Advanced Infusion Therapy

IV INOTROPIC MEDICATION ADMINISTRATION

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CONTINUOUS IV INOTROPIC THERAPY

Upon completion of this course, the participant should be able to:

1. Identify the most used inotropic in the treatment of congestive heart failure.
2. Understand the mechanism of action of continuous infusion of Inotropic drugs.
3. Enumerate appropriate dosages in the use of IV inotropic for the treatment of congestive heart failure.
4. Demonstrate understanding of inotropic medication administration by recognizing the steps involved in medication preparation and infusion.
5. Accurately monitor their patient and recognize the potential side effects and complications related to the use of continuous inotropic infusion.
6. Properly document in the patient medical record their assessment, the progress of the patient, as well as the patient response to the treatment.

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CONTINUOUS IV INOTROPIC THERAPY

General knowledge

Although there are many drugs classified as inotropes, this course refers to inotropic therapy as those inotropes administered by the intravenous route.

Intravenous inotropic therapy is usually employed for the temporary treatment of:

- Diuretic-refractory acute heart failure,
- Decompensated congestive heart failure.
- As a bridge to definitive treatment such as revascularization or cardiac transplantation.
- As palliative care in end-stage heart failure when definitive treatment is not possible.

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CONTINUOUS IV INOTROPIC THERAPY

General knowledge

These drugs lower end diastolic pressure and improve diuresis, which temporarily improves the decompensated patient's condition, often allowing oral medication therapy to be re-regulated for optimal effectiveness.

Parenteral inotropic therapy in chronic heart failure is not considered to be a first line treatment.

Although it has positive effects short-term, it has consistently been shown to increase the risk of ventricular arrhythmias and mortality. The goals of therapy must be considered, and the role of inotropic therapy should be kept in a supportive context to allow treatment of the underlying disorder whenever possible.

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CONTINUOUS IV INOTROPIC THERAPY

General knowledge

The most recommended inotropic therapies for refractory CHF are dobutamine and milrinone.

Dobutamine and milrinone are used to improve cardiac output and increase diuresis by improving renal blood flow and decreasing systemic vascular resistance without exacerbating systemic hypotension.

Most CHF patients can be weaned off inotrope infusions successfully after diuresis of excess volume and careful adjustment of oral medications.

Some patients with symptoms of advanced heart failure, or those requiring frequent hospital admissions may receive intermittent inotrope infusions.

The infusions may last from 3 hours to as long as 48 hours and are usually scheduled once or twice a week.

These patients may experience improvement of symptoms and less frequent hospital admissions.

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IV INOTROPIC DRUGS

Dobutamine (Dobutrex®)

Dobutamine is indicated when parenteral therapy is necessary for inotropic support of adults with cardiac decompensation due to depressed contractility. Continuous dobutamine infusion has been shown to be beneficial on a short-term basis.

It may also be administered intermittently as an alternative for carefully selected patients with severe heart failure, when conventional therapies have failed.

Since the drug has a very short half-life of only two minutes, for those receiving a continuous infusion, stable venous access is essential. Loss of venous access could result in negative consequences with the drug effects being very short-lived upon sudden discontinuation.

Additionally, dobutamine is a vesicant. As such, this drug should always be administered into a central vascular access device (CVAD).

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IV INOTROPIC DRUGS

Dobutamine (Dobutrex®) - Dosage

The usual initial infusion rate is 0.5 to 2 mcg/kg/min with titration at intervals of a few minutes, guided by the patient's response, including systemic blood pressure, urine flow, frequency of ectopic activity, and heart rate.

The optimal infusion rate varies from patient to patient, usually 2 to 20 mcg/kg/min but sometimes slightly outside of this range. On rare occasions, infusion rates up to 40 mcg/kg/min have been required to obtain the desired clinical effects.

The infusions may be given over a period of as short as 3 hours or as long as 48 hours, and as often as twice per week to as infrequently as once every 3 to 6 weeks for up to 6 months.

Rates of infusion (ml/hr) for dobutamine concentrations will be determined by the Prescriber / LIP before the patient is admitted to the facility.

MEDICATION DOSAGE IS NOT TO BE CHANGED IN FACILITY! If a dosage change is required, the patient will be transferred to an acute care setting.

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IV INOTROPIC DRUGS

Milrinone (Primacor®)

Milrinone is also indicated for the short-term intravenous treatment of patients with acute decompensated heart failure.

The majority of patients experience improvements in hemodynamic function within 5 to 15 minutes of the initiation of therapy.

If a patient is receiving a continuous milrinone infusion, stable venous access is important because the drug has a half-life of 1 to 2 hours, which can result in possible adverse outcomes if the medication is inadvertently interrupted. Therefore, milrinone should always be administered into a central venous access device.

The duration of therapy depends upon the patient's responsiveness. Patients receiving milrinone should be closely monitored during infusions, as the potential for arrhythmias, present in congestive heart failure itself, may be increased with the use of this drug.

During therapy, blood pressure and heart rate should be monitored, and the rate of infusion slowed or stopped if the patient shows an excessive decrease in blood pressure. **A Prescriber / LIP order is required when a rate change is necessary.**

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IV INOTROPIC DRUGS

Milrinone (Primacor®) - Dosage

Milrinone should be administered with a loading dose followed by a continuous infusion maintenance dose. The loading dose is 50 mcg/kg, administered slowly over 10 minutes. The loading dose may be given undiluted but diluting to a rounded total volume of 10 or 20 ml may simplify visualization of the injection rate.

The infusion rate should be adjusted according to the patient's hemodynamic and clinical response.

The dosage may be titrated to the maximum hemodynamic effect but should not exceed 1.13 mg/kg/day. There are no special dosage recommendations for the elderly patient.

The maintenance dose in ml/hr by patient body weight, in kilograms, will be determined by the Prescriber / LIP.

MEDICATION DOSAGE IS NOT TO BE CHANGED IN FACILITY! If a dosage change is required, the patient will be transferred to an acute care setting.

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IV INOTROPIC DRUG ADMINISTRATION

- As with any intravenous infusion, the clinician should always use aseptic technique when preparing and administering an inotropic medication.
- Additionally, inotropes are always administered with the use of an electronic infusion device (EID) to ensure an accurate infusion rate since precise dosing is critical.
- Before beginning the infusion, all products should be carefully examined for expiration date, leakage, clarity, particulates or precipitants.
- No product should be infused if there is evidence of particulate matter, precipitants, or cloudiness. Inotropic agents should never be mixed with any other medication.

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CONTINUOUS INOTROPIC ADMINISTRATION POLICY

1. The Licensed Nurse per facility policy and State Regulations may perform the continuous intravenous (IV) administration of an IV inotropic medication if qualified through infusion therapy education and clinical competency validation. The minimum requirements of the Licensed Nurse to perform IV inotropic continuous medication administration include:
   a) Documentation of successful completion of infusion therapy education per policy.
   b) Documentation of successful completion of infusion therapy clinical competencies per policy.
   c) Documentation of IV Inotropic Medication Administration in-service education and clinical competency initially then annually.
2. IV Inotropic medications will NOT be initiated in the Skilled Nursing Facility (SNF).

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CONTINUOUS INOTROPIC ADMINISTRATION POLICY

3. Admission requirements for a patient receiving an IV Inotropic Medication include:
   a) a. The patient must be under the care of a Cardiologist.
   b) b. The patient shall be initiated in the hospital setting with continuous EKG monitoring and stabilized on the specific inotropic agent / specific dose with no adverse effects for at least 72 hours PRIOR TO admission to the SNF.
   c) c. The patient must have a central vascular access device (CVAD), double lumen preferred, along with documentation of the CVAD tip confirmation within the SVC / CAJ or IVC above the level of the diaphragm per policy.
   d) d. A back up plan must be established and documented prior to admission for the unexpected loss of use of the CVAD.
      i. First, utilize the alternate CVAD lumen, if appropriate.
      ii. Second, utilize a short peripheral catheter inserted immediately by the qualified Facility RN for short term use until a new CVAD is inserted or an alternate plan has been determined by the Prescriber / LIP, if appropriate. Monitor site frequently due to increased risk of phlebitis and other local complications.
      iii. Third, Nursing Agency to insert PICC at the bedside per policy.
      iv. Lastly, transfer patient the acute care setting for insertion of new CVAD.

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CONTINUOUS INOTROPIC ADMINISTRATION POLICY

4. IV Inotropic Medication DOSE changes will NOT be performed in the SNF. For this DOSE change, the patient shall be transferred to the acute care setting to ensure continuous EKG monitoring, the patient is free of adverse effects, and the change is beneficial.
5. A weight-based RATE change may be performed in the SNF with a Prescriber/ LIP order and is suggested to be limited to one time per week.
   EXAMPLE: If the resident is on Dobutamine 7.5 mcg/kg/min and has a weight loss of 3kg over 3 weeks, the prescriber may order a weight-based RATE change in ml/hr to maintain the same dose of Dobutamine 7.5 mcg/kg/min. Patients are not standardly transferred to the acute care setting for this weight-based RATE change.
6. The IV Inotropic Medications that may be ordered and administered in the SNF are:
   a) Dobutamine
   b) Milrinone

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CONTINUOUS INOTROPIC ADMINISTRATION POLICY

7. A Prescriber / LIP order for IV inotropic medication administration shall include:
   a. Inotropic Medication and weight-based dose (mcg/kg/min) based on patient's weight in kg; NOTE: infusion rate (ml/hr) is calculated utilizing the weight-based dose along with the concentration of the inotropic medication (mcg/mL or mg/ml).
   b. Duration of therapy
   c. Route (administered via dedicated lumen of the CVAD)
   d. Emergency back-up plan (for the unexpected loss of use of the CVAD)
   e. Monitoring orders with frequency which should include but are not limited to:
      i. HR; RR; BP; assessment of peripheral pulses; lung sounds; edema status, recommended every 4 hours with reportable parameters.
      ii. Weight and Intake & Output recommended daily with reportable parameters.
      iii. Laboratory Monitoring per Prescriber/ LIP orders. Report any critical results to the Prescriber/ LIP immediately.
      iv. 02 sat frequency with reportable parameters.
      v. Other monitoring as prescribed.

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CONTINUOUS INOTROPIC ADMINISTRATION POLICY

7. A Prescriber / LIP order for IV inotropic medication administration shall include:
   f. CVAD assessment every 2 hours and PRN during the continuous infusion per policy.
   g. CVAD catheter care orders per policy based on type of CVAD.
8. IV Inotropic Agents must be administered via an electronic infusion device (EID). The Pharmacy shall ensure an additional EID is available in the SNF as the emergency back-up EID for the patient on an IV Inotropic Medication.
9. The EID is initially programmed per Prescriber/ LIP order at the Pharmacy and the EID program and settings are verified prior to dispensing.
10. The inotropic medication bag and attached tubing shall:
    a. Include an anti-siphon valve to prevent infusion free-flow if disconnected from the EID;
    b. Be changed per Pharmacy guidelines for expiration date per USP Guidelines and prn;
    c. NOTE: An integrated air-in-line filter is recommended in conjunction with utilization of the EID air-in-line sensor.

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CONTINUOUS INOTROPIC ADMINISTRATION POLICY

11. In the SNF, the EID program is verified along with the prescription by 2 qualified Licensed Nurses at the following intervals:
    a. Upon change to the Facility EID and IV inotropic medication
    b. Every shift change
    c. With each inotropic medication bag change
    d. With any weight-based infusion rate (ml/hr) change
12. Documentation in the medical record includes, but is not limited to:
    a. Inotropic Flow Sheet:
       i. Upon change to the Facility EID and IV Inotropic Medication
       ii. Every shift change
       iii. With each inotropic medication bag change
       iv. With any weight-based infusion RATE (ml/hr) change.

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CONTINUOUS INOTROPIC ADMINISTRATION POLICY

12. Documentation in the medical record includes, but is not limited to:
    b. Narrative Nursing Note at least once per shift and PRN to include but not limited to:
        i. Date and time
        ii. Procedure performed if applicable
        iii. CVAD site assessment as performed per policy
        iv. Patient response
    c. Patient assessment per Prescriber/ LIP order.
    d. Other documentation per Facility policy.

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GENERAL GUIDELINES

1. Licensed Nurses will adhere to infection prevention and safety compliance standards and policies during all infusion therapy related procedures.
2. The Licensed Nurse administering the infusion shall have knowledge of, including but not limited to, the following prior to administration:
    a. Indication for prescribed infusion therapy
    b. Appropriate dosing, compatibility information, contraindications
    c. Potential adverse effects, side effects, and complications
    d. Patient allergies, current medications, and history
    e. Proper use of the EID utilized for continuous IV inotropic medication administration to include but not limited to: review / change program per Prescriber / LIP order, battery changes, and medication bag changes.

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GENERAL GUIDELINES

3. Each infusion medication or solution shall have a dedicated IV administration set.
4. Aseptic technique will be adhered to during the entire procedure.
5. It is recommended to coordinate the needleless connector change with the medication bag and administration set change, if possible.
   a. Routine catheter flushing to the dedicated CVAD lumen is NOT recommended when changing the needleless connector or changing the medication bag / administration set to prevent a rapid bolus of the inotropic medication.
   b. If flushing the dedicated CVAD lumen for inotropic medication administration is necessary, i.e. troubleshooting, then the nurse **must FIRST WITHDRAW 5ml of blood from the lumen and discard** prior to flushing to remove residual medication from the dedicated CVAD lumen.

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INOTROPIC SIDE EFFECTS AND MONITORING

Common side effects related to the use of IV inotropics are:

- Profound diuresis with fluid and electrolyte depletion
- Dehydration
- Reduced blood volume
- Rapid administration can lead to ototoxicity (This can be temporary or permanent)

Patient receiving IV inotropic will be monitored for the following, but not limited to:

- Urine output
- Blood pressure
- Electrolyte imbalance
- Tinnitus – ringing in ears

Inotropic medications are to be used with caution in patients receiving digitalis or potassium depleting steroids.

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IV INOTROPIC DOCUMENTATION

Documentation in the medical record is a crucial part of the nurse's responsibilities and should include, but is not limited to:

- Documentation on the continuous IV administration flow sheet.
- Narrative nursing notes at least once per shift and PRN.
- Patient assessment per Prescriber / LIP.
- Communications with LIP / Supervisor.
- Education provided to the patient / personal representative.
- Any other documentation per Facility policy.

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