# Assessment and Resuscitation in Trauma Management

Stephen Gondek, MD, MPH*, Mary E. Schroeder, MD, Babak Sarani, MD

**KEYWORDS**

• Trauma assessment • Resuscitation • Primary survey • Venous access
• Emergency airway • Cavitary triage

**KEY POINTS**

- Initial resuscitation should focus on rapid assessment and stabilization of life-threatening injuries with management of non–life-threatening injuries deferred until the patient is stabilized.
- Damage control resuscitation includes efficient intravenous access, avoidance of hypothermia, and a preference for colloid resuscitation rather than crystalloid.
- Providers should understand indications for both emergency intubation and discretionary intubation in the trauma setting as well as options when endotracheal intubation is not possible.
- Combining plain films, physical examination, and ultrasound allows for a complete cavitary triage to be performed and will identify nearly all hemodynamically significant sites of bleeding.
- Retrograde balloon occlusion of the aorta is likely beneficial in the profoundly hypotensive patient, but is not synonymous with resuscitative thoracotomy.

## INTRODUCTION

The Golden Hour was first coined by R. Adams Cowley to emphasize the importance of prompt and efficient management of the acutely injured patient. Advances in both resuscitation and diagnosis have given providers a host of new procedural and imaging options and have resulted in improved trauma care at centers of all levels.

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Center for Trauma and Critical Care, George Washington University Hospital, 2150 Pennsylvania Avenue Northwest, Washington, DC 20037, USA
* Corresponding author.
*E-mail address:* gondeks@gmail.com

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## BEYOND ADVANCED TRAUMA LIFE SUPPORT: INITIAL RESUSCITATION IN THE EMERGENCY DEPARTMENT

The Airway, Breathing, Circulation, Disability, Exposure management taught by Advanced Trauma Life Support (ATLS)[1] is an effective framework for initial evaluation and management of the injured patient and has been demonstrated to increase efficiency and quality of care.[2] As any experienced provider knows, in a well-staffed trauma center, these processes can be run in parallel and their order modified for certain exceptional cases. When performed in full, they represent a complete initial evaluation of the injured patient in an orderly and efficient manner (**Box 1**).

### *Airway/Access*

#### *Intravenous access*

Although typically straightforward, intravenous (IV) access can be a frustrating problem in the care of the trauma patient. Standard resuscitation calls for the placement of 2 large-bore IVs, typically in the antecubital position, with ultrasound (US) assistance if necessary. Alternatives to peripheral cannulation should be performed if peripheral access is not completed quickly. There are several options for access that can be used in the trauma bay, with variability in the rate of fluid administration[3] (**Box 2**). Multiple other solutions to access have been described, including venous cutdown,[3] corpus cavernosum,[4] catheterization, direct right atrial catheterization, and umbilical vein catheterization in infants, but these are not of common utility in the trauma bay.

#### *Central venous catheterization*

Central venous catheterization (CVC) is an efficient mode of vascular access. Subclavian or femoral access is often preferred because of the ease of placement without US guidance. Caution should be maintained when using femoral access in the setting of severe trauma to the chest or abdomen, particularly penetrating injuries, because disruption or injury of the vena cava or iliac veins will prevent adequate delivery. In addition, in the case of accidental arterial access, these lines can be used in an emergency, but should be converted to venous access promptly.

#### *Interosseous catheter*

Interosseous (IO) catheter use has become widely accepted in trauma resuscitation and provides a fast alternative to CVCs. In the adult trauma patient, humeral and tibial access is preferred with success rates as high as 97%, although multiple other sites including the sternum, iliac crest, and femur have been described. Humeral IO

**Box 1**
**The standard trauma**

1. Patient arrival
2. Pulse check
   a. IV access established
   b. Manual blood pressure measurement
3. Primary survey
4. Report from Emergency Medical Services
5. Adjunctive imaging
6. Secondary survey
7. Disposition