ATS Clinical Recommendations: 10 Steps for Hospitals Facing Intravenous Fluid Shortages

Hurricane Maria, a Category 5 status hurricane recorded as the tenth-most intense hurricane in Atlantic Ocean history, devastated parts of Puerto Rico and the Caribbean in September 2017. This caused widespread power outages, affecting more than 100 drug and medical device manufacturers. This natural disaster superimposed on continued market consolidation has created unprecedented supply disruptions of critical medications, including intravenous (IV) fluids. These shortages and the potential effect on hospital supply lines have been widely reported (1); however, management strategies and conservation methods remain a struggle for many institutions.

This shortage has largely impacted small diluent IV fluid products, commonly defined as having a solution volume ≤ 100 mL and intended for intermittent IV use (2). These products are typically not exclusively used in the preparation of many IV antibiotics. Supply disruptions have now extended to large IV diluent products (those with volumes greater than 100 mL), which are frequently utilized as bolus or maintenance fluids. These IV fluid shortages have put further pressure on hospital systems already suffering from significant supply disruptions with numerous other IV products including opioids, benzodiazepines, electrolytes, amino acids, emergency syringes (i.e. sodium bicarbonate, epinephrine), and local anesthetics.

In the event that your hospital or healthcare system is currently experiencing or is expected to experience critical shortages of IV fluids, electrolytes, or amino acids, here are 10 steps to consider adopting:

1. Convert all possible medications from IV to oral (PO) form
    - Institutions should consider formal intravenous to oral protocol implementation (click this link to view an IV to po protocol)
    - Common medications for IV to PO conversion include: antibiotics (e.g. azithromycin, beta-lactams, fluoroquinolones, metronidazole), antiepileptics (e.g. levetiracetam), proton-pump inhibitors, vitamins (e.g. thiamine [100 mg], folic acid)
2. Intravenous push administration antibiotics
    - Many antibiotics administered by ad-mixed IV piggyback can be administered as small volume reconstituted IV push
    - Many beta-lactam antibiotics may be considered for IV push administration. Common agents that are FDA-approved for administration by IV push include: aztreonam, cefazolin, cefoxitin, cefotaxime, ceftazidime, cefuroxime and meropenem
3. Use of premixed frozen antimicrobials, if available, to decrease use of small volume diluent products
4. Preserve unused IV fluids

- Be cognizant of discontinuing or switching to another product (e.g. 0.9% sodium chloride to dextrose 5% in sodium chloride 0.45%) before current infusion completed
- Upon switching to alternative product, ensure remainder is utilized (if clinically appropriate) before starting of new IV fluid
- Educate bedside nursing staff to keep unused IV fluids spiked and primed until expiration of product or tubing in the instance of therapy re-initiation

5. Consider severity of electrolyte disturbance and need for IV versus PO replacement
   - Restrict IV electrolyte replacement to patients with life-threatening electrolyte abnormalities or those with strict NPO status
   - Utilize enteral replacement for electrolytes (e.g. potassium, phosphorus)
6. Implement specific breakpoint criteria for utilization of intravenous electrolytes
   - Recommend electrolyte replacement dosing based on serum electrolyte concentrations (e.g. serum phosphorus concentration of less than 1.6 mg/dL)
7. Reconfigure electronic health record to guide appropriate prescribing
   - Utilize alternative diluent bag sizes based on current availability while maintaining safe concentrations for product stability
   - Implement soft alerts (denoting supply is low with guides to alternative therapy) as well as hard blocks (restricts ordering of product) in your institution's clinical decision support system
8. Limit utilization of parenteral nutrition (PN)
   - Initiation of PN should be based on assessed nutritional risk and status and duration of nothing by mouth (NPO) status (3)
   - Early discontinuation upon tolerance of enteral tube feeds or solid oral diet (3)
9. Consider enteral hydration in place of IV hydration for patients with a functioning gastrointestinal tract who are not critically ill
   - Commercially available products include, but are not limited to, the following: Trioral™, Oralyte®, and Pedialyte®
10. Consider delay of elective surgeries to conserve supplies

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