

# NICU: Intravenous Fluids: Preparation and Administration

## Site Applicability

St. Paul's Hospital Neonatal Intensive Care Unit

## Practice Level

*Specialized:*

- *NICU Registered Nurse*

## Requirements

A Registered Nurse (RN) prepares infusion(s) according to a prescriber's order. The order must specify:

- Fluid
- Fluid additive (if applicable)
- Medication (if applicable)
- Infusion rate expressed as mL/kg/24 hours.

## Need to Know

**Infusions of D12.5W or less can be administered via a peripheral line.**

All infusion solutions requiring medication additives are made for NICU by Pharmacy between the hours of 0800 and 2300.

Infusions of crystalloid (clear) solutions are changed every 72 hours; D10W with electrolytes are changed every 24 hours (as per SPH Pharmacy protocol).

## Equipment and Supplies

1. Infusion fluid
2. Sterile towel
3. Sterile gloves (for central line preparation)
4. Clean gloves (for peripheral line preparation)
5. 0.5% chlorhexidine gluconate swab or alcohol swab
6. Infusion administration set
7. Surface cleaning wipes (e.g Accel, Cavi-Wipes)
8. Alaris Pump

## Procedure

### Assessment

SPH NICU uses Dose Error Reduction System (DERS) within the Alaris Pump System. DERS allow infusion pumps to warn users of prescriber calculation error, administration calculation errors, or programming errors that could result in significant under- or over delivery of a drug, electrolyte, or other fluid. This is done by checking programmed doses against preset limits specific to a drug and to a clinical application or location. If the programmed dose is outside the limits, the pump alerts clinicians and can either require confirmation before beginning delivery (referred to as a soft limit) or not allow delivery at all (referred to as a hard limit). See [Appendix A for Hard and Soft Limits Troubleshooting](#).

The DERS feature on the infusion pump will be used in conjunction with NICU's specific policies related to the administration of parental therapy.

The use of the infusion device with DERS does not replace the need for the RN to follow the 7 rights of medication administration:

- Right Drug (diluent, allergy status, appearance, concentration, expiry)
- Right Dose (rate and concentration)
- Right Route
- Right Time
- Right Patient
- Right Indication
- Right Documentation

The RN will use the DERS feature for the administration of all medication listed in the drug library. See [Appendix B for Drug Library Updates](#).

The RN who assumes care of a patient will verify correct programming of the pump through an independent double check with another RN.

See [Appendix C for Pump Maintenance](#).

### Steps

#### Infusion Set Preparation

##### *Peripheral Line*

1. Check Physician's Order.
2. Assemble equipment. Obtain fluid.
3. Place intravenous label on fluid bag indicated the IV solution, volume, flow rate, the name/initial of the clinician who prepared the fluid and of the clinician who initiated the infusion.
4. Clean working surface area with cleaning Wipe and allow to air dry.

5. Wash hands.
6. Open sterile towel onto clean working surface.
7. Open sterile administration packages and other sterile towel using aseptic technique.
8. Perform hand hygiene.
9. Put on clean gloves if preparing fluids for peripheral line infusions.
10. Ensure administration set is primed, free of air.
11. Wrap lower portion of the tubing in a sterile towel and keep the tip sterile.
12. Insert the upper portion of the tubing into the infusion pump.
13. Set the infusion pump rate according to order (see below for pump programming).
14. Confirm solution is ready for infusion
15. Connect sterile tip of tubing to IV catheter.
16. Complete independent double check with RN.
17. Start infusion.
18. Complete and secure "Date change" label to administration tubing.

#### *Central Line Infusion*

1. Check Physician's Order.
2. Assemble equipment. Obtain fluid.
3. Place intravenous label on fluid bag indicated the IV solution, volume, flow rate, the name/initial of the clinician who prepared the fluid and of the clinician who initiated the infusion.
4. Clean working surface area with cleaning wipe and allow to air dry.
5. Wash hands.
6. Open sterile towel onto clean working surface.
7. Open sterile administration packages and other sterile towel using aseptic technique.
8. Perform hand hygiene. Put on sterile glove and mask if preparing fluids for central line infusions.
9. Prepare infusions using sterile technique with the assistance of a 2<sup>nd</sup> RN.
  - a. First nurse remains sterile and passes higher portion of infusion set to 2<sup>nd</sup> RN (non-sterile) to spike the bag, fill drip chamber and prime tubing.
10. 2<sup>nd</sup> RN inserts tubing into Alaris pump. 1<sup>st</sup> RN (sterile) cleans port with alcohol swab or 0.5% chlorhexidine for 30 seconds.
11. Let dry for 30 seconds.
12. Maintain sterility while attaching line to port.

## Pump Programing

1. Press System On
2. Ensure the Alaris pump is in the NEONATAL ICU profile.
  - a. Select required NEW PATIENT? Option
    - i. To indicate programming is for a new patient, select YES. Add MRN number to Patient ID.
    - ii. To indicate programming is for the same patient, select NO.
  - b. Accept or change profile to NEONATAL ICU profile
3. The RN will use the Guardrail IV Fluids infusion type for programming hydration (IV fluids with or without additives)
4. The RN will use the Guardrail Drug Infusion then select the correct drug entry in the drug library for medication infusions.
5. The RN will use Primary, Secondary and Syringe methods for administering intermittent medications. Determination of which method to use for an intermittent infusion is made by the RN based on the pharmacokinetics of the medication, in consultation with the pharmacist and provider and Alaris programming. The majority of intermittent medications given in the NICU will be administered via syringe.
6. Basic Infusion mode is only used for IV fluids or medication not available in the Alaris drug library when it is determined that the medication or fluid is clinically appropriate. The Basic Infusion mode contains no safety guardrails. If used, clearly mark channel with medication label and notify Pharmacy Parenteral Medication Pharmacist.

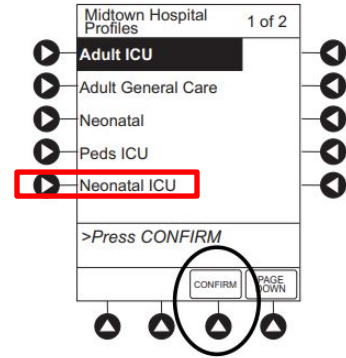


Figure 1 Alaris Pump Profile Setting

## Documentation

Document in Cerner.

Document insertion attempts and hourly site checks in CERNER. Cerner → Interactive View → NICU Lines-Devices- Procedures → Peripheral IV

Document IV Fluids in Cerner → Nurse Review Fluid Order → Administer infusion in MAR

Document Hourly Infusion in Cerner → Interactive View → Intake and Output → Continuous Infusions

Document Rate Changes in Cerner → MAR

## Patient and Family Education

Provide developmentally and culturally appropriate education based on the desire for knowledge, readiness to learn, and overall neurologic and psychosocial state.

Explain the need for IV access, the anticipated duration and goals, and the potential complications.

Explain how the family can assist or support the neonate (e.g., offering skin-to-skin care, holding the pacifier).

Explain special considerations needed for holding or handling the neonate. Reinforce the importance of continuing to touch and hold the neonate.

## References

Alaris. (2016). Alaris System with Guardrails Suite MX. User Manual.

Author. (2017) Intravenous: Initiation of over-the-needle cannula. Policy NN.10.01. British Columbia Women's Hospital, Neonatal Program Policy and Procedures. [http://policyandorders.cw.bc.ca/resource-gallery/Documents/BC%20Women's%20Hospital%20-%20Neonatal%20Program/NN.10.01%20Intravenous%20\(IV\)%20Therapy%20Over-the-Needle%20Cannula%20Insertion%20Procedure.pdf](http://policyandorders.cw.bc.ca/resource-gallery/Documents/BC%20Women's%20Hospital%20-%20Neonatal%20Program/NN.10.01%20Intravenous%20(IV)%20Therapy%20Over-the-Needle%20Cannula%20Insertion%20Procedure.pdf)

Author. (2016). IV Therapy: Use of infusion pump with error reduction software. British Columbia Women's Hospital. <http://policyandorders.cw.bc.ca/resource-gallery/Documents/Pharmacy,%20Therapeutics%20and%20Nutrition/PTN.02.022%20IV%20Therapy%20Use%20of%20Infusion%20Pump.pdf>

Elsevier. (2021). Medication Administration: Syringe Pump Method (Pediatric). [https://point-of-care.elsevierperformancemanager.com/skills/896/extended-text?skillId=CCP\\_164#scrollToTop](https://point-of-care.elsevierperformancemanager.com/skills/896/extended-text?skillId=CCP_164#scrollToTop)

Gardner, S., Carter, B., Enzam-Hines, M., and Hernandez, J. (2015). Merenstein and gardner's handbook of neonatal intensive care (8th Edition). Elsevier: St Louis, Missouri

## Appendices

- [Appendix A: Soft and Hard Limits](#)
- [Appendix B: Drug Library Updates](#)
- [Appendix C: Pump Maintenance](#)

## Appendix A: Hard and Soft Limits

Soft Limits are programmed limits that can be overridden. When encountering a soft limit that has been programmed into the pump the RN will:

- Verify the correct profile has been selected.
- Verify the correct drug entry and infusion concentration (i.e. X mg in Y mL) are entered per the prescriber's orders.
- Verify the correct patient weight is entered into the pump. If using BSA verify the amount (i.e. mg/m<sup>2</sup>) and rate/time are entered as per the prescriber's orders. Check the VTBI shown on the screen is within the accepted variance of 5%.
- Use clinical judgment to determine the clinical appropriateness of the order through consultation with colleagues, review of relevant drug information and discussion with pharmacy and ordering prescriber if necessary.
- If the RN finds the order is clinically appropriate they may override the soft limit and proceed with infusion.
- If the RN finds the order is not clinically appropriate they will contact the prescriber and obtain an order within the limits and re-program the pump.

Hard Limits are programmed into the pump and cannot be overridden. When encountering a hard limit the RN will:

- Verify the correct Profile has been selected.
- Verify the correct drug entry and infusion concentration (i.e. X mg in Y mL) are entered as per prescriber's orders.
- Verify the correct patient weight is entered into the pump. If using BSA verify the amount (i.e. mg/m<sup>2</sup>) and rate/time are entered as per the prescriber's orders. Check that the VTBI shown on the screen is within the accepted variance of 5%.
- If a programming error is identified the RN will re-program the pump correctly and proceed with infusion if it is within limits. If a soft limit is encountered as a result of re-programming the RN will follow the policy for soft limits.
- Request second RN attempt programming if problem remains.
- If a programming error is not identified despite second RN verification, the RN will contact the physician and obtain an order within the limits and re-program the pump.
- If it is clinically appropriate for the patient to receive a prescribed dose which is outside the hard limits, the RN will program the pump using a Basic Infusion, document the discussion with the prescriber, and notify the Clinical Nurse Leader or Charge Nurse that the infusion profile appropriate for that area does not include the dosage ordered for the patient.

**Appendix B: Drug Library Updates**

When notified that a new version of the pump library is available. The RN will:

- Ensure all pumps are turned on to receive the software update
- Once the drug library has uploaded wirelessly, the new library is activated by performing the following steps. Turn the pump OFF, then ON, and select NEW PATIENT
- If the new drug library fails to upload, the RN will complete a Biomedical Engineering Service request and send the pump to Biomedical Engineering.

**Appendix C: Pump Maintenance**

In the event of pump malfunction, breakdown, and degradation of surfaces or need for maintenance the RN will:

- Remove the pump from the treatment area
- Clearly label the pump so other healthcare providers can easily ascertain that the pump cannot be used and the reason
- Submit a Biomedical Engineering Service Request and send the pump to Biomedical Engineering ensuring the pump is cleaned beforehand



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