

DEHYDRATION

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Scenario #1

- An 11-month-old boy comes to ER with a 4-day history of intractable acute viral gastroenteritis. He has had a decreased urine output for the past 48 hours, parched buccal mucosa, markedly sunken eyes and anterior fontanelle. HR 186 beats/min, and his BP is 84/42 mm Hg. Skin turgor is decreased, and his capillary refill is 3 seconds. He responds to stimulation, but seems very tired.

Which of the following is the best first step in management?

- A) Oral rehydration therapy
- B) IV fluid bolus of 0.2% NS at 20ml/kg
- C) IV fluid bolus of 0.45% NS at 20ml/kg
- D) IV fluid bolus of 0.9% NS at 20ml/kg
- E) Await lab results before giving therapy

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Discussion

- Severe dehydration is characterized by: >10% volume loss, rapid/weak/absent pulse, hypotension, capillary refill >3sec, parched buccal mucosa, markedly sunken eyes and fontanelle, and cool, mottled skin with tenting.^[1]
- Emergent volume resuscitation should **never** consist of hypotonic or hypertonic solutions as these can cause rapid fluid shifts, which can lead to cerebral edema, seizure, and demyelination.^[2]

Discussion cont.

- ORT is recommended by the AAP as “the preferred treatment for fluid and electrolyte losses caused by diarrhea in children with mild to moderate dehydration.” Advantages include: lower cost, elimination for IV line placement, and involvement of parents in the rehydration process that can be continued at home. However, for severe dehydration, an IV fluid bolus should be given until adequate perfusion is restored.^[2]

Scenario #2

An 8 day old female is brought to the clinic with 15-hour h/o fever (38.4C), decreased urinary output, irritability, and 10% weight loss. Pt was born full term to a G1P0 mother via SVD w/o complication. Mom is an avid breast-feeder and baby has been sleepy since birth. On exam mucus membranes are dry, tears are absent with decreased skin turgor. Labs show: serum sodium 157mEq/L, BUN 42, Cr 0.7.

What is the next best step for this patient?

- A) Sepsis workup
- B) IV LR
- C) IV 0.9% NS bolus at 20ml/kg followed by gradual repletion of water deficit
- D) Oral rehydration therapy

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Discussion

- The goals of therapy in children with hypovolemia and serum Na > 155mEq/L are: correction of volume deficit and gradual correction of hypernatremia at rates <12mEq/L per day. (<0.5mEq/L per hour)^[3]
- If repletion of fluid is too rapid, the resultant cerebral edema can range from seizures to brain herniation and death.^[3]

Discussion cont.

- LR should not be used because it is more hypotonic than NS and may cause too rapid a decrease in serum Na conc.^[3]
- The duration of correction after NS bolus can be determined based on the initial Na conc. ^[3]
 - 145-157 mEq/L (24hours)
 - 158-170 mEq/L (48hours)
 - 171-183 mEq/L (72hours)
 - 184-186 mEq/L (84hours)

Discussion cont.

- Typical fluid – D5 ½ NS (with 20mEq/L KCl unless contraindicated) at 1.25-1.5 times maintenance. Adjust fluid based on clinical status and serum sodium conc.^[3]
 - Na decreases too fast:
 - increase Na conc
 - Decrease rate
 - Na decreases too slowly:
 - Decrease Na conc
 - Increase rate

Sources

- 1. Somers, Michael MD. UpToDate. **Clinical Assessment and Diagnosis of Hypovolemia in Children.** July 27, 2011
- 2. Somers, Michael MD. UpToDate. **Treatment of Hypovolemia in Children.** February 2, 2012.
- 3. Kliegman, Robert MD. **Nelson Textbook of Pediatrics.** 19th Ed. 2011. (p248-249)