Sonographer and Resident Driven Quality Improvement Curriculum for First-Year Radiology Residents

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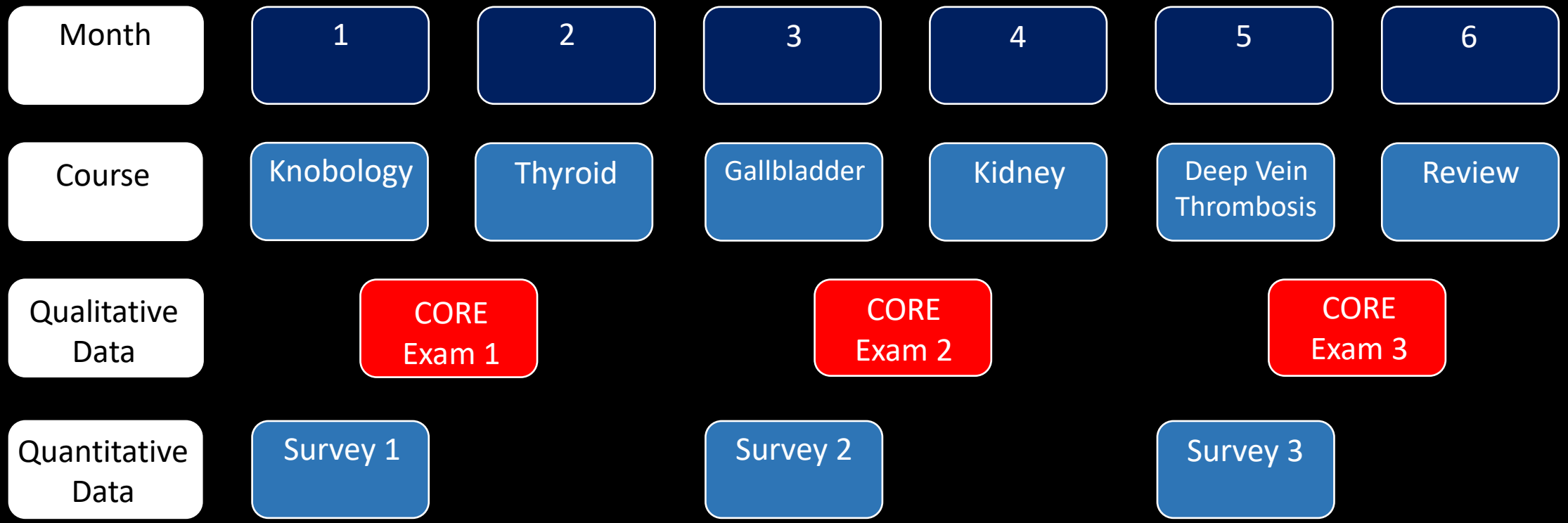
Background

- Ultrasound is highly user dependent compared with other imaging modalities, and radiologists are dependent upon sonographers to produce diagnostic ultrasound images.
- Radiology residents quickly develop the ability to interpret images, but workflow and patient care demands hinder “back scanning,” leading to resident concerns regarding hands-on ultrasound training.
- The ability to scan independently in difficult cases remains a concern among ultrasound trainees.
- Sonographers have the potential to play a critical role in residents’ ultrasound training.
- Multi-level sonographers should be recruited for various topics covered in resident training curriculum.

OBJECTIVE: Determine whether radiology resident confidence and technical ability improves after participating in a senior resident and sonographer driven ultrasound scanning curriculum.

Study Design



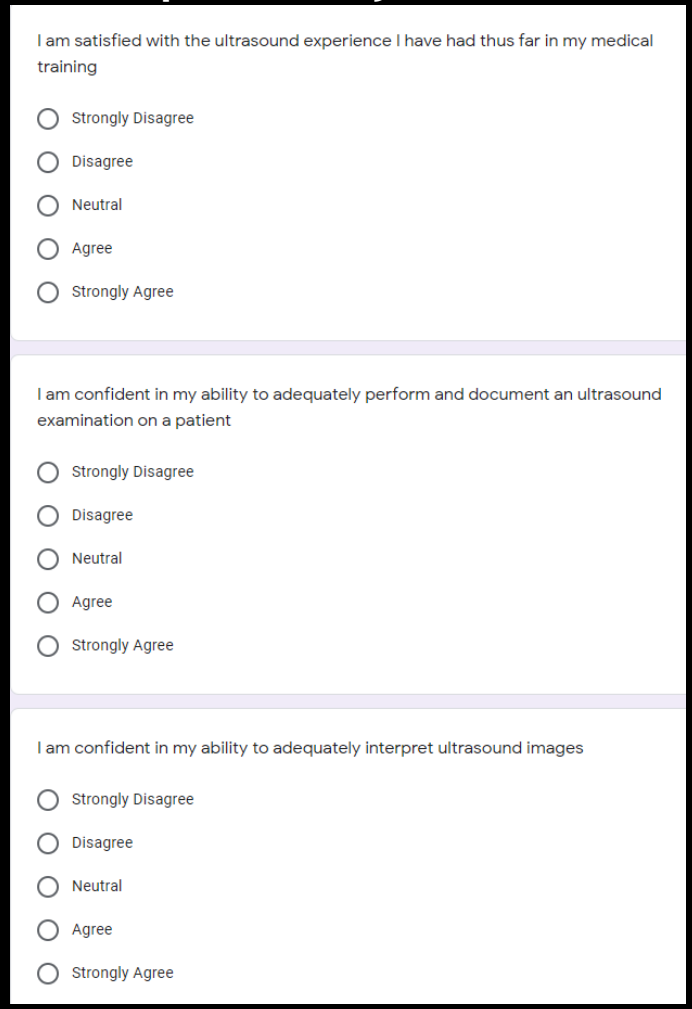
Methods

- Eleven first year radiology residents participated in mandatory hands-on scanning sessions and surveys.
- Curriculum focused on knobology, image acquisition and technique, patient positioning, and specific imaging examinations.
- Held after clinic hours utilizing standardized patients at the clinical skills and simulation center.
- Sonographer driven scanning lessons with a supplemental written curriculum sent prior to lessons. Google Drive was used for easy access to materials.
- Each training session included targeted hands-on ultrasound scanning sessions involving different organ systems.
- Sonosite X-Porte and Edge II ultrasound machines were utilized. Standardized patients were scanned for all evaluation sessions. Each resident received an identification number for anonymity.

Methods: Qualitative Data

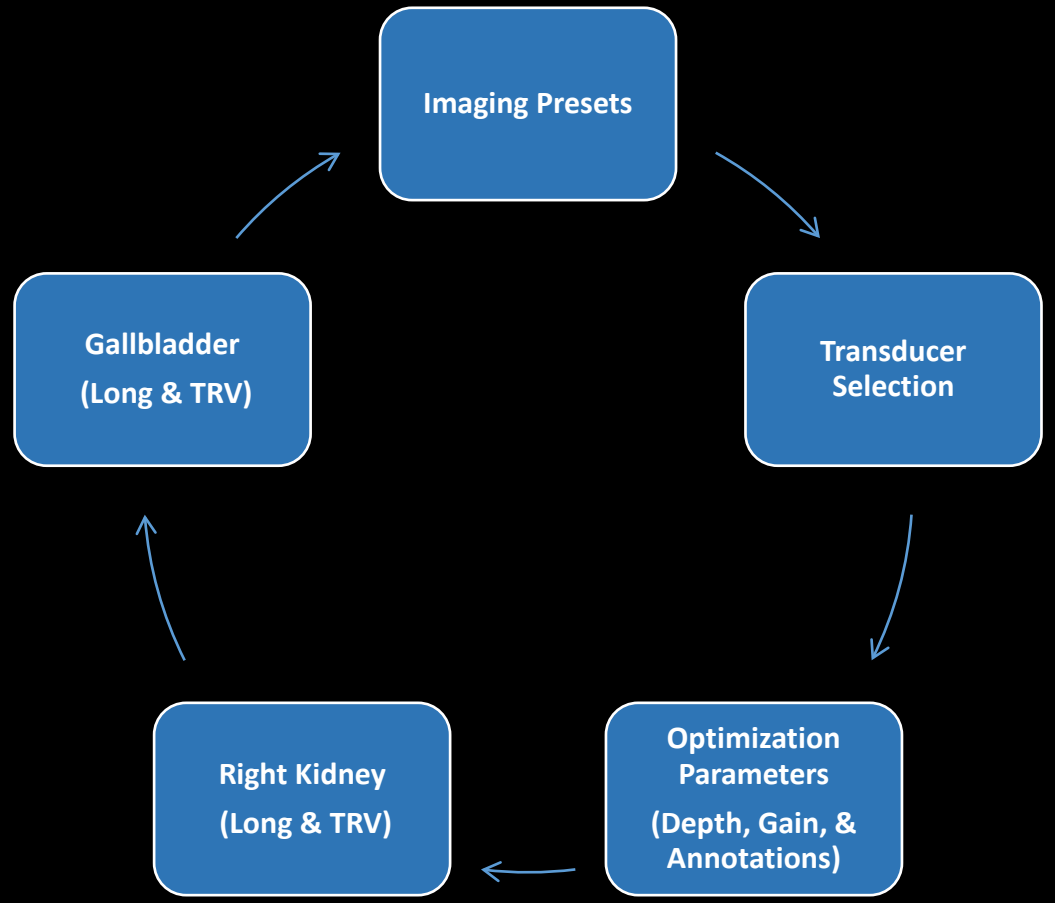
- Confidence survey.
- Google Form format.
- Completed prior to the course, at mid-point, and at completion.
- Residents rate their overall confidence using a 5-point Likert scale:
  - Ultrasound scanning.
  - Exposure to ultrasound in residency.
  - Exposure to ultrasound in medical education.
  - Interested in additional ultrasound training in residency.

Example Survey Questions



Methods: Quantitative Data

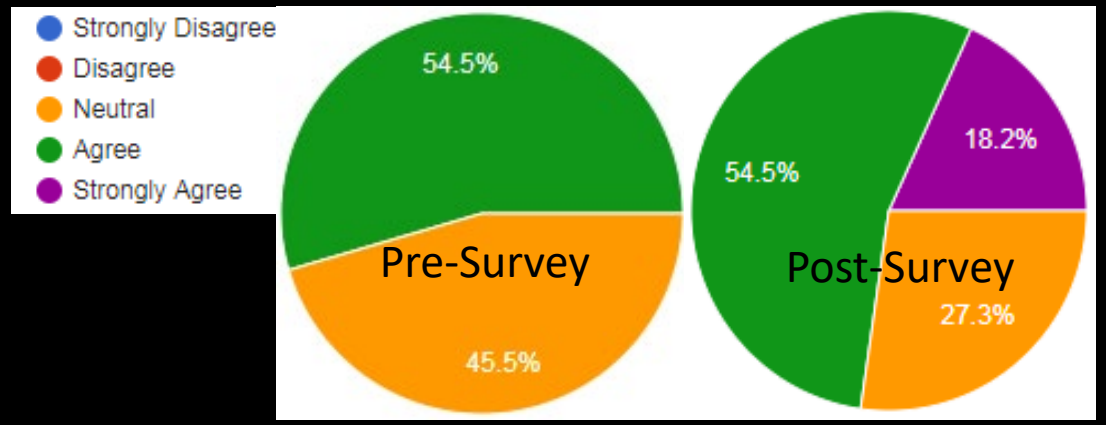
- Core examination to test residents' scanning skills in beginning, mid-point, and completion.
- Evaluated on residents' ability to produce diagnostic quality ultrasound images.
- Observed and graded by sonographer.
- Specific knobology and image quality metrics were assessed.



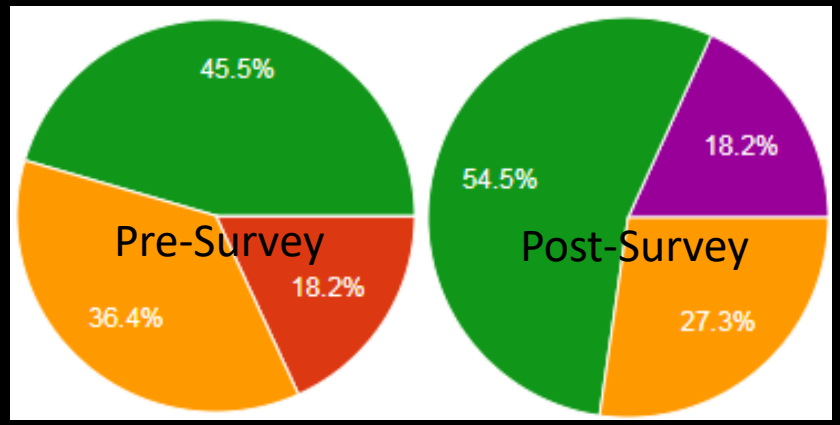
Results: Qualitative Data

- Average resident age: 30.6 years.
- 82% male and 18% female.
- Increase in confidence and ultrasound training.
- Most residents were not satisfied with their ultrasound training thus far.
- Previous ultrasound exposure was limited.
- No significant negative change in the balancing measure, satisfaction with time spent learning radiology outside clinical hours.

I am confident in my ability to integrate ultrasound findings into my clinical decision making



Rate your level of satisfaction with time spent learning radiology outside clinical hours



Results: Quantitative Data

- Core examinations graded 1 to 5 (incomplete-exceptional)
- Reached statistical significance pre- to post-core examinations
  - Right Kidney, p value = 0.02.
  - Gallbladder, p value = 0.03.
- More confident optimizing depth and gain rather than annotations

Kidney Core Examinations			
N=10	Pre vs Mid Exam	Mid vs Post Exam	Pre vs Post Exam
Right Kidney Long Depth	2.3 ± 0.5	2.3 ± 0.82	3.9 ± 0.99
Right Kidney Long Gain	2 ± 0	2.3 ± 0.67	3.6 ± 0.52
Right Kidney Long Annotation	1.3 ± 0.67	1.2 0.63	3.3 ± 2.0
Right Kidney Trans Depth	2.4 ± 0.70	2.3 ± 0.82	3.7 ± 0.82
Right Kidney Trans Gain	1.9 ± 0.32	2.6± 0.7	3.5 ± 0.97
Right Kidney Trans Annotation	1.7 ± 0.95	1.2 ± 0.63	3.3 ± 2.0

Results: Quantitative Data

- Core examinations graded 1 to 5 (incomplete-exceptional)
- Reached statistical significance pre- to post-core examinations
  - Right Kidney, p value = 0.02.
  - Gallbladder, p value = 0.03.
- More confident optimizing depth and gain rather than annotations

Gallbladder Core Examinations			
N=10	Pre vs Mid Exam	Mid vs Post Exam	Pre vs Post Exam
Gallbladder Long Depth	1.3 ± 0.48	1.3±0.48	3.5±1.43
Gallbladder Long Gain	1.4 ±0.52	2.4±0.84	3.5±1.10
Gallbladder Long Annotation	1.1 ±0.32	1±0	2.9±2.02
Gallbladder Trans Depth	1.2±0.63	1.4±0.84	3.6±1.43
Gallbladder Trans Gain	1.1±0.32	2.4±0.84	3.8±0.63
Gallbladder Trans Annotation	1.0±0	1.0+0	3.2±1.93

Conclusion/Future Directions

- A dedicated hands-on ultrasound scanning curriculum tailored toward first year radiology residents can improve subjective and objective measures of ultrasound scanning.
- The hospital, and ultimately patients, benefit from improved quality and delivery of care. Success of this program raises the possibility of inter-departmental educational opportunities.
- Future Directions:
  - Shorten the curriculum to two months and permanently integrate this curriculum into the residency.
  - New topics, including MSK, OBGYN, and interventional procedures.
  - Expand the program to include inter-departmental educational opportunities.
  - Recruit additional sonographers.