

## Most children's broken bones are treated improperly, study finds

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Hundreds of thousands of times each year in the United States, children go to emergency rooms with bone fractures. But new research from University of Maryland School of Medicine shows that the injuries are almost never splinted properly.

Ninety-three percent of the splints that are used to immobilize fractured limbs temporarily are not put on correctly, according to the study of pediatric patients in the Baltimore area. And that can lead to swelling, skin injuries and other problems - some of them long-term.

"I did the study because I see a lot of splints on wrong, but I didn't think it would be that high," said Dr. Joshua M. Abzug, the director of pediatric orthopedics at the University of Maryland Medical Center and the lead author of the study. "This is really a baseline study that shows, 'Hey, there is a problem and we recognize that it exists.

"The next step is education."

Abzug, who is also an assistant professor in Maryland's School of Medicine, studied 275 children and teenagers who came to a Maryland pediatric orthopedist from a community hospital emergency department or urgent care center in the region. He presented his findings in Washington last month at a conference of the American Academy of Pediatrics.

The splints that are used to stabilize broken bones usually include a strip

of rigid material, a wrapping of soft padding and an elastic bandage to hold them in place.

Most of the time, Abzug said, the application is good enough for a patient who will see an orthopedist within a few days. The orthopedist can evaluate the patient and put on a cast.

But if that visit is delayed, he said, serious problems can develop. They include wounds that require skin grafts or even surgery to reset a bone.

In 77 percent of the cases Abzug studied, elastic bandages were incorrectly put directly on skin. In 59 percent, joints were not immobilized correctly. In 52 percent, splints were the wrong length. About 40 percent of the kids had skin and soft-tissue complications.

Those percentages are particularly troubling, he said, given the numbers who are splinted. Nearly half of all boys and a quarter of girls suffer fractures before age 16, Abzug said. Almost 1 million kids under 15 fracture limbs each year, the Centers for Disease Control and Prevention found in its 2010 National Hospital Ambulatory Medical Care Survey, and millions more get splints for sprains or strains.

Abzug suspects that adults also are not splinted properly.

The researchers could not identify who was applying splints incorrectly most often - doctors, nurses, physician assistants or medical assistants - because parents couldn't reliably tell them. They planned to demonstrate up-to-date techniques to staff in area hospitals and urgent care centers and perhaps provide some posters and pocket-size cards for reminders. Abzug said they would redo the study to see whether splinting improved.

Dr. Robert G. Graw Jr., founder and medical director of the Righttime Medical Care group of 13 [urgent care centers](#) in Maryland, said he

would welcome the additional training.

Graw, a pediatrician, said 15 percent of the kids who visit a Righttime center have injuries that require splints. He said staff members learn how to apply splints from the orthopedist groups to which Righttime refers patients. The demonstrations are video-recorded so staff members who don't perform the tasks often can refresh their skills on demand.

But techniques and materials change, Graw said, and people lose skills that they don't use regularly, so updates are important.

"Splints are a small percentage of what we do, and we like to learn from people who do things all the time," he said. "Send him my way."

Graw said children and their parents also need to be warned not to take off splints, because they could be reapplying them improperly.

The year-old son of Jessica Ryan, an Abingdon, Md., mother of four, was injured last month in an accident in the home. X-rays showed a fractured tibia.

His leg was splinted at the emergency room; Ryan declined to say where. At one point, he crawled out of the splint. At another, she removed it so he could sleep.

When Hudson saw Abzug for a cast, the pediatrician told Ryan he wasn't surprised to see a sore on Hudson's heel.

Ryan doesn't know if she or the hospital applied the splint incorrectly.

More than a month later, the cast is now off and the sore is a scab. Hudson and his twin brother, Hayden, are learning to walk. But Ryan still thinks about the family's experience.

"I wonder how many emergency rooms even know this is happening," she said. "You don't see them again. They didn't warn us to look out for blistering or rubbing so maybe they didn't know that was a possibility."

"I feel terrible that we may have prolonged [Hudson's] recovery."

Dr. Jennifer M. Weiss, a board member of the American Academy of Orthopedic Surgeons, has long noticed improperly placed splints.

A pediatric orthopedic surgeon at Kaiser Permanente Los Angeles Medical Center, Weiss said there is little training in proper methods even for orthopedists. Most learn on the job, she said, from someone who might or might not know how to splint correctly.

Weiss said Abzug's study should provide good evidence to push for additional training.

"We need to make sure we're providing education in medical school and residency and people are comfortable with it," she said. And like a fractured limb, she added, "I think this is fixable."

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