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Improving Portable Chest X-ray Techniques Through Image Review and Education of Radiology Technologists

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Abstract

Introduction: Patient rotation, foreign body overlying anatomy, and anatomy out of field of view can have detrimental impacts on the diagnostic quality of x-rays. Although preventable, these “quality failures” are common and may increased radiation exposure, diagnostic errors, and healthcare costs for patients. We aimed to generate interventions to minimize operator-dependent pCXR quality failures first by identifying the prevalence of quality failures. We then implemented interventions directed at technologists and hospital floor staff to improve imaging quality. Finally, we assessed the effectiveness of our interventions.

Methods: From July 12, 2021 to July 25, 2021, pCXRs were evaluated by radiologists for failures in technical image quality using a standardized rubric (Figure 1). To address technical quality errors, didactic sessions and worksheets were provided to radiology technologists. Additionally, programs were initiated to recruit nursing staff to assist technologists with patient positioning and to have internal medicine residents verify the quality of films by bedside. Post-intervention analysis was then conducted using the same methodology as the pre-intervention analysis.

Results: Figure 1 compares the quality of PCXRs obtained pre- and post-intervention. Technical errors were present in 231 of the 500 pre-intervention radiographs and in 126 of the 287 post-intervention

studies. Using a 0 to 3 scale for evaluating patient rotation (0 being no rotation and 3 being severe rotation), a 0.46-point reduction was observed post-intervention ($p<0.005$). There was also a 25% reduction in films with moderate to severe rotation in the post-intervention pCXRs, but no percentage change in pCXRs with mild rotation. The number of pCXRs with obscured anatomy declined by 20.9% post-intervention. A missed diagnosis was observed in 43.5% of studies pre-intervention vs 12.2% of studies post-intervention.

Conclusion: Our interventions resulted in a decrease in the quantity and severity of quality failures resulting in less missed diagnoses.