TRANSPORTATION-RELATED GUIDELINES FOR HIP SPICA APPLICATION AND SUBSEQUENT DISCHARGE PLANNING

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Purpose: Hip spica casts are a common method to treat trauma or hip dysplasia for children aged ~6 months to 4 or 5 years. The cast is typically applied with the lower extremities positioned to achieve satisfactory fracture reduction and/or joint stability while avoiding a reduction in blood flow to the hip joint. A number of studies have observed that some spica cast positions can present a challenge to safely transport the child home. This is due to the posterior cast geometry which is typically not congruent with the child’s car seat. In the current study, a series of transportation options were evaluated to identify seats that accommodate a hip spica cast.

Methods: A crash dummy representing a 3-year-old child was used as a surrogate for a child in the current study. The dummy possesses the size and mass distribution of an average 3-year-old child along with articulating joints in the extremities. A hip spica-casting table was fabricated to apply the cast in a clinically relevant position to treat a femur fracture. A final casting position of knee flexion with 30 degrees hip abduction and 60 degrees hip flexion was chosen. A folded towel was placed over the chest to create space for pulmonary function. Per prior studies, following application of the cast a portion of the upper edge was removed over the middle ribcage to prevent head contact in the event of a forward crash. The cast was then removed from the dummy and reassembled as a stand-alone cast. This stand-alone cast was used to screen available seats at several local retail facilities to identify those best able to accommodate the casted dummy. This investigation revealed that the casted position placed the groin area forward in the seat, making it impossible for the crotch strap to be secured to the shoulder and lap harness for the majority of child seats. Thus, car seats were sought which could safely secure the harness around the cast and child. Additional surveys of available seats were completed online, via discussion with car seat experts for special needs children, and through review of hip spica message board discussions by hip spica caregivers. All car seats were evaluated twice. First, the uncasted dummy was positioned in the seat following manufacturer’s instructions. The dummy was then casted as described above and positioned a second time in the seat. In both cases, the position of the dummy was evaluated in the seat.

Results: Five restraints were identified as suitable options for further analysis when considering the hip spica cast described above: two traditional child seats (20 lb Graco Nautilus and 25 lb Diono Radian R100), a traditional booster seat (12 lb Britax Parkway), a seat specifically designed for hip spica casts (31 lb Merritt Wallenberg), and a special harness-only device similar to a rock climbing harness often used for spica casted children (1.5 lb EZ-ON Modified Vest). The four seats all accommodated the forward position of the groin and the harness was easily secured into position. That said, the Nautilus and Parkway positioned the casted child in a different position than the uncasted condition. For these seats, the spine of the casted dummy was off set 11 degrees from the uncasted condition in the same seat. In contrast, the Radian
R100 and Wallenberg casted positions were very similar to the uncasted position. In addition, the Nautilus is fitted with armrests that may interfere with the knees due to the abducted position of the hips. The R100 and Wallenberg do not have arm rests and can accommodate a wide range of hip abduction angles. Finally, the EZ-On harness requires the child to lie down on along the seat such that two seating positions are used and also requires that the car have a bench seat.

**Conclusion:** Safely discharging a patient with a hip spica cast should be recognized as a potential transportation challenge. It is important to consult a caseworker trained in the proper use of child seats to identify the most appropriate transportation option. If the child’s car seat can be evaluated prior to casting, it may be possible to apply the cast in a position that accommodates the child seat while also being clinically acceptable. In the event this is not possible, the hospital should consider stocking one or more car seat options that can: 1) appropriately fit a casted child, 2) appropriately and correctly be secured in a range of family vehicles, and 3) works well for families. When considering factors such as positioning of the child, ease of use, seat weight, cost, and utility in a wide range of vehicles, the R100 rated the best out of all seats evaluated.