



**Drug Shortages Alert
Sodium Bicarbonate**

Date of last update: September 2022

Recommendations and information provided in Drug Shortage Alerts are compiled by experts in the field. Practitioners always are advised to consult with staff to ensure that response to any drug shortage is in line with internal policies and procedures.

INTRODUCTION

- IV sodium bicarbonate syringes and vials have previously and sporadically been affected by shortages due to manufacturer discontinuation and/or increased demand.
- The SCCM Drug Shortages and Medication Safety Committee has developed a detailed review of common uses of IV sodium bicarbonate in the ICU and suggested management strategies.
- The recommendations provided are based on a combination of the current evidence and the need for conservation during this shortage (**Table 1**).

Table 1. Potential Management Strategies for Drug Shortage

Indication in the critically ill	Suggested strategies	Key points
ACLS/cardiac arrest ¹⁻³	<ul style="list-style-type: none"> • Consider only after adequate ventilation and cardiac compressions have been established. 	<ul style="list-style-type: none"> • Routine use of sodium bicarbonate is not recommended. • May consider in setting of prolonged cardiac arrest or attributed to metabolic acidosis hyperkalemia, or tricyclic antidepressant overdose.
Diabetic ketoacidosis ⁴⁻¹¹	<ul style="list-style-type: none"> • Sodium bicarbonate is not recommended. 	<ul style="list-style-type: none"> • Treat underlying ketogenesis. • May consider for patients with pH < 6.9 due to numerous vascular effects associated with severe acidosis.
Prevention of contrast-induced nephropathy in those at risk ¹²⁻²²	<ul style="list-style-type: none"> • Sodium bicarbonate is no longer recommended for the prevention of contrast-induced nephropathy; crystalloids are preferred therapy. • Provide volume expansion with isotonic fluid such as 0.9% normal saline preferred before and after administration of contrast. 	<ul style="list-style-type: none"> • Sodium bicarbonate offers no significant improvement over 0.9% sodium chloride. • Screen patient according to past medical history. • Check eGFR if at risk. • Minimize modifiable risks in patients with eGFR ≤ 30mL/min (e.g., concomitant nephrotoxins). • Avoid repeat contrast exposure ≤ 48hrs.

Urinary alkalization to enhance drug elimination ²³⁻²⁸	<ul style="list-style-type: none"> • Optimal alternatives vary depending on the drug. 	<ul style="list-style-type: none"> • Evidence to support use of sodium bicarbonate is limited for most agents, with the best data in relation to enhancing elimination of high-dose methotrexate or in specific overdoses (e.g., salicylate). • In setting of shortage, may reserve alkalization for patients with salicylate levels > 35 mg/dL.
Rhabdomyolysis (see urinary alkalization in previous row) ²⁹⁻³⁴	<ul style="list-style-type: none"> • Aggressive resuscitation with crystalloid fluid. 	<ul style="list-style-type: none"> • Sodium bicarbonate offers no significant improvement over aggressive fluid resuscitation with 0.9% sodium chloride.
Severe hyperkalemia (acute management) ³⁵⁻⁴¹	<ul style="list-style-type: none"> • Insulin, 10 units IV push with 50% dextrose, 50 mL • +/- inhaled beta-2 agonists 	<ul style="list-style-type: none"> • Consider only with persistent severe hyperkalemia and/or ECG changes despite calcium and other therapies. • Sodium bicarbonate therapy has little use in the routine treatment of hyperkalemia unless • severe metabolic acidosis is present.
Severe metabolic acidosis ^{4-6, 41-46}	<ul style="list-style-type: none"> • Reserve sodium bicarbonate recommended for patients with pH < 7.2 in the setting of septic shock. 	<ul style="list-style-type: none"> • Studies do not support the hypothesis that sodium bicarbonate enhances catecholamine effectiveness. • Treat underlying shock.

ACLS, advanced cardiac life support; eGFR, estimated glomerular filtration rate.

PHARMACOTHERAPEUTIC CONSIDERATIONS⁴⁶⁻⁵¹

- The use of IV sodium bicarbonate and management strategies in the setting of drug shortages is indication dependent (**Table 2**).

Table 2. Alternative Products for IV Sodium Bicarbonate Drug Shortage

Tromethamine (THAM)			
Indication	Dosing	Monitoring	Key points
Severe metabolic acidosis	<ul style="list-style-type: none"> • 111 to 333 mL of 0.3 M solution (3.6 to 10.8 grams) • Dose (mL) = body weight (kg) × base deficit (mEq/L) × 1.1 	<ul style="list-style-type: none"> • Serum electrolytes including potassium and glucose (triggers insulin release) • Arterial blood gas 	<ul style="list-style-type: none"> • Administer via slow infusion over 1 hour • May be given peripherally
Sodium acetate			
Indication	Dosing	Monitoring	Key points
Severe metabolic acidosis Urinary	<ul style="list-style-type: none"> • Equivalent dosing to sodium bicarbonate • Intermittent: 40 mEq/100 mL sterile 	<ul style="list-style-type: none"> • Central line is preferred for intermittent infusion 	<ul style="list-style-type: none"> • Sodium acetate is metabolized to bicarbonate on an equimolar basis (e.g., 50

alkalinization	water or 5% dextrose <ul style="list-style-type: none"> • Continuous: 150 mEq/1000 mL sterile water or 5% dextrose • Do not IV push • Infuse intermittently over 15-20 minutes or continuously 	preparations due to high osmolarity.	mEq sodium acetate = 50 mEq sodium bicarbonate) by acetyl coenzyme A hydrolase found primarily in the liver. <ul style="list-style-type: none"> • Animal studies suggest reduced metabolism of acetate to acetoacetate in tumor tissue of the liver, which may confer a limited production of bicarbonate in human models.
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SAFETY IMPLICATIONS

- Lack of prefilled syringes in code boxes may present patient and responder safety issues in emergent situations.
- Use of alternatives that are not commonly used presents safety concerns and potential for errors throughout the entire medication process. As such, a heightened awareness for errors is warranted during the prescription, preparation, and administration processes.

IMPACT ON ICU CARE

- Lack of availability of a buffering solution can present challenges for management of acidotic patients, potentially resulting in prolonged acidosis and subsequent physiologic effects, which may include but are not limited to depression of myocardial contractility, tachycardia, vasoconstriction, dysrhythmias, and central nervous system depression.
- Outsourcing the production of sodium bicarbonate syringes and continuous infusions (a strategy some pharmacies may use to obtain more supply) can represent increased drug acquisition costs.

Original date: July 2012

Revision dates: September 2016, November 2017, June 2022

Contributed to and revised by:

Nadia Ferguson, PharmD, BCCCP

Originally developed by:

Farooq A. Bandali, PharmD, BCPS

Michael L. Bentley, PharmD, FCCM

Katherine E. Burenheide-Foster, MS, PharmD, BCPS

Emily Hutchinson, PharmD, BCPS

Rachel M. Kruer, PharmD, BCPS

John J. Lewin III, PharmD, MBA

Liz G. Ramos, BS, PharmD, BCPS

Reviewed by:

Anne Rain T. Brown, PharmD, BCCCP, FCCM

Adrian Wong, PharmD, MPH, BCCCP, FCCM

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