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SODIUM BICARBONATE FOR METABOLIC ACIDOSIS IN HOSPITAL USM

INTRODUCTION

Sodium bicarbonate ($NaHCO_3$) is used in the treatment of a wide variety of metabolic acidosis

MECHANISM OF ACTION[2]

It provides bicarbonate ion which neutralizes hydrogen ion concentration and raises blood and urinary pH.

Availability[5]	IV $NaHCO_3$ 8.4%	Mist $NaHCO_3$ 8.4%	$NaHCO_3$ powder
Content[5]	1ml = 84mg of $NaHCO_3$ = 1mmol Na^+ & 1mmol HCO^{3-}		1g = 11.9mmol Na^+ & 11.9mmol HCO^{3-}
Indication[2]	Acute severe metabolic acidosis	Metabolic acidosis in patients with chronic kidney disease	
Dosing	<u>If acid-base status available</u>[2,4]: Dosing based on HCO^3 deficit = 0.5 x weight (kg) x [desired HCO^{3-} - measured HCO^{3-} (mmol/L)] <u>If acid-base status not available</u>[2,3,4]: Severe cases (e.g. cardiac arrest): 1 mmol/kg via slow IV, followed by 0.5 mmol/kg given at 10-minute intervals depending on individual arterial blood gases Less urgent cases: 2 to 5 mmol/kg IV infusion over 4 to 8 hours; subsequent doses should be based on patient's acid-base status	15 - 20 ml/ day in divided doses (max: 70ml/day)[2]	1200mg – 1950mg/day in divided doses (max: 5850mg/day)[2] Example: 500 mg TDS * In fluid restricted patient, $NaHCO_3$ powder is preferred compared to mist $NaHCO_3$ 8.4%

DILUTION AND ADMINISTRATION OF IV $NaHCO_3$ 8.4%

LESS URGENT FORMS OF METABOLIC ACIDOSIS

Choice 1[6,7]

Based on this formula: **M1 x V1 = M2 x V2**

M1: Existing concentration (8.4%) ; V1: Volume to syringe out from 8.4%

M2: Intended concentration isotonic (1.5%) ; V2: Final volume

Example: To produce isotonic $NaHCO_3$ 1.5% from 10 ml $NaHCO_3$ 8.4%, how many diluent that we need?

(8.4 %) x 10 ml = (1.5%) x V2ml

V2 = (8.4 x 10)/1.5

= 56 ml [**final volume**]

Therefore diluent needed is 56 ml-10 ml = 46 ml

Conclusion: Dilute 1 ampoule (10 ml) $NaHCO_3$ 8.4% in 46 ml of diluent (WFI/NS/D5) to produce 56 ml $NaHCO_3$ 1.5% w/v (isotonic)

Choice 2[7]

An IV infusion can be prepared by adding 75ml sodium bicarbonate to 425mL D5W (288 mOsm/kg)

Administer over 4 to 8 hours[3,9] (maximum rate of administration: 1 mEq/kg/hour)[2]

SEVERE METABOLIC ACIDOSIS (PH <7.1)

Choice 1[8] **[Practiced in ICU medical ward]**

Undiluted 50 mmol IV $NaHCO_3$ 8.4% (50ml) given **over 1 hour** in severe DKA.

*Plasma pH, electrolytes and pCO_2 must be closely monitored and over-correction avoided

Choice 2[6,7]

For emergency cases, e.g: cardiac arrest

Undiluted 8.4% IV $NaHCO_3$ given by **slow IV** injection **over 5 min (refer dosing cardiac arrest)**

Concentrations>1.26% should be given via a central line except in emergencies[8]

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