Management Issues in Critically Ill Pediatric Patients with Trauma

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KEYWORDS

• Pediatric trauma • Deep venous thrombosis • Blunt cardiac injury
• Delayed diagnosis of injury • Solid organ injury • Blunt cerebrovascular injury
• Component therapy • Chest wall trauma

KEY POINTS

- The use of component therapy during massive transfusion can help reverse the effects of coagulopathy during trauma resuscitation.
- Isolated solid organ injury in hemodynamically stable patients can be observed outside of an intensive care setting.
- Pulmonary contusions are more common than rib fractures after pediatric injury and can increase morbidity during recovery from other injuries.
- In the absence of a contraindication, aspirin should be used in the management of grade I blunt cerebrovascular injury.
- Postpubertal and severely injured adolescent traumas should be considered for thromboembolism prophylaxis.

INTRODUCTION

The management of pediatric patients with trauma poses many unique challenges. Severe injuries in pediatric trauma are rare, making it difficult to obtain sufficient data to develop evidence-based treatment algorithms for many injuries. This lack of data results in the need to rely on either guidelines developed for adults that may not be directly applicable to children or to rely only on clinical judgment. This article provides an overview of the treatment of critically injured children and highlights several areas of management that require an integrated approach between trauma surgeons and critical care physicians.

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OVERVIEW

Data obtained from the National Trauma Databank in 2014 show that 42% of injured children (n = 29,725) seen at trauma centers are admitted to an intensive care unit during their hospitalizations (Fig. 1). The average age of injured children admitted to an intensive care unit is 8 years old and these children spend 5 days on average in the intensive care unit. Most children who are admitted to an intensive care unit have sustained blunt trauma (91%). Children with either a head or neck injury represent the most common injuries requiring admission to the intensive care unit (57%). Among children with a head or neck injury, most had injuries classified as at least moderate (Fig. 2). Excluding patients who went to the operating room and those who died in the emergency department, only 19% of patients (172 out of 908) who died during their hospitalizations were treated in the intensive care unit. More than 50% of injured children in intensive care units have an injury severity score (ISS) greater than 15, showing the complexity of these patients (Fig. 3). Injured children admitted to an intensive care unit at any time during their hospitalizations have as much as a 3-fold greater risk of hospital readmission than do injured children who do not require intensive monitoring.[1] Although care should be improved in all settings, several studies have suggested that critically injured children have lower mortality and lower hospital length of stay when treated in a pediatric hospital compared with treatment in an adult hospital.[2] The better outcomes in these patients support the selective triage of seriously injured children to trauma centers with pediatric intensive care units when this is an available option.[3]

FLUID RESUSCITATION

Fluid resuscitation is a critical component of the early management of many injured children. Over-resuscitation and under-resuscitation can each have adverse effects. Inadequate resuscitation can worsen the shock state, whereas the administration of excess fluid can trigger a cascade of adverse events, including oxygen desaturation, prolongation of intubation, and edema. For hemodynamically unstable children, standard recommendations for initial resuscitation are to administer a crystalloid fluid bolus of 20 mL/kg, to repeat this bolus if needed, and to then begin transfusion of

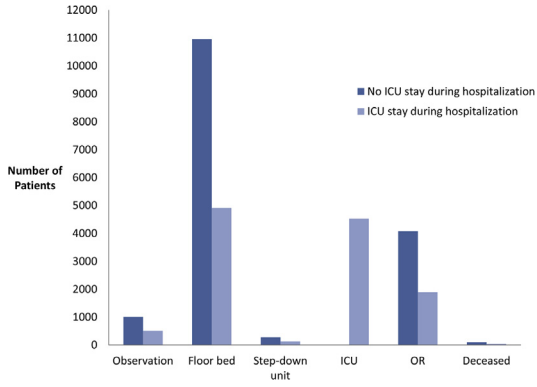

Fig. 1. Emergency department disposition of pediatric patients with trauma. ICU, intensive care unit; OR, operating room. (*Data from* National Trauma Data Bank. 2014. Available at: https://www.facs.org/~/media/files/quality%20programs/trauma/ntdb/ntdb%20pediatric%20annual%20report%202014.ashx.)