Mini C-Arm Cuts Triage Time in Busy Pediatric Emergency Department

Children’s Healthcare of Atlanta
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While wait times at most pediatric emergency departments (ED) are up, some of the busiest ED’s have found ways to significantly drive down triage time.

One of the biggest challenges ED’s face today is improving patient throughput, and a major bottleneck to patient flow is caused by high-volumes of orthopedic cases. Over 50 percent of all upper limb and 21 percent of all lower limb ED admissions in the United States are due to some type of fracture. This is especially true at pediatric hospitals, where there is typically a large orthopedic population. At Children’s Healthcare of Atlanta (CHOA), one of the largest pediatric systems in the country and recently ranked one of the top orthopedic hospitals for pediatrics*, visits to the ED average over 126,000 annually. “A large majority of children with bone injuries come through our emergency department since most of these injuries are sudden or unexpected”, explained Melinda Dobbs, RN, BSN, CCRC, Manager, Radiology, CHOA. To better triage the large volume of bone fractures or dislocations, CHOA has streamlined patient management by using the Hologic Fluoroscan® InSight mini C-arm extremity imaging system in the ED. “The mini C-arm is located in our ED and assists our staff in determining the presence and extent of a fracture and is helpful in assessing the realignment of bone after ED staff has set a fracture”, said Dobbs. “The Hologic mini C-Arm allows us to do quick imaging of bone injuries compared to the larger, more traditional equipment in radiology.” CHOA has five Hologic Fluoroscan InSight mini C-arm extremity imaging systems, all of which are in the ED. The healthcare network has invested in this technology because it enables staff to immediately image patients in the ED without having to transfer them to the radiology department - a process that has cut treatment times nearly in half.
A Paradigm Shift

Most ED’s rely on radiographic images to diagnose and treat fractures and dislocations. What is unique about CHOA’s orthopedic program is for the last 15 years the mini C-arm has been part of its standard of care. CHOA continues to find with the Fluoroscan InSight that the mini C-arm saves time, enhances patient comfort and improves throughput.

“Having access to dynamic, radiographic fractures in the emergency room is a paradigm shift. It is unbelievable the difference the mini C-arm makes - it’s the only way to go”, said Robert W. Bruce, Jr., M.D., who is the Medical Staff President, Pediatric Orthopaedic Surgeon, CHOA, and Chief of Pediatric Orthopaedics, Assistant Professor of Orthopaedic Surgery at Emory University School of Medicine. CHOA uses the mini C-arm for patients with acute orthopedic injuries, most of which are fractures and dislocations. Hologic’s mini C-arm allows orthopedic doctors to manipulate the extremity, acquire images and review the fraction reduction right there in the ED. “We use it for diagnostic purposes, but more importantly for therapeutic purposes. We use it to reduce those fractures and assess the success of a fracture or the dislocation”, said Dr. Bruce. “The mini C-arm is a necessary system for maintaining the level of care for displaced fractures in the emergency setting. We have the ability to provide anesthesia, and with the mini C-arm to direct therapy, so that we can provide operative care in a setting of lower acuity.”

By using the mini C-arm in the ED, patients do not have to be wheeled to the radiology department to take an X-ray, a process that usually backs up patient flow and creates longer wait-times.

“It provides real-time access to the patient without having to remove the child from the emergency setting to go to the X-ray department. Often these children are under sedation or we have applied a regional anesthetic, and those patients cannot be moved while they are under sedation or their regional anesthetic is in place. If the fracture reduction is successful, we wouldn’t be able to attempt a second reduction or try to improve the position of the extremity”, Dr. Bruce explained.

David Singleton, RN, BSN, MBA, Administrative Resource Nurse, CHOA, emphasizes another advantage in pediatrics is the patient can remain in the room with his or her parents. “The Hologic mini C-arm helps our patients dramatically by not having to travel outside of our ED for radiology services. They can get their pre- and post-films within the same room”, he described. “The use of the C-arm cuts down their ED visit time and helps our department get to those patients in a timely fashion. That has really helped us with our flow on the ED side.” Dr. Bruce added, “Having the mini C-arm substantially improves patient outcomes and throughput. It saves time. It saves money.”

Dobbs agrees the mini C-arm has improved triage at the front end. “I think because it is portable and located in the emergency department in the orthopedic room it makes it more efficient. We can quickly show the orthopedic surgeon working in the ED the break and where it is located”, said Dobbs. “It takes digital images that are easily saved and sent to PACS, and it definitely can get quick results and quick diagnosis in triage, which is important.”

Enhancing IT Connectivity

Workflow efficiency is critical to improving the level of patient care. To further optimize efficiencies, CHOA set out to streamline the communication between the ED and radiology. As a completely DICOM compatible system, the Hologic Fluoroscan InSight mini C-arm easily interfaced with the existing picture archive and communication system (PACS). This has facilitated communication and the transfer of images between the ED and radiology. “Hologic’s mini C-arm is easily integrated in PACS, and the data can be downloaded into it. The system demonstrates the amount of time the fluoroscopy
was used and the radiation dose, which is nice data to have your hands on”, said Dr. Bruce.

The ED staff can now readily share the images with the radiology department. Once the patients are registered for radiology services and an order is entered, the nurse chooses the patient from the list and proceeds from there. “The mini C-arm is in the room and talks electronically to the X-ray department”, said Tracy Robertson, Orthopedic Technician, CHOA. “Once we save the image, and call radiology, in 10 or 15 minutes we can pull it up on the radiology PACS, and the orthopedic doctor reads it. Then, the ED physician will review it to decide if they can discharge the patient.” From there, the staff provides the patients and their family with copies of their medical images burned on a CD. “We can pull up the images right after we tag and send them. We can go over to PACS and pull up that patient and make copies on CDs all in that one room”, noted Robertson.

**Lowering Radiation, Keeping Quality**

It is widely recognized throughout the pediatric imaging community that children are more sensitive to radiation received from imaging scans than are adults. That is why Hologic designed the Fluoroscan InSight mini C-arm with patient safety in mind. The system’s integrated software with an Automatic Dose Control feature adjusts the dosage to minimize exposure for large and small extremities alike, while maintaining image quality.

“For a pediatric patient, lowering radiation levels is important because their cells are more sensitive to reaction. In addition, it takes into consideration ALARA (as low as reasonably achievable), Starla Jones, Radiology Manager, CHOA, stressed. “We have the mini C-arm set up in our ED to take images with low dose radiation exposure and to preserve the images automatically. Yet, we can still look at extremities from a dynamic standpoint”, indicated Dr. Bruce. Dobbs acknowledges the mini C-arm does emit less radiation than a radiograph, “but we still recommend the staff and patients wear lead aprons or shields”, she added. Even when lowering the radiation setting, Dr. Bruce says it produces high-quality images. “The size is adequate to visualize the patients, particularly the pediatric patients, and the quality of the images is superb”, said Dr. Bruce. “I would like this type of device in my own orthopedic clinic.”

**User-Friendly Imaging Experience**

For orthopedic doctors, a system that offers high-quality imaging packaged with an intuitive easy-to-use interface is a powerful tool. The staff at CHOA can attest to that in their experience using the Fluoroscan InSight mini C-arm. In addition to producing diagnostic-quality images, the mini C-arm’s flexible and user-friendly features, plus its portability, make it well-suited for their needs in the ED and beyond. The system’s flex arm is designed to increase articulation range to position the flat panel display. The display then tilts and extends for close proximity viewing. The flexible and easy-to-maneuver C-arm allows staff at CHOA to capture images in hard-to-reach angles. “Another reason we chose Hologic’s Fluoroscan InSight mini C-arm extremity imaging system was because of the image manipulation”, said Singleton. “You can orient that picture on the screen right there. You can print pictures of what the break looks like and hand it to the patient. We liked the ease of use of the Hologic mini C-arm; there are just a few buttons, and it’s ready to go.”

Singleton went on to highlight the benefits of user-friendly features as well as its more sophisticated modes. “You can take a snapshot or the doctor can press the cine’ button, recording a video as the doctor moves around the bone. You can show the patient the video or image on the screen”, he said. According to Robertson, “Everything is just a touch of a button.”

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*The flexible and easy-to-maneuver C-arm allows staff at CHOA to capture images in hard-to-reach angles.*
added, “The C-arm is easy to move around the room. The patient information is already there and quickly pulled up, and the images develop in seconds.”

In fact, the system’s ease of use frees up the technologist to attend to other patients. Jones noted, “With the mini C-arm, when the tech or the orthopedic residents come over to do a post-reduction, they can operate the unit, and it frees up the technologist to see other patients, which improves our throughput and turnaround time.” The compact size and portability of the mini C-arm enables the system to be positioned around the patient. The deeper C-arm accommodates hand and foot surgical tables, making it appropriate for the OR setting as well. “You are not going to have an X-ray system in every room in the emergency room, so the portability of the mini C-arm is essential, and that eliminates the ability to use a digital X-ray”, said Dr. Bruce. “The mini C-arm’s footprint is more appropriate for an emergency room.” According to Dr. Bruce, the mini C-arm is so versatile it can also be used in the operating room for smaller extremity fractures, such as ankles, wrists and elbows. “This device has the potential to do so many other things for other purposes. The quality of this unit is extraordinary. It’s easy to use, does a lot of things automatically. It is very optimizable. It could be used for definitive diagnosis and therapeutic imaging”, said Dr. Bruce. “It has the potential to be the only imaging device one uses for most musculoskeletal injuries.” He added, “I would recommend it for any facility in which fractures and dislocations are reduced. To have this type of device available for therapy is essential.”


Note: The pictures used in this article were staged with a model to demonstrate an exam. No X-rays were taken of the child. Hologic recommends appropriate shielding and radiation safety procedures.