



Resident Education Of Free Flap Monitoring: A Two-year Evaluation Of An Online Learning Module



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Introduction

- Vascular compromise of free flaps most commonly occurs within 48 hours postoperatively¹
- Re-exploration salvage rates are ~70%²
- Meticulous monitoring is essential for early detection
- Most studies in the literature focus on educating nurses in postoperative flap monitoring
- At many institutions, off-service residents care for these patients overnight
- This knowledge gap is an opportunity to adapt and tailor the nursing educational framework for residents
- We created a time-efficient, multi-component online module to improve first-year residents' competency in free flap monitoring
- This study aimed to evaluate the effectiveness of each component in improving knowledge and self-reported comfort levels

Methods

- Residents cross-covering plastic surgery patients at Cedars-Sinai Medical center (Los Angeles, CA) were included
 - Including general surgery, neurosurgery, urology, anesthesia, podiatry, ENT, orthopedic, and cardiothoracic surgery residents
- For 2 years (2024-2025), they were assigned:
 - Online module: Pamphlet, 11-minute PowerPoint presentation, supplemental videos
 - 1.5 hour in-person session: Hands-on clinical experience with dopplers
- Participants were asked to complete:
 - Background questions
 - Comfort level survey (before and after)
 - Knowledge-based quiz (before and after)
 - Feedback questions
- Statistical analysis performed with R software

Results

- 55 residents completed the module
 - 7 (12.7%) had previous experience in the OR with free flaps
 - 13 (23.6%) had experience monitoring free flaps postoperatively
- Knowledge-based quiz scores
 - Online module improved scores from 69.3% to 88.8% ($p < 0.001$)
 - In-person session decreased quiz score by 4.6%
 - Mean score increase from 72.6 to 85.4% ($p < 0.001$) after module
- Comfort level
 - Online module improved comfort levels across all 5 questions ($p < 0.001$)
 - In-person decreased the composite comfort score ($p = 0.002$)
 - After training, all increased ($p < 0.001$)
 - Largest improvement was monitoring free flaps

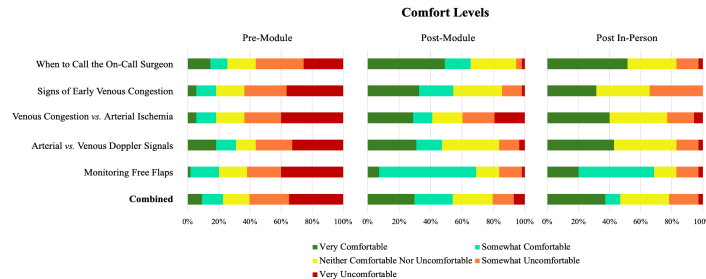


Figure 1. Participants' self-reported comfort levels at each stage of the training

- No significant association between comfort level and quiz performance ($p = 0.061$)
- Free text responses for suggested improvement:
 - Examples of scratch test
 - Additional images/videos
 - Ability to access materials (updated in 2025 version)
 - Different skin tones
 - "On-call" scenarios

Format Feedback

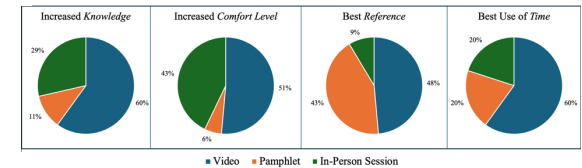


Figure 2. Participants' feedback on which format was the most effective

Discussion

- Online module had the greatest impact in knowledge scores and comfort level
 - Reported as the most effective format by participants
- There was a decrease in scores after in-person session
 - Likely a result of awareness of complexity of physical exam after a hands-on experience
- Despite this, the overall knowledge scores and comfort levels significantly increased when compared to the pre-module scores
- Limitations:
 - Small sample size
 - Education conducted at varying timepoints
 - Focused on foundational clinical skills and did not review monitoring adjuncts
- Future studies include comparing free flap salvage rates before and after integration of the module

Conclusion

- A structured, multi-component online module is time-efficient and effective in training first-year residents on free flap monitoring
- Ultimately, we hope to increase recognition of impending flap compromise and improve care of patients undergoing free flaps

References

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