

# Seeing is Believing (Implementation of an USGPV training curriculum in pediatric medical providers)

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## Background

- Establishing vascular access is a frequent obstacle in pediatric patients. This is due to a variety of barriers such as smaller vascular diameter, excessive subcutaneous tissue that increases difficulty of palpation or direct visualization, and vascular hyperreactivity. Multiple studies have proven that ultrasound can be a useful tool in obtaining peripheral vascular access.

## Objective

- This study aims to implement and assess the efficacy of an ultrasound guided peripheral intravenous curriculum in attending physicians, residents, nurses and nurse practitioners in addition to improving overall comfortability with ultrasound.

## Methods

Training consisted of two 1-hour sessions with both sessions occurring within a 48-hour window. Participants consisted of various pediatric medical staff including attending physicians, residents, nurses, nurse practitioners, and medical students. Session one consisted of an initial pretest, followed by a standardized didactic presentation describing basic ultrasound terminology and usage, USGPV methods, and concluded with a hands-on component to gain familiarity with the portable US machine. Session two was a focused simulation session using the USGPV method on mannequins. Following 2 successful USGPV placements, participants completed a post-test to assess retention of material.

### Data Collection

Study period: July 2022 to February 2023

### Session 1

- Slideshow
- Instructional videos
- Familiarizing with the ultrasound

### Day 2

- Sim lab Session
- Attempts on USGPV training pads
- Direct supervision from instructors

## Results

### Pre and Post-Test overall results

	Nurse Pre-Test	Nurse Post-Test	Resident Pre-Test	Resident Post-Test	All participants Pre-Test	All participants Post-Test
Overall Score	28.57%	82.86%	53%	86%	46%	86%
US comfortability	1.86	6.43	3.37	6.68	2.892	6.607
UGPVI comfortability	2.14	6	2.42	6.89	2.250	6.642

• Table 1: Comfortability questions answered with 10-point Likert scale eg; 1=Least-10=Most  
• P-Value for overall score for nurses, residents, and all participants < 0.005

### Resident Performance (n=19)

Question Topic	Pre-Test	Post-Test	Difference
Choosing correct probe	73.68%	89.47%	+15.79%
Angle of entry	47.37%	89.47%	+42.1%
Features of a vein	100%	100%	+0%
Recognizing view/plane	10.53%	73.68%	+63.15%
Proper indicator orientation	31.58%	78.95%	+47.37%

### Nursing Performance (n=7)

Question Topic	Pre-Test	Post-Test	Difference
Choosing correct probe	42.86%	100%	+57.14%
Angle of entry	14.29%	71.43%	+57.14%
Features of a vein	57.14%	100%	+42.86%
Recognizing view/plane	14.29%	85.71%	+71.42%
Proper indicator orientation	0%	57.14%	+57.14%

## Discussion

- Data were obtained from a total of 28 participants' pre and post surveys
- Participants had a mean improvement of 40% (p <0.005) on their post tests.
- The average score for each individual question also improved
- Greatest improvement was noted on recognizing view/plane
- After participating in the US training, 100% of participants were able to correctly identify features of a vein on ultrasound
- Residents scored higher than nurses on the knowledge based questions but also endorsed more comfortability with US and USGPV both pre and post-test
- Nurses outperformed residents on recognizing view/plane on pre and post-tests
- Additionally, mean comfortability with ultrasound and USGPV placement increased from 2.892 to 6.607 and 2.250 to 6.642 respectively (p <0.005)

## Conclusion

- Implementation of our curriculum showed a significant improvement in USGPV placement competency. Additionally, participant confidence in both general US use and USGPV placement notably improved.

## References

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- Nakayama Y, Takeshita J, Nakajima Y, Shime N. Ultrasound-guided peripheral vascular catheterization in pediatric patients: a narrative review. Crit Care. 2020 Sep 30;24(1):592. doi: 10.1186/s13054-020-03305-7. PMID: 32998762; PMCID: PMC7526377.