

PHTLS

Prehospital Trauma Life Support

NINTH EDITION

LESSON 4

Breathing, Ventilation, and Oxygenation

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Lesson Objectives (1 of 2)

- Identify inadequate breathing based on the assessment of a trauma patient.
- Manage life-threatening injuries impairing airway and breathing in a trauma patient.

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Lesson Objectives (2 of 2)

- Choose the most appropriate airway management intervention through risk versus benefit.
- Choose the most appropriate supplemental oxygen delivery device based on the patient's signs and symptoms.
- Determine when to ventilate and when to oxygenate a trauma patient.
- Monitor the ventilation and perfusion status of a trauma patient using waveform capnography.

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Presentation/Dispatch

- You are responding to the practice field of the local high school baseball team.
- Dispatch information
 - 16-year-old male
 - Struck by a wild pitch during batting practice
 - Difficulty breathing
 - Level 1 trauma center is 15 minutes away by ground and level IV hospital is 5 minutes away by ground.

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Scene Size-Up and General Impression

- Scene size-up
 - Players direct you to the patient.
 - An athletic trainer is with the patient.
 - Numerous concerned players and coaches are around the patient.
- General impression
 - Patient is alert and oriented, sitting in a tripod position, holding the right side of his chest.
 - Patient appears to be in distress.

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Primary Survey

- X—None
- A—Patent
- B—30 breaths/min, diminished lung sounds on the right side of the chest, severe difficulty breathing
- C—Lips and nail beds are cyanotic.
- D—GCS: 15 (E4, V5, M6)
- E—Bruising to the right side of the chest; crepitus upon palpation in that area; no chest expansion on the right side of the rib cage

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Discussion

- What possible injuries would cause a baseball player to have such severe difficulty breathing?
- What part of the patient's anatomy would you expect to be injured?
- What ventilation/oxygenation issues would you expect these injuries to cause?
- Why are these ventilation and/or oxygenation issues being caused?

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Discussion

- What is your general impression?
- What do you notice about the patient's breathing?
- Does the patient need assistance with ventilation or oxygenation? Why?
- What are the indications of life-threatening injuries that will need immediate attention?

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Discussion

- Why is exposing the injured area important for this patient?
- Look at that contusion! If it looks like that on the outside, what does the inside look like?



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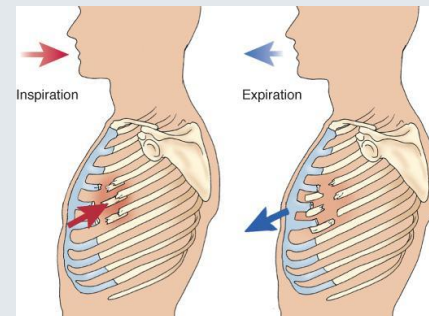


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Discussion

- Why does the middle of that bruise move in the opposite direction of the rest of the chest?
- What other injuries or complications can a flail segment cause?



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Discussion

- What will you feel when you ask the patient to take a deep breath?
 - What does this tell you?
- When you listen to the patient's lung sounds, what would you hear on the right side?

Discussion

- What are the treatment priorities of this patient?
- How would you manage the flail segment?
- How would you address the patient's ventilation issues?
- How would you address the patient's oxygenation issues?

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Assisting Ventilations

- Ventilating the patient:
 - What is the correct rate in an adult? In a child?
 - What volume do you use?
 - Why should hyperventilation be avoided?
- Assisting ventilation:
 - How do you do it?
 - How do you know it works?

Discussion

- To what type of facility will you transport your patient?
- What assessments and procedures will need to be performed during transport? Why?



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Capnography Review (1 of 3)

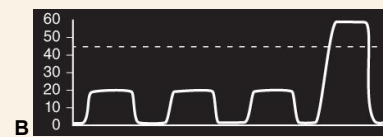
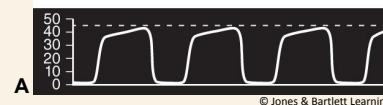
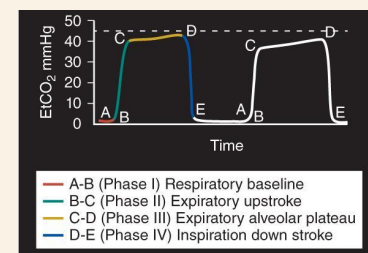
- End tidal carbon dioxide (ETCO₂) represents the amount of CO₂ in exhaled air.
- Consists of a number and a graph
- Normal values range between 30–40 mm Hg in a critical trauma patient.



Courtesy of DRE Medical Equipment.

Capnography Review (2 of 3)

- Normal end-tidal waveform capnography
- Capnography waveform indicating ROSC after cardiac arrest

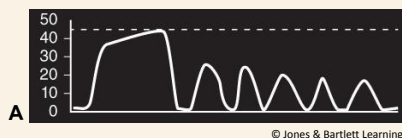


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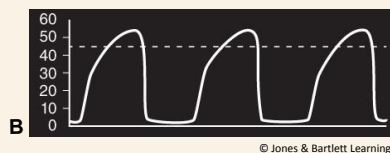
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Capnography Review (3 of 3)

- Capnography waveform trending down in shock

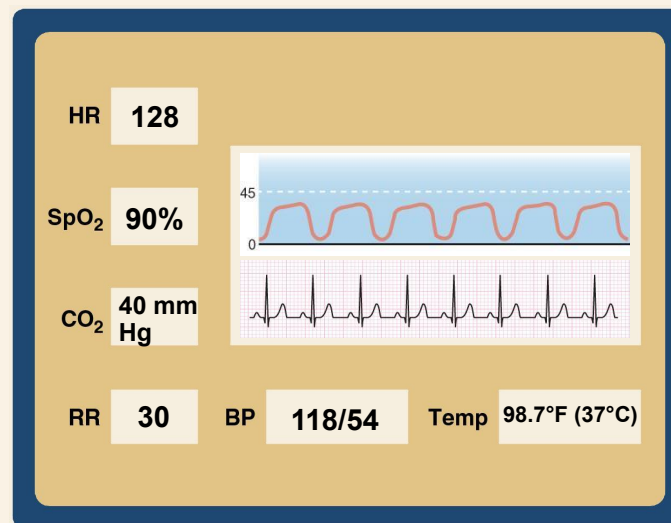


- Capnography waveform indicating hypoxia due to asthma



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Secondary Survey



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Case Summary

- A secondary survey was completed en route.
- Patient transported to level I trauma center
- Treated as an adult
 - Flail segment
 - Large pulmonary contusion
 - Intubated
- Admitted to ICU and heals after a short stay
- Returns to baseball team

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Critical Actions

- Airway and breathing assessment to identify and manage potential life threats
- Determining the best method to manage breathing difficulty in this patient and prevent further decline
- Reassessment of the airway after management of the airway is completed to ensure improvement of the patient's condition

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Wrap-Up

- Ventilation vs oxygenation in the trauma patient
- Methods by which a patient can be oxygenated
- Adjuncts used to increase the ability to ventilate a patient
- Tools used to assess the patient's ventilation and oxygenation status