

Exploring the Efficacy of Assistive Artificial Intelligence for Ultrasound Guided Regional Anesthesia in Residency Training

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Fellowship Funded By: Department of Anesthesiology, Medical College of Wisconsin

Background

- **Ultrasound-guided regional anesthesia (UGRA)** is the standard for many nerve blocks, but it requires precise image interpretation and anatomical recognition
- **Trainees face a steep learning curve**, often beginning UGRA training with little prior exposure
- **Challenges:** Anatomical variation, obesity, and patient-specific factors make skill acquisition difficult even for experienced providers
- **AI support:** ScanNav provides **real-time anatomical recognition and decision guidance**, offering a potential solution to improve training outcomes
- **Why it matters:** Improving UGRA training with AI could lead to **safer patient care, faster skill acquisition, and more consistent resident education**

Hypothesis

Integration of the ScanNav AI-assisted device into UGRA training will **enhance residents' learning outcomes, procedural confidence, and block performance** as perceived by residents and supervising faculty.

Methods

- **Design:** Mixed-methods study (quantitative surveys + qualitative observational analysis)
- **Participants:** 21 anesthesiology residents on their first regional anesthesia rotation and 19 supervising providers
- **Procedure:**
 - Residents perform nerve blocks with faculty supervision
 - ScanNav provides real-time anatomical interpretation during procedures
- **Post-Block Survey Questions:**

Confidence

- Trainee scanning confidence with and without ScanNav (0-10)
- Provider scanning confidence with and without ScanNav (0-10)
- Provider confidence in trainee performance with and without ScanNav (0-10)

Anatomy & Image Acquisition

- Ease of identification of anatomical structures with ScanNav (helped, no difference, hindered)
- Ease of acquisition of correct ultrasound view with ScanNav (helped, no difference, hindered)

Educational Impact

- Provider ease of teaching with ScanNav (helped, no difference, hindered)
- Trainee ease of learning block with ScanNav (helped, no difference, hindered)
- Overall training benefit of ScanNav use during block (helped, no difference, hindered)

Supervision & Workflow

- Supervision effectiveness with ScanNav (helped, no difference, hindered)
- Frequency of provider intervention with use of ScanNav (increased, no difference, decreased)
- Amount of supervisory support required while using ScanNav (increased, no difference, decreased)

Discussion

- ScanNav was associated with **significant perceived educational benefit among trainees** and increased faculty confidence in trainee performance
- Provider self-confidence and perceived teaching burden were unchanged, suggesting **no disruption to existing supervision workflows**
- These findings support AI-assisted ultrasound as a **useful adjunct for early UGRA training and supervision**
- The observed trend toward increased trainee confidence suggests **potential educational value** beyond subjective utility alone

Future Work

- Include and obtain **objective** performance metrics
- Evaluate **longitudinal effects** on skill acquisition and retention
- Assess **generalizability** across additional blocks and procedural domains
- Study **optimal integration** of AI-assisted guidance into residency training curricula

Acknowledgements

- Department of Anesthesiology, Medical College of Wisconsin
- Regional Anesthesia and Acute Pain Service team, Froedtert Hospital
- MCW Clinical and Translational Science Institute

References

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Results

Trainee Outcomes

- ScanNav was associated with **improved perceived educational benefit**, including anatomical identification, acquisition of the correct ultrasound view, and overall learning experience (**p=0.017**)
- Trainees demonstrated a trend toward increased scanning confidence with ScanNav (p=0.053)

Provider Outcomes

- Providers reported **significantly greater confidence in trainee performance** when ScanNav was used (**p=0.023**)
- ScanNav did not significantly change provider scanning confidence (p=0.19) or perceived impact on teaching, supervision, or intervention frequency (p=0.12)

Overall, ScanNav was associated with **significant perceived educational benefit for trainees** and **increased faculty confidence in trainee performance**, without altering provider self-confidence or perceived teaching burden.

