

Performance Measurement in PICC Insertion

Robert B. Dawson, DNP, MSA, RN, ACNP-BC, CPUI, CRNI, VA-BC
Jocelyn Hill, MN, RN, CVAA, ONC, VA-BC

Background

PICC insertion practice is variable as measured by the Zone Insertion Method (ZIM), and may lack objective accountability related to clinical decisions. Device size, insertion location, and tip position have all been demonstrated to impact patient outcomes related to PICC insertion practice. Application of best evidence should be done systematically, and in a way to provide performance measurement feedback. Performance measurement is the critical factor for all healthcare quality improvement.

Objectives

- Create an objective scoring system for PICC insertion practice
- Use three criteria: Catheter-Vein Ratio, Zone Insertion Method, and Final Tip Position to achieve a performance score
- Measure outcomes and associate with performance scores

Methods

Two sites volunteered to retrospectively submit quality data on PICC insertion practice. A shared spreadsheet was used to populate raw data, without the use of patient identifiable information. Three scoring criteria based on the literature have demonstrated impact on patient outcomes. The three criteria fit in a proposed Vascular Access Conceptual Framework. The three criteria include: Catheter-Vein Ratio, Zone Insertion Location, Final Tip Position. Each item reflects upon the clinician's process of decision making, assessment, and application of evidence.

Measures

A raw vascular access score was calculated for each of the three criteria based on assigning a range of points from 0 – 4. The maximum score for any criterion was 4. One point was assigned for each level away from ideal practice. The raw scores were added to provide a total score from 0-12 for each PICC insertion. The lower the score, the higher the performance. The raw score was then converted to a percent grading system with 100% being the best possible score. Each raw point equaled 8 percentage points. Descriptive measures: mean, mode, max, and min were used to evaluate the data.

Figure 1: Scoring Template

Catheter-Vein Ratio	<= 1:4	<= 1:3	<= 1:2	> 1:2 < 1:1	>= 1:1
Score	0	1	2	3	4
Zone Insertion	Ideal	Green	Yellow	Red	Non-ZIM Location
Score	0	1	2	3	4
Final Tip	Carotid/axial	Low 1/3 SVC	Mid 1/3 SVC	Up 1/3 SVC	Other
Score	0	1	2	3	4

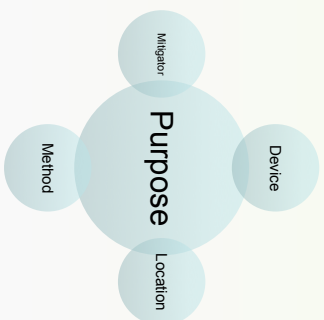
Results

Total Sample: N = 83
Average Row Score = 3.1, Mode = 3
Maximum Score = 6, Minimum Score = 1
Complications: N = 17
Infection (3), Occlusion (8), Malposition (4), DVT (1), Removed Early (1), Average Row Score: 3.5

PICC Raw Score	% Performance Equivalent	Frequency	Complications
0	100%	0	n/a
1	92%	2	0
2	84%	20	2
3	78%	43	11
4	68%	7	0
5	60%	6	2
6	52%	5	2

Figure 2 Performance Data

Figure 3. Conceptual Framework. (Dawson, 2012)



Discussion

PICC insertion practice remains variable as evidenced by the results. More than half all PICC insertions could have demonstrated improvement in at least one quality category. The majority of PICC insertions received the quality score of 76%. There was no perfect score and only 2 of 83 received a 92% performance rating. However, by assigning objective scoring measures the potential for standardizing and improving performance exists. The most frequent score also had the most frequent complication rate of 26%. At 84% performance, the complication rate fell to 10%.

Conclusion

PICC performance can be objectively measured. Objective scoring of clinical practice to reflect evidence based decision making may be the next step in the ever evolving field of vascular access. Achieving real time performance measurement is an evidence-based improvement method, it is critical to sustainable clinical quality. More work needs to be done to associate performance scores with patient outcomes, and even to determine if one performance criterion has more impact than another.

References

Barton, J., Danek, G., Johns, P. & Coore, M. (1998). Improving patient outcomes through CDI: vascular access. *Bulletin of Nursing Care Quality*, 12(2), 77-85.

Balalain Formula. (2012, April 18th). Linking knowledge to improvement (online microsystem academy). Retrieved from Dawson, R. B. (2012). PICC insertion: standards for training world wide (General Session), 2nd World Congress on Vascular Access, Amsterdam, Netherlands.

Dawson, R. B., Schmitt, M., Arai, T., & Stinet, R. (2008). Vascular access assessment and planning: a systems approach. *Journal of Vascular Access*, 9(2), 103-107.

Dawson, R. B. (2011). PICC zone insertion method (zom): a systematic approach to determine the ideal insertion site for PICCs in the upper arm. *JVAA*, 16(3), 156-163.

Evens, S. M., Sharpe, J. H., Lambert, L. H., Lloyd, J. E., Topp, J. S., & Jones, J. P. et al. (2010). Risk of symptomatic DVT associated with central venous catheters. *Chest*, 138(4), 1033-1039.

Grove, J. R., & Francis, W. C. (2000). Venous thromboses related to peripherally inserted central catheters. *J Vasc Med Biol*, 11, 837-840.

Radatz, T. J., & Cullen, T. J. (2011). The effect of catheter to vein ratio on blood flow rates in a simulated model of peripherally inserted central catheters. *Chest*, 140, 48-53.

Chudhury, A., Lammone, J. A. L., Fitzsimons, L., Spencer, Shaw, A., & Swartzell, R. (2004). To add or not to add? That is the question in central venous catheters. *Clinical Radiology*, 59, 343-345.

Poster Awards & ePoster Gallery

(this slide does not print)

★ *All poster presenters were sent a customized login email for access to the AVA ePoster Gallery. Retrieve that email when you are ready to submit your poster to AVA.*

★ *Login to the ePoster Gallery to:*

1. Submit your poster to AVA by **Monday, August 5** to be eligible for the 1st, 2nd or 3rd place Poster awards, which will be determined in advance this year.
2. Add your poster PDF to a virtual library made available to attendees before the meeting. The same gallery will be used to determine the winner of the “People’s Choice” poster award, which will be voted for onsite.

★ *Posters must be submitted in the following formats:*

1. Original PowerPoint
 - ✓ Make sure you include your ABSTRACT ID # in the upper right hand corner of your poster
2. PDF – *print with the following settings:*
 - ✓ Go to the Acrobat menu
 - ✓ Click on **Preferences**
 - ✓ Set Conversion Settings to **Oversized Pages** and click OK
 - ✓ Click on **Create PDF**

★ *Click on the **Upload Your Poster** task item to submit your poster files.*

Adding a QR Code to your poster

(this slide does not print)

- *Adding a QR code to your poster will enable attendees to download your poster's information to their smartphone and to vote for your poster in the "People's Choice" award onsite.*
- A QR code has already been created for your poster! All you have to do is login to your ePoster Gallery portal and click on the **Download Your Poster's QR Code** task item. Follow the instructions and then insert the picture into the bottom left hand corner of your poster.