The study includes 51 radiographs (CXR) of the NICU CXR with more consistent and appropriate collimation.

Results
A statistically significant improvement was observed in top edge ratings from pre-to immediately post-training (mean 2.29 to 2.65, p=0.0167). While top edge ratings remained improved from pre-training to one year post-training (mean 2.29 to 2.59), the improvement was no longer significant. Bottom edge ratings progressively improved from pre-training to one year post-training (mean 2.29, 2.43, 2.59), however, the improvement was not significant. (Tables 1 and 2). While variability improved from pre-to immediately post-training, right and left edge ratings had returned to near pre-training levels by one year post-training.

Discussion
Initial review of radiographic practices in the University of Minnesota Masonic Children’s Hospital NICU revealed some effective methods were already being employed by radiographers to reduce dose. This included the absence of grid use, the absence of post-acquisition image cropping (which falsely decreases the apparent amount of radiated tissue), and knowledge of the mAs and kVp settings and exposure indices appropriate for NICU patients. There was, however, opportunity for improvement in collimation, as excess body tissues were routinely being included in standard CXR.

Appropriate CXR collimation with light beam guidance minimizes the radiation dose a patient receives by excluding as much of the non-lung body structures as possible. While pathologic can exist and be excluded with very tight collimation standards and clinical experience. Tight collimation limits unnecessary direct radiation dose and minimizes dose related to scatter from excess tissues included in the radiation field (scatter also decreases image contrast). The small size of patients in the NICU makes collimating effectively uniquely difficult. In this study the difference between a 3 rating and a 1 rating could represent a difference in collimation of less than 2-3 cm. The International Atomic Energy Agency recommends the tolerance away from optimal collimation in the neonatal population should be 1 cm or less. The relative size variation of patients in the NICU was not controlled for in our study. Despite this limitation, using our collimation technique based on body landmarks has lead to NICU CXR which are more consistently similar to the international standard. Given the return to baseline for lateral edge scores by one year post training and slight regression in top edge scores immediately post-training to one year post-training, re-training of technologists will be required to maintain our collimation standards over time.

Conclusion
Implementation of a CXR collimation technique utilizing external landmarks resulted in improvement in top and bottom edge collimation of NICU CXR and in CXR that more consistently approached the international standard. Improvement in lateral edge collimation diminished over time, suggesting repeat radiographer training and individual performance feedback are necessary.

Literature Cited