sodium chloride (IV/oral) (soe-dee-um klor-ide)
NaCl
Classification
Therapeutic: mineral and electrolyte replacements/supplements
Pregnancy Category C

Indications
IV: Hydration and provision of NaCl in deficiency states. Maintenance of fluid and electrolyte status in situations in which losses may be excessive (excess diuresis or severe salt restriction). 0.45% (“half-normal saline”) solution is most commonly used for hydration and the treatment of hyperosmolar diabetes (hyperosmole). 0.9% (“normal saline”) solution is used for Replacement; Treatment of metabolic alkalosis; A priming fluid for hemodialysis; To begin and end blood transfusions; Small volumes of 0.9% NaCl (preservative-free or bacteriostatic) are used to reconstitute or dilute other medications; Hyperosmolar solutions (3%, 5%) may be required in situations in which rapid replacement of sodium is necessary: Hypertension, Hypokalemia, Renal failure, Hypovolemic shock; PO: Prevention of or management of volume depletion due to salt restriction or heat prostration when excessive sweating occurs during exposure to high temperatures. Irrigating Solutions: 0.9% and 0.45% may be used as irrigating solutions. Concentrated sodium chloride: Used as an additive to parenteral fluid therapy in very specific situations.

Action
Sodium is a major cation in extracellular fluid and helps maintain fluid volume distribution, fluid and electrolyte balance, acid base equilibrium, and osmotic pressure. Chloride is the major anion in extracellular fluid and is involved in maintaining acid-base balance. Solutions of NaCl resemble extracellular fluid. Reduces corneal edema by an osmotic effect.

Therapeutic Effects: IV, PO: Replacement in deficiency states and maintenance of homeostasis.

Pharmacokinetics
Absorption: Well absorbed following oral administration. Replacement solutions of NaCl are administered IV only.
Distribution: Rapidly and widely distributed.
Metabolism and Excretion: Excreted primarily by the kidneys.

Half-life: Unknown.

Contraindications/Precautions
Contraindicated in: Hypertonic (3%, 5%) solutions should not be used in patients with elevated, slightly decreased, or normal serum sodium, fluid retention or hypernatremia.
Use Cautiously in: Patients prone to metabolic, acid-base, or fluid and electrolyte abnormalities, including: geriatric patients, those with nasogastric suctioning, vomiting, diarrhea, diuretic therapy, glucocorticoid therapy, fistulas, HF, severe renal failure, severe liver disease (additional electrolytes may be required). Pedi: NaCl preserved with benzyl alcohol should not be used in neonates; Inadequate hydration (water and other electrolytes must be replaced).

Adverse Reactions/Side Effects
Seen primarily during PO and IV use: CV: HF, pulmonary edema, edema. F and E: hypernatremia, hypervolemia, hypokalemia. Local: IV—extravasation, irritation at IV site.

Interactions
Drug-Drug: Excessive amounts of NaCl may partially antagonize the effects of antihypertensives. Use with caution since sodium may result in excess sodium retention.

Route/Dosage
IV (Adults): 0.9% NaCl (isotonic)—1 L (contains 150 mEq sodium/L), rate and amount determined by condition being treated. 0.45% NaCl (hypotonic) —1–2 L (contains 75 mEq sodium/L), rate and amount determined by condition being treated. 3%, 5% NaCl (hypertonic) —0.1–0.2 mL/min (contains 50 mEq sodium per 100 mL). PO (Adults): 1–2 g 3 times daily.
PO, IV (Children and Infants): Maintenance sodium requirements—3–4 mEq/kg/day (maximum: 150 mEq/day).
PO, IV (Neonates): Maintenance sodium requirements—1–2 mEq/kg/day.

Metabolism and Excretion: Excreted primarily by the kidneys.
Half-life: Unknown.

Contraindications/Precautions
Contraindicated in: Hypertonic (3%, 5%) solutions should not be used in patients with elevated, slightly decreased, or normal serum sodium, fluid retention or hypernatremia.
Use Cautiously in: Patients prone to metabolic, acid-base, or fluid and electrolyte abnormalities, including: geriatric patients, those with nasogastric suctioning, vomiting, diarrhea, diuretic therapy, glucocorticoid therapy, fistulas, HF, severe renal failure, severe liver disease (additional electrolytes may be required). Pedi: NaCl preserved with benzyl alcohol should not be used in neonates; Inadequate hydration (water and other electrolytes must be replaced).

Adverse Reactions/Side Effects
Seen primarily during PO and IV use: CV: HF, pulmonary edema, edema. F and E: hypernatremia, hypervolemia, hypokalemia. Local: IV—extravasation, irritation at IV site.

Interactions
Drug-Drug: Excessive amounts of NaCl may partially antagonize the effects of antihypertensives. Use with caution since sodium may result in excess sodium retention.

Route/Dosage
IV (Adults): 0.9% NaCl (isotonic)—1 L (contains 150 mEq sodium/L), rate and amount determined by condition being treated. 0.45% NaCl (hypotonic) —1–2 L (contains 75 mEq sodium/L), rate and amount determined by condition being treated. 3%, 5% NaCl (hypertonic) —0.1–0.2 mL/min (contains 50 mEq sodium per 100 mL). PO (Adults): 1–2 g 3 times daily.
PO, IV (Children and Infants): Maintenance sodium requirements—3–4 mEq/kg/day (maximum: 150 mEq/day).
PO, IV (Neonates): Maintenance sodium requirements—1–2 mEq/kg/day.
NURSING IMPLICATIONS

Assessment
- Assess fluid balance (intake and output, daily weight, edema, lung sounds) throughout therapy.
- Assess patient for symptoms of hypovolemia (hypotension, tachycardia, tachypnea)
- Assess patient for symptoms of hyponatremia (headache, tachycardia, lassitude, dry mucous membranes, nausea, vomiting, muscle cramps, or hyponatremia (edema, weight gain, hypotension, elevated blood pressure, tachycardia, fever, flushed skin, mental irritability) throughout therapy. Sodium is measured in relation to its concentration in fluid in the body, and symptoms may change based on patient's hydration status.
- Lab Test Considerations: Monitor serum sodium, potassium, bicarbonate, and chloride concentrations and acid-base balance periodically for patients receiving prolonged therapy with sodium chloride.
- Monitor serum osmolarity in patients receiving hypertonic saline solutions.

Potential Nursing Diagnoses
- Deficient fluid volume (indications)
- Excess fluid volume (side effects)

Implementation
- High alert: Accidental administration of hypertonic sodium chloride solutions (greater than 0.9%) have resulted in serious electrolyte imbalances. Do not confuse vials of concentrated sodium chloride (23.4%) with vials of sodium chloride flush solution (0.9%).
- Dose of NaCl depends on patient's age, weight, condition, fluid and electrolyte balance, and acid-base balance.
- Do not administer bacteriostatic NaCl containing benzyl alcohol as a preservative in neonates. This should not be used to reconstitute or dilute solutions or to flush intravascular catheters in neonates.
- Solution of 6.45% NaCl is hypotonic, 0.9% NaCl is isotonic, and 3% and 5% NaCl are hypertonic.

IV Administration
- pH: 4.5 – 7.0
- Administration: Administer 3% or 5% NaCl via a large vein and prevent infiltration. After the first 100 mL, sodium, chloride, and bicarbonate concentrations should be re-evaluated to determine the need for further administration.
- Rate: Rate of hypertonic NaCl solutions should not exceed 100 mL/hr or 1 mEq/kg/hr.

Patient/Family Teaching
- Explain to patient the purpose of the infusion.
- Advise patients at risk for dehydration due to exposure to extreme temperatures when and how to take NaCl tablets. Inform patients that undigested tablets may be passed in the stool; oral electrolyte solutions are preferable.

Evaluation/Desired Outcomes
- Prevention or correction of dehydration.
- Normalization of serum sodium and chloride levels.
- Prevention of heat prostration during exposure to high temperatures.

Why was this drug prescribed for your patient?