

# Advanced Trauma Life Support<sup>1</sup>

## An Overview of ATLS Protocol

Prepared by Douglas P. Collins, MD, Univ of Cincinnati Dept of Fam & Comm Medicine

### I. Introduction

- ATLS—developed in U.S. in 1978, after Dr. Jim Styner was in a plane crash in 1976 and lost loved ones, in part due to care that was substandard for the time.
- Deaths from trauma occur at 3 times:
  1. immediately after injury;
  2. within minutes to several hours after injury;
  3. several days to weeks after injury.
- ATLS exists to prevent deaths in the *second* category.
- Primary concept of ATLS is that *injuries of one type kill more quickly than injuries of another type*. This leads to the priorities of the ATLS approach:
  - A—Airway
  - B—Breathing
  - C—Circulation
  - D—Disability: Neurologic status
  - E—Exposure and Environment

### II. Initial Assessment

To save the seriously injured patient, a rapid, systematic approach is necessary (*9 Steps*):

1. *Preparation*—1) equipment ready; 2) personnel ready (laboratory, radiology); 3) protection from disease (HIV, Hep B)
2. *Triage*—Sort patients based on need for treatment and resources available
3. **Primary Survey**—Consider resources and need to transfer; repeat primary survey frequently during management; Steps 4&5 integrated w/ Primary Survey
4. *Resuscitation*—occurs with Primary Survey as problems are identified
5. *Adjuncts*
6. **Secondary Survey**—Repeat secondary survey frequently during management; Step 7 integrated w/ Secondary Survey
7. *Adjuncts*
8. *Continued Post-resuscitation Monitoring and Re-evaluation*
9. *Definitive Care*

### III. Primary Survey, Resuscitation, & Adjuncts

#### A—Airway maintenance and C-spine protection:

- Check for foreign bodies or fractures/swelling obstructing airway
- Protect the cervical spine—use *chin lift* or *jaw thrust* to open airway  
\*\*\* Assume C-Spine trauma until proven otherwise in any multisystem trauma, especially with altered LOC or blunt injury above the clavicle
- Altered consciousness *with no gag reflex* requires placement of airway (OP airway temporarily); GCS  $\leq 8$  usually requires definitive airway placement; *If any doubt of pt's ability to maintain airway integrity, definitive airway advised.*
- Immobilize neck for removal of helmet or neck brace

---

<sup>1</sup> See <http://www.facs.org/trauma/atls/index.html> / Information in this summary is based on the ACS ATLS 1997 Manual (6<sup>th</sup> Edition); in 2004, a 7<sup>th</sup> Edition was introduced.

- Re-evaluate the airway often (Beware changing status due to: edema, equipment failure)

### **B—Breathing and ventilation**

- Expose chest
- Rule out: pneumothorax, hemothorax, flail chest
- If tension pneumothorax, immediate chest decompression
- Every injured patient should receive supplemental oxygen

### **C—Circulation with hemorrhage control**

- *Hemorrhage is the number one cause of preventable post-injury deaths*
- Immediately check: level of consciousness, skin color, and central pulse (femoral or carotid)  
\*\*\*Hypotension after trauma is due to hypovolemia until proven otherwise!
- Control rapid blood loss by direct manual pressure. Avoid tourniquets.
- 5 major sources of hidden blood loss:
  - thoracic cavity
  - abdominal cavity
  - soft tissue around long bone fracture
  - retroperitoneal space after pelvic fracture
  - penetrating torso injury
- Beware hidden blood loss in: healthy elderly, children, and athletes. May not demonstrate signs of hypovolemia early.
- Common Management:
  - 2 large-bore peripheral IVs, upper extremity (*With simultaneous blood draw for baseline studies, and pregnancy test for all females of child-bearing age*)
  - *Initial Bolus: Warmed NS/RL: adults = 1 L; children = 200 cc/kg for children; more bolus fluids often required*

### **D—Disability: Neurologic status**

- Assess Level of Consciousness (LOC):
  - *“AVPU” method* – Alert, Responds to Vocal stimuli, Responds only to Painful stimuli, Unresponsive to all stimuli
  - *Glascow Coma Score (GCS)* = Eye opening (1-4) + Verbal response (1-5) + Motor response (1-6); may replace AVPU or wait until Secondary Survey;
  - *Revised Trauma Score (RTS)* adds systolic BP and RR variables
  - *Pediatric Trauma Score (PTS)* replaces GCS or RTS in children; >8 should have a 0% mortality rate, <8 should be triaged to pediatric trauma center
- LOC due to: hypoxemia, hypovolemia, alcohol/drugs, CNS trauma. *If hypovolemia and hypoxemia are ruled out, CNS trauma is assumed as cause of changed LOC until proven otherwise.*

### **E—Exposure/Environmental control**

- Patient ideally *completely* undressed then covered with blanket
- Roll patient over and look at back
- Keep patient warm (warm IVF, warm blanket): *Efforts to rewarm the pt and prevent hypothermia should be considered as important as any other component of primary survey and resuscitation.*

### **Adjuncts:**

- *Vital Signs* (frequent)
- *EKG monitoring*
- *Urethral catheter* if not contraindicated (pelvic fracture, meatal/scrotal blood, perineal ecchymosis, high-riding or non-palpable prostate)
- *Gastric catheter* to decompress stomach and reduce risk of aspiration (Must have suction available; avoid nasal intubation if possible cribriform plate injury)
- *Pulse oximetry* (not distal to BP cuff) and *Arterial Blood Gas*

- Xrays (Used judiciously; should not delay resuscitation; if essential, do not avoid in pregnant patient)
  - *C-spine (Lateral)* – negative does not rule-out fracture
  - *Chest (AP)*
  - *Pelvis (AP)*
- *FAST (Focused Assessment with Sonography for Trauma) ultrasound* or *Diagnostic Peritoneal Lavage* as needed to identify occult intraabdominal hemorrhage

#### IV. Secondary Survey & Adjuncts

Completed only after Primary Survey, Resuscitation, and Adjuncts (Steps 3-5); Secondary Survey is a head-to-toe complete history and physical and includes reassessment of vital signs; includes complete neurologic exam and GCS determination if not already done; special tests/procedures may be obtained during the Secondary Survey; “Tubes and fingers in every orifice”

##### History:

- Use *AMPLE* mnemonic (“Take an *AMPLE* history”)—*Allergies, Medications, Past illnesses/ Pregnancy, Last meal* (Assume full stomach if unknown), *Events/Environment related to injury*. Describe and classify trauma (blunt or penetrating).

##### Physical:

- Repeat vital signs / Use frequent reevaluation
  - Continuous monitoring (Urine output: adults = 0.5 mL/kg/hr; children >1yr = 1 mL/kg/hr)
  - Consider pain control
- Head/scalp
  - Ocular assessment: Visual acuity and ocular mobility are important components; caution fractures of orbital rim (palpate for step-off), “blow out” fractures of orbital floor (evaluate w/ Water’s view and/or Caldwell view), hyphema (blood in anterior chamber indicating severe IO trauma, glaucoma risk)
- Maxillofacial
  - Fracture mgmt may be safely delayed if no airway obstruction or major bleeding
  - Midface (LeForte) fractures may have cribriform plate injury – do not use NT/NG intubation approach
- Cervical Spine and Neck
  - Before removing c-collar: no pain or tenderness, normal neurologic exam, no distracting injuries
  - Rule out need for rigid spine board as soon as practical to remove device and avoid decubitus ulcer formation
- Chest
  - Includes palpation of entire chest cage (ribs, clavicles, sternum)
  - Breath sounds are auscultated high in anterior chest wall for pneumothorax and in posterior bases for hemothorax
- Abdomen
  - Specific diagnosis not as important as injury recognition and potential need for surgery
  - Avoid excessive manipulation of pelvis to prevent blood loss
- Perineum/Rectum/Vagina
  - Rectal exam before placement of urethral catheter
  - Rectal exam includes assessment of sphincter tone, integrity of rectal wall, presence of high-riding prostate, and presence of pelvic fracture
  - Females: Rule out blood in vaginal vault
- Musculoskeletal

- Evaluate for contusions/deformities in extremities and for pelvic fracture (Use *gentle* AP pressure with hands on SAIC and Symphysis Pubis to rule out pelvic ring fx)
- Ecchymosis over iliac wings, pubis, labia, or scrotum
- Neurologic
  - Immobilize entire patient (long spine board + semi-rigid cervical collar) until spine injury excluded; GCS score

**Adjuncts:**

- Specific diagnostic tests may be performed during the Secondary Survey if the patient's hemodynamic status has been normalized and the patient has been carefully examined:
  - CT scans
  - Contrast x-rays
  - Extremity x-rays
  - Endoscopy
  - Ultrasonography