

Practice Guidelines

Maintenance Intravenous Fluids in Children: AAP Provides Recommendation

Key Points for Practice

- Maintenance IV fluids provided to acutely ill children should be isotonic to prevent hyponatremia.
- Dextrose and potassium chloride can be added to isotonic maintenance fluids without risk of injury from hypertonicity.

From the *AFP* Editors

Maintenance intravenous (IV) fluids are a common element of the care of acutely ill children. Hypotonic maintenance fluids have long been a clinical standard for children, although this practice is not evidence based. The American Academy of Pediatrics (AAP) has created an evidence-based guideline recommending the use of isotonic fluids for patients 28 days to 18 years of age to reduce the risk of developing hyponatremia.

Background

The standard administration of hypotonic maintenance IV fluid in children has been based on an article from 1957 that recommends weight-based fluid and glucose for maintenance (*Pediatrics*, 1957;19(5):823-332). Electrolyte recommendations were based on levels in human and cow's milk. Recent evidence has shown that hypotonic maintenance fluid administration significantly increases the risk of hyponatremia. The most common electrolyte complication in hospitalized patients is hyponatremia, affecting approximately 15% to 30% of hospitalized children and adults.

Commonly used hypotonic commercial solutions, 0.2% sodium chloride (NaCl) and 0.45% NaCl, have sodium concentrations of 34 mEq per L and 77 mEq per L, respectively.

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This series is coordinated by Sumi Sexton, MD, Editor-in-Chief.

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CME This clinical content conforms to AAFP criteria for continuing medical education (CME). See CME Quiz on page 205.

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The sodium concentration in isotonic solutions is closer to plasma levels (134 to 144 mEq per L), with 0.9% NaCl having a concentration of 154 mEq per L.

Treatment

The AAP recommends the use of isotonic solutions with adequate potassium chloride and dextrose for maintenance IV fluids in children; this recommendation significantly reduces the risk of hyponatremia without increasing other risks, including hypernatremia and acidosis. The recommendation is rated as strong and is based on well-designed randomized controlled trials and systematic reviews. The number needed to treat with isotonic fluids is 8 to prevent hyponatremia and 28 to prevent moderate hyponatremia, compared with hypotonic maintenance fluids.

Dextrose and potassium supplementation are commonly required in maintenance fluids for children and can be added to isotonic fluids. Whereas glucose increases the fluid osmolality, glucose is readily absorbed and does not appear hyperosmolar to cells. Potassium supplementation minimally increases osmolality.

Population

This AAP recommendation is intended for children and adolescents 28 days to 18 years of age who require maintenance IV fluids in the general inpatient ward or in a postoperative or critical care setting. The recommendation does not apply to patients with neurosurgical disorders, congenital or acquired cardiac disease, hepatic disease, cancer, renal dysfunction, diabetes insipidus, voluminous watery diarrhea, or severe burns or to infants younger than 28 days or in the newborn intensive care unit because these populations were excluded from most studies.

Guideline source: American Academy of Pediatrics

Evidence rating system used? Yes

Systematic literature search described? Yes

Guideline developed by participants without relevant financial ties to industry? Yes

Recommendations based on patient-oriented outcomes? Yes

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Available at: <https://pediatrics.aappublications.org/content/142/6/e20183083.long>

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