INSTRUCTIONS FOR EMERGENCY WARD DRUGS

(DOSAGE, ADMINISTRATION, PRECAUTIONS AND MONITORING)

PREPEARED BY CLINICAL PHARMACIST: ESHRAQ ALABWEENY

THE SUPERVISOR OF DRUG INFORMATION CENTER / JUST

1. Acetyl Salicylic Acid 100 mg EC TAB

Dosage:

- ✓ **Secondary prevention after acute coronary syndrome, secondary prevention after (CABG) surgery, primary prevention of cardiovascular diseases (CVD) , secondary prevention of CVD** : 1 tablet daily continued indefinitely.
- ✓ **Atrial fibrillation** (to prevent thromboembolism): 1-3 tablets once daily.
- ✓ **Percutaneous coronary intervention (PCI):** 1-3 tablets preprocedure and 1 tablet daily postprocedure continued indefinitely.
- ✓ **Peripheral arterial disease or coronary artery disease (CAD), established or chronic**: 1 tablet daily.
- ✓ **Prosthetic heart valve replacement** (thromboprophylaxis) : 1 tablet daily with anticoagulation (warfarin).
- ✓ **Pericarditis in association with myocardial infarction:** 6 tablets 4 times daily; may increase after 24 hours to 975 mg(9-10 tablets) 4 times daily if necessary .
- ✓ **Stroke/TIA**: initial dose of 3 tablets within 24 to 48 hours after stroke/TIA onset, followed 1 tablet once daily**.**

☒ Administration:

Do not crush enteric-coated tablet. Administer with food or a full glass of water to minimize GI distress. In situations for which a rapid onset of action is required (eg, acute treatment of MI), have patient chew immediate-release tablet.

☒ Precautions:

- Avoid use in patients with active peptic ulcer disease.

- Avoid for 24 hours following administration of alteplase.

- It should be avoided (if possible) in surgical patients for 1 to 2 weeks prior to elective surgery, to reduce the risk of excessive bleeding.

2 . Adenosine (6 mg/2 ml) Ampoule

☒ Dosage:

Adult:

- ✓ **Paroxysmal supraventricular tachycardia:** rapid IV bolus (over 1 to 2 seconds, via peripheral line): Initial: 6 mg; if not effective within 1 to 2 minutes, 12 mg may be given; may repeat 12 mg bolus if needed (maximum single dose: 12 mg). Follow each dose with 20 mL normal saline flush.
- ✓ **Pharmacologic stress testing:** continuous IV infusion via peripheral line: 140 mcg/kg/minute for 6 minutes using syringe or volumetric infusion pump; total dose: 840 mcg/kg. Thallium-201 is injected at midpoint (3 minutes) of infusion.

Pediatric:

- ✓ **Paroxysmal supraventricular tachycardia:** Infants and Children: IV, Intraosseous: Initial: 0.1 mg/kg (maximum initial dose: 6 mg); if not effective within 1 to 2 minutes, administer 0.2 mg/kg (maximum single dose: 12 mg). Follow each dose with ≥5 mL normal saline flush. **Rapid IV push (over 1 to 2 seconds) via peripheral line, followed by a normal saline flush:**

☒ **Administration**: For rapid bolus IV use only; administer IV push over 1 to 2 seconds at a peripheral IV site as proximal as possible to trunk (not in lower arm, hand, lower leg, or foot); follow each bolus with a rapid normal saline flush (infants and children ≥5 mL; adults 20 mL). Use of 2 syringes (one with adenosine dose and the other with NS flush) connected to a T-connector or stopcock is recommended. If administered via **central line** in adults, reduce initial dose to 3 mg.

☒ **Preparation for Administration: Doses ≥0.6 mg**: Give undiluted. **Doses <0.6 mg**: Further dilution of dose may be necessary to ensure complete and accurate administration; dilution with **NS** to a final concentration of 0.3 to 1 mg/mL has been used; to prepare a 0.3 mg/mL solution, add 3 mg of adenosine (1 mL) to 9 mL of NS; to prepare a 1 mg/mL, add 3 mg of adenosine (1 mL) to 2 mL of NS.

☒ Precautions:

- Avoid use in irregular or polymorphic wide-complex tachycardia.

- Correct electrolyte disturbances, especially hypokalemia or hypomagnesemia, prior to use and throughout therapy.

- Use with extreme caution in heart transplant recipients.

- Avoid use in patients with bronchoconstriction or bronchospasm (eg, asthma); dyspnea, bronchoconstriction, and respiratory compromise have occurred during use.

- Avoid use in patients with WPW syndrome and preexcited atrial fibrillation/flutter since ventricular fibrillation may result.

☒ **Monitoring Parameters:** ECG, HR, BP

3 .Adrenaline Injection (1 mg/ml) Ampoule

Epinephrine 1:1000 = 1 mg/mL and is most commonly used IM

Epinephrine 1:10,000 = 0.1 mg/mL and is used IV

☒ Dosage:

Adult:

- ✓ **Asystole/pulseless arrest, pulseless VT/VF :***IV, Intraosseous:* 1 mg every 3 to 5 minutes until return of spontaneous circulation. *Endotracheal:* 2 to 2.5 mg every 3 to 5 minutes until IV/intraosseous access established or returns of spontaneous circulation; dilute in 5 to 10 mL NS or sterile water (preferable).
- ✓ **Bradycardia (symptomatic; unresponsive to atropine or pacing):** *IV infusion:* 2 to 10 mcg/minute **or** 0.1 to 0.5 mcg/kg/minute, titrate to desired effect.
- ✓ **Hypersensitivity reaction (eg, anaphylaxis): Note:** *IM (preferred), SubQ:* 0.2 to 0.5 mg using the **1 mg/mL** solution every 5 to 15 minutes in the absence of clinical improvement.
- ✓ **Hypotension/shock:** Severe and fluid resistant: IV infusion: Initial: 0.01 to 0.5 mcg/kg/minute; titrate to desired response. **Septic shock**: IV infusion: Initial: 0.05 to 2 mcg/kg/; titrate to desired mean arterial pressure (MAP). May adjust dose every 10 to 15 minutes by 0.05 to 0.2 mcg/kg/minute to achieve desired blood pressure goal. After hemodynamic stabilization, may wean incrementally every 30 minutes over 12 to 24 hours.

Pediatrics:

- ✓ **Asystole/pulseless arrest, pulseless VT/VF (after failed defibrillation attempts), Bradycardia (symptomatic; unresponsive to atropine or pacing): :** Infants, Children, and Adolescents:

IV, Intraosseous: 0.01 mg/kg (0.1 mL/kg of **0.1 mg/mL** solution) (maximum single dose: 1 mg) every 3 to 5 minutes until return of spontaneous circulation

Endotracheal: 0.1 mg/kg (0.1 mL/kg of **1 mg/mL** solution) (maximum single dose: 2.5 mg) every 3 to 5 minutes until IV/Intraosseous access established or return of spontaneous circulation.

Note: IV and Intraosseous are the preferred methods of administration.

- ✓ **Cardiac output maintenance/stabilization, postresuscitation :** Infants, Children, and Adolescents: Continuous IV/Intraosseous infusion: 0.1 to 1 mcg/kg/minute; doses <0.3 mcg/kg/minute generally produce beta-adrenergic effects and higher doses (>0.3 mcg/kg/minute) generally produce alpha-adrenergic vasoconstriction; titrate dosage to desired effect.
- ✓ **Hypersensitivity reaction (eg, anaphylaxis):** Infants, Children, and Adolescents: **Note:** SubQ administration results in slower absorption and is less

reliable. IM administration in the anterolateral aspect of the middle third of the thigh is preferred in the setting of anaphylaxis

General dosing or health care settings: IM (preferred), SubQ: 0.01 mg/kg (0.01 mL/kg of **1 mg/mL** solution) not to exceed 0.3 to 0.5 mg every 5 to 15 minutes.

- ✓ **Hypotension/shock, fluid-resistant:** Infants, Children, and Adolescents:

Continuous IV infusion: 0.1 to 1 mcg/kg/minute; rates >0.3 mcg/kg/minute associated with vasopressor activity; doses up to 5 mcg/kg/minute may rarely be necessary; for fluid-resistant shock, may be combined with inotropic support .

SubQ: 0.01 mg/kg (0.01 mL/kg of 1 mg/mL solution) (maximum single dose: 0.5 mg) every 20 minutes for 3 doses .

☒ Administration:

IV infusion: 1 mg in 250 mL (concentration: 4 mcg/mL) of D5W or NS.

IV: **central line** is preferred in continuous infusion. IV infusions require an infusion pump. If central line not available, as a temporary measure, may administer through a large vein. Avoid use of ankle veins, leg veins in elderly patients, or leg veins in those suffering from occlusive vascular diseases (eg, diabetic endarteritis, Buerger disease, arteriosclerosis, and atherosclerosis).

Vesicant; ensure proper needle or catheter placement prior to and during infusion; avoid extravasation.

Extravasation management: stop infusion immediately and disconnect (leave cannula/needle in place); gently aspirate extravasated solution (do NOT flush the line); remove needle/cannula; elevate extremity. Initiate phentolamine (or alternative antidote). Apply dry warm compresses.

Phentolamine: Dilute 5 to 10 mg in 10 to 20 mL NS and administer into extravasation site as soon as possible after extravasation; may readminister if patient remains symptomatic.

- SubQ administration results in slower absorption and is less reliable.

- Endotracheal: Dilute in NS or sterile water. Absorption may be greater with sterile water. Stop compressions, spray drug quickly down tube. Follow immediately with several quick insufflations and continue chest compressions. May cause false-negative reading with exhaled CO_2 detectors; use second method to confirm tube placement if CO_2 is not detected.

☒ Precautions:

- Rapid IV administration may cause death from cerebrovascular hemorrhage or cardiac arrhythmias. However, rapid IV administration during pulseless arrest is necessary.

- IM administration in the anterolateral aspect of the middle third of the thigh is preferred in the setting of anaphylaxis. Do not administer repeated injections at the same site (tissue necrosis may occur). Monitor for signs/symptoms of injection-site infection.

- Correct blood volume depletion before administering adrenaline

- Adrenaline is sensitive to light and air. Protection from light is recommended. Oxidation turns drug pink, then a brown color. Solutions should not be used if they are discolored or contain a precipitate.

☒ Monitoring Parameters

HR, BP (invasive blood pressure monitoring and central venous pressure monitoring recommended while receiving continuous infusion); monitor site of infusion for blanching/extravasation.

4 . Amiodarone Injection (150 mg/3ml) Ampoule

☒ Dosage:

Adult:

- ✓ **Pharmacologic cardioversion for (Atrial fibrillation, Supraventricular tachycardia), electrical storm and incessant ventricular tachycardia hemodynamically stable, sudden cardiac arrest due to VF or pulseless VT, sustained monomorphic VT hemodynamically stable**: IV: Initial: 150 mg over 10 minutes, then 1 mg/minute for 6 hours, followed by 0.5 mg/minute for at least 18 hours ,then change to oral maintenance dosing.
  - ✓ **Rate control for atrial fibrillation:** IV: 300 mg over 1 hour, then 10 to 50 mg/hour over 24 hours followed by an oral maintenance dose .Some experts recommend a more typical regimen of 150 mg over at least 10 minutes, followed by 0.5 to 1 mg/minute; may administer repeat boluses of 150 mg IV over at least 10 minutes as needed. Mean daily doses >2.1 g/day have been associated with hypotension.

Pediatric

- ✓ **Pulseless ventricular tachycardia or ventricular fibrillation:** Infants, Children, and Adolescents: IV, Intraosseous: 5 mg/kg (maximum: 300 mg per dose) rapid bolus; may repeat twice up to a maximum total dose of 15 mg/kg during acute treatment.
- ✓ **Perfusing tachycardias:** Infants, Children, and Adolescents: IV, Intraosseous: Loading dose: 5 mg/kg (maximum: 300 mg per dose) over 20 to 60 minutes; may repeat twice up to maximum total dose of 15 mg/kg during acute treatment.

☒ Administration:

- Injection must be diluted in D5W before continuous IV infusion use. Dilute to final concentration of 1 to 6 mg/mL. During pulseless VT/VF, administering undiluted is preferred.

- For infusions >1 hour, use concentrations ≤2 mg/mL unless a central venous catheter is used.

- Administer through an IV line located as centrally as possible. For peripheral infusions, an in-line filter has been recommended during administration to reduce the incidence of phlebitis.

- Adjust administration rate to urgency (give more slowly when perfusing arrhythmia present). Slow the infusion rate if hypotension or bradycardia develops. Infusions >2 hours must be administered in a non-PVC container (eg, glass or polyolefin). PVC tubing is recommended for administration regardless of infusion duration.

- **Incompatible** with heparin; flush with saline prior to and following infusion.

- May be a **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); initiate hyaluronidase antidote for refractory cases; remove needle/cannula; apply dry warm compresses; elevate extremity.

Hyaluronidase: Intradermal: Inject a total of 1 mL (15 units/mL) as 5 separate 0.2 mL injections (using a 25-gauge needle) into area of extravasation.

☒ Precautions:

- May cause hypotension and bradycardia (infusion-rate related).

- May cause life-threatening or fatal cutaneous reactions, including Stevens-Johnson syndrome and toxic epidermal necrolysis (TEN). If symptoms or signs (eg, progressive skin rash often with blisters or mucosal lesions) occur, immediately discontinue.

-Avoid excessive exposure to sunlight; may cause photosensitivity.

-Amiodarone can exacerbate arrhythmias.

- Prior to initiation, obtain a baseline chest X-ray and pulmonary function tests, including diffusion capacity. Repeat history, physical exam, and chest X-ray every 3 to 6 months.

- May cause hyper- or hypothyroidism. Assess thyroid function tests before initiation of treatment and then periodically.

- Correct electrolyte disturbances, especially hypokalemia, hypomagnesemia, or hypocalcemia, prior to use and throughout therapy.

☒ Monitoring Parameters

BP, HR, ECG and rhythm, serum electrolytes, especially potassium and magnesium, infusion site.

5. Atracurium (50 mg/5 ml) ampoule (5 ml)

☒ Dosage:

Adult:

- ✓ **Intensive care unit paralysis :** IV: Initial bolus of 0.4 to 0.5 mg/kg, followed by 4 to 20 mcg/kg/minute (0.24 to 1.2 mg/kg/hour)

- ✓ **Neuromuscular blockade for endotracheal intubation, surgery, or mechanical ventilation (as adjunct to general anesthesia):** IV (bolus): 0.4 to 0.5 mg/kg, then 0.08 to 0.1 mg/kg administered 20 to 45 minutes after initial dose to maintain neuromuscular block; repeat dose at 15- to 25-minute intervals as needed. **Maintenance infusion during extended surgical procedures:** a continuous infusion may be initiated at a rate of 9 to 10 mcg/kg/minute (0.54 to 0.6 mg/kg/hour); block usually maintained by a rate of 5 to 9 mcg/kg/minute (0.3 to 0.54 mg/kg/hour) under balanced anesthesia; range: 2 to 15 mcg/kg/minute (0.12 to 0.9 mg/kg/hour).

Pediatric

- ✓ **Adjunct to surgical anesthesia (neuromuscular blockade):** IV (not to be used IM): Dose to effect; doses must be individualized due to interpatient variability; use ideal body weight for obese patients

Infants and Children <2 years: Initial: 0.3 to 0.4 mg/kg followed by maintenance doses as needed to maintain neuromuscular blockade. **Note:** Maintenance doses in infants and children may need to be administered with slightly greater frequency compared to adults.

Children ≥2 years and Adolescents: 0.4 to 0.5 mg/kg, then 0.08 to 0.1 mg/kg administered 20 to 45 minutes after initial dose to maintain neuromuscular block; repeat dose at 15- to 25-minute intervals as needed. **Note:** Initial dose may be reduced to 0.3 to 0.4 mg/kg in patients with significant cardiovascular disease or history of elevated risk of histamine release (eg, severe anaphylactoid reactions or asthma).

☒ Preparation for Administration:

- May prepare an infusion solution (final concentrations: 0.2 mg/mL or 0.5 mg/mL) by admixing with an appropriate diluent (eg, NS, D_5W, D_5NS).
-Do not mix with alkaline solutions

☒ Administration:

- May be given undiluted as a bolus injection.
- Do not administer IM (excessive tissue irritation).
- May also administer via continuous infusion; requires the use of an infusion pump. Use infusion solutions within 24 hours of preparation

☒ Precautions:

- Ensure adequate pain control and sedation prior to and during administration of neuromuscular blockade to achieve deep sedation.
- Resistance may occur in burn patients (≥20% of total body surface area), usually several days after the injury, and may persist for several months after wound healing
- Use with caution in the elderly, effects and duration are more variable.
- Maintenance of an adequate airway and respiratory support is critical.
- Reduce initial dosage and inject slowly (over 1 to 2 minutes) in patients in whom substantial histamine release would be potentially hazardous (eg, patients with clinically-important cardiovascular disease).
- Accidental administration may be fatal. Confirm proper selection of intended product, store vial so the cap and ferrule are intact and the possibility of selecting the wrong product is minimized, and ensure that the intended dose is clearly labeled and communicated, when applicable.

☒ Monitoring Parameters

- Vital signs (HR, BP, RR); degree of muscle paralysis (eg, presence of spontaneous movement, ventilator asynchrony, shivering, and consider use of a peripheral nerve stimulator with train of four monitoring along with clinical assessments).

6 . Atropine Sulfate Injection (1 mg/ml) Ampoule

☒ **Dosage:**

Adult

- ✓ **Antidote for anticholinesterase poisoning** (carbamate insecticides, nerve agents, organophosphate insecticides); antidote for muscarine-containing mushroom poisoning: *IV, IM, endotracheal:* 1 to 6 mg; repeat every 3 to 5 minutes as needed, doubling the dose if previous dose did not induce a response. Administer repeat doses as needed for ≥2 to 12 hours based on recurrence of symptoms.
- ✓ **Treatment of symptomatic sinus bradycardia, atrioventricular (AV) nodal block**.: *IV, IM:* 0.5 mg every 3 to 5 minutes; maximum total dose: 3 mg

- ✓ **Inhibit salivation and secretions (preanesthesia):** *IM, IV, SubQ:* 0.4 to 1 mg 30 to 60 minutes preoperatively and repeats every 4 to 6 hours as needed; maximum total dose: 3 mg.

Pediatric

Note: Doses <0.1 mg have been associated with paradoxical bradycardia.

- ✓ **Bradycardia:**
- ✓ *IV, I.O.:* Infants, Children, and Adolescents: 0.02 mg/kg, minimum dose recommended by PALS: 0.1 mg; however, use of a minimum dosage of 0.1 mg in patients <5 kg will result in dosages >0.02 mg/kg and is not recommended ; there is no documented minimum dosage in this age group; maximum single dose: 0.5 mg; may repeat once in 3 to 5 minutes; maximum total dose: 1 mg .
- ✓ **Muscarine-containing mushroom poisoning:** Infants, Children, and Adolescents: IV: 0.02 mg/kg/dose; minimum dose: 0.1 mg. Titrate and repeat as needed.
- ✓ **Organophosphate or carbamate insecticide or nerve agent poisoning:** Infants, Children, and Adolescents: **Note:** The dose of atropine required varies considerably with the severity of poisoning. The total amount of atropine used for carbamate poisoning is usually less than with organophosphate insecticide or nerve agent poisoning. Severely poisoned patients may exhibit significant tolerance to atropine; ≥2 times the suggested doses may be needed. Titrate to pulmonary status (decreased bronchial secretions); consider administration of atropine via continuous IV infusion in patients requiring large doses of atropine. Once patient is stable for a period of time, the dose/dosing frequency may be decreased.

  IV, IM : Initial: 0.05 to 0.1 mg/kg; repeat every 5 to 10 minutes as needed, doubling the dose if previous dose does not induce atropinization. Maintain atropinization by administering repeat doses as needed for ≥2 to 12 hours based on recurrence of symptoms .

  IV infusion: Following atropinization, administer 10% to 20% of the total loading dose required to induce atropinization as a continuous IV infusion per hour; adjust as needed to maintain adequate atropinization without atropine toxicity .

☒ **Administration**: Administer undiluted by rapid IV injection; slow injection may result in paradoxical bradycardia. In bradycardia, atropine administration should not delay treatment with external pacing.

☒ Precautions:

- IV doses <0.5 mg have been associated with paradoxical bradycardia.

- Avoid use if possible in patients with obstructive uropathy or in other conditions resulting in urinary retention.

- Use may cause thickening of bronchial secretions and formation of viscid plugs in patients with chronic lung disease.

- Use may precipitate acute glaucoma.

☒ Monitoring Parameters:

HR, BP, pulse, mental status; intravenous administration requires a cardiac monitor. Signs and symptoms of atropine toxicity (eg, fever, muscle fasciculation, delirium); if toxicity occurs, discontinue atropine and monitor closely.

7 . Calcium Gluconate 10 % (10 ml)

☒ Dosage:

Adult:

✓ **Hypocalcemia:** IV:

Mild (ionized calcium: [1 to 1.2 mmol/L]): 1 to 2 g over 2 hours; asymptomatic patients may be given oral calcium.

Moderate to severe (without seizure or tetany; ionized calcium: [<1 mmol/L]): 4 g over 4 hours.

Severe symptomatic (eg, seizure, tetany): 1 to 2 g over 10 minutes; repeat every 60 minutes until symptoms resolve. **Note:** Repeat ionized calcium measurement 6 to 10 hours after completion of administration. Check for hypomagnesemia and correct if present. Consider continuous infusion if hypocalcemia is likely to recur due to ongoing losses. ***Continuous infusion***: 5 to 20 mg/kg/hour; in patients with hypoparathyroidism, oral calcium and active vitamin D (ie, calcitriol) with or without ergocalciferol or cholecalciferol should be initiated as soon as is practical; IV calcium is generally tapered slowly while oral therapy is adjusted .

✓ **Hypocalcemia induced by citrate-based replacement fluid during continuous renal replacement therapy (CRRT)**: IV (administered via return line): **Note:** Prior to initiation of CRRT, check ionized calcium and administer calcium gluconate if (<1 mmol/L) until (>1 mmol/L). During CRRT, a continuous infusion sliding scale may be initiated (may use calcium gluconate 20 gram/1,000 mL NS or D5W solution). The following schema has been employed :
If ionized calcium is **(<0.9 mmol/L)**: Notify nephrology. If ionized calcium is **(0.9 to 1 mmol/L)**: 1.4 g/hour. If ionized calcium is **(1 to 1.1 mmol/L)**: 1.2 g/hour. If ionized calcium is **(1.1 to 1.3 mmol/L)**: 1 g/hour. If ionized calcium is **(>1.3 mmol/L)**: Notify nephrology.

✓ **Cardiac arrest or cardiotoxicity in the presence of hyperkalemia, hypocalcemia, or hypermagnesemia:** IV: 1.5 to 3 g over 2 to 5 minutes.

✓ **Parenteral nutrition, maintenance requirement:** IV: **Note:** Expressed in terms of **elemental calcium:** 10 to 20 **mEq elemental calcium** daily. Adjust dose based on total or ionized calcium.

Pediatric

Note: One gram of calcium gluconate salt is equal to 93 mg of elemental calcium.

✓ **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 .

☒ 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 200 mg/minute in adults or 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.

8. Chlorpheniramine maleate 10mg/1ml

☒ Dosage:

Adult:

- ✓ **Allergic symptoms, allergic rhinitis, urticaria, pruritus** :IM, IV, or SubQ
  :Usual range: 5 to 20 mg once or twice daily (maximum: 40 mg/24 hours)

Pediatric:

- ✓ **Allergic symptoms, allergic rhinitis, urticaria, pruritus:** IM, IV, or SubQ:

Infants 1 month to <1 year: 0.25 **mg/kg** per dose. Children 1 to <6 years: 2.5 to 5 **mg** per dose **or** 0.2 **mg/kg** per dose. Children 6 to 12 years: 5 to 10 **mg** per dose **or** 0.2 **mg/kg** per dose. Children >12 and Adolescents: 10 to 20 **mg** per dose **or** 0.2 **mg/kg** per dose

☒ Administration :

IV Inject slowly over at least 1 minute.

☒ Preparation for Administration:

May be diluted with NS to a final concentration of 1 mg/mL to facilitate accurate measurement.

☒ Precautions:

-May cause CNS depression, which may impair physical or mental abilities; patients must be cautioned about performing tasks which require mental alertness (eg, operating machinery or driving).

-Use with caution in patients with cardiovascular disease (including hypertension and ischemic heart disease).

- Use with caution in patients with increased intraocular pressure.

- Use with caution in patients with prostatic hyperplasia and/or GU obstruction.

- Use with caution in patients with asthma or other chronic breathing disorders.

-Use with caution in patients with thyroid dysfunction.

- Effects may be potentiated when used with other sedative drugs or ethanol.

- Antihistamines may cause excitation in young children. Not for OTC use in children <2 years of age.

9. Dexamethasone 8 mg/2ml amp

☒ Dosage:

Adult

- ✓ **Adrenal crisis (shock due to adrenal insufficiency and unresponsive to conventional therapy):** IV: 4 to 10 mg as a single dose, which may be repeated if necessary.
- ✓ **Anti-inflammatory/immunosuppressive/endocrine disorders:** IM, IV: 0.5 to 9 mg/day in divided doses every 6 to 12 hours; dose depends upon condition being treated and response of patient..
- ✓ **Accelerated fetal lung maturation :** IM: 6 mg every 12 hours for a total of 4 doses. A single course is recommended for women between 24 and 34 weeks of gestation, including those with ruptured membranes or multiple gestations, who are at risk of delivering within 7 days. A single course may be appropriate in some women beginning at 23 weeks gestation or late preterm (between 34 0/7 weeks and 36 6/7 weeks gestation). A single repeat course may be considered in some women with pregnancies less than 34 weeks gestation at risk for delivery within 7 days and who had a course of antenatal corticosteroids >14 days prior .
- ✓ **Airway edema or extubation:** IV: 0.5 mg/kg/dose (maximum dose: 10 mg/dose) 6 to 12 hours prior to extubation then every 6 hours for 5 doses **or** 5 mg every 6 hours for 4 doses with extubation performed 24 hours after last injection .

Pediatric

- ✓ **Anti-inflammatory/immunosuppressive/endocrine disorders:** Infants, Children, and Adolescents: IM, IV: Initial dose range: 0.02 to 0.3 mg/kg/**day** (0.6 to 9 mg/m^2/**day**) in divided doses every 6 to 12 hours; dose depends upon condition being treated and response of patient; dosage for infants and children should be based on disease severity and patient response
- ✓ **Asthma exacerbation:** Infants, Children, and Adolescents: IM, IV: 0.6 mg/kg once daily as a single dose or once daily for 2 days; maximum dose: 16 mg/dose; single dose regimens as low as 0.3 mg/kg/dose and as high as 1.7 mg/kg/dose have also been reported. **.**
- ✓ **Airway edema or extubation :** Infants, Children, and Adolescents: IV: 0.5 mg/kg/dose (maximum dose: 10 mg/dose) 6 to 12 hours prior to extubation then every 6 hours for 5 doses (total dexamethasone dose: 3 mg/kg) .

☒ Preparation for Administration: May be given undiluted or further diluted in NS or D5W. Use the preservative-free product in neonates, especially premature infants.

☒ Administration :

IM: Administer 4 mg/mL concentration by deep IM injection.

IV: May administer 4 mg/mL concentration undiluted over ≤1 minute. Rapid administration may be associated with perineal irritation (especially with higher doses); consider further dilution and administration by IV intermittent infusion over 5 to 15 minutes.

☒ Precautions:

- May cause hypercortisolism or suppression of hypothalamic-pituitary-adrenal (HPA) axis, particularly in younger children or in patients receiving high doses for prolonged periods.

- May alter glucose production/regulation leading to hyperglycemia.

☒ Monitoring Parameters:

Hemoglobin, occult blood loss, **blood pressure, serum potassium**, **glucose**, weigh, HPA axis suppression.

10. Diazepam(10 mg) Ampoule

☒ Dosage:

Adult:

- ✓ **Acute ethanol withdrawal:** *IV, IM:* 10 mg initially; may administer 5 to 10 mg 3 to 4 hours later, if needed.
  - ✓ **Anxiety (symptoms/disorders):** *IM, IV:* 2 to 10 mg; may repeat in 3 to 4 hours, if needed. **Preoperative: Anxiety:** *IM:* 10 mg prior to surgery
  - ✓ **Sedation in the ICU patient:** *IV:* Loading dose: 5 to 10 mg; Maintenance dose: 0.03 to 0.1 mg/kg every 30 minutes to 6 hours.

Pediatric:

- ✓ **Conscious sedation for procedures:** *IV:* Adolescents: 5 mg; may repeat with 2.5 mg if needed.
- ✓ **Muscle spasm associated with tetanus:** *IV, IM:* Infants >30 days and Children <5 years: 1 to 2 mg/dose every 3 to 4 hours as needed. Children ≥5 years: 5 to 10 mg/dose every 3 to 4 hours as needed.
- o **Status epilepticus:** *IV:* 0.1 to 0.3 mg/kg (maximum dose: 10 mg) given over ~2 minutes; may repeat dose after 5 to 10 minutes OR *IV*: 0.15 to 0.2 mg/kg (maximum dose: 10 mg); may repeat once OR *IV:* 0.15 mg/kg (maximum dose: 10 mg) given at a rate of ≤5 mg/minute; may repeat in 5 minutes.

☒ Administration:

- Administer undiluted by slow IV push; do not mix with other solutions or medications.
- Rapid injection may cause respiratory depression or hypotension. In infants and children, do not exceed 1 to 2 mg/minute IV push.
- Do not administer through small veins (eg, dorsum of hand/wrist). Avoid intra-arterial administration.
- Continuous infusion is not recommended because of precipitation in IV fluids and absorption of drug into infusion bags and tubing.
- Vesicant; ensure proper needle or catheter placement prior to and during infusion; avoid extravasation.

Extravasation management: If extravasation occurs, stop IV administration immediately and disconnect (leave cannula/needle in place); gently aspirate extravasated solution (do **NOT** flush the line); remove needle/cannula; elevate extremity. Apply dry cold compresses.

☒ Precautions:

- It has been associated with anterograde amnesia.

- Patients must be cautioned about performing tasks that require mental alertness (eg, operating machinery, driving).

- Use with caution in patients with respiratory disease; a lower dose is recommended for chronic respiratory insufficiency.

- Concomitant use with opioids may result in profound sedation, respiratory depression, coma, and death; limit dosages and durations to the minimum required. Follow patients for signs and symptoms of respiratory depression and sedation.

- Chronic use of this agent may increase the perioperative benzodiazepine dose needed to achieve desired effect.

- Use caution when reducing dose or withdrawing therapy; decrease slowly and monitor for withdrawal symptoms.

☒ Monitoring Parameters:

HR, RR, BP, and mental status; liver enzymes and CBC with long-term therapy, depth of sedation in critically-ill patients.

11. Diclofenac sodium (75 mg) Ampoule

☒ Dosage:

Adult:

Pain: IM: 75 mg diclofenac; if needed may repeat dose several hours later (maximum diclofenac dose: 150 mg/day). Alternatively, may combine with other dosage forms (tablets, capsules, suppositories) up to a maximum combined diclofenac dose of 150 mg/day.

☒ **Administration**: Administer by deep intragluteal injection in upper outer quadrant. If two injections daily are required, the other buttock should be used to administer the second injection.

☒ Precautions:

- Diclofenac can cause an increased risk of serious (and potentially fatal) adverse cardiovascular thrombotic events, including MI and stroke. Risk may occur early during treatment and may increase with duration of use.

- Diclofenac can cause an increased risk of serious gastrointestinal inflammation, ulceration, bleeding, and perforation (may be fatal); elderly patients and patients with history of peptic ulcer disease and/or GI bleeding are at greater risk for serious GI events. These events may occur at any time during therapy and without warning. Avoid use in patients with active GI bleeding.

- Contraindicated in patients with aspirin-sensitive asthma; severe, potentially fatal bronchospasm may occur. Use caution in patients with other forms of asthma.

☒ Monitoring Parameters:

Blood pressure, renal function.

12 . Digoxin (0.5 mg/ 2 ml) ampoule

☒ Dosage:

Adult:

- ✓ **Rate control in atrial fibrillation or atrial flutter, supraventricular tachycardia :** *Total digitalizing dose (TDD):* Initial: IV: 0.25 to 0.5 mg over several minutes, with repeat doses of 0.25 mg every 6 hours to a maximum of 1.5 mg over 24 hours **or** a total of 8 to 12 **mcg**/kg (use lean body weight) (not to exceed 0.75 to 1.5 **mg**) administered by giving 50% of TDD over 5 minutes and the remaining 50% as 2 doses of 25% of TDD at 4- to 8-hour intervals after the initial dose; follow either of these TDD regimens with an oral maintenance regimen .

Pediatric: Note: Dosage must be individualized due to substantial individual variation and must take into account renal function. Doses should be based on lean body weight.

- ✓ **Heart failure :(optional):** Total digitalizing dose should be divided (see below); digitalizing dose (loading dose) may not be necessary; consider use if rapid titration is desired. To avoid toxicity, consider doses at lower end of the recommended range; dosage should be individualized based on patient response (eg, clinical response, serum drug levels).

Infants, Children, and Adolescents: IV **(Digitalizing dose), initial regimen** :Do not give full total digitalizing dose (TDD) at once. Give one-half of the TDD for the initial dose, then give one-fourth of the TDD for each of 2 subsequent doses at 6- to 8-hour intervals; prior to additional doses, clinical response should be fully evaluated (eg, ECG).

Dosage Recommendations for Digitalizing Dose (Optional) Based on lean body weight and normal renal function for age		Maintenance Dosage Recommendations for Digoxin
Age	**Total Digitalizing Dose** **Administer in 3 Divided Doses (mcg/kg)(IV)**	**Daily Maintenance Dose** **If ≤10 years, administer in equal divided doses twice** **dailyIf >10 years, administer once daily** **(mcg/kg/day) (IV)**
1-24 months	30 to 50	9-15
2-5 years	25-35	6-9
5-10 years	15-30	4-8
>10 years	8 to 12	2-3

- ✓ **Tachyarrhythmias, treatment:** Infants, Children, and Adolescents: IV:Initial (digitalizing dose):IV: 10 to 12 mcg/kg/dose every 8 hours for 3 doses

☒ Preparation for Administration:

May be administered undiluted or diluted fourfold in D_5W, NS, or SWFI for direct injection. Less than fourfold dilution may lead to drug precipitation.

☒ Administration:

- May be administered undiluted or diluted. Inject slowly over ≥5 minutes

- Vesicant; ensure proper needle or catheter placement prior to and during administration; avoid extravasation.

Extravasation management: If extravasation occurs, stop IV administration immediately and disconnect (leave cannula/needle in place); gently aspirate extravasated solution (do **NOT** flush the line); remove needle/cannula; elevate extremity.

☒ Precautions:

- Digoxin toxicity: Signs and symptoms of digoxin toxicity include anorexia, nausea, vomiting, visual changes, and cardiac arrhythmias; toxicity is usually associated with digoxin levels >2 ng/mL, although symptoms may occur at lower levels. Patients at increased risk for digoxin toxicity include those with low body weight, advanced age, renal impairment, hypokalemia, hypercalcemia, or hypomagnesemia.

- Proarrhythmic effects: Monitor for proarrhythmic effects (especially with digoxin toxicity).
- Correct electrolyte disturbances, especially hypokalemia or hypomagnesemia, prior to use and throughout therapy; toxicity may occur despite therapeutic digoxin concentrations
- Use with caution in patients with renal impairment; dosage adjustment needed.

☒ Monitoring Parameters

HR, rhythm , periodic ECGs to assess desired effects and signs of toxicity; baseline and periodic serum creatinine, serum electrolytes, digoxin level.

13 . Dobutamine 250 mg injection

☒ Dosage:

Adult:

- ✓ **Cardiac decompensation:** IV infusion:Initial dose: 0.5 to 1 mcg/kg/minute; may also initiate at higher doses (eg, 2.5 mcg/kg/minute) depending on severity of decompensation with titration to desired response.
  Maintenance dose: 2 to 20 mcg/kg/minute. Maximum dose: 40 mcg/kg/minute. Heart failure guidelines recommend a maximum dose of 20 mcg/kg/minute

- ✓ **Stress echocardiography (diagnostic agent):** IV infusion: Initial: 5 to 10 mcg/kg/minute; increase at 3-minute intervals to 20 mcg/kg/minute, then 30 mcg/kg/minute, and then 40 mcg/kg/minute.

Pediatric

- ✓ **Maintain cardiac output and for post-resuscitation stabilization:** Infants, Children, and Adolescents: Continuous IV or Intraosseous infusion: Initial: 0.5 to 1 mcg/kg/minute, titrate gradually every few minutes until desired response achieved; usual range: 2 to 20 mcg/kg/minute.

☒ Administration:

- IV infusion: 250 mg in 500 mL (concentration: 500 **mcg**/mL), 500 mg in 250 mL (concentration: 2,000 **mcg**/mL), **or** 1,000 mg in 250 mL (concentration: 4000 **mcg**/mL) of D5W or NS.
- Always administer via infusion device; administer into large vein.

☒ Precautions:

- Ensure that ventricular rate is controlled in atrial fibrillation/flutter before initiating; may increase ventricular response rate.
- May cause dose-related increases in heart rate.
- Correct electrolyte disturbances, especially hypokalemia or hypomagnesemia, prior to use and throughout therapy to minimize the risk of arrhythmias.
- Correct hypovolemia first to optimize hemodynamics.

☒ Monitoring Parameters

BP, ECG, HR, CVP, RAP, MAP

14 . Dopamine (40 mg/ ml) ampoule(5 ml)

☒ Dosage:

Adult, Pediatric:

- ✓ **Hemodynamic support:** IV infusion: 2 to 20 mcg/kg/minute; titrate to desired response (maximum: 50 mcg/kg/minute); infusion may be gradually increased by 5 to 10 mcg/kg/minute increments until optimal response is obtained.

☒ Administration:

- IV administer as a continuous infusion with the use of an infusion pump.
- Administer into large vein to prevent the possibility of extravasation (central line administration); monitor continuously for free flow; use infusion device to control rate of flow; administration into an umbilical arterial catheter is not recommended.
- When discontinuing the infusion, gradually decrease the dose of dopamine (sudden discontinuation may cause hypotension).

- **Vesicant**; ensure proper needle or catheter placement prior to and during infusion; avoid extravasation.

Extravasation management: If extravasation occurs, stop infusion immediately and disconnect (leave cannula/needle in place); gently aspirate extravasated solution (do **NOT** flush the line); remove needle/cannula; elevate extremity. Initiate phentolamine antidote. Apply dry warm compresses.

Phentolamine: Dilute 5 to 10 mg in 10 to 20 mL NS and administer into extravasation site as soon as possible after extravasation; may readminister if patient remains symptomatic .

☒ Precautions:

- May cause increases in heart rate, increasing the risk of tachycardia and other tachyarrhythmias including ventricular arrhythmias.
- Correct electrolyte disturbances, especially hypokalemia or hypomagnesemia, prior to use and throughout therapy to minimize the risk of arrhythmias.

- Protect from light.

☒ Monitoring Parameters:

BP, ECG, HR, CVP, RAP, MAP

15. Flumazenil 0.5 mg amp

☒ **Dosage:**

Adult :

- ✓ **Benzodiazepine reversal when used in conscious sedation or general anesthesia:** IV: Initial dose: 0.2 mg **over 15 seconds**. Repeat doses (maximum: 4 doses): If the desired level of consciousness is not obtained, 0.2 mg may be repeated at 1-minute intervals. Maximum total cumulative dose: 1 mg (usual total dose: 0.6 to 1 mg). In the event of resedation: Repeat doses may be given at 20-minute intervals as needed at 0.2 mg per minute to a maximum of 1 mg total dose and 3 mg in 1 hour.
- ✓ **Management of benzodiazepine overdose:** IV: Initial dose: 0.2 mg **over 30** seconds; if the desired level of consciousness is not obtained 30 seconds after the dose, 0.3 mg can be given over 30 seconds. Repeat doses: 0.5 mg over 30 seconds repeated at 1-minute intervals. Maximum total cumulative dose: 3 mg (usual total dose: 1 to 3 mg).

Pediatric

- ✓ **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 resedation is unlikely.

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

☒ Dosage:

Adult

- ✓ **Acute pulmonary edema:** IV: Initial: 40 mg/dose. If response not adequate within 1 hour, may increase to 80 mg/dose. **Note:** Minimal additional response is gained by single doses over 160 to 200 mg; maximum: 200 mg/dose
- ✓ **Edema:**IM, IV: Initial: 20 to 40 mg/dose; if response is not adequate, may repeat the same dose or increase dose in increments of 20 mg/dose and administer 1 to 2 hours after previous dose (maximum: 200 mg/dose). **Note:** A higher initial dose may be considered for those receiving chronic oral diuretic therapy. Individually determined dose should then be given once or twice daily although some patients may initially require dosing as frequent as every 6 hours.

  - Continuous IV infusion: Initial: IV bolus dose 40 to 100 mg over 1 to 2 minutes, followed by continuous IV infusion rate of 10 to 40 mg/hour; repeat loading dose before increasing infusion rate.

  Note: In clinical trials evaluating dosing strategies in acute decompensated heart failure, median and maximum doses were ≤ 20 mg/hour. With lower baseline CrCl (eg, CrCl <25 mL/minute), the upper end of the initial infusion dosage range should be considered. If urine output is <1 mL/kg/hour, double as necessary to a maximum of 80 to 160 mg/hour. The risk associated with higher infusion rates (80 to 160 mg/hour) must be weighed against alternative strategies.

Note: in acute renal failure, doses up to **1 to 3 g** daily may be necessary to initiate desired response; avoid use in oliguric states.

Pediatric

- ✓ **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 adults, undiluted direct IV injections may be administered at a rate of 20 to 40 mg per minute; maximum rate of administration for short-term intermittent infusion is 4 mg/minute; exceeding this rate increases the risk of ototoxicity. In children, a maximum rate of 0.5 mg/kg/minute has been recommended.

- 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.

- For some patients, despite higher doses of loop diuretic treatment, an adequate diuretic response cannot be attained. Diuretic resistance can usually be overcome by iv administration, the use of two diuretics together (eg, furosemide and chlorothiazide), or the use of a diuretic with a positive inotropic agent. When such combinations are used, serum electrolytes need to be monitored even more closely.

- 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.

17. Glucagon 1 mg vial

☒ Dosage:

Adult:

- ✓ **Diagnostic aid:** *Relaxation of stomach, duodenal bulb, duodenum, and small bowel:* IM: 1 mg or IV: 0.2 to 0.5 m . *Relaxation of colon:* IM: 1 to 2 mg or IV: 0.5 to 0.75 mg.
- ✓ **Hypoglycemia:** IM, IV, SubQ: 1 mg; may repeat in 15 minutes as needed. **Note:** IV dextrose should be administered as soon as it is available; if patient fails to respond to glucagon, IV dextrose must be given.
- ✓ **Anaphylaxis (refractory to epinephrine) in patients on beta-blocker therapy:** IV: Initial: 1 to 5 mg bolus; followed by an infusion of 5 to 15 **mcg/minute**; titrate the infusion rate to achieve an adequate clinical response.
- ✓ **Beta-blocker- or calcium channel blocker-induced myocardial depression (with or without hypotension) unresponsive to standard measures:** IV: 3 to 10 mg (or 0.05 to 0.15 mg/kg) bolus followed by an infusion of 3 to 5 mg/hour (or 0.05 to 0.1 mg/kg/hour); titrate infusion rate to achieve adequate clinical response.

Pediatric

- ✓ **Hypoglycemia:** Infants, Children, and Adolescents: IM, IV, SubQ:
  GlucaGen:
  Age-based dosing (if weight is unknown):
  Infants and Children <6 years: 0.5 mg; may repeat in 15 minutes if needed
  Children ≥6 years and Adolescents: 1 mg; may repeat in 15 minutes if needed

  Weight-based dosing:
  <25 kg: 0.5 mg; may repeat in 15 minutes if needed
  ≥25 kg: 1 mg; may repeat in 15 minutes if needed

☒ Preparation for Administration

Reconstitute powder for injection by adding 1 mL of manufacturer-supplied sterile diluent or sterile water for injection to a vial containing 1 unit of the drug, to provide solutions containing 1 mg of glucagon/mL. Shake vial gently to dissolve. Solution for infusion may be prepared by reconstitution with and further dilution in NS or D_5W .

☒ Administration:

- IM or IV: After the diagnostic procedure or response to hypoglycemia treatment; administer oral carbohydrates to patients who have been fasting, if this is compatible with the diagnostic procedure applied.
- If given IV, administer over 1 minute. Bolus IV doses >1 mg are not recommended.
- Rapid injection may be associated with increased nausea and vomiting; place patient in lateral recumbent position to protect airway and to prevent choking when consciousness returns.

☒ Precautions:

- Use caution if using as diagnostic aid in patients with diabetes on insulin; may cause hyperglycemia.

- The use of glucagon is contraindicated in patients with pheochromocytoma, glucagonoma, insulinoma.

- Supplemental carbohydrates should be given to patients who respond to glucagon for severe hypoglycemia to prevent secondary hypoglycemia.

☒ **Monitoring Parameters**:

BP, blood glucose, ECG, heart rate, mentation; signs or symptoms of a hypersensitivity reaction.

18. Heparin sodium (5000 IU/ ml) vial

☒ Dosage:

Adult:

- ✓ **Acute coronary syndromes:** IV infusion (weight-based dosing per institutional nomogram recommended):

  STEMI, NSTE-ACS: Adjunct to fibrinolysis, Initial bolus of 60 units/kg (maximum: 4,000 units), then 12 units/kg/hour (maximum: 1,000 units/hour) as continuous infusion. Adjust to target aPTT of 1.5 to 2 times control (approximately 50 to 70 seconds). Continue for a minimum of 48 hours, and preferably for the duration of hospitalization (up to 8 days) or until revascularization (if performed)

- ✓ **Anticoagulation (Intermittent administration):** IV: Initial: 10,000 units, then 50 to 70 units/kg (5,000 to 10,000 units) every 4 to 6 hours.
- ✓ **Venous thromboembolism (DVT/PE), treatment :***Initial anticoagulation:*

  IV: Inpatient setting: 80 units/kg (or alternatively 5,000 units) IV bolus followed by an initial continuous infusion of 18 units/kg/hour (or alternatively 1,000 units/hour).

Pediatric

- ✓ **Thrombosis, treatment:** *Systemic heparinization:* Infants: IV: Initial loading dose: 75 units/kg over 10 minutes; then initial continuous maintenance infusion at: 28 units/kg/hour; adjust dose to maintain an anti-Xa activity of 0.35 to 0.7 units/mL or an aPTT range that correlates to this anti-Xa range or a protamine titration range of 0.2 to 0.4 units/mL .

☒ Administration:

- Continuous IV infusion: Infuse via infusion pump.

- Heparin lock: Inject via injection cap using positive pressure flushing technique. Heparin lock flush solution is intended only to maintain patency of IV devices and is **not** to be used for anticoagulant therapy.

- Central venous catheters: Must be flushed with heparin solution when newly inserted, daily (at the time of tubing change), after blood withdrawal or transfusion, and after an intermittent infusion through an injectable cap. A volume of at least 10 mL of blood should be removed and discarded from a heparinized line before blood samples are sent for coagulation testing.

- Do **not** administer IM due to pain, irritation, and hematoma formation.

☒ Precautions :

- Use with caution in patients with an increased risk of bleeding

- Monitor for hyperkalemia.

- Heparin-induced thrombocytopenia (HIT) may occur. Monitor platelets closely; discontinue therapy and consider alternatives if platelets are <100,000/mm^3 and/or thrombosis develops. HIT may be delayed and can occur up to several weeks after discontinuation of heparin.

☒ Monitoring Parameters:

- **Hemoglobin, hematocrit, signs of bleeding; fecal occult blood test**; **aPTT**(prior to heparin therapy, 6 hours after initiation, and 6 hours after any dosage change, and should be used to adjust the heparin infusion until the aPTT exhibits a therapeutic level. When two consecutive aPTT values are therapeutic, subsequent measurements may be made every 24 hours, and if necessary, dose adjustment carried out.

- **Platelet** counts should be routinely monitored (eg, every 2 to 3 days on days 4 to 14 of heparin therapy) when the risk of HIT is >1% (eg, receiving therapeutic dose heparin, postoperative antithrombotic prophylaxis), if the patient has received heparin or low molecular weight heparin (eg, enoxaparin) within the past 100 days, if pre-exposure history is uncertain, or if anaphylactoid reaction to heparin occurs. When the risk of HIT is <1% (eg, medical/obstetrical patients receiving heparin flushes), routine platelet count monitoring is not recommended.

- Institution-specific and indication-specific nomograms should be consulted for dose adjustment.

19 . Hydralazine 20mg amp

☒ Dosage:

Adult:

- ✓ **Hypertensive emergency:** IM, IV: 10 to 20 mg every 4 to 6 hours as needed; may increase dose to a maximum of 40 mg/**dose** if necessary.
- ✓ **Hypertensive emergency in pregnancy or postpartum (including acute-onset hypertension in preeclampsia/eclampsia) :** IM, IV: Initial: 5 or 10 mg; repeat with 5 to 10 mg doses every 20 minutes if blood pressure continues to exceed thresholds .If SBP or DBP remains above threshold after a total cumulative dose of 20 to 30 mg, another agent should be used.
- ✓ **Perioperative hypertension :**IV: 5 to 20 mg every 4 to 6 hours as needed .

Pediatric

- ✓ **Hypertensive emergency/urgency:** IM, IV: Initial: 0.1 to 0.2 mg/kg/**dose** every 4 to 6 hours; increase as required to suggested usual range: 0.2 to 0.6 mg/kg/**dose** every 4 to 6 hours as needed; maximum dose: 20 mg/dose.

☒ Administration:

undiluted as IM injection. **Also** undiluted as slow IV push. Maximum rate in children: 5 mg/minute.

☒ Precautions:

- May cause a drug-induced lupus-like syndrome including: glomerulonephritis, especially in patients receiving higher doses.

- Postural hypotension may occur.

- Use is contraindicated in patients with coronary artery disease (CAD)
- Use with caution in patients with mitral valvular disease; may increase pulmonary artery pressure in these patients. Use is contraindicated in patients with mitral valve rheumatic heart disease.
- Use with caution in patients with advanced renal impairment; dosage adjustment recommended

☒ Monitoring Parameters:

- BP , HR,CBC

20 . Hydrocortisone 100 mg vial

☒ Dosage:

Adult

- ✓ **Anti-inflammatory or immunosuppressive:** IM, IV: Initial: 100 to 500 mg/dose at intervals of 2, 4, or 6 hours.
- ✓ **Multiple sclerosis, acute exacerbations:** IM, IV: 800 mg/day for 1 week, followed by 320 mg every other day for 1 month
- ✓ **Adrenal insufficiency:**
  Acute adrenal insufficiency (adrenal crisis) : 100 mg IV bolus, immediately followed by 200 mg over 24 hours as a continuous IV infusion or in divided doses (IM or IV) every 6 hours, then 100 mg over 24 hours the following day. Alternatively, may administer 100 mg IV bolus, then 50 to 75 mg IV every 6 hours for 24 hours, followed by a slow taper over the next 72 hours (administering doses every 4 to 6 hours during taper).
- ✓ **Septic shock:** IV: 50 mg bolus every 6 hours, either as monotherapy or in combination with fludrocortisone **or** 200 mg/day as a continuous infusion . Guidelines suggest therapy duration of ≥3 days; most studies treated for up to 7 days; not all studies tapered therapy. May consider a slow taper over several days when vasopressors are no longer required to avoid possible hemodynamic deterioration which may occur with abrupt .
- ✓ **Thyroid storm:** IV: 300 mg loading dose, followed by 100 mg every 8 hours.

Pediatric

- ✓ **Anti-inflammatory or immunosuppressive:** *Infants and Children:* IM, IV: Initial: 0.56 to 8 mg/kg/day or 20 to 240 mg/m^2/day in 3 or 4 divided doses. Alternate dosing: 1 to 5 mg/kg/day **or** 30 to 150 mg/m^2/day divided every 12 to 24 hours. *Adolescents:* IM, IV, SubQ : 15 to 240 mg every 12 hours .
- ✓ **Septic shock:** Infants, Children, and Adolescents: IV (hydrocortisone sodium succinate): 50 to 100 mg/m^2/day ; in some cases, doses may be titrated up to 50 mg/**kg**/day for shock reversal; however, efficacy data variable with the higher doses .

☒ Preparation for Administration:

- IV bolus or IM administration: Reconstitute 100 mg vials with bacteriostatic water or bacteriostatic sodium chloride (not >2 mL).

- IV infusion administration: Add reconstituted solutions to an appropriate volume of D5W, NS, or D5NS (100 to 1,000 mL for a 100 mg solution.In cases where administration of a small volume of fluid is desirable, 100 to 3,000 mg of hydrocortisone may be added to 50 mL of D5W or NS.

☒ Administration:

IM: Avoid injection into deltoid muscle (high incidence of subcutaneous atrophy). Dermal and/or subdermal skin depression may occur at injection site.

IV: Dermal and/or subdermal skin depression may occur at injection site.

IV bolus: Administer undiluted over at least 30 seconds; for large doses (≥500 mg), administer over 10 minutes.

IV intermittent infusion: Further dilute in a compatible fluid and administer over 20 to 30 minutes.

☒ Precautions :

- Prolonged use of corticosteroids may increase the incidence of secondary infection, mask acute infection (including fungal infections), prolong or exacerbate viral infections.
- May cause hypercortisolism or suppression of hypothalamic-pituitary-adrenal (HPA) axis, particularly in younger children or in patients receiving high doses for prolonged periods.
- Acute myopathy has been reported with high dose corticosteroids, usually in patients with neuromuscular transmission disorders; may involve ocular and/or respiratory muscles; monitor creatine kinase; recovery may be delayed.
- Corticosteroid use may cause psychiatric disturbance.
-Use with caution in patients with HF and/or hypertension; use has been associated with fluid retention, electrolyte disturbances, and hypertension.
- May alter glucose production/regulation leading to hyperglycemia.
- Use with caution in patients with GI diseases (diverticulitis, fresh intestinal anastomoses, active or latent peptic ulcer, ulcerative colitis, abscess or other pyogenic infection) due to perforation risk.
- High-dose corticosteroids should not be used for the management of head injury.
- Use with caution in patients with cataracts and/or glaucoma; increased intraocular pressure, open-angle glaucoma, and cataracts have occurred with prolonged use.
- May affect growth velocity; growth should be routinely monitored in pediatric patients.
- Withdraw therapy with gradual tapering of dose.

☒ Monitoring Parameters:

Serum glucose, electrolytes, BP.

21. Hyoscine Butylbromide (20mg/ml) amp

☒ Dosage:

Adult:

- ✓ Gastrointestinal/genitourinary spasm: IM, IV, SubQ: 10 to 20 mg; maximum: 100 mg/day.

Pediatric

- ✓ Gastrointestinal/genitourinary spasm: IM, IV, SubQ: 0.3-0.6 mg/ kg to be administered by slow injection several times daily. The maximum daily dose of 1.5 mg / kg should not be exceeded.

☒ Preparation for Administration:

- IM, IV : No dilution required.

☒ Administration :

- Intramuscular injections should be administered 10 to 15 minutes prior to radiological/diagnostic procedures.

- Inject at a rate of 1 mL/minute for IV .

- May administer by subcutaneous injection.

☒ Precautions:

- May cause drowsiness and/or blurred vision, which may impair physical or mental abilities; patients must be cautioned about performing tasks which require mental alertness (eg, operating machinery or driving).
- Discontinue if patient reports unusual visual disturbances or pain within the eye.
- Adverse events (including dizziness, headache, nausea, vomiting) may occur following abrupt discontinuation of large doses or in patients with Parkinson's disease.
- Use with caution in patients with coronary artery disease, tachyarrhythmias, heart failure, or hypertension; evaluate tachycardia prior to administration.
- Use with caution in patients with GI obstruction; when used for the treatment of smooth muscle spasm of the GI tract avoid continuous (daily) or prolonged use without evaluating source of abdominal pain.
- Use with caution in patients with hyperthyroidism; may have increased risk for arrhythmias.
- Use with caution in patients with ulcerative colitis; may precipitate/aggravate toxic megacolon.

☒ Monitoring Parameters:

Body temperature, HR, urinary output, intraocular pressure.

22 . Ipratropium 500 mic + salbutamol 2.5 mg (UDV)

☒ Dosage:

- ✓ **COPD**: Nebulization solution*:* Initial: 1 vial (3 mL) (ipratropium bromide 0.5 mg/albuterol 2.5 mg) every 6 hours (maximum: 6 vials [18 mL]/day).
- ✓ **Acute asthma (exacerbations):** Nebulization solution: 1 vial (3 mL) every 20 minutes for 3 doses, then as needed.
- ✓ **Bronchospasm, asthma (quick relief) :** Nebulization solution: 1 vial (3 mL) every 4 to 6 hours.

☒ Administration :

Administer via jet nebulizer to an air compressor with an adequate air flow, equipped with a mouthpiece or face mask.

☒ Precautions:

- Use with caution in patients with cardiovascular disease (arrhythmia, coronary insufficiency, hypertension, heart failure). It may produce ECG changes (flattening of the T wave, prolongation of the QTc interval, ST segment depression) and/or cause elevation in blood pressure, heart rate and result in CNS stimulation/excitation.

Use with caution in patients with hypokalemia.

- May elevate intraocular pressure.

- May increase serum glucose.

☒ Monitoring Parameters:

BP, HR; CNS stimulation; serum glucose, serum potassium, signs/symptoms of glaucoma; hypersensitivity reactions; urinary retention; shortness of breath.

23. Isosorbid Dinitrate 5 mg SL tab

☒ Dosage:

- ✓ Acute angina attack: **sublingual**: 5 mg , in the case of no response within 5 minutes, an additional tab must be administered. In the case of no response within the next 5 minutes, an additional tab must be administered with going to the emergency.

☒ Administration:

Place one tablet under the tongue and allow it to dissolve. Do not chew or swallow the tablet.

☒ Precautions :

- Take the dose while you are sit-down to prevent orthostatic hypotension.

24 . Ketamine HCL (50 mg/ ml) 10 ml vial

☒ Dosage:

Adult:

- ✓ **Anesthesia:** Induction of anesthesia: IM: 4 to 10 mg/kg , IV: 0.5 to 2 mg/kg Maintenance of anesthesia: May administer supplemental doses of one-half to the full induction dose or a continuous infusion of 0.1 to 0.5 mg/minute .

- ✓ **Analgesia (subanesthetic dosing) :**

- Chronic pain : Initial: IV infusion: 0.5 mg/kg over 6 hours. *If pain improved* by 50% or more after completion of initial dose, then continue infusion at 1.5 mg/kg/24 hours for 48 hours. *If pain not improved* after completion of initial dose, increase to 2 mg/kg over 12 hours. *If pain recurs* after initial improvement, titrate upwards by 50% to 100% every 24 hours as needed.

- Acute on chronic episodes of neuropathic pain, severe: Continuous IV infusion: 2.3 to 6.7 mcg/kg/minute (equivalent to 0.14 to 0.4 mg/kg/hour).

- Postoperative opioid sparing: IV: 0.2 to 0.8 mg/kg bolus .May follow bolus dose with a continuous infusion if necessary. Continuous IV infusion: 1 to 2 mcg/kg/minute (equivalent to 0.06 to 0.12 mg/kg/hour) .

- ✓ **Procedural sedation/analgesia:** IV: 1 to 2 mg/kg (usual adult dose: 100 mg) over 1 to 2 minutes. If initial sedation inadequate or repeated doses are necessary to accomplish a longer procedure, may administer incremental doses of 0.5 to 1 mg/kg every 5 to 15 minutes as needed.

Pediatric

- ✓ **Anesthesia:**

- *Induction of anesthesia:*

Infants ≥3 months, Children, and Adolescents <16 years: Limited data available: IM: 5 to 10 mg/kg has been reported and suggested by experts. IV: 1 to 3 mg/kg has been reported and suggested by experts.

Adolescents ≥16 years: IM: 6.5 to 13 mg/kg, IV: 1 to 4.5 mg/kg.

- *Maintenance of anesthesia:* Adolescents ≥16 years: May administer supplemental doses of one-half to the full induction dose as needed.

- ✓ **Endotracheal intubation:** Limited data available: Infants, Children, and Adolescents: IV: 1 to 2 mg/kg as part of rapid sequence sedation .

- ✓ **Sedation/analgesia, procedural:** Infants, Children, and Adolescents: **Note:** Due to risk of airway obstruction, laryngospasm, and apnea, ACEP only recommends use in patients ≥3 months of age.

Ketamine without propofol:

IM: 4 to 5 mg/kg as a single dose; may give a repeat dose (range: 2 to 5 mg/kg) if sedation inadequate after 5 to 10 minutes or if additional doses are required. Some have recommended smaller doses (2 to 2.5 mg/kg) for minor procedures (eg, wound suture with local anesthetic) .

IV: 1 to 2 mg/kg over 30 to 60 seconds. If initial sedation inadequate or repeated doses are necessary to accomplish a longer procedure, may administer additional doses of 0.5 to 1 mg/kg every 5 to 15 minutes as needed.

Ketamine with propofol ("ketofol"): Infants ≥3 months, Children, and Adolescents: IV: 0.5 to 0.75 mg/kg of each agent. This combination has been used to decrease the dose of each agent required .

- ✓ **Sedation/analgesia, critically ill patients:** Very limited data available: Infants ≥5 months, Children, and Adolescents: Initial dose: IV: 0.5 to 2 mg/kg, then continuous IV infusion: 5 to 20 **mcg**/kg/minute; start at lower dosage listed and titrate to effect ; doses as high as 60 **mcg**/kg/minute have been reported in patients with refractory bronchospasm .

☒ Preparation for Administration

The 50 mg/mL vials may be further diluted in D5W or NS to prepare a maintenance infusion with a final concentration of 1 mg/mL (or 2 mg/mL in patients with fluid restrictions); mix well. Do not mix with barbiturates or diazepam (precipitation may occur)

☒ Administration:

Administer bolus/induction doses over 1 minute or at a rate of 0.5 mg/kg/minute.

☒ Precautions:

- Discontinue infusion if pulse >110 bpm, SBP increases >25% of baseline, sustained respiratory rate <7, agitation or severe psychotomimetic effects.

- If used as analgesic, consider the concomitant use of a benzodiazepine (eg, lorazepam) to prevent or reduce psychotomimetic effects and glycopyrrolate for excessive salivation or lacrimation.

- In Procedural sedation/analgesia; may consider prophylactic use of a benzodiazepine (eg, midazolam) before ketamine administration to reduce the risk of emergence reactions.

- More rapid administration may result in respiratory depression and enhanced pressor response.

- When used for procedural sedation for major procedures involving the posterior pharynx (eg, endoscopy) or when used for patients with an active pulmonary infection or disease (including upper respiratory disease or asthma), the use of ketamine increases the risk of laryngospasm

- Driving, operating hazardous machinery, or engaging in hazardous activities should not be undertaken for ≥24 hours after anesthesia .

- May cause dependence (withdrawal symptoms on discontinuation) and tolerance with prolonged use. A withdrawal syndrome with psychotic features has been described following discontinuation of long-term use.

- Consider discontinuation of ketamine for continued genitourinary pain in the setting of other genitourinary symptoms.

- Use with caution in patients with increased intraocular pressure (IOP).

- Use with caution in patients with coronary artery disease, catecholamine depletion, hypertension, and tachycardia.

- If used in a nonintubated and/or nonmechanically ventilated patient, qualified personnel and appropriate equipment for rapid institution of respiratory and/or cardiovascular support must be immediately available.

☒ **Monitoring Parameters**:

HR, BP, RR, transcutaneous O_2 saturation, emergence reactions.

25 . Lidocaine 2% plain (50 mg) Vial

☒ Dosage:

Adult:

- ✓ **Antiarrhythmic for VF or pulseless VT (after defibrillation attempts, CPR, and vasopressor administration), alternative to amiodarone and for hemodynamically stable monomorphic VT:** IV, intraosseous (IO): Initial: 1 to 1.5 mg/kg bolus. If refractory VF or pulseless VT, repeat 0.5 to 0.75 mg/kg bolus every 5 to 10 minutes (maximum cumulative dose: 3 mg/kg). Follow with continuous infusion (1 to 4 mg/minute) after return of perfusion . Reappearance of arrhythmia during constant infusion: 0.5 mg/kg bolus and reassessment of infusion .

  Note: Reduce maintenance infusion in patients with CHF, shock, or hepatic disease; initiate infusion at 10 mcg/kg/minute (maximum dose: 1.5 mg/minute or 20 mcg/kg/minute).

- ✓ **Anesthesia, local injectable:** Varies with procedure, degree of anesthesia needed, vascularity of tissue, duration of anesthesia required, and physical condition of patient.

  - *Cutaneous infiltration*: Maximum: 4.5 mg/kg/dose not to exceed 300 mg; do not repeat within 2 hours.

  - *Intraosseous line or infusion pain:* Lidocaine 2% preservative-free solution: Intraosseous: Initial dose: 40 mg over 1 to 2 minutes; usual adult dose range and maximum: 20 to 50 mg/dose; after allowing lidocaine to dwell for up to 1 minute, follow with NS flush; immediately following the NS flush, some centers administer a second lower (50% dose reduction) lidocaine dose over 30 to 60 seconds (usual adult maximum repeat dose: 20 mg/dose); if discomfort reoccurs, may repeat doses at a maximum frequency of every 45 minutes during intraosseous access; maximum total dose not established .

Pediatric

- ✓ **Ventricular arrhythmias, shock-refractory VF or pulseless :** Infants, Children, and Adolescents: ***IV, intraosseous (IO)****:* Loading dose: 1 mg/kg; follow with continuous infusion; may administer second bolus if delay between initial bolus and start of infusion is >15 minutes. Continuous infusion: 20 to 50 mcg/kg/minute. Per the manufacturer, do not exceed 20 mcg/kg/minute in patients with shock, hepatic disease, cardiac arrest, or CHF.

  Endotracheal: Loading dose: 2 to 3 mg/kg; flush with 5 mL of NS and follow with 5 assisted manual ventilations

- ✓ **Anesthesia, local injectable:** Dose varies with procedure, degree of anesthesia needed, vascularity of tissue, duration of anesthesia required, and physical condition of patient.

- *Cutaneous infiltration*: Children and Adolescents: Typically solutions with concentration <2% should be used (allow for larger volumes); maximum dose: 5 mg/kg/dose not to exceed the recommended adult maximum dose of 300 mg/dose; do not repeat within 2 hours .

- *Intraosseous line or infusion pain:* Infants, Children, and Adolescents: Lidocaine 1% or 2 % preservative-free solution: Intraosseous: Initial dose: 0.5 mg/kg over 1 to 2 minutes; usual adult dose range and maximum: 20 to 50 mg/dose; follow with NS flush; immediately following the NS flush, some centers administer a second lower (50% dose reduction) lidocaine dose over 30 to 60 seconds (usual adult maximum repeat dose: 20 mg/dose); if discomfort reoccurs, may repeat doses at a maximum frequency of every 45 minutes during intraosseous access; maximum total dose not established, some centers suggest that dose should not exceed: 3 mg/kg/24 hours. **Note:** Intraosseous access devices have a minimum weight and age for a particular device in addition to specific instruction for insertion and validation; consult product specific information for more detail.

☒ Preparation for Administration:

Local infiltration: Buffered lidocaine for injectable local anesthetic may be prepared: Add 2 mL of sodium bicarbonate 8.4% to 18 mL of lidocaine 1%.

☒ Administration:

IV Bolus: may administer at 25 to 50 mg/minute. In the setting of cardiac arrest (eg, ventricular fibrillation or pulseless ventricular tachycardia), may be infused rapidly into a peripheral vein .

IV Continuous infusion: After initial bolus dosing, may administer as a continuous infusion; refer to indication-specific infusion rates in dosing for detailed recommendations. In the setting of cardiac arrest, infusion may be initiated once patient has return of spontaneous circulation resulting from lidocaine administration; however, there is no evidence to support subsequent continuous infusion to prevent recurrence. Local thrombophlebitis may occur in patients receiving prolonged IV infusions.

☒ Precautions:

- Use with extreme caution in patients with severe hepatic dysfunction; may have increased risk of lidocaine toxicity.

- Constant ECG monitoring is necessary during IV administration.

- Use cautiously in hepatic impairment, HF, marked hypoxia, severe respiratory depression, hypovolemia, history of malignant hyperthermia, or shock. Increased ventricular rate may be seen when administered to a patient with atrial fibrillation.

- Use is contraindicated in patients with Wolff-Parkinson-White syndrome and severe degrees of SA, AV, or intraventricular heart block (except in patients with a functioning artificial pacemaker).

- Correct electrolyte disturbances, especially hypokalemia or hypomagnesemia, prior to use and throughout therapy.

- Correct any underlying causes of ventricular arrhythmias. Monitor closely for signs and symptoms of CNS toxicity.

☒ Monitoring Parameters:

Liver function tests, ECG; in patients requiring drug >24 hrs, blood level monitoring recommended.

26 . Magnesium Sulphate 10% (10ml) ampoule

☒ Dosage:

Note: 1 g of magnesium sulfate = 98.6 mg elemental magnesium = 8.12 mEq elemental magnesium = magnesium 4.06 mmol.

Adult:

- ✓ **Eclampsia/preeclampsia (severe):** IV, IM: An initial total dose of 10 to 14 g administered as follows: 4 g IV infusion with simultaneous IM injections of 4 to 5 g in each buttock. After the initial IV/IM doses, may administer a 1 to 2 g/hour continuous infusion or may follow with IM doses of 4 to 5 g into alternate buttocks every 4 hours as necessary. Maximum: 40 g/24 hours. Alternatively, may administer an IV only regimen using an initial 4 to 6 g loading dose followed by 1 to 2 g/hour continuous infusion for at least 24 hours.

- ✓ **Hypomagnesemia, treatment:**

- Mild deficiency: IM: 1 g every 6 hours for 4 doses, or as indicated by serum magnesium concentrations

- Mild to moderate (serum concentration 1 to 1.5 mg/dL): IV: 1 to 4 g (up to 0.125 g/kg), administer at ≤1 g/hour if asymptomatic; do not exceed 12 g over 12 hours. **Note:** Additional supplementation may be required after the initial dose with replenishment occurring over several days.

- Severe deficiency:*IM*: Up to 250 mg/kg within a 4-hour period. *IV*: Severe (<1 mg/dL): 4 to 8 g (up to 0.1875 g/kg), administer at ≤1 g/hour if asymptomatic; in symptomatic patients, may administer ≤4 g over 4-5 minutes .

- ✓ **Torsades de pointes: Polymorphic VT (with pulse) associated with QT prolongation (torsades de pointes):** IV: 1 to 2 g (diluted in 50 to 100 mL D5W) over 15 minutes (range: 5 to 60 minutes); may follow with a continuous IV infusion of 0.5 to 1 g/hour. **VF/pulseless VT associated with torsades de pointes:** IV/IO: 1 to 2 g (diluted in 10 mL D5W) administered as a bolus .

Pediatric

- ✓ **Hypomagnesemia, treatment: Note:** Treatment depends on severity and clinical status: IV, I.O.: 25 to 50 mg/kg/dose over 10 to 20 minutes (over several minutes for torsade de pointes); maximum single dose: 2000 mg .

- ✓ **Hypomagnesemia, prevention (parenteral nutrition supplementation) :**IV:
  ≤50 kg: 0.3 to 0.5 mEq elemental magnesium/kg/day
  >50 kg: 10 to 30 mEq elemental magnesium daily

- ✓ **Asthma (acute severe exacerbations) :** IV: Children and Adolescents: 25 to 75 mg/kg (maximum: 2000 mg) as a single dose over 20 to 60 minutes; recommended as adjunctive therapy for severe life-threatening exacerbations and for exacerbations that remain severe after 1 hour of intensive conventional therapy.

☒ Preparation for Administration:

IV: Dilute to ≤20% in a compatible solution (eg, D5W, NS) for IV infusion.

☒ Administration:

- Must be diluted to a ≤20% solution for IV infusion and may be administered IV push, IVPB, or as a continuous IV infusion, or intraosseous (IO).

- When giving IV push, must dilute first and should generally not be given any faster than 150 mg/minute.

- Maximal rate of infusion (routine administration for hypomagnesemia prevention/treatment): Up to 50% of an IV dose may be eliminated in the urine, therefore, slower administration may improve retention (maximum rate: 1 g/hour in asymptomatic hypomagnesemia). For doses <6 g, infuse over 8 to 12 hours and for larger doses infuse over 24 hours if patient is asymptomatic. If patient is severely symptomatic (or has conditions such as preeclampsia or eclampsia) more aggressive therapy (≤4 g over 4 to 5 minutes) may be required; patients should be closely monitored .

☒ Precautions:

- Use with extreme caution in patients with myasthenia gravis or other neuromuscular disease.

- Use with caution in patients with renal impairment; accumulation of magnesium may lead to magnesium intoxication.

- Concurrent hypokalemia or hypocalcemia can accompany a magnesium deficit. Hypomagnesemia is frequently associated with hypokalemia and requires correction in order to normalize potassium.

- Magnesium toxicity can lead to fatal cardiovascular arrest and/or respiratory paralysis.

☒ Monitoring Parameters:

ECG, vital signs, deep tendon reflexes; magnesium concentrations if frequent or prolonged dosing required particularly in patients with renal dysfunction, calcium, and potassium concentrations; renal function.

27. Metoclopramide 10 mg Ampoule

☒ Dosage:

Adult:

✓ **Migraine, severe acute (emergency setting), acute tension-type headache,:** Premedication with diphenhydramine is suggested to prevent akathisia and other acute dystonic reactions. Avoid rapid IV administration of metoclopramide doses >10 mg.

IV (preferred), IM, SubQ: 10 mg as a single dose; for migraine with severe nausea and vomiting, some experts increase the dose to 20 mg .

Alternative high-dose regimen: IV: 20 mg every 30 minutes as needed for up to 4 doses in combination with IV diphenhydramine .

✓ **Nausea and/or vomiting:**

Undifferentiated or due to a variety of medical conditions associated with acute self-limiting nausea/vomiting :

IV: 10 mg or 20 mg as a single dose; avoid rapid IV administration of doses >10 mg.

Pregnancy-associated, severe or refractory: **Note:** May be considered as add-on therapy for nausea and vomiting when symptoms persist following initial pharmacologic therapy and IV hydration if hypovolemic .

IV, IM: 5 to 10 mg every 6 to 8 hours, added to current treatment regimen; if feasible, give 30 minutes before meals and bedtime.

☒ **Preparation for Administration:** Lower doses (≤10 mg): no dilution required. Higher doses (>10 mg): Dilute in 50 mL of compatible solution (preferably NS).

☒ Administration:

- IV: Injection solution may be given direct IV push, short infusion (15 minutes), or continuous infusion; lower doses (≤10 mg) of metoclopramide can be given IV push undiluted over 1 to 2 minutes; higher doses (>10 mg) to be diluted in 50 mL of compatible solution (preferably NS) and given IVPB over at least 15 minutes.

Note: Rapid IV administration may be associated with a transient (but intense) feeling of anxiety and restlessness, followed by drowsiness.

- May be administered IM

- Injection is photosensitive and should be protected from light during storage.

☒ Precautions:

- May impair physical or mental abilities; patients must be cautioned about performing tasks that require mental alertness (eg, operating machinery or driving).

- May cause extrapyramidal symptoms, generally manifested as acute dystonic reactions within the initial 24 to 48 hours of use at the usual adult dose (30 to 40 mg/day)

- May elevate blood pressure; avoid use in patients with hypertension

- Metoclopramide has been known to cause sinus arrest (usually with rapid IV administration or higher doses)

- Avoid use in patients with Parkinson disease and other patients being treated with antiparkinsonian drugs.

☒ Monitoring Parameters

Signs of, extrapyramidal symptoms.

28 . Midazolam(15 mg/3ml) Ampoule

☒ Dosage:

Adult:

✓ **Anesthesia:** IV: ***Induction****:* Adults <55 years of age:
- Unpremedicated patients: Initial: 0.3 to 0.35 mg/kg over 20 to 30 seconds; after 2 minutes, may repeat if necessary at ~25% of initial dose every 2 minutes, up to a total dose of 0.6 mg/kg in resistant cases.
- Premedicated patients: Usual dosage range: 0.05 to 0.2 mg/kg. Use of 0.2 mg/kg administered over 5 to 10 seconds has been shown to safely produce anesthesia within 30 seconds and is recommended for ASA physical status P1 and P2 patients. When used with other anesthetic drugs (ie, coinduction), the dose is <0.1 mg/kg .
- ASA physical status >P3 or debilitation: Reduce dose by at least 20% .

Maintenance*:* 0.05 mg/kg as needed , or continuous infusion 0.015 to 0.06 mg/kg/**hour** (0.25 to 1 **mcg**/kg/minute) .

✓ **Sedation/anxiolysis/amnesia (preoperative/procedural):**
- *Healthy adults <60 years of age:* **IM**: 0.07 to 0.08 mg/kg 30 to 60 minutes prior to surgery/procedure; usual dose: 5 mg.

IV: Initial: 0.5 to 2 mg over at least 2 minutes; slowly titrate to effect by repeating doses every 2 to 3 minutes if needed; usual total dose: 2.5 to 5 mg .. A total dose >5 mg is generally not needed.

- *Adults ≥60 years of age, debilitated, or chronically ill:* **IM**: 2 to 3 mg (or 0.02 to 0.05 mg/kg) 30 to 60 minutes prior to surgery/procedure; some may only require 1 mg if anticipated intensity and duration of sedation is less critical.

IV: Initial: same dose of as healthy adults.

✓ **Sedation in mechanically-ventilated patients:** IV: Initial: 0.01 to 0.05 mg/kg (~0.5 to 4 mg); may repeat at 10- to 15-minute intervals until adequate sedation achieved; maintenance infusion: 0.02 to 0.1 mg/kg/**hour** (0.3 to 1.7 **mcg**/kg/minute). Titrate to reach desired level of sedation. Titration to maintain a light rather than a deep level of sedation is recommended unless clinically contraindicated . May consider a trial of daily awakening; if agitated after discontinuation of drip, then restart at 50% of the previous dose.

✓ **Palliative sedation:** *IV, SubQ:* Continuous infusion: Initial: 0.5 to 1 mg/hour; may increase as needed. Usual dosage range: 1 to 20 mg/hour; may also intermittently administer 1 to 5 mg during infusion as needed. Some have recommended an initial bolus dose of 5 to 10 mg (size of dose depending on patient weight, age, and degree of debility).

Pediatric

Note: The dose of midazolam needs to be individualized based on the patient's age, underlying diseases, and concurrent medications. Decrease dose (by ~30%) if opioids

or other CNS depressants are administered concomitantly. Children <6 years may require higher doses and closer monitoring than older children; in children with obesity, calculate dose based on ideal body weight.

- ✓ **Sedation/Anxiolysis/Amnesia (preoperative/procedural):** Infants ≥6 months, Children, and Adolescents ≤16 years:
  - ***IM:*** 0.1 to 0.15 mg/kg 30 to 60 minutes before surgery or procedure; range: 0.05 to 0.15 mg/kg; doses up to 0.5 mg/kg have been used in more anxious patients; maximum total dose: 10 mg
  - ***IV:*** Infants <6 months: Limited information is available in nonintubated infants; dosing recommendations not clear; infants <6 months are at higher risk for airway obstruction and hypoventilation; titrate dose in small increments to desired effect
  - Infants 6 months to Children 5 years: Initial: 0.05 to 0.1 mg/kg; total dose of 0.6 mg/kg may be required; maximum total dose: 6 mg
  - Children 6 to 12 years: Initial: 0.025 to 0.05 mg/kg; total doses of 0.4 mg/kg may be required; maximum total dose: 10 mg
  - Children 12 to 16 years: Refer to adult dosing; maximum total dose: 10 mg

- ✓ **Sedation in mechanically-ventilated patients:** Infants, Children, and Adolescents: IV: Loading dose: 0.05 to 0.2 mg/kg, followed by initial continuous infusion: 0.06 to 0.12 mg/kg/**hour** (1 to 2 **mcg**/kg/minute); range in clinical trials: 0.024 to 0.564 mg/kg/**hour** (0.4 to 9.4 **mcg**/kg/minute) .
- ✓ **Seizures, acute treatment:** Children and Adolescents: IM: 0.2 mg/kg (maximum dose: 6 mg); may repeat every 10 to 15 minutes .
- ✓ **Status epilepticus:** Infants, Children, and Adolescents: Limited data available:
  - *IM:* **Note:** Midazolam IM is the preferred treatment in patients *without* IV access. Weight-based dosing: 0.2 mg/kg once; maximum dose: 10 mg/dose .
  - Fixed dosing : <13 kg: Not evaluated ,13 to 40 kg: 5 mg once, >40 kg: 10 mg once
- ✓ **Status epilepticus, refractory:** Infants, Children, and Adolescents:
  IV: **Note:** Mechanical ventilation and cardiovascular monitoring required :
  - Loading dose: 0.2 mg/kg followed by a continuous infusion.
  - Continuous infusion: 0.05 to 2 mg/kg/**hour** (0.83 to 33.3 **mcg**/kg/minute) titrated to cessation of electrographic seizures or burst suppression. If patient experiences breakthrough status epilepticus while on the continuous infusion, administer a bolus of 0.1 to 0.2 mg/kg and increase infusion rate by 0.05 to 0.1 mg/kg/**hour** (0.83 to 1.66 **mcg**/kg/minute) every 3 to 4 hours. **Note:** A period of at least 24 to 48 hours of electrographic control is recommended prior to withdrawing the continuous infusion; withdraw gradually to prevent recurrent status epilepticus.

☒ Preparation for Administration:

For continuous IV infusion, may dilute with NS or D5W to a final concentration of 0.5 mg/mL or 1 mg/mL.

☒ Administration:

IM: Administer undiluted deep IM into large muscle.
IV: Do **not** administer intraarterially. For procedural sedation/anxiolysis/amnesia, administer by slow IV injection over at least 2 minutes using a concentration of 1

mg/mL or a dilution of the 1 or 5 mg/mL concentrations. For induction of anesthesia, administer IV bolus over 5 to 15 seconds. For other clinical situations (eg, sedation in the mechanically-ventilated patient), a continuous infusion may also be administered.

☒ Precautions:

- Midazolam has been associated with anterograde amnesia.

- Concomitant use of benzodiazepines and opioids may result in profound sedation, respiratory depression, coma, and death. Limit dosages and durations to the minimum required. Follow patients for signs and symptoms of respiratory depression and sedation.
- Immediate availability of resuscitative drugs and age- and size-appropriate equipment for bag/valve/mask ventilation and intubation, and personnel trained in their use and skilled in airway management should be assured. For deeply sedated patients, a dedicated individual, other than the practitioner performing the procedure, should monitor the patient throughout the procedure.
- Patients must be cautioned about performing tasks that require mental alertness (eg, operating machinery, driving). A minimum of 1 day should elapse after midazolam administration before attempting these tasks.
- Hypotension may occur more frequently in patients who have received opioid analgesics.
- Contraindicated in patients with acute narrow angle glaucoma; may use in patients with open-angle glaucoma only if receiving appropriate therapy.
- Use with caution in patients with renal impairment; half-life of midazolam and metabolites may be prolonged.
- Use with caution in patients with respiratory disease (eg, COPD); these patients may be sensitive to the respiratory depressant effects of midazolam.
- Withdrawal symptoms (convulsions, hallucinations, tremor, abdominal and muscle cramps, vomiting and sweating) may occur following abrupt discontinuation or large decreases in dose. Use caution when reducing dose or withdrawing therapy; decrease slowly and monitor for withdrawal symptoms.

☒ Monitoring Parameters

Level of sedation, respiratory rate, HR, BP, oxygen saturation (ie, pulse oximetry), depth of sedation in critically-ill patients.

29. Naloxone (0.4 mg/ml) amp

☒ Dosage:

Adult:

- ✓ **Opioid overdose:** IV, IM, SubQ: Initial: 0.4 to 2 mg; may need to repeat doses every 2 to 3 minutes. A lower initial dose (0.1 to 0.2 mg) should be considered for patients with opioid dependence to avoid acute withdrawal or if there are concerns regarding concurrent stimulant overdose. After reversal, may need to readminister dose(s) at a later interval (ie, 20 to 60 minutes) depending on type/duration of opioid. If no response is observed after 10 mg total, consider other causes of respiratory depression. *Continuous infusion:* IV: **Note:** For use with exposures to long-acting opioids (eg, methadone), sustained release product, and symptomatic body packers after initial naloxone response. Calculate dosage/hour based on effective intermittent dose used and duration of adequate response seen **or** use two-thirds ($^2/_3$) of the initial effective naloxone bolus on an hourly basis (typically 0.25 to 6.25 mg/hour); one-half ($^1/_2$) of the initial bolus dose should be readministered 15 minutes after initiation of the continuous infusion to prevent a drop in naloxone levels; adjust infusion rate as needed to assure adequate ventilation and prevent withdrawal symptoms.

- ✓ **Reversal of respiratory depression with therapeutic opioid doses:** IV: Initial: 0.02 to 0.2 mg; titrate to avoid profound withdrawal, seizures, arrhythmias, or severe pain. *Continuous infusion:* IV: **Note:** same regimen as in opioid overdose but the rate is (typically 0.2 to 0.6 mg/hour).

  - *Opioid-dependent patients being treated for cancer pain:* IV: **Note:** May dilute 0.4 mg/mL (1 mL) ampule into 9 mL of normal saline for a total volume of 10 mL to achieve a 0.04 mg/mL (40 **mcg**/mL) concentration. 0.02 mg (20 **mcg**) IV push; administer every 2 minutes until improvement in symptoms **or** 0.04 to 0.08 mg (40 to 80 **mcg**) slow IV push; administer every 30 to 60 seconds until improvement in symptoms; if no response is observed after total naloxone dose 1 mg, consider other causes of respiratory depression. If respiratory depression is due to long-acting opioids, may consider administering naloxone as a continuous infusion starting at 66% of the total bolus dose (or 0.2 mg per hour) to reverse the opioid toxicity .

  - *Postoperative reversal:* IV: 0.1 to 0.2 mg every 2 to 3 minutes until desired response (adequate ventilation and alertness without significant pain). **Note:** Repeat doses may be needed within 1 to 2 hour intervals depending on type, dose, and timing of the last dose of opioid administered.

- ✓ **Opioid-induced pruritus:** IV infusion: 0.25 **mcg/kg/hour** . Doses up to ~3 **mcg/kg/hour** have been employed. However, doses >2 **mcg/kg/hour** are more likely to lead to reversal of analgesia and are not recommended.

Pediatric

- ✓ **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 ampul) 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.

☒ 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.

30 . Noradrenaline 4 mg injection

☒ Dosage:

Adult :

- ✓ **Hypotension/shock:** Continuous IV infusion:Initial: 8 to 12 mcg/minute; titrate to desired response. Usual maintenance range: 2 to 4 mcg/minute; dosage range varies greatly depending on clinical situation.

Pediatric

- ✓ **Hypotension/shock:** Infants, Children, and Adolescents: Continuous IV infusion: Initial: 0.05 to 0.1 mcg/kg/minute; titrate to desired effect; usual maximum dose: 2 mcg/kg/minute.

☒ Preparation for Administration:

Continuous IV infusion: Dilute with D5W, D5NS.
Concentrations ranging from 4 to 16 mcg/mL are typically used in clinical

☒ Administration:

- Administer as a continuous infusion via an infusion pump**.** Dilute prior to use. **Central line** administration is preferred.

- Ensure proper needle or catheter placement prior to and during infusion; avoid extravasation.

- Do not administer sodium bicarbonate (or any alkaline solution) through an IV line containing norepinephrine; inactivation of norepinephrine may occur.

Extravasation management: stop infusion immediately and disconnect (leave cannula/needle in place); gently aspirate extravasated solution (do **NOT** flush the line); remove needle/cannula; elevate extremity. Initiate **phentolamine** (or alternative) antidote. Apply dry warm compresses .Phentolamine: dilute 5 to 10 mg in 10 mL NS and administer into extravasation area (within 12 hours of extravasation).

☒ Monitoring Parameters

HR, BP or MAP, cardiac output (as appropriate), intravascular volume status, pulmonary capillary wedge pressure (as appropriate); urine output, peripheral perfusion; monitor infusion site closely.

31 . Oxybuprocaine HCL 0.4 % single dose ED

☒ **Dosage:** Children, adolescents and adult :

✓ **Ophthalmological anesthesia:** Instill 1 to 2 drops into each eye; instill additional drops at intervals >90 seconds for deeper anesthetic effects. For most procedures a total of 1 to 2 drops in each eye is sufficient.

- For removal of foreign bodies or minor surgery: a total of 3 to 6 drops in each eye.

- For or pterygium surgery: 1 drop per minute for 10 minutes has provided adequate anesthesia.

- For tonometry: 1 drop has been shown sufficient after 1 minute.

☒ Administration:

To minimize systemic absorption compress the lacrimal sac at the medial canthus for 1 minute. Single use only.

☒ Precautions:

- For topical ophthalmic use only.
- May cause blurred vision which may impair visual acuity; patients must be cautioned to avoid tasks which may require clear vision (eg, operating machinery or driving).
- May cause corneal damage, keratitis, and acquired tolerance with prolonged use.

32. Paracetamol 1g vial

☒ Dosage:

Adult:

- ✓ **Pain or fever:** *IV:* **<50 kg**: 12.5 mg/kg every 4 hours or 15 mg/kg every 6 hours; maximum single dose: 15 mg/kg/dose (≤750 mg/dose); maximum daily dose: 75 mg/kg/day (≤3.75 g/day). **≥50 kg**: 650 mg every 4 hours or 1,000 mg every 6 hours; maximum single dose: 1,000 mg/dose; maximum daily dose: 4 g/day.

Pediatric : Pain or fever: *IV:*

- Neonates (including premature neonates born ≥32 weeks gestational age) up to 28 days (fever only): 12.5 mg/kg every 6 hours; maximum daily dose: 50 mg/kg/day.

- Infants 29 days to 2 years of age (fever only): 15 mg/kg every 6 hours; maximum daily dose: 60 mg/kg/day.

- Children 2 to 12 years: 12.5 mg/kg every 4 hours or 15 mg/kg every 6 hours; maximum single dose: 15 mg/kg/dose (≤750 mg/dose); maximum daily dose: 75 mg/kg/day (≤3.75 g/day)

- Adolescents: Refer to adult dosing.

☒ Preparation for Administration:

- Injectable solution may be administered without further dilution.

☒ Administration:

- For IV infusion only. Administer undiluted over 15 minutes.

- Doses <1,000 mg (<50 kg): Withdraw appropriate dose and transfer to a separate sterile container (eg, glass bottle, plastic IV container, syringe) for administration.
- Doses of 1,000 mg (≥50 kg): Insert a vented IV set through vial stopper or a non-vented IV set through the administration spike port of the bag.

☒ Precautions:

- Hepatotoxicity is usually associated with excessive acetaminophen intake and often involves more than one product that contains acetaminophen. Do not exceed the maximum recommended daily dose **(>4 g daily in adults)**.

- Use of the IV formulation is contraindicated in patients with severe hepatic impairment or severe active liver disease.

- Use with caution in patients with alcoholic liver disease; consuming ≥3 alcoholic drinks/day may increase the risk of liver damage.

-Take care to avoid dosing errors; ensure that the dose in **mg** is not confused with **mL**, dosing in patients <50 kg is based on body weight, infusion pumps are properly programmed, and total daily dose of acetaminophen from all sources does not exceed the maximum daily limits.

☒ Monitoring Parameters:

Assess patient for history of liver disease or ethanol abuse (acetaminophen and any ethanol may have adverse liver effects). Ensure adult patients keep daily dose to ≤4 g/day.

33.Phenobarbitone Sodium 200mg/ml

☒ Dosage:

Adult:

- ✓ **Sedation:** IV, IM: 30 to 120 mg/day in 2 to 3 divided doses; maximum: 400 mg/day

  Preoperative sedation: IM: 100 to 200 mg 60 to 90 minutes before surgery

- ✓ **Status epilepticus:** IV*:* 15 mg/kg as a single dose. *Neurocritical Care Society recommendation:* 20 mg/kg (infused at 50 to 100 mg/minute); if necessary, may repeat once after 10 minutes with an additional 5 to 10 mg.
- ✓ **Seizures:** Maintenance dose: IV: 2 mg/kg/day in divided doses
- ✓ **Alcohol withdrawal:**IV: Initial dose of 260 mg, followed by subsequent doses of 130 mg as needed.

Pediatric

- ✓ **Sedation:** Infants and Children: IM: 2 to 3 mg/kg/day in divided doses every 8 to 12 hours
- ✓ **Status epilepticus:** Infants, Children, and Adolescents: IV: Initial:20 mg/kg (maximum dose: 1,000 mg) over 10 minutes; if necessary, may repeat dose after 15 minutes (maximum total dose: 40 mg/kg) .
- ✓ **Seizures:** Maintenance dose: IV: **Note:** Maintenance dose usually starts 12 hours after loading dose. Initial: IV: Infants and Children ≤5 years of age: 3 to 5 mg/kg/day in 1 to 2 divided doses. Children >5 years of age: 2 to 3 mg/kg/day in 1 to 2 divided doses. Adolescents: 1 to 3 mg/kg/day in 1 to 2 divided doses.

☒ Administration:

- IM: Inject deep into muscle. Do not exceed 5 mL per injection site due to potential for tissue irritation.

-IV: rapid IV administration >60 mg/minute in adults and >30 mg/minute in children **should be avoided.** In the setting of status epilepticus, administration at a rate of 50 to 100 mg/minute

- Avoid extravasation.

- Intra-arterial injection is contraindicated. Avoid subcutaneous administration.

☒ Precautions:

- May cause CNS depression, which may impair physical or mental abilities; patients must be cautioned about performing tasks which require mental alertness (eg, operating machinery or driving).

- May cause respiratory depression particularly when administered intravenously; use with caution patients with respiratory disease, including status asthmaticus.

- Use with caution in patients with depression or suicidal tendencies, diabetes.

- Use with caution in patients with acute or chronic pain; paradoxical excitement could be induced or important symptoms could be masked.

- It should not be discontinued abruptly because of the possibility of increasing seizure frequency.

☒ Monitoring Parameters:

RR, HR, BP, IV site (stop injection if patient complains of pain in the limb).

34 . Phenytoin 250mg/5ml inj (vial)

☒ Dosage:

Adult:

- ✓ **Status epilepticus:** IV:
  Loading dose: 20 mg/kg at a maximum rate of 50 mg/minute; if necessary, may give an additional dose of 5 to 10 mg/kg 10 minutes after the loading dose.

Pediatric

- ✓ **Status epilepticus:** Infants, Children, Adolescents: IV:Loading dose: 20 mg/kg at a maximum rate of 1 mg/kg/minute; if necessary, may give an additional dose of 5 to 10 mg/kg 10 minutes after the loading dose .

☒ Preparation for Administration

May be further diluted in NS to a final concentration ≥5 mg/mL; infusion must be completed within 4 hours after preparation. Do not refrigerate.

☒ Administration :

- It is preferable that phenytoin be administered via infusion pump either undiluted or diluted in normal saline as an IV piggyback (IVPB) to prevent exceeding the maximum infusion rate (monitor closely for extravasation during infusion).

-The maximum rate of IV administration is 50 mg/minute in **adults**. Highly sensitive patients (eg, elderly patients, patients with preexisting cardiovascular conditions) should receive phenytoin more slowly (eg, 20 mg/minute) .In **pediatric** patients, the manufacturer recommends a maximum rate of 1 to 3 mg/kg/minute or 50 mg/minute (whichever is slower); however, a lower maximum rate of 0.5 to 1 mg/kg/minute is used clinically .

- Administer directly into a large peripheral or central vein through a large-gauge catheter.

- Following IV administration, NS should be injected through the same needle or IV catheter to prevent irritation. avoid IV administration in small veins.

- 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); remove needle/cannula; elevate extremity and apply dry heat; closely monitor for tissue sloughing or compartment syndrome . There is conflicting information regarding an antidote; some sources recommend not to use an antidote or to use hyaluronidase in refractory cases, while other sources recommend

hyaluronidase. *Hyaluronidase (if appropriate):* SubQ: Administer four separate 0.2 mL injections of a 15 units/mL solution (using a 25-gauge needle) into area of extravasation .

☒ Precautions:

- Hypotension and severe cardiac arrhythmias (eg, heart block, ventricular tachycardia, ventricular fibrillation) may occur with rapid administration. IV use is contraindicated in patients with sinus bradycardia, sinoatrial block, or second and third degree heart block.

- Early detection of hematologic change is important; advise patients of early signs and symptoms including fever, sore throat, mouth ulcers, infections, easy bruising, petechial or purpuric hemorrhage.

- Measure plasma phenytoin concentrations at the first sign of acute toxicity; dosage reduction is indicated if phenytoin concentrations are excessive; if symptoms persist, discontinue administration.

- Immediately discontinue phenytoin in patients who develop acute hepatotoxicity and do not readminister.

- Potentially significant interactions may exist, requiring dose or frequency adjustment, additional monitoring, and/or selection of alternative therapy**.**

☒ Monitoring Parameters:

Continuous cardiac monitoring (rate, rhythm, blood pressure) and observation during administration recommended; blood pressure and pulse should be monitored every 15 minutes for 1 hour after administration; infusion site reactions.

35. Potassium Chloride 15% (10 ml) ampoule

☒ Dosage:

Adult

- ✓ **Treatment of hypokalemia:** *IV intermittent infusion:* Peripheral or central line: ≤10 mEq/hour; repeat as needed based on frequently obtained lab values; central line infusion and continuous ECG monitoring highly recommended for infusions >10 mEq/hour.

  Potassium dosage/rate of infusion general guidelines (per product labeling): **Note:** High variability exists in dosing/infusion rate recommendations; therapy guided by patient condition and specific institutional guidelines. As an estimate, 10 mEq of potassium chloride will roughly increase serum levels by 0.1 mEq/L. Patients with more severe forms of hypokalemia (eg, serum potassium levels <3.5 mEq/L) may require increased amounts due to total body potassium deficit .

  Serum potassium >2.5 to 3.5 mEq/L: Maximum infusion rate: 10 mEq/hour; maximum concentration: 40 mEq/L; maximum 24-hour dose: 200 mEq

  Serum potassium <2.5 mEq/L or symptomatic hypokalemia (excluding emergency treatment of cardiac arrest): Maximum infusion rate (central line only): 40 mEq/hour in presence of continuous ECG monitoring and frequent lab monitoring; in selected situations, patients may require up to 400 mEq/24 hours.

Pediatric

Note: Maintenance potassium IV doses should be incorporated into the patient's maintenance IV fluids; intermittent IV potassium administration should be reserved for severe depletion situations; continuous ECG monitoring should be used for intermittent IV doses >0.5 mEq/kg/**hour.**

- ✓ **Hypokalemia, treatment; severe**: Infants, Children, and Adolescents: Intermittent IV infusion: 0.5 to 1 mEq/kg/dose; maximum dose: 40 mEq/dose; infuse at a rate ≤0.5 mEq/kg/**hour** ; serum concentrations should be evaluated 1 to 2 hours after completion of infusion; may repeat as needed based on lab values; severe depletion or ongoing losses may require >200% of normal daily maintenance .

☒ Preparation for Administration:

It must be diluted prior to parenteral administration. The concentration of infusion may be dependent on patient condition and specific institution policy. Some clinicians recommend that and 20-40 mEq/100 mL for central infusions.

☒ Administration:

- Potassium chloride **must be diluted** prior to parenteral administration. For IV infusion; **do not administer IV push.**

- The maximum concentration for peripheral infusion is 10 mEq/100 mL and the maximum rate of administration for peripheral infusion is 10 mEq/hour. With central line administration, higher concentrations and more rapid rates of infusion may be used; concentrations of 20 to 40 mEq/100 mL at a maximum rate of 40 mEq/hour via central line have been safely administered.

- **Vesicant/irritant** (at concentrations >0.1 mEq/mL); 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); 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 .

☒ Precautions:

- Use with caution in patients with cardiovascular disease (eg, heart failure, cardiac arrhythmias, atrioventricular [AV] block); patients may be more susceptible to life-threatening cardiac effects associated with hyper/hypokalemia.

- Evaluate renal function, cardiac and fluid status, and any factors contributing to altered potassium concentrations (eg, acidosis, alkalosis) prior to therapy.

- Do NOT administer undiluted or IV push.

- Pain and phlebitis may occur during parenteral infusion requiring a decrease in infusion rate or potassium concentration.

☒ Monitoring Parameters:

Electrolytes (including serum potassium, calcium, chloride, magnesium, phosphate, sodium), acid/base balance; renal function; cardiac monitor (if intermittent infusion or potassium infusion rates >10 mEq/hour in adults); to assess adequate replacement, repeat serum potassium level 2 to 4 hours after dose; IV infusion site.

36 . Propofol 1% (10 mg /ml) 20ml ampoule

☒ **Dosage:** Dosage must be individualized based on total body weight and titrated to the desired clinical effect. Wait at least 3 to 5 minutes between dosage adjustments to clinically assess drug effects.

Adult

✓ **General anesthesia:** ***Induction****:* Healthy adults, ASA-PS 1 or 2, <55 years: IV: 2 to 2.5 mg/kg (~40 mg every 10 seconds until onset of induction). ***Maintenance of general anesthesia****:* Healthy adults, <55 years: IV infusion: Initial: 100 to 200 mcg/kg/minute (or 6 to 12 mg/kg/**hour**) for 10 to 15 minutes; usual maintenance infusion rate: 50 to 100 mcg/kg/minute (or 3 to 6 mg/kg/**hour**) to optimize recovery time. Or IV intermittent bolus: 25 to 50 mg increments as needed.

✓ **Monitored anesthesia care sedation:** Healthy adults, ASA-PS 1 or 2, <55 years: Slow IV infusion: 100 to 150 mcg/kg/minute (or 6 to 9 mg/kg/**hour**) for 3 to 5 minutes **or** slow injection: 0.5 mg/kg over 3 to 5 minutes followed by IV infusion of 25 to 75 mcg/kg/minute (or 1.5 to 4.5 mg/kg/**hour**) **or** incremental bolus doses: 10 mg or 20 mg.

✓ **ICU sedation in intubated mechanically-ventilated patients:** Avoid rapid bolus injection; individualize dose and titrate to response. ***Continuous infusion****:* Initial: 5 mcg/kg/minute (or 0.3 mg/kg/**hour**); increase by 5 to 10 mcg/kg/minute (or 0.3 to 0.6 mg/kg/**hour**) every 5 to 10 minutes until desired sedation level is achieved; usual maintenance: 5 to 50 mcg/kg/minute (or 0.3 to 3 mg/kg/**hour**); reduce dose after adequate sedation established and adjust to response. Daily interruption with retitration or a light target level of sedation is recommended to minimize prolonged sedative effects.

Pediatric

✓ **General anesthesia:**
Induction of general anesthesia: IV: Healthy children 3 to 16 years, ASA-PS 1 or 2: 2.5 to 3.5 mg/kg over 20 to 30 seconds; use a lower dose for children ASA-PS 3 or 4
Maintenance of general anesthesia: IV infusion: Healthy children 2 months to 16 years, ASA-PS 1 or 2: 125 to 300 mcg/kg/minute (or 7.5 to 18 mg/kg/**hour**); after 30 minutes, if clinical signs of light anesthesia are absent, decrease the infusion rate. Children ≤5 years may require larger infusion rates compared to older children.

✓ **Status epilepticus, refractory** IV: **Note:** Mechanical ventilation and cardiovascular monitoring required; titrate dose to cessation of electrographic seizures or burst suppression.
Neurocritical Care Society recommendations:
Loading dose: 1 to 2 mg/kg with initiation of a continuous infusion.
Continuous infusion: Initial: 20 mcg/kg/minute (1.2 mg/kg/**hour**). If the patient experiences breakthrough status epilepticus while on continuous infusion, increase infusion rate by 5 to 10 mcg/kg/minute (0.3 to 0.6 mg/kg/**hour**) every 5 minutes (may also administer a 1 mg/kg bolus dose with continuous infusion titration); dosage range: 30 to 200 mcg/kg/minute (1.8 to 12 mg/kg/**hour**). **Note:** Use caution with doses >80 mcg/kg/minute (>4.8 mg/kg/**hour**) for >48 hours. Prior to withdrawal, a period of at least 24 to 48 hours of electrographic control is recommended; withdraw gradually to prevent recurrent status epilepticus.

☒ Preparation for Administration:

Does not need to be diluted; however, propofol may be further diluted in D5W to a concentration of ≥2 mg/mL. The mixture should be prepared aseptically immediately prior to administration and must be administered within 6 hrs of preparation.

☒ Administration:

- IVbolus or by continuous IV infusion.

-Do not administer through the same IV catheter with blood or plasma. Tubing and any unused portions of propofol ampoule should be discarded after 12 hours.

- To reduce pain associated with injection, use larger veins of forearm or antecubital fossa; lidocaine IV (1 mL of a 1% solution) may also be used prior to administration or it may be added to propofol immediately before administration in a quantity not to exceed 20 mg lidocaine per 200 mg propofol. Do not use filter <5 micron for administration.

☒ Precautions:

- Use a lower induction dose, a slower maintenance rate of administration, and avoid rapidly delivered boluses in **elderly** patients to reduce the incidence of unwanted cardiorespiratory depressive events.

- Serum triglyceride levels should be obtained prior to initiation of therapy and every 3 to 7 days thereafter. Monitoring of serum **triglycerides** should especially be considered with therapy >48 hours with doses exceeding 50 mcg/kg/minute .
- The major cardiovascular effect of propofol is **hypotension** especially if patient is hypovolemic or if bolus dosing is used.

- Propofol-related infusion syndrome (PRIS) is a serious side effect with a high mortality rate ,characterized by dysrhythmia (eg, bradycardia or tachycardia), heart failure, hyperkalemia, lipemia, metabolic acidosis, and/or rhabdomyolysis or myoglobinuria with subsequent renal failure. The onset of the syndrome is rapid, occurring within 4 days of initiation. Alternate sedative therapy should be considered .
- Avoid abrupt discontinuation prior to weaning or daily wake up assessments. Discontinue opioids and paralytic agents prior to weaning. Long-term infusions can result in some tolerance; taper propofol infusions to prevent withdrawal.

☒ Monitoring Parameters

Cardiac monitor, BP, O_2 saturation (during monitored anesthesia care sedation), arterial blood gas (with prolonged infusions). With prolonged infusions (eg, ICU sedation), monitor for signs and symptoms of propofol-related infusion syndrome (PRIS): Metabolic acidosis, hyperkalemia, rhabdomyolysis or elevated CPK, hepatomegaly, and progression of cardiac and renal failure.

Note: use intravenous port opposite propofol infusion or temporarily suspend infusion and flush port prior to blood draw.

37 . Protamine sulfate (10 mg /ml) ampoule

☒ Dosage:

Adult

✓ **Heparin overdosage, following *intravenous* administration :**IV:adjust the protamine dosage depending upon the duration of time since heparin administration as follows: See table.

Time elapsed	Dose of Protamine (mg) to Neutralize 100 units of Heparin
Immediate	1 to1.5
30 to 60 mins	0.5 to 0.75
> 2 hours	0.25 to 0.375

✓ **Heparin overdosage, following *SubQ* injection :** IV: 1 to 1.5 mg protamine per 100 units heparin; this may be done by a portion of the dose (eg, 25 to 50 mg) given slowly IV followed by the remaining portion as a continuous infusion over 8 to 16 hours (the expected absorption time of the SubQ heparin dose)

✓ **LMWH overdose: IV:**

- Enoxaparin: *Enoxaparin administered in* ***≤8 hours***: 1 mg of protamine sulfate neutralizes 1 mg of enoxaparin. *Enoxaparin administered in* ***>8 hours*** *or if it has been determined that a second dose of protamine is required*: 0.5 mg of protamine sulfate for every 1 mg of enoxaparin administered.

- Dalteparin or tinzaparin: 1 mg protamine for each 100 anti-Xa units of dalteparin or tinzaparin; if PTT prolonged 2 to 4 hours after first dose (or if bleeding continues), consider additional dose of 0.5 mg for each 100 anti-Xa units of dalteparin or tinzaparin.

Pediatric

Heparin or enoxaparin neutralization : Infants, Children, and Adolescents: IV: Protamine dosage is determined by the most recent dosage of heparin or low molecular weight heparin (LMWH); 1 mg of protamine sulfate neutralizes ~100 units of heparin or 1 mg of enoxaparin; maximum protamine dose: 50 mg/dose. **Note:** When heparin is given as a continuous IV infusion, only heparin given in the preceding several hours (eg, 2 hours) should be considered when administering protamine.

Heparin overdosage following *intravenous* administration : Infants, Children, and Adolescents:

Neutralization Dose of Protamine for IV Heparin Overdosage in Pediatric Patients

Time Since Last Heparin Dose (min)	Dose of Protamine (mg) to Neutralize 100 units of Heparin
<30	1
30 to 60	0.5 to 0.75
60 to 120	0.375 to 0.5
>120	0.25 to 0.375

LMWH overdosage (enoxaparin): Infants, Children, and Adolescents:

Enoxaparin dose administered ≤8 hours: IV: Dose of protamine should equal the dose of enoxaparin administered; therefore, 1 mg protamine sulfate neutralizes per 1 mg of enoxaparin.

Enoxaparin administered >8 hours prior or if it has been determined that a second dose of protamine is required (eg, if aPTT measured 2 to 4 hours after the first dose remains prolonged or if bleeding continues): IV: 0.5 mg protamine sulfate for every 1 mg enoxaparin.

☒ Administration:

- May be further diluted in D5W or NS.
- For IV use only. Administer slow IVP (50 mg over 10 minutes). Rapid IV infusion causes hypotension; maximum of 50 mg in any 10-minute period.

☒ Precautions:

- Heparin rebound associated with anticoagulation and bleeding has been reported to occur occasionally; symptoms typically occur 8-9 hours after protamine administration, but may occur as long as 18 hours later.
- May cause hypersensitivity reaction in patients.
- Too rapid administration can cause severe hypotensive and anaphylactoid-like reactions.

☒ Monitoring parameters:

- Coagulation test, aPTT, cardiac monitor and blood pressure monitor required during administration.

38 . Ranitidine 50 mg/ 2 ml ampoule

☒ Dosage:

Adult

✓ **Duodenal ulcer:** IM: 50 mg every 6 to 8 hours

IV:Intermittent bolus or infusion: 50 mg every 6 to 8 hours (if increased doses are necessary utilize more frequent administration up to a maximum of 400 mg/day).Continuous IV infusion: 6.25 mg/hour

✓ **Pathological hypersecretory conditions:**IM: 50 mg every 6 to 8 hours

IV:Continuous IV infusion: 6.25 mg/hour

Continuous infusion for Zollinger-Ellison: Initial: 1 mg/kg/hour; measure gastric acid output at 4 hours, if >10 mEq or if patient is symptomatic, increase dose in increments of 0.5 mg/kg/hour; doses of up to 2.5 mg/kg/hour (or 220 mg/hour) have been used

Intermittent bolus or infusion: 50 mg every 6 to 8 hours (if increased doses are necessary utilize more frequent administration up to a maximum of 400 mg/day).

✓ **Anaphylaxis, adjunct therapy:** IV: 50 mg/dose; **Note:** Should not be used as monotherapy or as first line therapy.

✓ **Stress ulcer prophylaxis in critically ill patients: Note:** Intended for patients with associated risk factors (eg, coagulopathy, mechanical ventilation for >48 hours, severe sepsis); discontinue use once risk factors have resolved. IV: Intermittent bolus: 50 mg every 6 to 8 hours.

Pediatric

✓ **Duodenal ulcer:** IV: Infants, Children, and Adolescents ≤16 years: 2 to 4 mg/kg/day divided every 6 to 8 hours; maximum dose: 50 mg/dose
Adolescents >16 years: Refer to adult dosing.

✓ **Pathological hypersecretory conditions:** Adolescents >16 years: Refer to adult dosing.

✓ **Anaphylaxis, adjunct therapy:** Infants, Children, and Adolescents: IV: 1 mg/kg/dose; maximum dose: 50 mg/dose; **Note:** Should not be used as monotherapy or as first line therapy.

☒ Preparation for Administration:

- Continuous infusion: Dilute in D_5W or other compatible IV solution; for Zollinger-Ellison patients, dilute in D_5W or other compatible IV solution to a maximum concentration of 2.5 mg/mL.
- Intermittent bolus injection: Dilute in NS or other compatible IV solution to a maximum concentration of 2.5 mg/mL (20 mL).

- Intermittent infusion: Dilute in D_5W or other compatible IV solution to a maximum concentration of 0.5 mg/mL (100 mL).
IM: No dilution necessary.

☒ Administration

- Intermittent bolus: Manufacturer recommends a maximum rate of administration of 10 mg/minute (infuse over at least 5 minutes); however, in adults may also be administered at a maximum rate of 25 mg/minute (or over 2 minutes) if necessary.

- Intermittent IV infusion: Administer over a maximum rate of 2.5 to 3.5 mg/minute (infuse over at least 15 to 20 minutes)

- Continuous IV infusion: Administer at a rate of 6.25 mg/hour; for Zollinger-Ellison patients, administer at a rate of 1 mg/**kg**/hour (infusion rates as high as 220 mg/hour have been used).

☒ Precautions

- Ranitidine is primarily excreted renally; dosage adjustment is recommended in patients with renal impairment.

Adult: CrCl <50 mL/minute:IV: 50 mg every 18 to 24 hours; adjust dose cautiously if needed.

Pediatric: IV:GFR 30 to 50 mL/minute/1.73 m^2: 1 mg/kg/dose every 12 hours.GFR 10 to 29 mL/minute/1.73 m^2: 0.5 mg/kg/dose every 12 hours.GFR <10 mL/minute/1.73 m^2: 0.5 mg/kg/dose every 24 hours.

- Increased risk for development of acute gastroenteritis and community-acquired pneumonia in pediatric patients .

- Rapid administration has been associated with bradycardia (rare), usually in patients with predisposing risk factors for cardiac rhythm disorders. Do not exceed the recommended IV administration rate

☒ Monitoring Parameters

serum creatinine; occult blood with GI bleeding, signs/symptoms of peptic ulcer disease; when used to prevent stress-related GI bleeding, measure the intragastric pH and try to maintain pH >4; when used for Zollinger-Ellison syndrome, monitor gastric acid secretion (goal: <10 mEq/hour).

39. Rocuronium (10 mg /ml) 5 ml ampoule

☒ Dosage:

Adult

- ✓ **Intensive care unit paralysis (eg, use for up to 48 hours in patients with early ARDS with PaO_2/FiO_2 <150, to facilitate mechanical ventilation, or for shivering from therapeutic hypothermia) :**Initial bolus of 0.6 to 1 mg/kg, followed by continuous IV infusion of 8 to 12 **mcg**/kg/**minute** (0.48 to 0.72 **mg**/kg/**hour**); monitor depth of blockade every 2 to 3 hours initially until stable dose, then every 8 to 12 hours; adjust rate of administration by 10% increments according to desired clinical response and possibly with peripheral nerve stimulation .

- ✓ **Neuromuscular blockade for endotracheal intubation, surgery, or mechanical ventilation (as adjunct to general anesthesia):**
  - Rapid sequence intubation: IV: 0.6 to 1.2 mg/kg

  - Tracheal intubation: IV:*Initial:* 0.45 to 0.6 mg/kg; administration of 0.3 mg/kg may also provide optimal conditions for tracheal intubation .
  -*Maintenance for continued surgical relaxation:* 0.1 to 0.2 mg/kg; repeat as needed **or** a continuous infusion of 10 to 12 **mcg**/kg/**minute** (0.6 to 0.72 **mg**/kg/**hour**) only after recovery of neuromuscular function is evident; infusion rates have ranged from 4 to 16 **mcg**/kg/**minute** (0.24 to 0.96 **mg**/kg/**hour**).

Pediatric

Neonates, Infants, Children, and Adolescents: **Note:** In general, onset is shortened and duration is prolonged as dose increases. Duration is shortest in children >2 to ≤11 years and longest in neonates and infants.

- ✓ **Tracheal intubation:** IV: 0.45 mg/kg or 0.6 mg/kg. *Maintenance for continued surgical relaxation:* IV: 0.075 to 0.15 mg/kg; redosing interval is guided by monitoring with a peripheral nerve stimulator **or** 7 to 12 **mcg**/kg/**minute** (0.42 to 0.72 **mg**/kg/**hour**) as a continuous infusion; use lower end of the continuous infusion dosing range for neonates and the upper end for children >2 to ≤11 years
- ✓ **Rapid sequence intubation:** IV: 0.9 mg/kg or 1.2 mg/kg. Not recommended, per the manufacturer, for rapid sequence intubation in pediatric patients; however, it has been used successfully in clinical trials for this indication in children >1 year .

☒ Preparation for Administration:

May be diluted in D5NS, D5W, LR or NS at concentrations up to 5 mg/mL; use within 24 hours of preparation.

☒ Administration:

May be given as a bolus injection (undiluted) or via a continuous infusion.

☒ Precautions:

- Ensure adequate pain control and sedation prior to and during administration of neuromuscular blockade to achieve deep sedation.
- Ideal body weight or adjusted body weight is generally recommended when calculating dose for obese patients.
- Resistance may occur in burn patients (≥20% of total body surface area), usually several days after the injury, and may persist for several months after wound healing.
-Maintenance of an adequate airway and respiratory support is critical. Tolerance to rocuronium may develop.
- All patients should receive eye care including liberal use of lubricating drops, gel, or ointment and eyelids should remain closed during continuous neuromuscular blockade to protect against damage to the cornea (ulceration and drying).
- Should be administered by adequately trained individuals familiar with its use.
- If extravasation occurs, local irritation may ensue; discontinue administration immediately and restart in another vein.

☒ Monitoring Parameters:

Vital signs (heart rate, blood pressure, respiratory rate); degree of muscle paralysis (eg, presence of spontaneous movement, ventilator asynchrony, shivering, and consider use of a peripheral nerve stimulator with train of four monitoring along with clinical assessments).

40 . Salbutamol solution (0.5%) (5 mg/ml)

☒ Dosage:

Adult

- ✓ **Bronchospasm:** *Nebulization solution:* 2.5 mg 3 to 4 times daily as needed; Quick relief: 1.25 to 5 mg every 4 to 8 hours as needed
- ✓ **Exacerbation of asthma (acute, severe):** *Nebulization solution:* 2.5 to 5 mg every 20 minutes for 3 doses, then 2.5 to 10 mg every 1 to 4 hours as needed, **or** 10 to 15 mg/hour by continuous nebulization.
- ✓ **Hyperkalemia :** Inhalation: *Nebulization solution:* 10 to 20 mg over 10 minutes in combination with other recommended therapies .

Pediatric

- ✓ **Bronchospasm:** *Nebulization solution:* Quick relief: Children ≤4 years of age: 0.63 to 2.5 mg every 4 to 6 hours as needed. Children ≥5 years of age and Adolescents: Refer to adult dosing. (Maximum: 10 mg/day)

- ✓ **Exacerbation of asthma (acute, severe)** : *Nebulization solution:* Children <12 years: 0.15 mg/kg (minimum: 2.5 mg) every 20 minutes for 3 doses, then 0.15 to 0.3 mg/kg (maximum: 10 mg) every 1 to 4 hours as needed, **or** 0.5 mg/kg/hour by continuous nebulization
  Children ≥12 years and Adolescents: Refer to adult dosing.

☒ Preparation for Administration:

Dilute 0.25 mL (1.25 mg dose) or 0.5 mL (2.5 mg) of solution to a total of 3 mL with normal saline; also compatible with cromolyn or ipratropium nebulizer solutions.

☒ **Administration**: Concentrated solution should be diluted prior to use; adjust nebulizer flow to deliver dosage over 5 to 15 minutes; avoid contact of the dropper tip (multidose bottle) with any surface, including the nebulizer reservoir and associated ventilator equipment. Blow-by administration is not recommended; use a mask device if patient unable to hold mouthpiece in mouth for administration.

☒ Precautions:

- Use with caution in patients with cardiovascular disease (arrhythmia, coronary insufficiency, hypertension, heart failure). It may produce ECG changes (flattening of the T wave, prolongation of the QTc interval, ST segment depression) and/or cause elevation in blood pressure, heart rate and result in CNS stimulation/excitation.

Use with caution in patients with hypokalemia. May elevate intraocular pressure.

- May increase serum glucose.

☒ **Monitoring Parameters:** BP, HR; CNS stimulation; serum glucose, serum potassium, serum creatinine; asthma symptoms; arterial or capillary blood gases (if patients condition warrants).

41. Sodium Bicarbonate 8.4% (50 ml) vial

☒ **Dosage:** **Note:** 1 mEq $NaHCO_3$ is equivalent to 84 mg; each g of $NaHCO_3$ provides ~12 mEq each of sodium and bicarbonate ions**.**

✓ **Adult , Pediatric**

Metabolic acidosis: IV: Dosage should be based on the following formula if blood gases and pH measurements are available:

HCO_3^-(mEq) = 0.5 x weight (kg) x [24 - serum HCO_3^-(mEq/L)] **or** HCO_3^-(mEq) = 0.5 x weight (kg) x [desired increase in serum HCO_3^-(mEq/L)]

Administer $^1/_2$ dose initially, then remaining $^1/_2$ dose over the next 24 hours; monitor pH, serum HCO_3^-, and clinical status. **Note:** These equations provide an estimated replacement dose. *If acid-base status is not available*: 2 to 5 mEq/kg IV infusion over 4 to 8 hours; subsequent doses should be based on patient's acid-base status.

✓ **Adult : Hyperkalemia:** IV: 50 mEq over 5 minutes (as appropriate, consider methods of enhancing potassium removal/excretion).

☒ Administration:

- For IV administration to **infants**, use the 0.5 mEq/mL solution or dilute the 1 mEq/mL solution 1:1 with **sterile water**; for direct IV infusion in emergencies, administer slowly (maximum rate in infants: 10 mEq/minute); for infusion, dilute to a maximum concentration of 0.5 mEq/mL in dextrose solution and infuse over 2 hours (maximum rate of administration: 1 mEq/kg/hour).

- Vesicant (at concentrations ≥8.4%); 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); 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 .

☒ Precautions:

- Rapid administration in **neonates, infants, and children <2 years** of age has led to hypernatremia, decreased CSF pressure, and intracranial hemorrhage.

☒ Monitoring Parameters:

Monitor infusion site, monitor for signs of fluid retention, monitor cardiac status, arterial blood gases, and electrolytes.

42. Regular Insulin (100IU/ ml)(10 ml vial)

☒ Dosage:

✓ **Diabetes mellitus, type 1:** SubQ: **The total daily doses (TDD) presented below are expressed as the total units/kg/day of all insulin formulations combined.**

General insulin dosing: ***Initial TDD:*** ~0.4 to 0.5 units/kg/day ; conservative initial doses of 0.2 to 0.4 units/kg/day may be considered to avoid the potential for hypoglycemia; higher initial doses may be required in patients who are obese, sedentary, or presenting with ketoacidosis .

Usual TDD maintenance range: 0.4 to 1 units/kg/day in divided dose

Division of TDD (multiple daily injections): Basal insulin: Generally, 40% to 50% of the TDD is given as basal insulin (intermediate [NPH]- or long-acting [eg, glargine, degludec, detemir]) in 1 to 2 daily injections . Prandial insulin: The remaining portion (ie, 50% to 60%) of the TDD is then divided and administered before or at mealtimes.

Dose adjustment: Dosage must be titrated to achieve glucose control and avoid hypoglycemia. Adjust dose to maintain premeal and bedtime glucose in target range.

✓ **Diabetes mellitus, type 2:** SubQ: *Initial:* 4 to 6 units **or** 0.1 unit/kg **or** 10% of the **basal** insulin dose administered before the largest meal of the day and usually given in addition to a regimen that includes basal insulin (ie, a long-acting insulin such as glargine, degludec, or detemir; or an intermediate-acting insulin such as NPH) and metformin +/- other noninsulin agents. Consider reducing the basal insulin dose if HbA_{1c} is <8% when initiating prandial insulin.

*Dosage adjustment:*To reach self-monitoring glucose target: Adjust prandial insulin dose by 10% to 15% **or** 1 to 2 units; may adjust at weekly **or** twice weekly intervals .For hypoglycemia: If no clear reason for hypoglycemia, decrease prandial insulin dose by 2 to 4 units **or** by 10% to 20% .
HbA_{1c}still not controlled despite titrations to reach glycemic targets: One option is to advance to 'basal-bolus' (ie, prandial insulin coverage before ≥2 meals per day) in addition to **basal** insulin and usually given in addition to metformin +/- other noninsulin agents.

✓ **Patients with diabetes receiving enteral feedings:** SubQ: **Note**: TDD of insulin is divided into a basal component (intermediate- or long-acting insulin) and nutritional and correctional components (regular insulin or rapid-acting insulins).

Nutritional/Correctional: SubQ: 1 unit of regular insulin per 10 to 15 g of carbohydrate plus correctional regular insulin (as needed for hyperglycemia) administered every 6 hours or prior to each bolus feeding.

✓ **Patients with diabetes receiving parenteral feedings (ADA 2018)**:

IV (added to TPN solution): 1 unit of regular insulin per 10 g of carbohydrate added to TPN IV solution; adjust dose daily. One option is to increase the amount of regular insulin added to the TPN by two-thirds of the amount of the correctional insulin used on the previous day . *SubQ*: Administer correctional regular insulin every 6 hours as needed for hyperglycemia.

- ✓ **Diabetic ketoacidosis:** IV:*Bolus:* 0.1 units/kg (optional), *Infusion:* If a bolus was administered, follow with 0.1 units/kg/hour. If no bolus was administered, initiate with 0.14 units/kg/hour (lower doses may not achieve adequate insulin concentrations to suppress hepatic ketone body production).

Adjustment: If serum glucose does not fall by at least 10% in the first hour, give an IV bolus of 0.14 units/kg and continue previous regimen. In addition, if serum glucose does not fall by 50 to 75 mg/dL in the first hour, the insulin infusion dose should be increased hourly until a steady glucose decline is achieved Once serum glucose reaches **200** mg/dL, decrease infusion dose to 0.02 to 0.05 units/kg/hour or switch to SubQ rapid-acting insulin (eg, aspart, lispro) at 0.1 units/kg every 2 hours; administer dextrose-containing IV fluids to maintain serum glucose between 150 to 200 mg/dL until the resolution of ketoacidosis.

Transition from IV to SubQ insulin: After resolution of diabetic ketoacidosis, supplement IV insulin with SubQ insulin as needed until the patient is able to eat and transition fully to a SubQ insulin regimen. An overlap of ~1 to 2 hours between discontinuation of IV insulin and administration of SubQ insulin is recommended to ensure adequate plasma insulin levels; for basal insulin analogues (eg, degludec, detemir, glargine), may consider an overlap of 3 to 4 hours due to their delayed onset of action .

- ✓ **Hyperkalemia, moderate to severe:** IV: 10 units regular insulin mixed with 25 g dextrose (50 mL $D_{50}W$) given over 15 to 30 minutes or alternatively, 10 units regular insulin as IV bolus followed by 50 mL $D_{50}W$ administered over 5 minutes; a weight-based insulin dose of 0.1 units/kg (maximum: 10 units) may also be considered to reduce the risk of hypoglycemia. Effects on potassium are temporary; repeat dosing as needed.
- ✓ **Hyperosmolar hyperglycemic state: IV** *Bolus:* 0.1 units/kg bolus (optional)

Infusion: If a bolus was administered, follow with 0.1 units/kg/hour. If no bolus was administered, initiate with 0.14 units/kg/hour.

Adjustment: If serum glucose does not fall by at least 10% in the first hour, give an IV bolus of 0.14 units/kg and continue previous regimen. In addition, if serum glucose does not fall by 50 to 75 mg/dL in the first hour, the insulin infusion dose should be increased hourly until a steady glucose decline is achieved. Once serum glucose reaches **300** mg/dL, decrease dose to 0.02 to 0.05 units/kg/hour; administer dextrose-containing IV fluids to maintain serum glucose between **200 to 300** mg/dL until the patient is mentally alert.

Transition from IV to SubQ insulin: same as **Diabetic ketoacidosis**.

Pediatric

Diabetic ketoacidosis (DKA): Infants, Children, and Adolescents: As part of overall DKA management, dextrose should be added to IV fluids to prevent hypoglycemia, usually once serum glucose is between 250 to 300 mg/dL but it may be required sooner if serum glucose has decreased precipitously. Generally, only dextrose 5% is necessary and is added to NS or $^{1}/_{2}$NS; however, dextrose 10% or 12.5% may be necessary in some cases. Refer to institution-specific protocols where appropriate.

Continuous IV infusion:

Initial: 0.05 to 0.1 units/kg/**hour**; continue the rate at 0.05 to 0.1 units/kg/hour if tolerated until resolution of ketoacidosis (pH >7.3; bicarbonate >15 mEq/L and/or closure of anion gap); **Note:** Some patients (eg, some young children with DKA, or older children with established diabetes) may have marked sensitivity to insulin requiring lower infusion rates; these lower infusion rates should only be used provided that resolution of the acidosis continues .

Hyperkalemia: Infants, Children, and Adolescents: IV: 0.1 unit/kg with 400 mg/kg of glucose; usual ratio of combination therapy of insulin to glucose is 1 unit of insulin for every 4 g of glucose. An alternate approach is glucose 1 g/kg followed by 0.2 units of insulin/g of glucose administered over 15 to 30 minutes then infused continuously as a similar amount per hour. In adults, the usual dose is 10 units of insulin mixed with 25 g of dextrose (50 mL of $D_{50}W$) administered over 15 to 30 minutes .

Hyperosmolar hyperglycemic state (HHS): Children and Adolescents: **Note:** Only regular IV insulin should be used. Insulin administration should be initiated when serum glucose concentration is no longer declining at a rate ≥50 mg/dL per hour with fluid administration alone; earlier initiation may be required in patients with severe ketosis and acidosis. Infusion should continue until reversal of mental status changes and hyperosmolality. Serum glucose is not a direct indicator of these abnormalities, and may decrease more rapidly than correction of the metabolic abnormalities. Refer to institution-specific protocols where appropriate.

Continuous IV infusion: Initial: 0.025 to 0.05 units/kg/**hour**; titrate dose to achieve a decrease in serum glucose concentration at a rate of 50 to 75 mg/dL per hour; higher rates of decline may be required in some patients; however, if rate of decline exceeds 100 mg/dL per hour discontinue infusion.

☒ **Preparation for Administration:** **For IV infusion:**100 IU may be diluted in 100 ml NS to concentrations of 1 unit/mL.

☒ Administration:

✓ **IV:**

- Do not use if solution is viscous or cloudy; use only if clear and colorless.
- IV infusions: To minimize insulin adsorption to plastic IV tubing: Insulin loss will occur by adsorption to plastic (ie, PVC, polyethylene, polyolefin, polypropylene) IV containers and tubing .Therefore, flush the IV tubing with a priming infusion of 20 mL from the insulin infusion, whenever a new IV tubing set is added to the insulin infusion container .
- If insulin is required prior to the availability of the insulin drip, regular insulin should be administered by IV push injection.
- Because of insulin adsorption to plastic IV tubing or infusion bags, the actual amount of insulin being administered via IV infusion could be substantially less than the apparent amount. Therefore, adjustment of the IV infusion rate should be based on effect and not solely on the apparent insulin dose. The apparent dose may be used as a starting point for determining the subsequent SubQ dosing regimen ; however, the transition to SubQ administration requires continuous medical supervision, frequent monitoring of blood glucose, and careful adjustment of therapy.

✓ Subcutaneous:

- Do not use if solution is viscous or cloudy; use only if clear and colorless.
- Regular insulin cold injections should be avoided.
- Should be administered approximately 30 minutes before a meal.
- SubQ administration is usually made into the thighs, arms, buttocks, or abdomen; rotate injection sites within the same region to avoid lipodystrophy.
- When mixing 100 IU regular insulin with NPH insulin, 100 IU regular insulin should be drawn into syringe first.

☒ Precautions:

- Close monitoring of blood glucose and serum potassium.

- Exclusive use of **a sliding scale** insulin regimen in the inpatient hospital setting is strongly discouraged. In the critical care setting, continuous IV insulin infusion has been shown to best achieve glycemic targets.

- In noncritically ill patients with either poor oral intake or taking nothing by mouth, **basal** insulin or **basal** plus bolus is preferred.
- In noncritically ill patients with adequate nutritional intake, a combination of **basal** insulin, nutritional, and correction components is preferred.
- A blood glucose value <70 mg/dL should prompt a treatment regimen review and change, if necessary, to prevent further hypoglycemia.
- Diabetes self-management education (DSME) is essential to maximize the effectiveness of therapy.

☒ Monitoring Parameters

Serum potassium and glucose.

43. Tetanus Toxoid 10 doses/ 5 ml

☒ Dosage:

Adult and children ≥7 years:

- ✓ **Primary immunization:** IM: 0.5 mL; repeat 0.5 mL at 4-8 weeks after first dose and at 6-12 months after second dose.
- ✓ **Tetanus prophylaxis in wound management:** Tetanus prophylaxis in patients with wounds should consider if the wound is clean or contaminated, the immunization status of the patient, proper use of tetanus toxoid and/or tetanus immune globulin (TIG), wound cleaning, and (if required) surgical debridement and the proper use of antibiotics. Patients with an uncertain or incomplete tetanus immunization status should have additional follow up to ensure a series is completed. Patients with a history of Arthus reaction following a previous dose of a tetanus toxoid-containing vaccine should not receive a tetanus toxoid-containing vaccine until >10 years after the most recent dose even if they have a wound that is neither clean nor minor. See table.

Tetanus Prophylaxis in Wound Management

History of Tetanus Immunization Doses	Clean, Minor Wounds		All Other Wounds[1]	
	Tetanus Toxoid[2]	TIG	Tetanus Toxoid[2]	TIG
Uncertain or <3 doses	Yes	No	Yes	Yes
3 or more doses	No[3]	No	No[4]	No

[1]Such as, but not limited to, wounds contaminated with dirt, feces, soil, and saliva; puncture wounds; wounds from crushing, tears, burns, and frostbite.

[2]Tetanus toxoid in this chart refers to a tetanus toxoid-containing vaccine. For children <7 years of age, DTaP (DT, if pertussis vaccine contraindicated) is preferred to tetanus toxoid alone. For children ≥7 years and Adults, Td preferred to tetanus toxoid alone; Tdap may be preferred if the patient has not previously been vaccinated with Tdap.

[3]Yes, if ≥10 years since last dose.

[4]Yes, if ≥5 years since last dose.

Adapted from CDC "Yellow Book" (*Health Information for International Travel 2010*), "Routine Vaccine-Preventable Diseases, Tetanus" (available at http://www.cdc.gov/yellowbook) and *MMWR* 2006, 55(RR-17).

Abbreviations: **DT** = Diphtheria and Tetanus Toxoids (formulation for age ≤6 years); **DTaP** = Diphtheria and Tetanus Toxoids, and Acellular Pertussis (formulation for age ≤6 years; Daptacel®, Infanrix®); **Td** = Diphtheria and Tetanus Toxoids (formulation for age ≥7 years; Decavac®,Tenivac™); **TT**= Tetanus toxoid (adsorbed [formulation for age ≥7 years]); **Tdap** = Diphtheria and Tetanus Toxoids, and Acellular Pertussis (Adacel® or Boostrix® [formulations for age ≥7 years]); **TIG** = Tetanus Immune Globulin

☒ Administration:

IM: Inject intramuscularly in the area of the vastus lateralis (midthigh laterally) or deltoid. Do not inject into gluteal area. Shake well prior to withdrawing dose; do not use if product does not form a suspension.

- For patients at **risk of hemorrhage** following intramuscular injection, the ACIP recommends "it should be administered intramuscularly if, in the opinion of the physician familiar with the patient's bleeding risk, the vaccine can be administered by this route with reasonable safety. If the patient receives antihemophilia or other similar therapy, intramuscular vaccination can be scheduled shortly after such therapy is administered. A fine needle (23 gauge or smaller) can be used for the vaccination and firm pressure applied to the site (without rubbing) for at least 2 minutes. The patient should be instructed concerning the risk of hematoma from the injection." Patients on anticoagulant therapy should be considered to have the same bleeding risks and treated as those with clotting factor disorders.

☒ Precautions:

- Use with caution in patients with a history of bleeding disorders (including thrombocytopenia) and/or patients on anticoagulant therapy; bleeding/hematoma may occur from IM administration.
- Avoid injection into a blood vessel.
- Syncope has been reported with use of injectable vaccines and may be accompanied by transient visual disturbances, weakness, or tonic-clonic movements.
- Tetanus containing vaccines and emergency doses of tetanus vaccine should not be given more frequently than every 10 years in patients who have experienced a serious Arthus-type hypersensitivity reaction following a prior use of tetanus toxoid.

☒ Monitoring Parameters:

Monitor for syncope for 15 minutes following administration. If seizure-like activity associated with syncope occurs, maintain patient in supine or Trendelenburg position to reestablish adequate cerebral perfusion.

44 . Xylometazoline 0.05% , 0.1% nasal drop

☒ Dosage:

✓ **Nasal congestion:**

- Intranasal drops (0.1%) for **adult and children > 6 years**: Apply 2 to 3 drops in each nostril every 8 to 10 hours (4 applications a day are usually sufficient).

- Intranasal drops (0.05%) for **infants and children< 6 years**: Apply 1 to 2 drops in each nostril 1 to 2 times a day (don't exceed 3 applications a day).

☒ Administration:

For intranasal use only. Blow nose to clear nostrils before use. Tilt head slightly backward and then apply drops into each nostril. After application of drops inhale deeply. Wipe tip of container clean after each use.

☒ Precautions:

- Frequent or prolonged use may cause nasal congestion to recur or worsen.

- If symptoms persist longer than 3 days consult health care provider. Container should not be used by more than 1 individual.