NITROPRUSSIDE

DRUGDEX® Evaluations

DOSING/ADMINISTRATION

Adult Dosing

Normal Dosage

Sodium Nitroprusside

Intravenous route

Congestive heart failure, acute

1) The recommended dose of sodium nitroprusside for the treatment of acute congestive heart failure is an initial infusion of 0.3 micrograms/kilogram/minute (mcg/kg/min) to avoid excessive hypotension, then titration upwards to the desired effect. The average dosage is 3 mcg/kg/min, with a maximum dosage of 10 mcg/kg/min [1].

2) Administer with an infusion pump, preferably a volumetric pump [1].

3) Guideline Dosing

a) The recommended initial dosage is 0.1 to 0.2 microgram/kilogram/minute IV infusion, titrated every 5 minutes until hemodynamic goal is achieved, defined as blood pressure control or 20% to 50% decrease in occlusion pressure and/or 20% to 40% increase in cardiac output [21].

Hypertensive crisis

1) IMPORTANT NOTE

a) Nitroprusside is to be used only as an infusion in sterile Dextrose 5% in water, not for direct intravenous injection [6]. Dosage rates well within the product labeling have resulted in toxicity. Additionally, dosage rates that are well tolerated over a short course of therapy may be toxic over prolonged therapy. Infusion rates of 2 micrograms/kilogram/minute are suggested as safe, while rates greater than 4 micrograms/kilogram/minute may lead to cyanide toxicity within 3 hours [7].

2) The average intravenous dose of nitroprusside for patients not receiving antihypertensive medications is 3 micrograms/kilogram/minute. The range is 0.3 to 10 micrograms/kilogram/minute [6]. Doses exceeding 10 micrograms/kilogram/minute are rarely required. If the blood pressure is not adequately reduced after 10 minutes at 10 micrograms/kilogram/minute, nitroprusside should be stopped [6][8][9].

3) Administration should be by a microdrip regulator, infusion pump or any similar device that will allow precise measurement of the flow rate. Regulation of flow rates by simple gravity and/or mechanical clamps is not recommended [6].

MAXIMUM DOSE

a) Maximum recommended rates of administration are 8 micrograms/kilogram/minute in the UK and 10 micrograms/kilogram/minute in the US [9].

b) Maximum cumulative doses of 70 milligrams/kilogram within a period of 14 days are suggested [9].

WITHDRAWAL SCHEDULE

a) Sudden cessation of nitroprusside infusion may cause rapid and severe symptomatic increase in blood pressure; withdrawal should therefore be gradual [8][22][68].

Dosage in Renal Failure

A) Sodium Nitroprusside

1) No specific dosage adjustment of nitroprusside is necessary in patients with renal dysfunction [72]; however, nitroprusside's metabolite thiocyanate accumulates during renal failure and should be monitored to ensure levels remain less than 10 mg/dL. Some investigators indicate that nitroprusside is contraindicated in the presence of renal or hepatic failure.

2) A fatal case of severe hypotension developed in a 50-kg patient with renal insufficiency after receiving a total dose of 13 milligrams sodium nitroprusside over 90 minutes [9].

Dosage in Hepatic Insufficiency

A) Sodium Nitroprusside

1) No specific dosage adjustment appears to be necessary; however, consideration should be made for cyanide toxicity since cyanide is converted to thiocyanate by the liver [6].

Dosage in Geriatric Patients

A) Sodium Nitroprusside

1) No specific dosage adjustment necessary; however, consideration of renal function, even in the presence of apparent normal serum blood creatinine and urea nitrogen should be made.

2) Nitroprusside sodium was associated with increased sensitivity in elderly patients during deliberate hypotensive anesthesia. Utilizing a dose-response curve to evaluate changes in blood pressure to doses of nitroprusside, mean changes in arterial blood pressure per microgram/kilogram/minute nitroprusside dose correlated significantly with age: a reciprocal correlation was observed with age for maximal changes in heart rate produced by nitroprusside. It is suggested that increased sensitivity to the drug could be related to reduced baroreflex activity, altered sensitivity to vasodilating effects, or resistance of cardiac adrenergic receptors to stimulation by catecholamines. These data suggest that reduced doses of nitroprusside should be employed in the elderly patient during controlled hypotensive anesthesia [73].

Dosage Adjustment During Dialysis

A) Sodium Nitroprusside

1) HEMODIALYSIS

a) No maintenance dose need be given following hemodialysis [72].

2) PERITONEAL DIALYSIS

a) No adjustment is needed during chronic ambulatory peritoneal dialysis; no data exists to make recommendations for continuous arteriovenous hemofiltration (Bennet et al, 1994).

Administration

A) Sodium Nitroprusside

1) Preparation

a) Intravenous route

1) After reconstitution, the 50 milligram (mg) vial of sodium nitroprusside must be further diluted in 250 to 1000 milliliters (mL) of sterile 5% dextrose water (D5W). The diluted solution should be protected from light with the supplied opaque sleeve, aluminum foil or other opaque material [1].

2) Once diluted, the solution will have a faint brownish tint. A color change of blue, green, red or a much brighter brown color are indicative of trace contaminant reactions causing inactivation of sodium nitroprusside and the solution should be discarded [1].

3) The initial infusion rate should be started slowly (0.3 microgram/kilogram/minute (mcg/kg/min)) to avoid excessive hypotension (usual rate of 0.5 to 10 mcg/kg/min). A maximum infusion rate of 10 mcg/kg/min should last no longer than 10 minutes. Only an infusion pump, preferably a volumetric pump should be used. No other drug products should be administered in the same solution with sodium nitroprusside.[1].

B) Parenteral route

1) Store the freeze-dried preparation enclosed in the manufacturer's carton at controlled room temperature (15 to 30 Celsius (C); 59 to 86 Fahrenheit (F)) until ready to use. Protect from light, heat, and moisture. Maximum labeled shelf life is 18 months [136][94].

2) Nitroprusside should be reconstituted initially in 2 to 3 mL of sterile 5% dextrose injection, USP water [94]. While the manufacturer recommends no other diluent be used, sterile water for injection (without preservatives) has also been suggested as safe. Bacteriostatic water for injection should not be utilized because preservatives increase the rate of decomposition [136].

3) The initially prepared solution can be stored at controlled room temperature (15 to 30 Celsius (C); 59 to 86 Fahrenheit (F)) for up to 24 hours. Protect from light [94].

4) Further dilute the reconstituted powder in 250, 500, or 1000 mL of 5% dextrose solution to prepare infusion solutions in the concentrations of 200 micrograms/milliliter, 100 micrograms/milliliter, or 50 micrograms/milliliter, respectively. These solutions are also stable at room temperature for 24 hours, but must be protected from light with an opaque covering such as aluminum foil [94]. Amber plastic coverings do not afford adequate protection from light degradation and are not recommended [136].

5) Freshly prepared sodium nitroprusside solutions are described as exhibiting colors ranging from faint brown, brownish-pink, light orange to straw. These solutions are highly sensitive to light and trace contaminants and will decompose rapidly resulting in marked discoloration (green, red, orange, dark brown) upon exposure, with blue indicating almost complete degradation. Discolored solutions or those with particulate matter should not be used [136][94].

6) No other drugs should be administered in the same solution [94].

7) During drug infusion, only the bulk solution need be covered with opaque light protection; the infusion tubing need not be protected. Simulated infusions through 3 meters of PVC tubing at 10 and 50 mL/hr for 8 and 24 hours showed no loss in delivered strength. Sorption of sodium nitroprusside to bulk PVC bags does not appear to be clinically significant [136].