



Standardizing Ultrasound-Guided PIV Access in Perioperative Anesthesia: A Quality Improvement Project

Krizelle Alvarez, DNP (c); Krysten De Shields, DNP(c); Karen Joya, DNP(c); and Helena VanDoren, DNP(c)
Vanessa Jones-Oyefeso, DrPH, MSNA, CRNA; Svetlana Welebir, DNAP, CRNA; and Salem Dehom, PhD, MPH

BACKGROUND

DIVA (difficult intravenous access) is described in literature as clinically significant problem in perioperative care, with negative implications for patient safety, workflow efficiency, and resource utilization. At this Level I trauma center, anesthesia clinicians lacked a standardized ultrasound-guided peripheral IV (US-PIV) training and competency pathway. This project addresses this need by implementing a structured, US-PIV training, combining didactic content and simulation-based practice alongside tracking of vascular access patterns.

GAP ANALYSIS

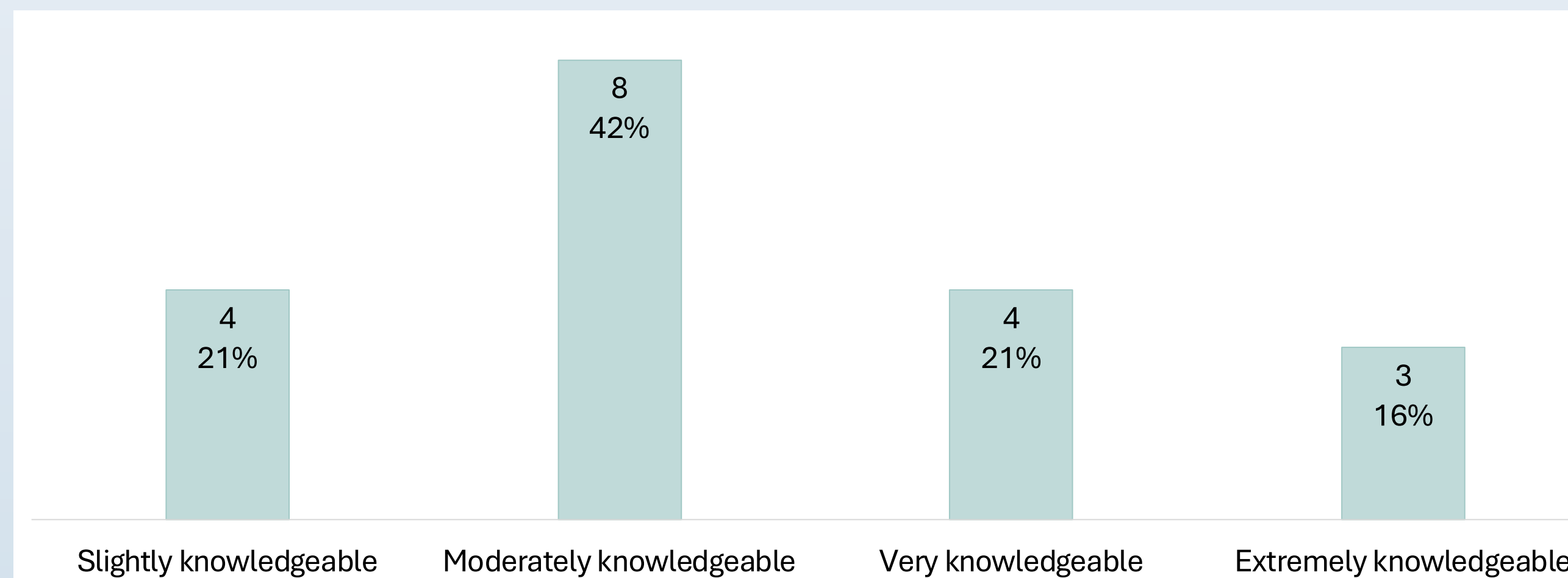


Figure 1: Perceived knowledge of ultrasound anatomy and image interpretation for IV placement

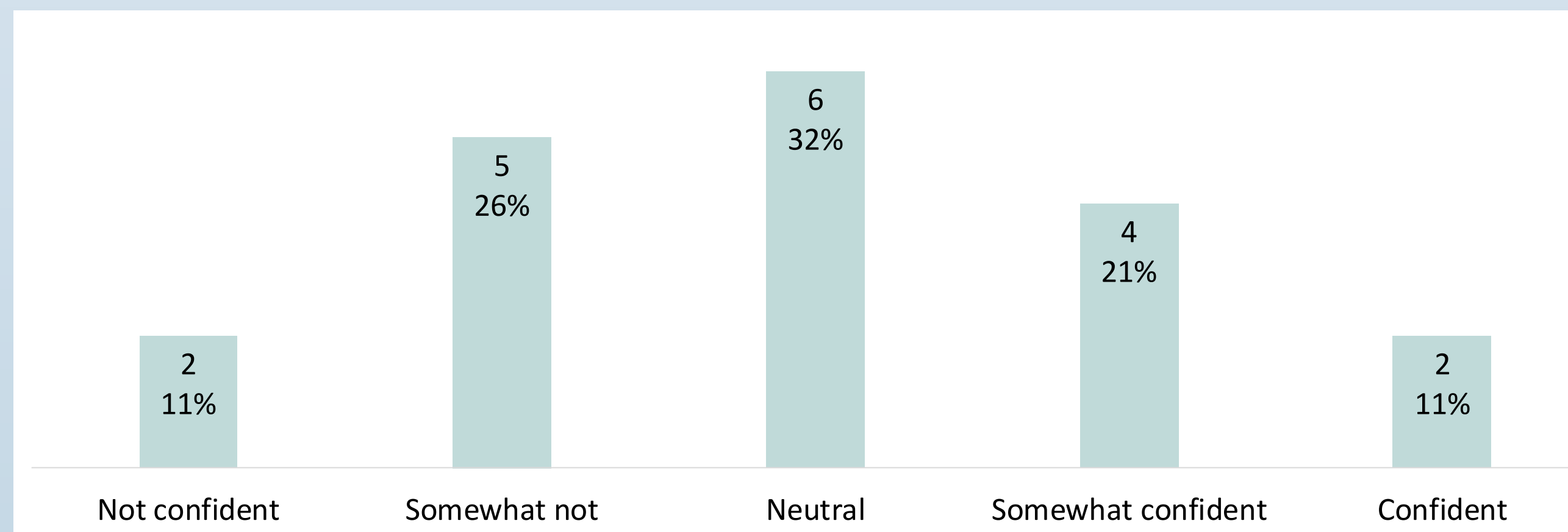


Figure 2: Self-confidence in performing ultrasound-guided IV placement

PICOT QUESTION

Among anesthesia providers and SRNAS at a Level-1 trauma center (P), does participation in a didactic and hands-on POCUS IV placement educational program (I), compared with usual current practice (C), lead to higher IV-placement knowledge and perceived usefulness of ultrasound for IV placement (O), and ultrasound-guided IV insertion skills over 4 weeks (T)?

PROJECT AIMS

Table 1: Project Aims

- Aim 1:** Evaluate changes in knowledge of physiology and clinical application of ultrasound technique for IV cannulation
- Aim 2:** Evaluate changes in perceived usefulness of ultrasound for peripheral IV cannulation following the education session
- Aim 3:** Assess trends of ultrasound-guided IV placement in perioperative areas following the education session
- Aim 4:** Participant Satisfaction and perceived training effectiveness
- Aim 5:** Assess hands-on skill and procedural efficiency in ultrasound-guided IV placement
- Aim 6:** Evaluate participants' perceived skill development and learning

THEORETICAL FRAMEWORK

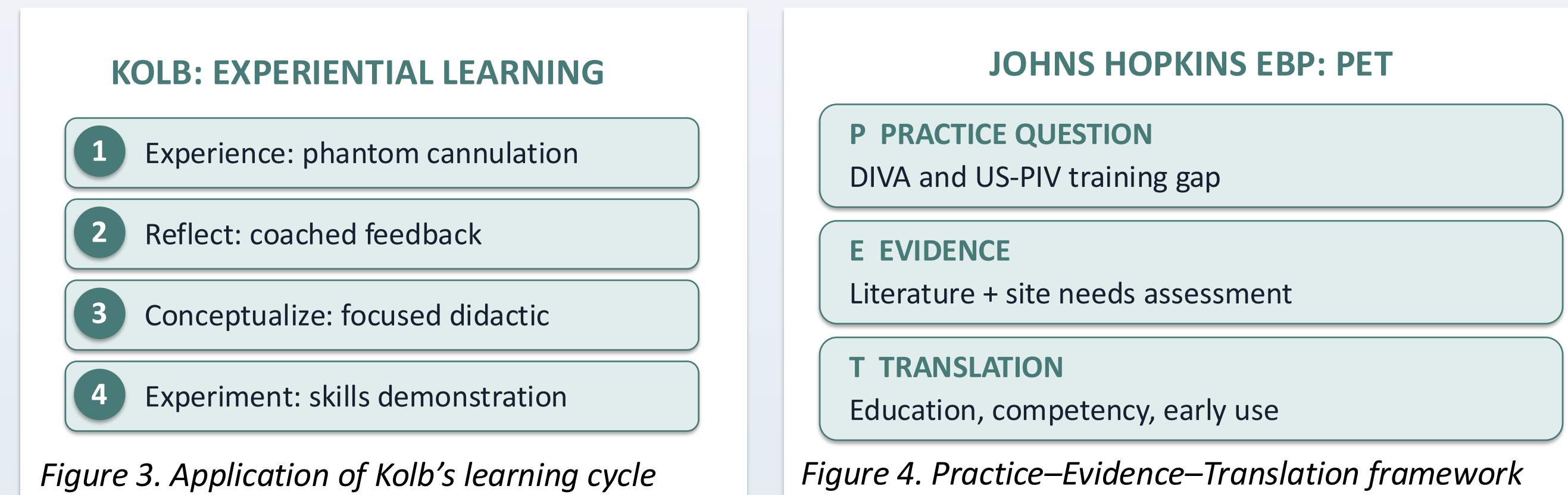


Figure 3. Application of Kolb's learning cycle

Figure 4. Practice-Evidence-Translation framework

METHODOLOGY

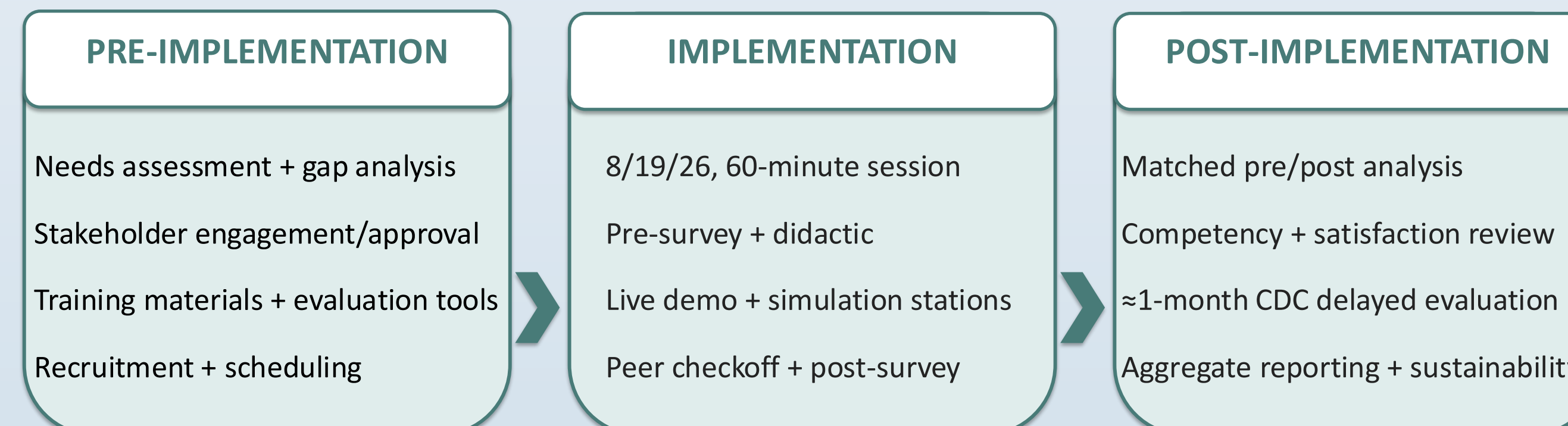


Figure 5: Quality improvement project phases

RESULTS

Aims 1-2

Table 2:

Perceived knowledge and usefulness of ultrasound techniques before and after education (n= 14)

	Before education	After education	% change in median score	P-value *
	Median (Min - Max)	Median (Min - Max)		
Knowledge of ultrasound techniques	81.8 (63.6 - 100.0)	90.9 (54.4 - 100.0)	11.1	0.308
Perceived Usefulness of Ultrasound	3.9 (2.7 - 5.0)	4.8 (3.3 - 5.0)	23.1	0.005

Aims 1-2

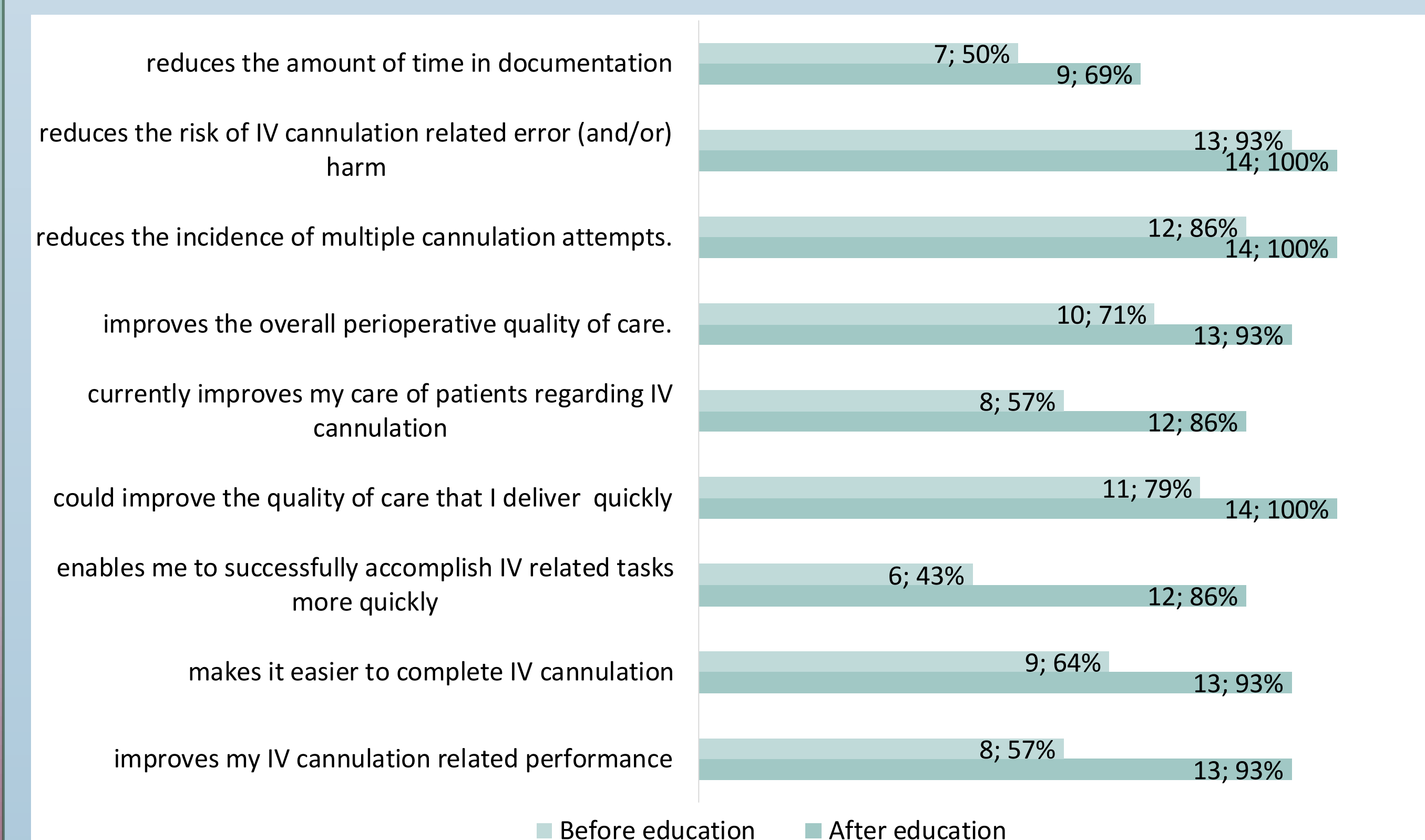


Figure 6: Participant perceived usefulness of Ultrasound before and after

Aim 3

Table 3:

The use of ultrasound techniques before and after the education

		Time			
		Before education	After education		
		n	%	n	%
The use of ultrasound techniques	No	114	88.4%	94	87.9%
	Yes	15	11.6%	13	12.1%

RESULTS

Aim 4

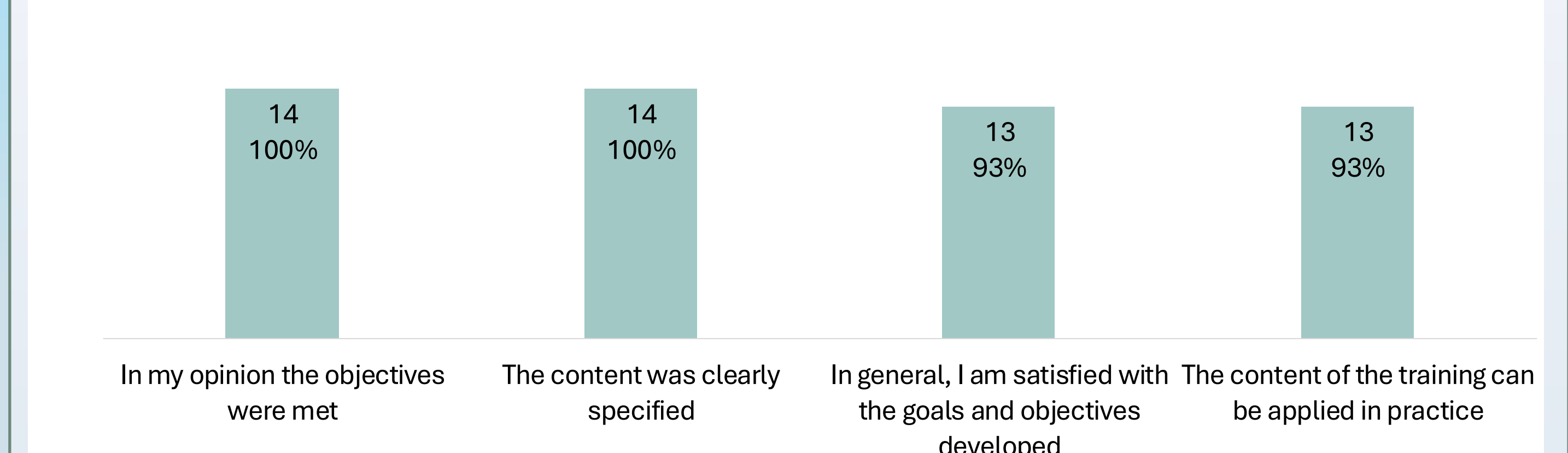
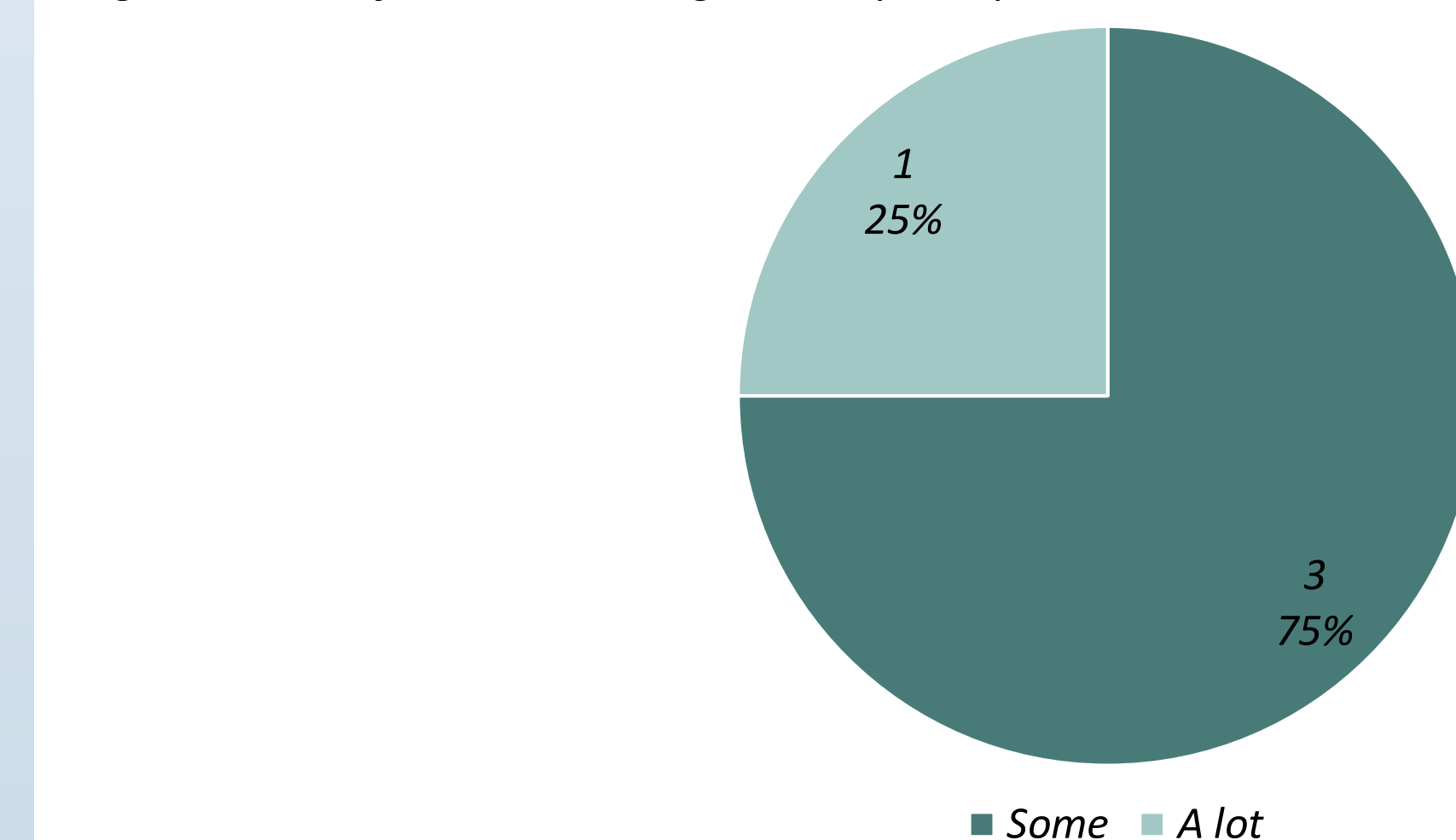


Figure 7: Participant satisfaction with the ultrasound-guided IV training (% of "Strongly agree / Agree")

Aim 5 – Competency Checklist: Due to equipment availability, certain checklist items not relevant. Of possible checklist items, participants successfully completed competency assessment with 88% -100% accuracy (n=12)

Aim 6

Figure 8: Use of course learning in workplace practice



STRENGTHS & LIMITATIONS

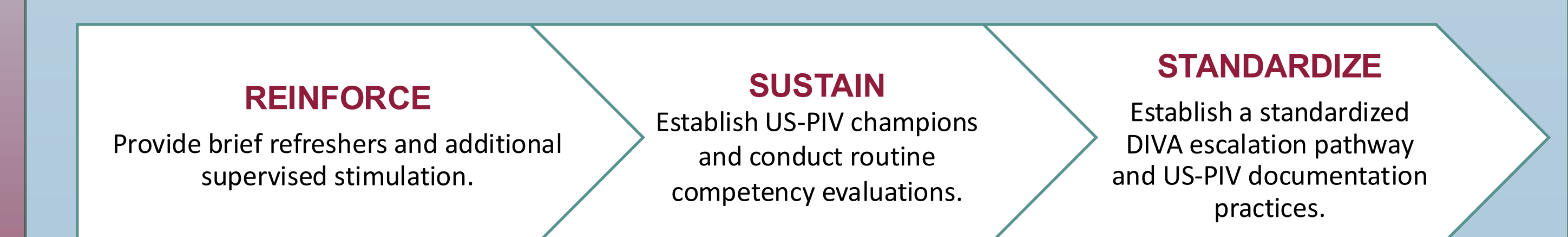
Strengths: Structured didactic and hands-on simulation addressed a site-identified training gap and included competency validation. Multiple outcomes were evaluated, including knowledge, perceived usefulness, satisfaction, competency, and early adoption.

Limitations: Single-site project, small paired sample (n = 14), short follow-up, unequal pre/post record counts, documentation-dependent utilization data, and limited psychometric testing of project-developed tools.

CONCLUSION & IMPLICATIONS FOR NURSING

US-PIV training significantly improved perceived usefulness, and all participants demonstrated competency. Knowledge and short-term utilization did not significantly change, highlighting the need for continued reinforcement and workflow integration to support sustained adoption.

RECOMMENDATIONS FOR FUTURE



CONTACT INFORMATION AND REFERENCES

kaalvarez@students.llu.edu | kdeshields@students.llu.edu | KJoya@llu.edu | HVandoren@llu.edu



ACKNOWLEDGEMENTS

We are grateful for the support of mentors Gloria Mattson Huerta, DNP, FNP-C, AGNP-C; Lauren Moran, CRNA, DNP; Eric Molina CRNA, DNAP; and the clinical site's anesthesia leadership and staff.