PURPOSE: The logical and sequential assessment of trauma patients is essential to rapidly identify and treat life-threatening injuries. The primary survey with simultaneous resuscitation of vital functions starts the sequence of assessment beginning with the ABCDEs of trauma care. Upon completion of the primary survey, all immediate life-threatening injuries should have been addressed and continued to be reassessed.

Airway Protection with Restriction of Cervical Spine Motion

I. The goal is to provide assurance of gas exchange through patent and competent proximal airways.
II. In an awake, alert, non-intoxicated patient without injuries to the face or neck, the native airway may be patent and adequately controlled.
III. If an artificial airway is deemed necessary, primary options include endotracheal and transtracheal intubation.
    a. Endotracheal intubation is the preferred method. This must be undertaken with care for cervical spine stabilization.
IV. If the personnel who are initially managing the patient are not able to place an artificial airway with the required expertise, more skilled help may become necessary.
    a. Until more experienced help arrives, the airway can often be maintained using a simple jaw thrust maneuver with mask ventilation.
    b. If endotracheal intubation is problematic cricothyroidotomy should be considered.
V. Any patient who is ventilated using a facemask under positive pressure will be prone to aerophagia and gastric distention. Thereafter, once the airway is secured, the stomach should be decompressed with an orogastric tube.
VI. Until cleared, the cervical spine should be assumed to be injured.

Breathing

I. Breathing considers all factors that contribute to gas exchange. The ability to breathe assumes a patient airway, intact respiratory drive, and the ability to exchange oxygen and carbon dioxide.
II. Full assessment of breathing includes assessment of ventilatory efforts as well as the capacity for alveolar gas exchange.
III. Patients with head injuries or other injuries that interfere with respiratory drive and those who are under the influence of respiratory depressants may not demonstrate appropriate respiratory drive.
    a. These patients may require mechanical ventilation.
IV. A variety of injuries may contribute to inadequate gas exchange despite an intact respiratory drive including pneumothorax, hemothorax, pulmonary contusion, aspiration, and airway obstruction.
V. Assessment of breathing should take place early and should be repeated frequently

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using observation, auscultation, end-tidal monitoring and pulse oximetry or arterial blood gas analysis if needed.

Circulation

I. Adequate circulation is defined by the ability of a patient to perfuse their tissues. Two components of cardiovascular function are important in this regard: cardiac pump function and circulating intravascular volume.

II. Most commonly, inadequate circulation is due to a reduction in intravascular volume as a result of hemorrhage. Initial resuscitation should be affected using 500 ml–1 liter of crystalloid.
   a. Normal Saline may be used for initial resuscitation but may ultimately lead to hypernatremia and/or hyperchloremic acidosis.
   b. Normal Saline is the fluid of choice for resuscitation for patients with Traumatic Brain Injury (TBI).

III. Preferred intravenous access for fluid resuscitation is two large bore peripheral catheters.
   a. Additional access can be achieved with vascular cannulation using a single lumen sheath introducer or an intraosseous access.

IV. Ongoing evaluation for sources of bleeding should be performed during circulation assessment.

V. After one liter of crystalloid has been administered, ongoing volume resuscitation should take blood loss into consideration and include replacement of lost blood components, ideally in a 1:1:1 ratio for blood, plasma, and platelets.
   a. Remember to warm all fluids and blood components to avoid hypothermia and its attendant complications (coagulopathy, cardiovascular instability, reduced oxygen delivery). In the face of massive hemorrhage, clinically significant loss of clotting proteins and platelets may occur.
   b. Inotropic agents can be considered but only after adequate volume resuscitation or diagnosis of high thoracic or cervical spine injuries.

VI. Initial evaluation for and ongoing monitoring of shock may require clinical examination including blood pressure, pulse, mental status as well as adjunctive information such as base deficit, lactic acid determination as well as End Tidal CO2 measurement.

Disability

I. For the primary survey, assessment of neurologic disability is generally satisfied using a simple and rapid approach, calculation of the Glasgow Coma Score

Eyes	Verbal	Motor
Spontaneous (4)	Oriented (5)	Obey (6)
To Sound (3)	Confused (4)	Localizing (5)
To Pressure (2)	Words (3)	Normal Flexion (4)
None (1)	Sounds (2)	Abnormal Flexion (3)
Non-Testable (NT)	None (1)	Extension (2)
	Non-Testable (NT)	None (1)
		Non-Testable (NT)

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(GCS), along with determination of gross spinal cord integrity.

II. Detailed assessment of neurologic function is done during the secondary survey. Every effort should be made to evaluate the patient's neurologic status and rapidly calculate the GCS prior to intubation or use of neuromuscular blocking agents.
   a. Since the primary survey is aimed at delineating life-threatening injuries, pertinent changes in neurologic function at this time include new and potentially progressive gross and/or lateralizing findings (such as hemiparesis, paraparesis, or quadriparesis), altering sensorium, or a reduction in the level of consciousness.

III. In contrast to emergency decompressive craniotomy for acute intracranial hemorrhage, initiation of therapies for nonoperative closed head injuries can be less immediate. These include various maneuvers to improve intracranial circulation and overcome the effects of intracranial hypertension.

IV. Until full and complete evaluation is finished, the patient should be maintained in a cervical spine collar and spinal precautions should be followed, including logroll techniques for turning.

Exposure

I. All patients who have suffered major injury should be exposed sufficiently to permit full evaluation of all parts of the body, looking for non-obvious injuries.

II. Patients should have their clothes removed and both the anterior and posterior aspects of the patient should be examined. Once the patient is unclothed, they should be covered with warm blankets and the ambient temperature in the resuscitation room should be maintained at an appropriately high level.

III. In the event the patient becomes hypothermic (less than 97 degrees), an external heating device, such as a Bair Hugger, should be applied. If the patient is intubated, increase the temperature of the humidified gas. In addition, all resuscitation fluids should be warmed. If large-scale resuscitation is needed, a rapid fluid infuser/blood warmer should be used.

DEFINTIONS:

Term	Definition
ABCDE	Airway protection with restriction of cervical spine motion, Breathing, Circulation, Disability, Environment/Exposure

I. **ADDITIONAL RESOURCES**

ATLS, advanced trauma life support. (2018). 10th ed. Chicago, IL: American College of Surgeons, Ch.1.

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