

## POSNA Position Statement

### The Management of Pediatric Trauma

The Pediatric Orthopedic Society of North America, recognizes full well the major implications of trauma on the physical, psychological socioeconomic well being of children in North America. Of children admitted to the hospital for the treatment of multiple trauma, over 50% of them will have persistent limitations of physical function six months after discharge.<sup>1,2</sup> Injured children are frequently left with behavioural disturbances which are even more common with persistent physical limitations. It is only in the past decade that the full impact of life threatening and multi system injuries on children and their families has been recognized as requiring long term follow-up and the provision of multiple pediatric support systems. It must also be appreciated that residual deficits in children ultimately add up to more significant costs during the life of the individual than similar deficits in older individuals. The personal loss in adults may be as severe as in children, but the financial impact to society of similar trauma in children adds up over a longer lifespan. Therefore, it is cost effective to devote a disproportionate amount of funds and effort towards reducing pediatric morbidity.

POSNA recognizes that the management of the pediatric patient sustaining the traumatic injury is influenced by patient size, surface area to body mass ratio, thermo-regulation and fluid requirements. A predetermined and systematic approach to the injured child is essential and is best delivered in a pediatric environment. This guarantees the early recognition of life threatening injuries and provides a method for rapid stabilization of the immature child.<sup>3</sup> There are major differences in pathophysiology, injury patterns and treatment of the traumatized child as compared with the traumatized adult. Multiple trauma remains the leading cause of death among children. Insufficient training of medical personnel in pediatrics and hence the lack of expertise in the management of injured children are factors contributing to disability and death in such children.<sup>4</sup> Although the principles of resuscitation of injured children are similar to those for adults, appreciation of the differences in cardiorespiratory variables, airway anatomy, response to blood loss, thermo regulation and equipment required is essential for successful initial resuscitation. Cerebral, abdominal and thoracic injuries account for most of the disability and death among injured children. Cerebral damage may be due to secondary injuries to the brain and is potentially preventable. The need to preserve the spleen in children complicates the management of abdominal trauma. Although children usually have large cardiorespiratory reserves, they are likely to need airway control and ventilation with thoracic injuries. The psychological effect of trauma often poses long term problems and needs close follow-up. POSNA endorses the view that the care of seriously injured pediatric patients falls within the purview of surgical and medical specialists with special training in pediatrics. In analysing children with

multiple trauma, a pediatric trauma score should be applied. This assists in the identification of the more critically injured child and those who are most likely to utilize pediatric hospital resources as evidenced by the need for surgery, intensive care and hospital stay. We would agree with the recommendations to triage children with pediatric trauma scores of 8 or less to a Level 1 Pediatric Trauma Centre.<sup>5</sup>

The Trauma Committee of the American Pediatric Surgical Association and the Pediatric Trauma Committee of the New England Medical Centre in Boston have developed a group of standards for care of critically injured pediatric patients. These standards have been endorsed by the Board of Governors of the American Pediatric Surgical Association and were modelled after the American College of Surgeons 1976 report, "Optimal Hospital Resources for the Care of the Seriously Injured".<sup>6</sup> The most important reason for specialized care of injured children is that children have special needs. The child is truly not "a little man". Not only does he or she react differently to stress - the young child will compensate well for blood loss, for example, until it is extensive and then suddenly go into shock, but also has different reactions to drugs, suffers different types of injuries, and is a growing organism in whom injury can result in long term crippling if growth is interfered with. Because the acute management of injured children poses a number of specific problems; difficulty of vascular access, difficulty of airway access, peculiarities of ventilation, both in rate and volume, and the need for accuracy and fluid administration, the care of these multiple traumatized children is best delivered at a Pediatric Emergency Centre.

The need for specialized equipment and instrumentation for pediatric care is essential. Micro techniques eliminate the need to draw large quantities of blood from the small host. Smaller equipment for intubation and resuscitation, monitoring, etc. are essential to the care of children. All of the specialized equipment and techniques are found in a facility that is orientated specifically toward care of the pediatric patient. The few outcome studies performed regarding pediatric trauma at a Pediatric Trauma Centre indicates that there is reduced mortality and morbidity resulting from such care.  
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In summary, it is the position of the Pediatric Orthopedic Society of North America that the delivery of care for the traumatized child is best given at a Level 1 Pediatric Trauma Centre, staffed by pediatric medical and surgical specialists with the resources to deal with the multifaceted requirements of such traumatized children including pediatric surgical operating theatres, pediatric intensive care units and pediatric rehabilitation services.

## REFERENCES

1. Wesson, DE., Williams, JI., Spence, LJ., et al: Functional outcome in pediatric trauma. J of Trauma 29:589, 1989
2. Wesson, DE., Scorpio, RJ., Spence, LJ., Kenny, BD., et al.: The physical psychological and socioenconomic costs of pediatric trauma. J of Trauma 33:252, 1991
3. Eichelberger, MR., Randolph, JG.: Pediatric Trauma; An algorithm for Diagnosis and Therapy. J of Trauma 23:91, 1983.
4. Kisoan, N., Dreyer, J., Wallia, M.: Pediatric Trauma: Differences in pathophysiology, injury patterns and treatment compared with adult trauma. Can Med Ass J., 142:27, 1990
5. Aprahamian, C., Cattey, RP., Walker, AP., et al: Archives of Surgery, 125:1128, 1990.
6. Ramenofski, NL., Morris, TS.: Standards of care for the critically injured pediatric patients. J of Trauma, 22:921, 1982.
7. Cooper, A., Barlow, B., DiScala, C., et al: Efficacy of pediatric trauma care: Results of a population based study. J Ped surg 28:299, 1993.
8. Hulka, F., Mullens, RJ., Mann, NC., et al: Influence of a state wide trauma system onpediatric hospitalization and outcome. J Trauma, 42:514, 1997.
9. Hulka, F.: Pediatric Trauma systems: Critical distinctions. J Trauma, 47:585, 1999.
10. Phillips, S., Rond, PC, Kelly, SM., Swartz, PD.: The Need for Pediatric Specific Triage Criteria; Results from the Florida Trauma Triage Study. Ped Emerg Care 12:394, 1996.
11. Wesson, DE., Spence, LJ., Williams, JI., Armstrong, P.: Trauma Prevention and Treatment - the Odd Couple: Injury Scoring Sytems in Children. Can J Surg 30:398, 1987
12. Tepas, J.J.; Mollitt, DL., Talbert, JL., et al: The Pediatric Trauma Score as a Predictor of Injury Severity in the Injured Child. J of Ped. Surg. 22: 14-18, 1987.
13. Yian, EH., Gullahorn, LJ., Loder, RT., : Scoring of Pediatric Orthopedic Polytrauma: Correlations of Different Injury Scoring Systems and Prognosis for Hospital Course. J Pediatr Orthop, 20: 2, 203-208, 2000.