CT Radiation Dose Reduction
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Problem Statement
Radiation doses on lumbar spine CT’s performed at Memorial campus (particularly in larger patients) are too high resulting in excess cancer risk to patients.

Background
- 2012 – over 68 million CT’s performed
- Cancer risk estimate – 1-2% of all cancers
- Radiation dose measured in “seiverts”
- Typical dose for lumbar spine CT – 10 mSv
- At UMass, average dose over 5 months – 15.5 mSv
- 17 cases with doses exceeding 25 mSv
- All occurred in larger patients

- Different body parts require different amounts of radiation to penetrate tissue.
- Larger patients need higher doses
- Automatic Exposure Control (AEC)

Current Condition
- Patient brought to scanner
- Scout View
- Projected dose
- Adjustments to scan parameters
- Maximum mA
- 7 mSv – 46 mSv

Root Cause Analysis
- Radiation doses too high
  Why?
- Automatic exposure control modulating too high in larger patients
  Why?
- No upper limit being set by technologist
  Why?
- No protocol in place/education

Goals
- Lower average radiation dose to 11mSv
- Decrease number of cases >25mSv to zero
- Maintain diagnostic image quality

Countermeasures
1. Set upper limit of allowable dose prior to scanning
   - American College of Radiology standards
   - Standard work
2. Technologist Education
3. Radiologist survey

Results
- Average Dose:
  - Dose (mSv) vs Implementation
  - Maintenance of diagnostic image quality
    - 4 musculoskeletal radiologists polled
    - 4 out of 4 indicated no noticeable change in image quality after countermeasures implemented.

Conclusions
- Average dose reduced by 19% (15.5 mSv → 12.5 mSv)
- Number of cases >25 mSv reduced to zero
- Maintained diagnostic image quality throughout
- Key is root cause analysis
- Next steps:
  - Apply “template” to wider scope
  - Reduce doses even further

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