Removed list of insertion locations; added link to and list of NHSN great vessels to Section I exclusions; minor wording changes throughout for clarity	Nov 25, 2019
Version R	Aaron Dawson; Co-Leaders	Updated Appendix B with updated diagrams to include the scalp	Jan 28, 2020
Version S	Aaron Dawson; Co-Leaders	**Added exclusion:** extended dwell catheters	Feb 2, 2021

Version	Primary Author(s)	Description of Version	Date Completed
		Serious PIVIE Appendix A clarifications: Removed description of deep partial thickness burns and added a reference; changed "burn" to "tissue injury"; Changed "No Palpable distal pulse" → "No distal pulse by palpation or doppler"	
Version T	Katie Staubach; Sarah Gomez; Co-Leaders	**Updated definition of PIVC** per 2021 INS Standards**; removed exclusions**: midline catheters & extended dwell catheters; added minor clarity to population exclusion	6/21/21
Version U	Katie Staubach; Sarah Gomez, Co-Leaders	Retired Moderate & Serious PIVIE measures; Created All PIVIEs & PIVIES with Serious Harm measures with updated measure definitions; Updated Description & Rationale to include INS definition of infiltration & extravasation and definition of new measures;	12/19/22

Appendix A



OR