
Pediatric Spinal Immobilization: C-Spines, Car Seats, and Color-coded Collars

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Whether in the prehospital EMS environment or the hospital emergency department, the standard approach to trauma patients has included the age-old adage that “everyone has a cervical spine (C-spine) injury until proven otherwise.” While this is still an important concept, it has evolved through increased evidence-based knowledge and now includes some nontraditional techniques that broaden the possibility of “proving otherwise.” Protocols for the field (prehospital) clearance of the cervical spine by EMS personnel as well as nonradiographic clinical clearance in the emergency department are becoming more and more widely accepted. Initially established for adult patients, and more recently used in pediatrics, these techniques continue to evolve with ongoing experience.^{1,2}

C-Spines and spine boards

We have all been taught that “children are not small adults.” This lesson is especially true when considering the proper methods for immobilizing an injured child. There are crucial anatomic differences that must be taken into consideration. The normal anatomy of young children is that their heads are disproportionately large. Placing children in a supine position, flat on their backs, can force the chin of their larger head onto their chest of their smaller body, positioning them in such a way as to lead to a potential airway compromise³⁻⁵ (Figure 1). Therefore, special interventions for the positioning of children should be considered.⁵⁻⁷

These interventions may be as simple as placing a diaper or towel roll under the shoulders of the pediatric



FIGURE 1
“Chin on chest” with supine positioning. Photo courtesy of Jerome Medical, Moorestown, NJ.

patient, a simple technique that can better position the head and airway. This intervention is taught in Pediatric Advanced Life Support (PALS), Emergency Nurse Pediatric Course (ENPC), and Prehospital Emergency Pediatric Program (PEPP) classes, and it applies to pediatric injuries requiring spinal immobilization as well.^{3,6,8-11} In addition, there is a new adjustable pediatric pad (Jerome Medical, Moorestown, NJ) that can be placed on a cart or conventional spine board to help with proper head and neck positioning.^{2,11-13} The pad is color coded (Figures 2 and 3) to match the popular Broselow tape and system (Vital Signs, Inc, Totowa, NJ), which is quickly becoming a “standard” in EMS and ED pediatric care.^{14,15}

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Another method for attaining proper head and neck position for a pediatric injury patient is through the use

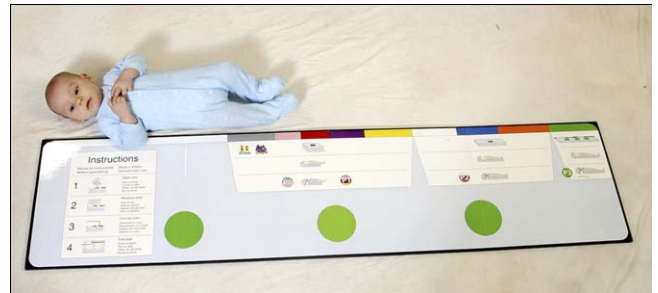


FIGURE 2
Adjustable pediatric pad (Jerome Medical, Moorestown, NJ) that can be placed on a cart or conventional spine board to help with proper head and neck positioning; the pad is color coded to match the popular Broselow tape and system.

of specially designed pediatric spine boards (Iron Duck, Chicopee, Mass). These devices are easily identified for pediatric patients because they are much smaller in length and width than a standard spine board. In addition, unlike usual short boards or extrication devices, some of these pediatric boards even have a “head drop” built into the board to offset their larger head. Unfortunately, one size does not fit all, and the “drop” may be too deep or too shallow for any individual child. Additional padding under the shoulders or head may be



FIGURE 3
Pediatric Airway Pad and Color-Coded Nec Loc Collar (Jerome Medical, Moorestown, NJ).

required to achieve proper spinal alignment^{2,5,9,10,12,13} (Figure 4).

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Car seats

EMS practitioners often are concerned about the proper immobilization of children found in car seats. Should they be taken out of the car safety seat and immobilized on a spinal board or just immobilized in the car seat? Both approaches are described in the EMS and emergency care literature.^{3,5,6,8,10,16,17} Parents generally are counseled to replace any child car safety seat involved in a motor vehicle crash (MVC). However, at the scene of the crash, if the car

seat appears to be intact and undamaged, and if the child does not appear to be injured or acutely ill, it is considered appropriate to leave the pediatric patient in the car seat. The ENPC⁶ and the Prehospital Trauma Life Support Course¹⁸ describe and demonstrate how effective spinal immobilization can be implemented. Utilizing a correctly sized cervical collar, towels, and tape in a “horseshoe” fashion, spinal precautions can be initiated while the patient remains in the car seat. Children also breathe better sitting up and they are quite often very comfortable with the support and security that comes with the car seat.

These same experts also recommend taking the child out of the car seat if circumstances are different. Properly installed car safety seats can definitely reduce the amount and nature of pediatric injuries that result from MVCs, but car seats were not made to clinically immobilize children. The reasons for taking a child out of a car seat include situations when there is a good possibility that unseen damage may affect the structural integrity of the car seat after a MVC or when a critically ill child requires medical interventions. Assessment of a fully immobilized child in a car seat can be very limited at best, and though rare, cervical



FIGURE 4
Pedi-Air Align Spinal Immobilization Board (Iron Duck,
Chicopee, Mass).

spine injuries can occur in pediatric patients, hence the need for proper and appropriate immobilization.^{3,5,6,8,10,11,16,17}

Collars

In addition to spine boards and the ever-popular towels and tape, cervical collars are an integral part of spinal immobilization.^{5,19} Unfortunately, experienced providers have found that many pediatric cervical collars simply do not fit children. The problem is finding a collar that not only optimizes cervical motion limitation but also properly fits the patient in order to avoid improper spinal position and skin breakdown.^{2,5,8,9,11,20,21}

There are now collars available for EMS and longer-term hospital use that are specifically designed for children and that actually fit the pediatric patients. In addition, implementing proper pediatric spinal immobilization can now benefit from the use of the Broselow-Luten “color coding” system. While there may be several sources for pediatric cervical collars with color codes, Nec-Loc & Miami-Jr collars by Jerome Medical follow the Broselow-Luten system (Jerome Medical, Moorestown, NJ).

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