

QUALITY, SAFETY AND VALUE, PAPER 25

Safely Reducing Unnecessary Radiographs in Suspected Pediatric Musculoskeletal Injuries Through a Multidisciplinary Developed Algorithm

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LOE-Not Applicable

Purpose: Children are particularly susceptible to ionizing radiation risks years later, and radiographs which do not add value should not be obtained. Over a several years, we observed a large number of unhelpful radiographs in children having suspected musculoskeletal (MSK) injuries and sought to decrease the unnecessary radiographs with their associated radiation, discomfort, and cost without missing important injuries through development and implementation of an interdepartmentally designed algorithm. We then determined the utility, safety, and efficacy of the algorithm.

Methods: At an academic pediatric trauma center, an interdepartmental committee including pediatric orthopedic surgeons, emergency medicine, trauma, and radiology providers created a MSK injury imaging algorithm based upon injury mechanism and physical examination for application in the emergency department. In stage 1, we retrospectively validated the algorithm for efficacy and safety through chart review of children seen in the ED from 6/24/2016 through 8/31/2016 having MSK extremity injury identified through CPT code and determined potential unnecessary radiographs per patient and any missed injuries utilizing the protocol. In stage 2, from 6/24/2018 through 8/31/2018, the guideline was prospectively implemented with education of orthopedic and emergency medicine attendings, APPs, and residents by having the protocol posted and easily accessible, meetings, emails, and creating standardized order sets. The number of unnecessary radiographs and any subsequently discovered injuries was assessed. In stage 3, the sustainability was prospectively evaluated by sampling 1 week each month over the following 8 months. Follow up was monitored via EMR for potentially missed fractures or dislocations.

Results: In stage 1, 295 patients presented with musculoskeletal injuries, a total of 2148 radiographs with 801 not indicated per the protocol for an average 2.75 unneeded radiographs by protocol per patient. No injuries were potentially missed utilizing the protocol. In stage 2, 472 patients had 2393 radiographs with 339 not indicated per protocol for 0.72 unnecessary radiographs per patient (P-value <0.001) with no injuries missed. This improvement was sustained over the subsequent 8 months (Figure).

Conclusions: Sustained reduction of unnecessary radiation to pediatric patients with suspected MSK extremity injuries was accomplished through development and implementation of a safe and effective imaging algorithm. The multidisciplinary approach combined with widespread education of pediatric providers improved buy-in driving a sustainable improvement.

Significance: Standard QI methods of multidisciplinary protocol development, targeted education and monitoring can safely reduce extremity radiographs in children with suspected musculoskeletal injuries.

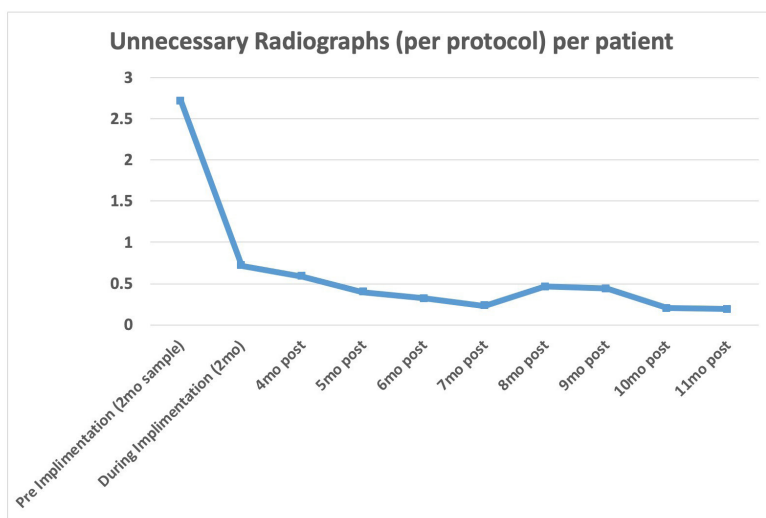


Figure: Run chart demonstrating change in unnecessary radiographs per patient