

## **SpiCast - Safe Transportation for Pediatric Patients with Femur Fractures**

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Pediatric femur fractures are the second most common long bone fracture in kids. Nineteen out of every hundred-thousand children in the United States experience femur fractures every year. Within the past year, an estimated 14,600 children between the ages of 0 to 11 had a femur fracture. These fractures can be as a result of birth, hip dysplasia, or due to unintentional falls and accidental injuries. Treatment varies and depends heavily on the child's age. However, the common form of treatment for children under the age of 5 is immediate spica casting, which is an orthopedic cast that immobilizes the hip or thigh. Everyday car seats do not provide the space, comfort or ease for spica cast patients. Although spica casts are the best method of treating children with femur fractures, they are extremely inconvenient, especially when it comes to transporting these children from place to place. Our team, ARCS Capstone, has created an attachment that can be inserted into the regular car seat of the patient, to be inexpensive, feasible, and comfortable. The prototype was created using an assortment of materials, including a vacuum-sealable bag, expandable foam, and fiberglass. The final product consists of a foam attachment that is tailored to the child and their respective car seat. After finalizing the design, a drop test was performed with the insert attached to a car seat to evaluate the impact of a fall on the child and car seat. From these results, we found that the acceleration on the baby was reduced by 2 m/s<sup>2</sup> with the carseat, however, the acceleration drop remained consistent between a 3 ft and 28 ft drop with our setup. Overall, the proposed prototype offers several societal benefits such as reduced parental strain, reduced financial burden, and improved safety and comfort for injured children. Future work can be conducted that includes material exploration, consumer testing, and NHTSA confirmation.