

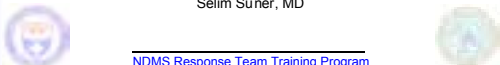
**Special Therapeutic Intervention**

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**Using Resuscitation Fluids in a Disaster Setting**

Conrad Salinas, MD  
Selim Suner, MD

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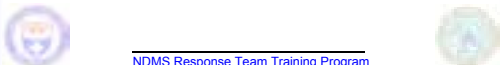
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**Objectives**

By the conclusion of this session, you should be able to:

- Recognize the difference between hospital and disaster use of IV fluids in the dehydrated patient.
- Identify characteristic symptoms of dehydration.
- Recognize the fluid therapy options and special considerations for the treatment of the dehydrated patient.

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**Limited Supplies**

- Hospitals have abundant supplies and equipment.
- In disasters, supplies are limited.

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## Limited Supplies



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## Triage for IV

- What is the purpose of starting an IV?
- Is there another way of achieving this purpose?



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## Paternal Medication Delivery

- Saline or heparin lock instead of IV bag
- Needle and syringe to administer drugs



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## IV Therapy Consideration

Patients who should be considered for IV therapy are those potentially salvageable where fluid use can prevent irreparable damage or morbidity.



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## Oral Rehydration

- **Gastroenteritis**
  - Gastroenteritis is frequently encountered during disasters.
  - Most cases can be treated with oral rehydration.
  - IV fluid therapy should be used if oral rehydration fails or if dehydration is severe.

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## Oral Rehydration

- **Patients with mild or moderate dehydration exhibit the following symptoms:**
  - Dry mucus membranes
  - Decreased skin turgor
  - Sunken fontanel
  - Loss of tears
- **These patients can be treated by oral rehydration.**

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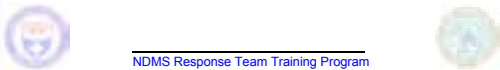
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## Oral Rehydration

- **The World Health Organization's recommended oral rehydration solution**
  - 3.5 grams salt
  - 2.5 grams sodium bicarbonate
  - 1.5 grams potassium chloride
  - 20 grams glucose
  - diluted in 1 liter of water



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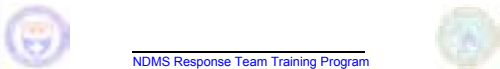
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## Shock

**Shock is a defect in circulation that leads to inadequate organ perfusion and tissue oxygenation.**



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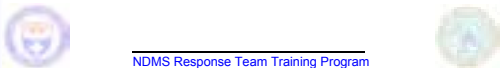
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## Factors Involved in Shock

- **Preload** – amount of blood circulation
- **Pump** – function of the heart
- **Afterload** – resistance that the circulatory system exerts on the flow of blood



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## Recognition of Shock

- **Objective measurements**
  - Pulse
  - Respiratory rate
  - Circulation
  - Pulse pressure
- **Help identify shock early.**
- **May be unreliable in the elderly or those taking certain medications.**



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## Recognition of Shock

- **Most common cause of shock is hemorrhage.**
- **Recognition can be delayed by the body's compensatory mechanisms.**



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## Etiologies of Shock

- **Hemorrhagic**
  - Loss of fluid
- **Nonhemorrhagic**
  - Cardiogenic
  - Neurogenic
  - Septic



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## Hemorrhagic

- Most common
- Loss of volume
  - Bleeding
  - Dehydration



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## Cardiogenic

- Cardiac contusion
- Cardiac tamponade
- Tension pneumothorax



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## Cardiogenic



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## Neurogenic

- Central nervous system (CNS) injury
- Spinal cord injury



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## Neurogenic

- Isolated head injuries do not cause shock.
- Treat for hypovolemia first.

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## Sepsis

Sepsis is not seen early in a disaster.



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## Physiology of Shock

- **Decrease tissue perfusion**
  - Leads to anaerobic metabolism
  - Cell swelling
  - Cell death



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## Hemorrhage

- **Most common form of shock**
- **Results from acute loss of circulating volume**
- **Consist of four classes**



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## Hemorrhagic Shock – Class I

- **Loss of about 15% of blood volume (750 cc of blood)**
- **During Class I**
  - Tachycardia
  - Normal blood pressure
  - Normal pulse pressure



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## Hemorrhagic Shock – Class II

- Loss of 15 to 30% of blood volume (750 to 1,500 cc of blood)
- During Class II
  - Tachycardia
  - Tachypnea
  - Decrease in pulse pressure



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## Hemorrhagic Shock – Class III

- Loss of 30 to 40% of blood volume (2,000 cc in an adult)
- Classic signs
  - Tachycardia
  - Drop in systolic pressure
  - Very narrow pulse pressure
  - Altered level of consciousness



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## Hemorrhagic Shock – Class IV

- Loss of more than 40% of blood volume
- Preterminal phase of shock
- Signs
  - Tachycardia
  - Drop in systolic blood pressure
  - Very narrow pulse pressure
  - Patient usually comatose



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## Soft Tissue Injuries and Shock

- Fractured tibia can lose 750 cc of fluid at the fracture site.
- Fractured femur can lose 1,500 cc of fluid at the fracture site.



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## Fluids for Resuscitation

- In hospital
  - Blood
- Out of hospital
  - Crystalloids
  - Colloids
  - Hypertonic saline

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## Crystalloids

- Most commonly used
- Less mortality than colloids
- 1 liter of crystalloid increases plasma volume by 180cc
- 1 to 3 rule
  - For every one liter of blood loss, 3 liters of crystalloids are needed to replace it.

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## Colloids

- **Smaller volumes of fluid are needed.**
  - 1 liter of dextran increase plasma volume by 790 cc.
- **Maintains serum protein levels.**



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## Hypertonic Saline

- **Ideal disaster fluid**
  - Rapid and sustained response in improving hemodynamic status
  - Only small amounts (250 cc) are needed
- **Pre-hospital survival rates to hospital discharge are improved but not significantly in head injury patients.**



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## Summary

- **The use of fluids in a disaster setting when supplies and equipment are limited should be well thought out.**
- **Oral rehydration should be considered when possible.**
- **Further research is needed about fluids ideal for disaster medical treatment.**



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