Lidocaine Infusion Administration for Pain Protocol (Adult/Pediatric)

Issued by: PMMC, DUH P&T, DRAH P&T, DRH P&T, CPC
Origination Date: 5/2015
Expiration Date: 5/2018, 4/2021
Review Date: 9/2015, 12/2015, 4/2018
Revision Date: 10/2015, 5/2016, 1/2017, 1/2018, 4/2018, 10/2018

Purpose: To provide guidance in the care of patients receiving lidocaine as an infusion for treatment of severe pain.

Level: Interdependent.

Supportive Data: Lidocaine is an amide local anesthetic given with the intent of relieving chronic pain conditions and perioperative pain. Injured nerves develop abnormal, spontaneous active sodium channels at the site of nerve injury and along the nerve pathway. In low doses, lidocaine can suppress this abnormal firing at concentrations that do not affect normal nerve or cardiac function. Lidocaine is rapidly metabolized in the liver and the metabolites are excreted by the kidneys. Dose adjustments may be required in the case of liver and/or renal insufficiency. Lidocaine can also have a negative inotropic effect and should be used with caution when there is a history of cardiac failure.

Administration of lidocaine infusion is contraindicated in patients with any of the following:
   a. Prior allergy to amide type local anesthetics
   b. Severe cardiac failure (Ejection fraction < 20%) or heart block (Exception: Patients with a pacemaker)
   c. Concurrent treatment with Class I or III antiarrhythmics or amiodarone use < 3 months
   d. History of Wolff-Parkinson-White Syndrome or active dysrhythmia
   e. Bradycardia
   f. Severe hepatic impairment (bilirubin > 1.5 mg/dL)
   g. Severe renal impairment (<30 mL/min/1.73 m² or ESRD)
   h. Uncontrolled seizures

Caution should be used in patients with the following:
   i. Cognitively impaired patients that are unable to report pain intensity and adverse effects
   j. History of structural heart disease (e.g. Coronary artery disease)
   k. History of seizures
I. Concomitant use with another systemic, regional or local anesthetic

Indications include: Postoperative pain, sickle cell disease acute pain, or acute on chronic cancer pain

Exclusions include: Complex Regional Pain Syndrome (CRPS), detox, chronic pain, or opioid weaning

Content:

A. Initial Pain Assessment
   2. Assess patient for risk of adverse event.

B. Initiating Therapy
   1. Prescribing lidocaine for pain
      a. IPS Consult required for all patients using lidocaine for pain as supported in order set. IPS Consult is not required at DRAH or DRH.
      b. At DUH, ordering and dose adjustment of lidocaine infusion restricted to IPS providers for non-ICU patients. For patients in the ICU; any ICU provider may order and initiate therapy per IPS Consult.
      c. At DRAH, ordering and dose adjustment is restricted to Anesthesiologist or Critical Care attending in the ICU setting. Dose adjustments may be made by any ICU provider at DRAH.
      d. At DRH, ordering and dose adjustment is restricted to Anesthesiologist or Bariatric Surgery attending.
      e. Recommended initial dosing for lidocaine infusion is **0.5 mg/kg/hr** based on actual body weight. For patients who are twice their ideal body weight (IBW), an initial dose of **0.25 mg/kg/hr** should be considered. At DRH, lidocaine infusion dose will be based on IBW for bariatric surgery patients.
      f. If patient has liver disease (LFTs > 1.5 ULN), or renal disease (CrCl 30-50 mL/min), dose should be initiated at **0.25 mg/kg/hr** based on actual body weight (50% of normal starting dose).
   2. Administration
      a. Review order.
      b. Obtain lidocaine infusion from Pharmacy. The standard drip concentration is 2 gm/250 mL (0.008 gm/mL).
      c. The infusion rate may be titrated based upon clinical response. Usual dosing range is 0.5-1.25 mg/kg/hr. At DRAH, each dose titration requires new order from critical care team or anesthesia team.
   3. Continuation of Therapy
      a. All lidocaine infusions orders will expire after 5 days.
b. If the length of therapy needs to exceed 5 days, a review and documentation of reason of extended therapy is needed by IPS provider.
c. If extension of therapy is deemed clinically appropriate, a new order should be entered by IPS provider.

C. **Patient Monitoring during Initial Administration, Dose Changes & Routine**

1. Obtain lidocaine level 12 hours after infusion initiation and then daily until discontinuation. Recommend that labs should be drawn from contralateral site and not from same site as the lidocaine infusion.
   a. Lidocaine level should be obtained 8 hours after each dose increase.
   b. Normal lidocaine level is 1-4 mcg/mL. If the lidocaine level is elevated (>4 mcg/mL) or the patient is experiencing signs and symptoms of lidocaine toxicity, lidocaine infusion should be stopped and provider notified.
   c. Infusion may be re-initiated as clinically indicated.
   d. Repeat lidocaine levels can be obtained as clinically indicated.
   e. The table below outlines toxicities that can be associated with serum lidocaine levels.

   **Lidocaine Serum Levels and Potential Associated Toxicities**

<table>
<thead>
<tr>
<th>Serum Level</th>
<th>Toxicity</th>
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<tbody>
<tr>
<td>4-8 mcg/mL</td>
<td>Numbness and tingling in fingers, toes, or around mouth; metallic taste; ringing in ears; lightheadedness/dizziness</td>
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<tr>
<td>8-12 mcg/mL</td>
<td>Severe dizziness, decreased hearing, tremors, changes in blood pressure and pulse</td>
</tr>
<tr>
<td>&gt; 12 mcg/mL</td>
<td>Seizures, loss of consciousness, cardiac arrhythmias, cardiac arrest</td>
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</tbody>
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   f. Monitoring and documentation to include: pain score, sedation score (RASS), respiratory rate, oxygen saturation, and for signs and symptoms of lidocaine toxicity
   g. Within 60 minutes of initiation.
   h. Then every 2 hours for the first 24 hours then every 4 hours. For an increase in dose, monitor every 2 hours for 24 hours then every 4 hours.

D. **Reportable Conditions**

Notify Medical team and ordering IPS provider if any of the following occur:

1. Sedation (RASS -2 to -5) or hyperactivity (RASS +2 to +4)
2. Increased pain level or unrelieved pain
3. Signs and symptoms of lidocaine toxicity (See Table above)

**E. Treatment for Local Anesthetic-Induced Cardiac Arrest**

In the event of local anesthetic-induced cardiac arrest that is unresponsive to standard therapy, in addition to standard cardio-pulmonary resuscitation, Intralipid 20% should be given IV in the following dose regimen:

**Adult Patients:**

- Intralipid 20% **100 mL IV bolus** over 1 minute
- Follow immediately with an **infusion of 250 mL over 20 minutes**
- Continue chest compressions (lipid must circulate)
- Repeat **100 mL bolus every 3-5 minutes, up to 2 times**, if circulation has not been restored
- Repeat **250 mL infusion** until hemodynamic stability is restored – please call pharmacy for additional intralipid bags if needed
- **A maximum total dose of 10 mL/kg is recommended**

**Pediatric Patients:**

- Intralipid 20% **3 mL/kg (IV bolus)**
- Follow immediately with an infusion of 0.25 mL/kg/min continuous infusion
- Continue chest compressions (lipid must circulate)
- Repeat **3 mL/kg bolus every 3-5 minutes, up to 2 times**, if circulation has not been restored
- Repeat **0.25 mL/kg/min infusion** until hemodynamic stability is restored – please call pharmacy for additional intralipid bags if needed
- **A maximum total dose of 8 mL/kg is recommended**

**References:**