Decreased radiation exposure with a safety training program

The importance of limiting radiation exposure among healthcare workers and patients is of utmost importance. According to the National Council on Radiation and Standards the recommended maximum annual dose of radiation to the whole body is 5,000 mR and 50,000 mR to the extremities. Fluoroscopy is a method which allows physicians in-training to take live x-rays during procedures. The mini C-arm is a portable fluoroscopic machine which enables physicians in-training to utilize fluoroscopy in multiple settings. One such setting is the emergency department where it is a powerful adjunct for fixing and casting fractures in the pediatric population.

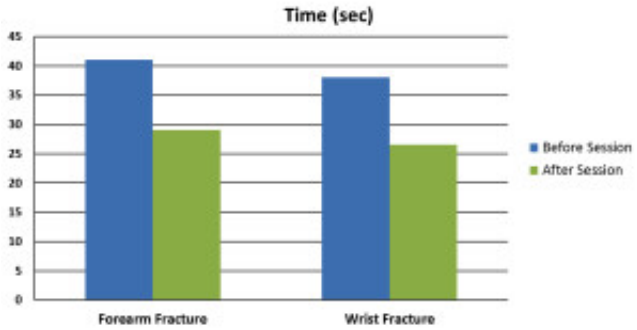

Fig. 1. Average radiation time for forearm and wrist fractures before and after the educational program.

Fluoroscopy during fracture reduction allows a physician in-training to assess fractures and immediately treat a pediatric patient. However, concern regarding the effects of radiation exposure has led us to the inception of a program called ALARA (as low as reasonably achievable) designed to reduce the amount of radiation exposure to the minimum amount needed to complete the procedure. Furthermore, the amount of radiation exposure is cumulative, thereby putting the physician in-training at particular risk due to the fact that he will perform multiple reductions on different patients. One potentially simple way, which to our knowledge has not been explored, to decrease radiation exposure is through formal education before mini C-arm use. The purpose of this study is to report radiation exposure among the physicians in-training after receiving a radiation safely education program.

Physicians in-training underwent a new annual 3 hour educational program about radiation safety. This session consisted of a one hour lecture explaining the basic science behind and functions of the mini C-arm. The second hour consisted of demonstration of the key concepts. During the third hour the physicians in-training were allowed to have a hand on experience with the mini C-arm to implement the concepts they had just learned. The program was taught by the hospital's health physics department. 45 consecutive pediatric patients undergoing wrist and forearm fracture

reduction in the Emergency Department by a physician in-training after the radiation safety education program were compared to 53 consecutive pediatric wrist and forearm fracture reductions prior to the education. Radiation exposure times and amount of whole body radiation emitted by the mini C-arm were compared.

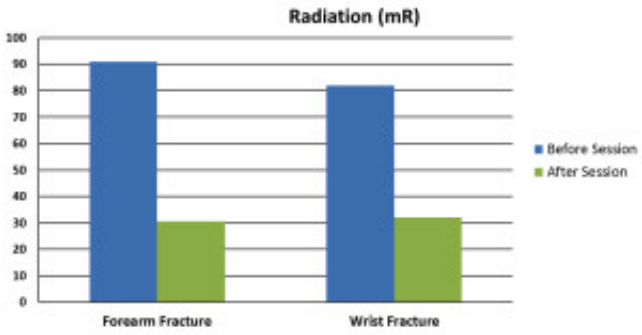

Fig. 2. Average radiation exposure for forearm and wrist fractures before and after the educational program.

We evaluated the change in radiation exposure to both the physician in-training and the patient when using the mini C-arm after undergoing radiation safety training by a radiation physicist including mini C-arm use. We found that there was a decrease in radiation exposure for the wrist and forearm fracture reductions when comparing physician in-trainings before and after radiation safety training. There was also a statistically significant decrease in reduction time for wrist fractures.

We evaluated the change in radiation exposure to both the physician in-training and the patient when using the mini C-arm after undergoing official training by a radiation physicist regarding mini C-arm use. We found that there was a significant decrease in radiation exposure for wrist and forearm fracture reductions when comparing physician in-trainings before and after mini C-arm training. There was also a statistically significant decrease in reduction time for wrist fractures. An educational program regarding proper c-arm use significantly decreased the duration and amount of radiation exposure among physicians in-training performing the reduction as well as patients.

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Publication

A Radiation Safety Training Program Results in Reduced Radiation Exposure for Orthopaedic

Residents Using the Mini C-arm.
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