

How much salt is sufficient?

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Opinion

Most of the guidelines and textbooks are still recommending hypotonic maintenance fluids for pediatric patients based on Holliday-Segar method. Maintenance intravenous (IV) fluids are designed to maintain homeostasis. There is risk of iatrogenic hyponatremia with hypotonic intravenous (IV) maintenance in otherwise normal children. Administration of hypotonic IV fluids is a major risk factor for developing hyponatremia in hospitalized euvoletic children who are dependent upon parenteral fluid therapy. The risk will increase significantly in those with the risk of Syndrome of Inappropriate Antidiuretic Hormone Secretion (SIADH). The estimated incidence of clinically significant, symptomatic cases of hospital acquired acute hyponatremia is relatively low (0.07%). Severe hyponatremia (<120mmol/l) has been reported to be associated with increase in the cost of stay, morbidity and mortality.

Hyponatremia is common in patients with infection (especially severe infection) and pulmonary disease (hypoxemic state). Hyponatremia has been reported in 52% of children with febrile convulsions and 33% of children with Respiratory syncytial virus (RSV) bronchiolitis. Surgical patients tended to have a greater fall in plasma sodium level than nonsurgical patients. Antidiuretic hormone (ADH) concentrations increase 2-4 folds during the operation and remained elevated through the first 24 hours postoperatively. There is increased risk of hyponatremia in postoperative children randomly assigned to hypotonic solution compared with those who received isotonic solution. There was no significant difference in the sodium level between ventilated and non-ventilated patients. So, what to do in case the SIADH is possible? Is it right to increase the salt concentration or decrease the rate of the fluid? It was found that the fluid type (isotonic or hypotonic solutions), not rate, determined the risk of hyponatremia and serum sodium changes, and fluid restriction may not satisfy a child's daily requirement. There is no evidence supports decrease the fluid rate to prevent hyponatremia due to increase SIADH.

Isotonic fluids are safer than hypotonic fluids in hospitalized children requiring maintenance IV fluid therapy in terms of plasma sodium level. Any child in hospital who requires IV fluids should be considered at risk for developing hyponatremia due to increased risk of SIADH. At particular risk are: Children undergoing surgery, Children with acute neurological or respiratory infections (eg, meningitis, encephalitis, pneumonia and bronchiolitis). So why not to use the isotonic fluid (Dextrose 5% in 0.9% Sodium Chloride) as maintenance for all patients? There is potential risk for hypernatremia with salt and water overload. There are also risks of developing hyperchloremic metabolic acidosis has been recognized in the context of rapid isotonic saline infusion, in addition to the increase in the serum osmolarity.

For patients with ADH secretion (eg, peri or postoperative; with respiratory or neurological infections) the use of isotonic saline (D5W 0.9% NaCl) is recommended. For other hospitalized children with normal Na level, the options are D5% in 0.9% NaCl or D5% 0.45% NaCl. The first option is preferred, especially when the serum Na is in the low normal range (135 mmol/L to 137 mmol/L inclusive). When serum electrolyte results are not yet available, it is recommended that D5%0.9% NaCl be initiated as the maintenance IV fluid. If the serum Na level is 145-154 mmol/L, then D5% in 0.45% NaCl should be initiated and frequent monitoring of the serum sodium performed. Any child in hospital who requires IV fluids should be considered at risk for developing hypo Na due to SIADH. At particular risk are: Children undergoing surgery, Children with acute neurological or respiratory infections (e.g. meningitis, encephalitis, pneumonia and bronchiolitis). Hypotonic IV fluids containing should not be used to provide routine maintenance. D5% in 0.9% NaCl is safer maintenance fluid in those patients and others with risk of SIADH. Intravenous fluid therapy should be viewed as a prescription requiring careful thought and measurement of intake, output, vital signs and even serum electrolytes.

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