



Optimizing Radiation Dose: UW-Madison's Experience with the ACR Learning Network ImPower Program

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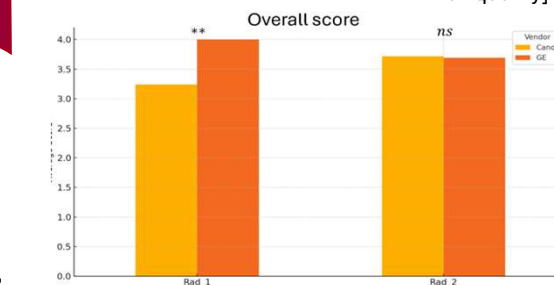
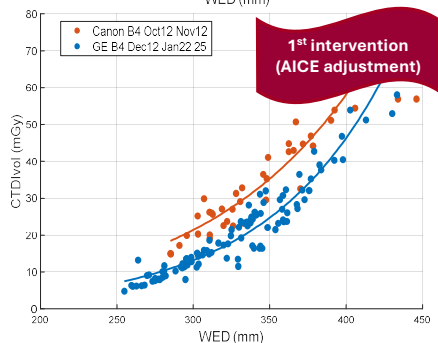
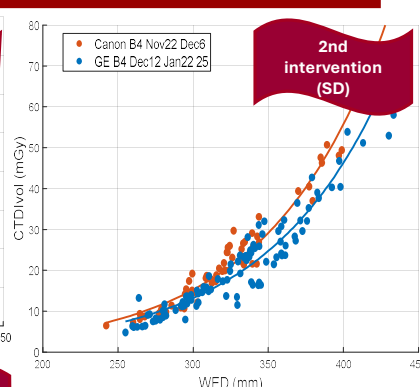
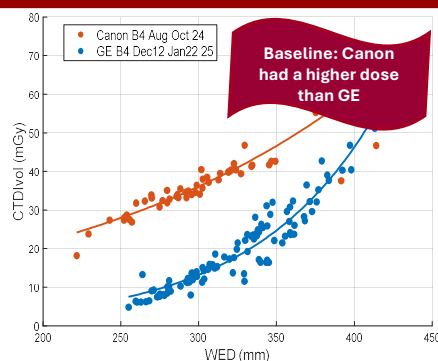
Purpose

- Doses for CT exams are often not optimized across the continuum of patient size, leading to unnecessarily high doses for some patients and poor or variable image quality for others.
- Ideally, doses and image quality for a particular type of CT exam should be the same for all patients of a given size across one's CT fleet.
- We had a situation where a new scanner had a higher dose compared to the rest of our fleet.

Methods

- We approached the scanner-to-scanner dose equalization process using the ACR Empower Program.
- We performed reader studies on IQ and pulled dose and patient size information from the high and regular dose scanners.
- We iteratively performed protocol changes to the high dose scanner and re-assessed reader scores and dose versus patient size curves.
- Protocol changes included
 - Changing deep learning recon level
 - Changing AEC quality target

Results (plots of dose versus patient size (water equivalent diameter) and reader study scores)



During the intervention period, we also confirmed the presence of metal implants, scan time technologist decisions, and patient mis-positioning were not factors in the higher doses on the Canon scanner.

Reader scoring. After interventions, the dose was equal, and radiologist scores were matched between scanners) [1,2,3,4,5] → [non dx, borderline dx, acceptable, good dx quality, excellent dx quality]

Conclusion

Participation in the ACR Empower program enabled our team to apply A3 thinking and fishbone analysis, as well as "Gemba" walks through our clinic to rule out personnel error in the dose differences we observed between CT scanners. After adjusting the higher dose scanner's AEC settings via denoising strength and quality target, we were able to achieve equivalent dose and equivalent reader scores between scanners.

