INSTRUCTIONS FOR PEDIATRIC WARD (4B) DRUGS

(DOSAGE, ADMINISTRATION, PRECAUTIONS AND MONITORING)

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THE SUPERVISOR OF DRUG INFORMATION CENTER / JUST

1. Calcium Gluconate 10 % (10 ml)

☒ Dosage:

Pediatric: Note: One gram of calcium gluconate salt is equal to 93 mg of elemental calcium.**Dosages expressed in terms of the calcium gluconate salt are based on a solution concentration of 100 mg/mL (10%) containing 0.465 mEq (9.3 mg)/mL elemental calcium, except where noted.**

- ✓ **Hypocalcemia:** General dosing: Infants, Children, and Adolescents: IV: 200 to 500 mg/kg/day as a continuous infusion or in 4 divided doses (maximum dose: 1,000 mg/dose [Infants, Children]; 2,000 to 3,000 mg/dose [Adolescents]) .

  Symptomatic (ie, seizures, tetany): Infants, Children, and Adolescents: IV: 100 to 200 mg/kg/dose over 5 to 10 minutes; usual adult dose: 1,000 to 2,000 mg/dose; may repeat after 6 hours or follow with a continuous infusion of 200 to 800 mg/kg/day.

- ✓ **Cardiac arrest or cardiotoxicity in the presence of hyperkalemia, hypocalcemia, or hypermagnesemia:** Infants, Children, and Adolescents: IV, intraosseous: 60 to 100 mg/kg/dose (maximum: 3,000 mg/dose); may repeat in 10 minutes if necessary; if effective, consider IV infusion

- ✓ **Parenteral nutrition, maintenance requirement:** IV:

Infants and Children (≤50 kg): **Note:** Dose expressed as **elemental calcium:** 0.5 to 4 **mEq elemental calcium**/kg/day

Children (>50 kg) and Adolescents: IV:10 to 20 **mEq elemental calcium** daily . Adjust dose based on total or ionized calcium.

☒ Preparation for Administration:

- IV: Observe the vial for the presence of particulates. If particulates are observed, place vial in a 60°C to 80°C water bath with occasional agitation until solution is clear; shake vigorously; cool to room temperature before use. Do not use vial if particulates do not dissolve. Prior to administration, dilute in D5W or NS and use immediately:

- Bolus: dilute to a concentration of 10 to 50 mg/mL. Continuous infusion: dilute to a concentration of 5.8 to 10 mg/mL.

☒ Administration: IV

- Administer bolus slowly (not to exceed 100 mg/minute in pediatric patients).

- For continuous infusions, adjust rate as needed based on serum calcium levels.

- Due to the potential presence of particulates, use a 0.22 micron inline filter for IV administration (1.2 micron filter if admixture contains lipids).

- Not for IM administration. In acute situations of symptomatic hypocalcemia, infusions over 5 to 10 minutes have been described in pediatric patients .

- **Vesicant**; ensure proper needle or catheter placement prior to and during IV infusion. Avoid extravasation. **Extravasation management:** If extravasation occurs, stop infusion immediately and disconnect (leave needle/cannula in place); gently aspirate extravasated solution (do **NOT** flush the line).

  Early/acute calcium extravasation: Initiate hyaluronidase antidote; remove needle/cannula; apply dry cold compresses; elevate extremity. **Hyaluronidase**: Intradermal or SubQ: Inject a total of 1 to 1.7 mL (15 units/mL) as five separate 0.2 to 0.3 mL injections (using a 25-gauge needle) into area of extravasation at the leading edge in a clockwise manner. May also inject hyaluronidase through the catheter that caused the infiltration.

  Delayed calcium extravasation: Closely monitor site; most calcifications spontaneously resolve. However, if a severe manifestation of calcinosis cutis occurs, may initiate sodium thiosulfate antidote. **Sodium thiosulfate:** IV: 12.5 g over 30 minutes; may increase gradually to 25 g 3 times per week; monitor for non-anion gap acidosis, hypocalcemia, severe nausea.

☒ Precautions :

- Use with caution in patients with severe hyperphosphatemia as elevated levels of phosphorus and calcium may result in soft tissue and pulmonary arterial calcium-phosphate precipitation.

- Hypomagnesemia is a common cause of hypocalcemia; therefore, correction of hypocalcemia may be difficult in patients with concomitant hypomagnesemia. Evaluate serum magnesium and correct hypomagnesemia (if necessary), particularly if initial treatment of hypocalcemia is refractory.

☒ Monitoring Parameters:

Serum calcium every 4 hours (during intermittent infusion) or every 1 to 4 hours (during continuous infusion); albumin, phosphate, and magnesium; vitals and ECG when appropriate. Monitor infusion site.

2. Flumazenil 0.5 mg amp

☒ Dosage:

- ✓ **Reversal of benzodiazepine when used in conscious sedation:** Children ≥1 year and Adolescents: IV: Initial dose: 0.01 mg/kg (maximum dose: 0.2 mg) given **over 15 seconds**. Repeat doses (maximum: 4 doses): If the desired level of consciousness is not obtained, 0.01 mg/kg (maximum dose: 0.2 mg) repeated at 1-minute intervals. **Maximum** total cumulative dose: 1 mg or 0.05 mg/kg (whichever is lower). **Mean total dose**: 0.65 mg (range: 0.08 to 1 mg)

☒ Administration: Administer in freely-running IV into large vein.

- Store at 20°C to 25°C .Once drawn up in the syringe or mixed with D5W, LR, or NS, use within 24 hours. Discard any unused solution after 24 hours.

☒ Precautions:

- Does not consistently reverse amnesia; patient may not recall verbal instructions after procedure.

-Patients must be cautioned about performing tasks which require mental alertness (eg, operating machinery or driving) for 24 hours after discharge.

- Flumazenil is not a substitute for evaluation of oxygenation. Establishing an airway and assisting ventilation, as necessary, is always the initial step in overdose management.

- Benzodiazepine reversal may result in seizures; seizures may occur more frequently in patients on benzodiazepines for long-term sedation or following tricyclic antidepressant overdose. Dose should be individualized and practitioners should be prepared to manage seizures.

☒ Monitoring Parameters

Monitor for return of sedation, respiratory depression, benzodiazepine withdrawal, and other residual effects of benzodiazepines for at least 2 hours and until the patient is stable and re-sedation is unlikely.

3 . Furosemide (20 mg/ 2ml) ampoule(2 ml)

☒ Dosage:

- ✓ **Edema:** Infants, Children, and Adolescents: IM, IV: Initial: 1 mg/kg/dose; if response not adequate, may increase dose in increments of 1 mg/kg/dose and administer not sooner than 2 hours after previous dose, until a satisfactory response is achieved; may administer maintenance dose at intervals of every 6 to 12 hours; maximum dose: 6 mg/kg/dose.

☒ Preparation for Administration:

IV infusion solution may be mixed in NS or D5W solution. May also be diluted for infusion to 1 to 2 mg/mL (maximum: 10 mg/mL).

☒ Administration:

- In children, a maximum rate of 0.5 mg/kg/minute has been recommended.

- May administer IM.

- Protect from light. Exposure to light may cause discoloration; do not use furosemide solutions if they have a yellow color.

- Refrigeration may result in precipitation or crystallization; however, resolubilization at room temperature or warming may be performed without affecting the drug's stability.

- Infusion solution in D5W, NS, or LR is stable for 24 hours at room temperature.

☒ Precautions:

- Close medical supervision and dose evaluation are required. Watch for and correct electrolyte disturbances; adjust dose to avoid dehydration. When electrolyte depletion is present, therapy should not be initiated unless serum electrolytes, especially potassium, are normalized.

- Asymptomatic hyperuricemia has been reported with use.

- Monitor fluid status and renal function in an attempt to prevent oliguria, azotemia, and reversible increases in BUN and creatinine; close medical supervision of aggressive diuresis required.

- Rapid IV administration, severe renal impairment, excessive doses, hypoproteinemia, and concurrent use of other ototoxins are associated with ototoxicity.

- Photosensitization may occur.

- Avoid in patients with Sulfonamide (“sulfa”) allergy.

- If given the morning of surgery, furosemide may render the patient volume depleted and blood pressure may be labile during general anesthesia.

- Pediatric: May lead to nephrocalcinosis or nephrolithiasis in premature infants and in infants and children <4 years of age with chronic use. May prevent closure of patent ductus arteriosus in premature infants.

☒ Monitoring Parameters:

Monitor I & O and weight daily; BP, orthostasis; serum electrolytes, renal function; monitor hearing with high doses or rapid IV administration.

4. Naloxone (0.4 mg/ml) amp

☒ Dosage:

✓ **Opioid overdose:**

IV: Note: May be administered IM, SubQ, or endotracheal (off-label route), but onset of action may be delayed, especially if patient has poor perfusion; endotracheal preferred if IV route not available; doses may need to be repeated. The use of naloxone is not recommended as part of initial resuscitative efforts in the delivery room for neonates with respiratory depression; support ventilation to improve oxygenation and heart rate.

Infants and Children <5 years or ≤20 kg: 0.1 mg/kg/dose (maximum dose: 2 mg); repeat every 2 to 3 minutes if needed

Children ≥5 years or >20 kg and Adolescents: 2 mg; if no response, repeat every 2 to 3 minutes

Endotracheal (off-label route): Infants, Children, and Adolescents: Optimal endotracheal dose unknown; current expert recommendations are 2 to 3 times the IV dose.

Continuous IV infusion: Infants, Children and Adolescents: 24 to 40 mcg/kg/hour has been reported. Doses as low as 2.5 mcg/kg/hour have been reported in adults and a dose of 160 mcg/kg/hour was reported in one neonate. If continuous infusion is required, calculate dosage/hour based on effective intermittent dose used and duration of adequate response seen or use two-thirds of the initial effective naloxone bolus on an hourly basis; titrate dose. **Note:** The infusion should be discontinued by reducing the infusion in decrements of 25%; closely monitor the patient (eg, pulse oximetry and respiratory rate) after each adjustment and after discontinuation of the infusion for recurrence of opioid-induced respiratory depression .

IM, SubQ: Infants, Children and Adolescents: Initial: 0.01 mg/kg/dose; if no response, a subsequent dose of 0.1 mg/kg may be given; **Note:** If using IM or SubQ route, dose should be given in divided doses.

✓ **Reversal of respiratory depression with therapeutic opioid dosing:**

Weight-directed dosing: Infants, Children, and Adolescents: IV: 0.001 to 0.005 mg/kg/dose; titrate to effect. **Note:** AAP recommends a wider dosage range of 0.001 to 0.015 mg/kg/dose .

Fixed dosing: Infants, Children, and Adolescents: IV: Initial: 0.005 to 0.01 mg; repeat every 2 to 3 minutes as needed based on response

☒ **Preparation for administration:** IV push: Dilute naloxone 0.4 mg (1 mL ampule) with 9 mL of NS for a total volume of 10 mL to achieve a concentration of **0.04 mg/mL.**

- IV infusion: Dilute naloxone 2 mg in 500 mL of NS or D5W to make a final concentration of 4 **mcg**/mL.

☒ Administration:

- IV push: Administer over 30 seconds as undiluted preparation **or** administer as diluted preparation slow IV push by diluting 0.4 mg (1 mL) ampoule with 9 mL of normal saline for a total volume of 10 mL to achieve a concentration of 0.04 mg/mL.

- May administer IM or SubQ if unable to obtain IV access.

Endotracheal: There is only anecdotal support for this route of administration. May require a slightly higher dose than used in other routes. Dilute to 1 to 2 mL with normal saline; flush with 5 mL of saline and then administer 5 ventilations.

☒ Precaution:

- Administration of naloxone causes the release of catecholamines, which may precipitate acute withdrawal or unmask pain in those who regularly take opioids. Symptoms of acute withdrawal in opioid-dependent patients may include pain, tachycardia, hypertension, fever, sweating, abdominal cramps, diarrhea, nausea, vomiting, agitation, and irritability**.**

- Continuously observe patients until there is no further risk of recurrent respiratory or CNS depression.

- Use with caution in patients with history of seizures; avoid use in the treatment of meperidine-induced seizures.

- Excessive dosages should be avoided after use of opioids in surgery.

☒ Monitoring Parameters

Respiratory rate, HR, BP, temperature, level of consciousness, ABGs or pulse oximetry.