INSTRUCTIONS FOR ONCOLOGY WARD (10D) DRUGS

(DOSAGE, ADMINISTRATION, PRECAUTIONS AND MONITORING)

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THE SUPERVISOR OF DRUG INFORMATION CENTER / JUST

1 . Calcium Gluconate 10 % (10 ml)

☒ Dosage:

✓ **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.

☒ 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.

2 . Chlorpheniramine maleate 10mg/1ml

☒ Dosage:

- ✓ **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)

☒ 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.

3. Diazepam(10 mg) Ampoule

☒ Dosage:

- ✓ **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.

☒ Administration:

- Administer undiluted by slow IV push; do not mix with other solutions or medications.
- Rapid injection may cause respiratory depression or hypotension, in adults, maximum infusion rate is 5 mg/minute.
- 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.

4. Flumazenil 0.5 mg amp

☒ Dosage:

- ✓ **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).

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

☒ 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.

5. Heparin sodium (5000 IU/ ml) vial

☒ Dosage:

- ✓ **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.
- ✓ **Maintenance of catheter patency (continuous infusion):** Using heparin 2 unit/mL large volume IV solutions, may administer at an infusion rate of 3 mL/hour (equivalent to 6 units/hour); however, rate of infusion dependent upon age, weight, clinical condition of patient, and procedure being employed. Do not use as a "catheter lock flush".
- ✓ **Maintenance of line patency (line flushing):** When using daily flushes of heparin to maintain patency of single and double lumen central catheters, 10 units/mL is commonly used for younger infants (eg, <10 kg) while 100 units/mL is used for older infants, children, and adults.
- ✓ **Thromboprophylaxis (low-dose heparin):** SubQ: 5,000 units every 8 to 12 hours. Duration of therapy and specific dosing for certain populations*:*

  - *Acute illness in hospitalized cancer patients:* SubQ: 5,000 units every 8 hours; recommended duration of therapy is length of hospital stay or until fully ambulatory.

  - *Major surgery in cancer patients:* SubQ: 5,000 units 2 to 4 hours preoperative and 5,000 units every 8 hours thereafter; continue therapy for at least 7 to 10 days. Prolonged treatment up to 4 weeks should be considered in patients undergoing major abdominal or pelvic surgery for cancer with high-risk features (eg, limited mobility, obesity, VTE history, comorbid conditions) .

  - *Orthopedic surgery:* Minimum duration of therapy of 10 to 14 days for patients undergoing total hip arthroplasty, total knee arthroplasty, or hip fracture surgery .

- ✓ **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).

☒ 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.

6. Hydrocortisone 100 mg vial

☒ Dosage:

- ✓ **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).
- ✓ **Stress dosing in patients known to be adrenally-suppressed (ie, prevention of adrenal crisis in glucocorticoid-treated patients) :**

Gastroenteritis with vomiting and/or diarrhea: IM, SubQ: 100 mg dose given early in course of illness; repeat after 6 to 12 hours.

Severe infection (eg, pneumonia/with altered cognition): IM, SubQ: 100 mg dose given early in course of illness; repeat after 6 to 12 hours until recovery.

Surgery:Minor stress (ie, inguinal herniorrhaphy): IV :25 mg/day for 1 day *Moderate stress (ie, joint replacement, cholecystectomy):* IV: 50 to 75 mg/day (25 mg every 8 to 12 hours) for 1 to 2 days .*Major stress (pancreatoduodenectomy, esophagogastrectomy, cardiac surgery):* IV: 100 to 150 mg/day (50 mg every 8 to 12 hours) for 2 to 3 days

- ✓ **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 .

☒ 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, weight, presence of infection; monitor IOP with therapy >6 weeks; bone mineral density; assess HPA axis suppression (eg, ACTH stimulation test, morning plasma cortisol test, urinary free cortisol test); growth in pediatric patients.

7. Lidocaine 2% plain (50 mg) Vial

☒ Dosage:

- ✓ **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 .

☒ 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.

8. 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

- ✓ **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 .

☒ 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 (Kraft 2005).

☒ 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.

9. Midazolam(15 mg/3ml) Ampoule

☒ Dosage:

✓ **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).

☒ 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.

10. 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**.**

✓ **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.

✓ **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.