Kingston Health Sciences Centre

Centre des sciences de la santé de Kingston

KINGSTON HEALTH SCIENCES CENTRE

MEDICATION ADMINISTRATION: BELOW THE DRIP CHAMBER

LEARNING GUIDE
FOR REGISTERED NURSES AND REGISTERED PRACTICAL NURSES

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Note: This learning guide contains information current at the time of distribution. Policies and procedures are frequently revised. Please refer to related policies and procedures contained in the Nursing Policy and Procedure Manuals for ongoing current information.

1.0 INTRODUCTION

An IV bolus is a concentrated dose of medication administered directly into the systemic circulation via a vein, usually over less than 10 minutes. An IV bolus, or push, usually requires a small volume of fluid, which is an advantage for patients who are at risk for fluid overload.

Safe administration of some medications requires continuous patient monitoring for arrhythmias, blood pressure changes, or other adverse reactions. Therefore some IV medications may be administered only in specific areas of the hospital where appropriate monitoring can be done.
Administering an IV bolus medication incorrectly or too quickly can cause serious negative patient outcomes, including death. The Institute for Safe Medication Administration Practices (ISMP) has identified the following strategies to reduce harm from IV push medications:

- IV push medications should be provided in a ready-to-administer form whenever feasible.
- Medication vials should be disinfected before preparation of parental medications.
- Access to ports including needleless connectors should be disinfected before the administration of IV push medications.
- Sterile IV push medications should be withdrawn from glass ampules using a blunt filter needle.
- IV push medications, including those available in prefilled syringes, should not be diluted unless recommended by the manufacturer, supported by literature endorsed by the organization.
- If dilution or reconstitution of an IV push medication becomes necessary outside of the pharmacy sterile compounding area, it should be performed in a clean, designated location using organization approved, readily available drug information resources.
- The nurse administering an IV bolus medication should be trained and competent at managing anaphylaxis.

To avoid the potential complications of the administration of medications by the direct intravenous method, additional education and training is required. The administration of any intravenous medication below the drip chamber, manually by syringe over usually less than 10 minutes, is an **Added Nursing Skill for Registered Nurses (RN) and Registered Practical Nurses (RPN) and requires special authorization to perform.**

1.1 Authorization Process

To become authorized to administer medications below the drip chamber, the nurse will:
- review the learning guide related to administration of medications below the drip chamber;
- complete a written test with a passing level of 80%; and

Reauthorization will be required when the need is identified by the Clinical Learning Specialist or delegate or by the nurse.

1.2 Expected Competencies for the Learner

Upon completion of the education program, the nurse will be able to:

- Administer an intravenous medication below the drip chamber.

2.0 CONSIDERATIONS IN THE ADMINISTRATION OF MEDICATION BELOW THE DRIP CHAMBER.

Drugs that can be administered below the drip chamber are listed in the various drug references endorsed at KGH.

1. Become familiar with the properties of the drug that you are administering. Refer to the following endorsed references:

   - HDH/KGH Parenteral Drug Therapy Manual;
   - The KGH NICU Drug Manual will be used as the reference manual for neonates only in ICU, NICU and Pediatrics;
   - Micromedex (IV compatibility software);
   - KGH/HDH Department of Pharmacy Services: Guidelines for the Admixture and Administration of Frequently Used IV Medications to Pediatric Patients will be used as a reference for infants and children;
   - The Hospital for Sick Children Handbook for Pediatrics is available as a reference for drug dosing for infants and children (located on the pediatric resuscitation cart in ER);
   - Computer program available for Pediatric medication dose calculation (ER, ICU, Peds);
   - The Hospital for Sick Children Formulary.

2. Select an Intravenous (IV) line. Consider:
   - what is infusing in the line (medications, fluids, blood products);
   - location and type of the intravenous line:

     Peripheral lines may be prone to increased incidence of tissue damage. There may be more likelihood of decreased circulation in the vasoconstricted patient and therefore reduced distribution of the medication.

     Central lines allow increased blood circulation. This allows for higher concentrations of the drug to be delivered. There will thus be a shorter reaction time for both therapeutic and adverse effects.

3. Check the IV catheter site for patency noting any signs of infiltration.

4. Determine compatibility of the medication with the IV solution. Refer to the HDH/KGH Parenteral Drug Therapy Manual and/or IV Drug Administration information.

2.1 Medication Compatibility

Types of Incompatibility

- Physical insolubility - An insoluble reaction results in a visible precipitate.
- Physical - There is no physical visible change, but the drug is affected and is less active.
- Chemical reaction - A reaction such as an acid-base reaction,

can lead to precipitation, colour changes, gas solution formation, or no observable change.

- pH incompatibility - The pH of the drug plus another drug or solution may lead to a reaction;
- Therapeutic interaction - An interaction occurs within the body that may inactivate or potentiate the drug.

2.2 Considerations Prior to Administration

Check 6 Rights: correct patient, route, dose, drug, time and documentation.

NOTE: Administration of an IV bolus medication carries serious risk as it allows no time to correct errors, therefore, extreme care must be taken when calculating the correct dose of medication. In addition to the six rights, the nurse should also confirm the right dilution or fluid compatibility, flow rate and monitoring requirements.

Before IV medication administration, consider:

- IV solution;
- pH of solution and drug;
- other drugs infusing in the IV line;
- the maximum concentration and rate of administration;
- drugs and solutions infused through a buretrol may remain in the filter, therefore, always flush the Buretrol;
- policy and procedure requirements;
- whether the presence of a physician is required?
- the patient condition and expected response to the medication
- If the patient is unstable or in an acute episode of illness the care of the patient and/or any drug administration should be an RN responsibility i.e. the patient in severe hypoglycemia should not receive Dextrose IV by an RPN

Due to the nature of some drugs, there may be the need for additional support and monitoring during and/or following their IV administration. These support and monitoring prerequisites are included in the Administration section of the relevant drug monographs of the HDH/KGH Parenteral Drug Therapy Manual. In order to highlight the drugs that have specific prerequisites, they also appear in a text box on the upper right hand corner of these drug monographs. The administration guidelines of all drugs should also be referred to in order to determine if there are other considerations in addition to the support and monitoring requirements. The support and monitoring requirements are defined as follows:

Blood Pressure Monitoring

Drugs requiring the use of non-invasive blood pressure monitoring with vital signs being monitored more frequently than q1h,

OR

Those drugs requiring continuous arterial line blood pressure monitoring.

Cardiac Monitoring

The patient must be connected to a cardiac monitor (excluding telemetry) and the Regulated Health Professional administering the drug must continuously monitor the patient and have acquired the skill of ECG interpretation.

Fetal Monitoring

The patient must be connected to an electronic fetal monitor and the Regulated Health Professional must have acquired the skill of interpreting the monitor strip.

Respiratory Support

There must be an oral airway, manual ventilator (ambu bag), airway suctioning and oxygen equipment readily available on the unit.

Ventilator Support

The patient must have an endotracheal tube or tracheostomy tube in situ, and must be mechanically ventilated.

2.3 Administration of Incompatible Medications

1. The nurse will review the implications surrounding the medication to be given by referring to endorsed references (i.e. Parental Drug Manual, NICU Drug Manual,)
2. Perform hand hygiene and don gloves.
3. Introduce self and verify patient using two identifiers. Explain task and obtain consent.
4. Assess for allergies.
5. Assess vital signs as per organizational policy.
6. Determine that the IV is patent. Assess for signs of infiltration or phlebitis.
7. Pause or delay infusion of incompatible fluid/medication.
8. Perform vigorous mechanical scrub with antiseptic before each access of the needless connector then allow drying for at least 30 seconds.
9. Confirm placement of central line by connecting a 10cc syringe of compatible flush solution, pinch line and gently draw back on syringe plunger to aspirate for blood. If patency is confirmed flush line with 10cc flush and disconnect syringe.
10. Disinfect port and connect syringe containing medication to be give IV push. Administer medication according to dosage and rate guidelines. Disconnect syringe.

NOTE: The nurse should ensure that a time keeping device (i.e. watch or clock) is used during medication administration to ensure safe medication administration. Calculating the amount of medication the patient is to receive per minute and using a second hand to ensure safe administration has been shown to decrease adverse patient reactions when giving medications below the drip chamber.

11. Disinfect port. Insert a 10cc syringe of compatible flush solution and flush the tubing with 10mL of solution from the port to the patient at a rate equal to the recommended rate of administration of the drug.

12. Resume the IV infusion as prescribed or flush saline lock as per policy I-5600. Document on the Medication Administration Record (MAR) or unit-specific flow sheet.

13. Reassess vital signs as required and document patient's response to medication, including any adverse reactions.

2.4 Administration of Compatible Medications

Follow steps 1-9 as outlined in section 2.3,

NOTE: It is not necessary to pause/delay infusion if it has been determined that the medication to be given and infusing fluids and/or medications are compatible.

1. Insert the syringe with the medication and administer according to dosage and rate guidelines. You may alternate pinching and pushing with releasing and infusing IV solution to meet the required rate guidelines

2. Disconnect syringe and resume the IV infusion as prescribed or flush saline lock as per policy I-5600. Document on the Medication Administration Record (MAR) or unit-specific flow sheet.

3. Reassess vital signs as required and document the patients' response to medication, including any adverse reactions.

2.5 Common Medications that can be Administered Below the Drip Chamber

Heparin, decadron, nalaxone, dextrose, and gravol to name a few may be used on units throughout the hospital but always refer to the HDH/KGH Parenteral Manual to seek direction regarding the time frame which is recommended for drug administration. If the medication requires a physician present, specific monitoring requirements or if you are unsure in any way it should not be administered below the drip chamber.

3.0 RESPIRATORY DEPRESSION

3.1 Respiratory Depression

Respiratory depression caused by opioids is a decrease in the depth or rate of respirations per minute. Opioid related respiratory depression is more likely to occur if:

- the patient is >70 and receives a large dose;
- there is a history of impaired respiratory function;
- parenteral narcotics, sedatives or antiemetics were administered concurrently;
- drugs were administered during surgery and/or labour.
- patient has been lying flat;

- patient is obese.

Usually opioids produce sedation before producing respiratory depression. Therefore monitoring the level of sedation (LOS) is as important as checking the respiratory rate (Pastero & McCaffery 1994).

Treatment

- Notify the attending service if an adult or pediatric RR < 10 and/or decreased level of sedation (LOS).
- Administer oxygen.
- Administer naloxone IV as ordered.

3.2 Naloxone

Naloxone is a pure opiate antagonist that rapidly reverses the central nervous system depression, respiratory depression and analgesic effect caused by opiate analgesics such as fentanyl. Naloxone should always be diluted and given in small increments.

Important Points to Remember

- Be aware that as naloxone reverses the analgesic effect of an opioid, effective pain control becomes a concern.
- Continue symptomatic treatment of respiratory depression with oxygen and artificial ventilation (with oral airway and ambu bag) as necessary until naloxone is effective.
- When an excessive dose of naloxone has been used it can precipitate withdrawal syndrome in an opioid-dependent individual.
- Rapid Naloxone administration increases the risk of cardiovascular complications (CPS 2000).
- The RPN should not administer below the drip chamber.

3.3 Documentation

Record the patient's assessment data, reaction to the drug, its effectiveness, and any adverse effects noted.

5.0 REFERENCES

Elsevier Clinincal Skills. Medication Administration: Intravenous Bolus (2018). Retrieved from https://lms.elsevierperformancemanager.com (Retrieved 2018/02/22).Institute for Safe Medication Practices (ISMP).(2015). ISMP Safe Practice Guidelines for Adult IV PushMedications: A compilation of safe practices from the ISMP Adult IV Push Medication Safety Summit .Retrieved February 23, 2018, from http://www.ismp.org/Tools/guidelines/ivsummitpush/ivpushmedguidelines.pdf.

4.0 AUTHORIZATION TEST: ADDING INTRAVENOUS MEDICATIONS BELOW THE DRIP CHAMBER

On the answer sheet following the test questions, circle the letter representing the phrase that best completes the following statements.

1. Which of the following should be considered when selecting an IV line for direct medication administration?

   a. solution currently infusing in the line
   b. peripheral versus central line
   c. maximum concentration and rate of administration
   d. all of the above

2. What are the disadvantages of a peripheral IV line when compared to a central venous line for direct IV medication administration?

   1. increased incidence of tissue damage
   2. onset of adverse reactions is unchanged
   3. decreased blood circulation
   4. greater risk of air emboli

   a. 1, 2 & 3
   b. 2 & 4
   c. 1 & 3
   d. 1, 2, 3 & 4

3. What should you ensure prior to administering a direct IV medication?

   1. catheter site shows no sign of infiltration
   2. IV line is patent and IV fluid is infusing well
   3. IV solution is compatible with the medication to be administered
   4. patient is not currently receiving a medication that is incompatible with direct IV medication
   5. dosage and rate of administration is correct

   a. 1, 2, 3
   b. 1, 2 & 5
   c. 2, 3 & 4
   d. all of the above

4. Which is the correct order of the following steps in the direct IV administration of a compatible medication?

    1. Administer medication according to dosage and rate guidelines.
    2. Pinch the IV line above the closest port to the patient, swab port with alcohol swab and insert syringe with medication.
    3. Observe the patient for therapeutic or adverse reactions and complete the documentation.
    4. Remove syringe, recheck IV infusion rate.
    5. Check for infiltration and patency, ensuring an adequate infusion rate.

    a. 5, 2, 3, 1, 4
    b. 2, 5, 3, 1, 4
    c. 2, 1, 4, 3, 5
    d. 5, 2, 1, 4, 3

5. What should you do when administering a direct IV medication?

    1. flush the line with 10cc of a compatible IV solution prior to administration of the drug
    2. administer the medication according to the dosage and rate guidelines
    3. alternate pinching of the IV line and pushing of the medication with releasing of the IV line and infusing the IV solution
    4. flush the IV line with 10cc of a compatible IV solution after administration of the drug at the same rate that the drug was administered

    a. 1 & 4
    b. 1, 2 & 4
    c. 1 & 2
    d. all of the above

6. Of the following medications which ones are reversed by naloxone?

    1. morphine
    2. diazepam
    3. meperidine
    4. phenobarbital

    a. 1 & 2
    b. 1 & 3
    c. 2 & 4
    d. 3 & 4

7. If you are asked to give Diazepam 10mg parenterally how could you determine the time required to administer the drug and whether it is safe to give it below the drip chamber?

a. Request the doctor order the time frame with the dose
b. Call the pharmacist
c. Refer to the HDH/KGH parenteral drug therapy manual
d. Ask a nursing colleague

Indicate on the answer sheet whether the following statements are true (T or false (F).

8. It is within the RPN scope of practice to give dextrose IV below the drip chamber to his/her patient that is experiencing severe hypoglycemia.

9. When administering medications that are incompatible, the typical flush solution is 10mL normal saline.

10. A chemical reaction of incompatible solutions will always lead to a visible change in the solution to be administered.

Authorization for Administration of Drugs Below the Drip Chamber: Test Answer Sheet

Name _____ **Date** _____ **Score** _____

1.	a	b	c	d
2.	a	b	c	d
3.	a	b	c	d
4.	a	b	c	d
5.	a	b	c	d
6.	a	b	c	d
7.	a	b	c	d
8.	T	F		
9.	T	T		
10.	T	F		

6.0 EVALUATON OF LEARNING GUIDE

Your feedback and comments are most appreciated. Thank you for your time in responding to this questionnaire. Your response will help us in planning/revising learning materials.

Please circle the appropriate response	Strongly disagree				Strongly agree
1. The content was clear and easy to understand. Comments:	1	2	3	4	5
2. The content was relevant. Comments:	1	2	3	4	5
3. I feel that my learning needs were met. Comments:	1	2	3	4	5
4. This guide will help me to meet the knowledge/skill requirements of administration of IV medications below the drip chamber. Comments:	1	2	3	4	5

Additional comments/suggestions:

Please return the completed evaluation to your Clinical Educator. Thank you.