CENTRE-WIDE NURSING EDUCATION PROGRAM

EDUCATIONAL LEARNING PACKAGE:
Alaris Pump Programming (Child Health and Newborn)

AUTHORIZATION
NEAC

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APPLICABLE POLICY:
80.140.042 Intravenous therapy: Central, peripheral, subcutaneous
200.70.113 Continuous Medication Administration Via Alaris Pumps
200.70.118 Medications: Preparation And Administration Of Medications
Requiring An Independent Double-Check And/Or Verification (Child Health)

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1.0 Alaris Pump Components

2.0 Loading the Syringe

2.1 Prime the syringe and tubing:

- Use the Alaris CC Syringe Pump tubing (# GC30402) for all medications EXCEPT those requiring non-PVC tubing
- Infusions requiring non-PVC /low sorbing tubing must use Alaris CC Syringe Pump tubing (G30303M). Infusions include lipids, tacrolimus, cyclosporine, and etoposide

2.2 To insert the syringe into the pump, open the syringe clamp, insert flanges (wings) of the barrel of the syringe into groove to right of pump syringe clamp and close the syringe clamp.

2.3 Adjust the blue/grey plunger grippers (on the pump) on to the syringe plunger such that:

   - The end of the plunger (plunger flange) fits to the right of the plunger grippers
   - The plunger grippers fit directly onto the plunger, not the clear end.
   - The upper finger grip on the Alaris returns to its original position (fully open)

2.4 Insert the pressure disc into the pressure transducer
3.0 Tips to Loading the Syringe

3.1 Most times, when the syringe plunger is not correctly loaded within the plunger grippers, the pump will alert the user with the flashing message "ON HOLD BD PLATIK ---". This requires intervention prior to starting infusion. The part of the syringe that is improperly loaded also flashes on the screen.

3.2 In some situations, this message is not displayed, and the pump will attempt to infuse without a properly loaded syringe flange.

3.3 Compare the position of the syringe plunger (the volume in the syringe) to the digital read-out of the volume to be infused (VTBI) whenever the volume infused is recorded.

3.4 Check that the syringe type and size being used matches the display. Press CONFIRM if the correct type and size is shown.

4.0 Turning the Pump “ON”

4.1 Turn pump "on” using white button on top left of pump

4.2 Enter “clear set up” to erase previous programming by pressing the soft key.
## Alaris main display:

![Alaris Pump Main Display](image)

### Screen Icons:

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="icon" alt="TIME REMAINING DISPLAY" /></td>
<td>TIME REMAINING DISPLAY icon - Indicates time before syringe will require replacing.</td>
</tr>
<tr>
<td><img src="icon" alt="BATTERY" /></td>
<td>BATTERY icon - Indicates battery charge level to highlight when the battery will require recharging.</td>
</tr>
</tbody>
</table>

### 5.0 To Program a Basic Rate in ml/hr:

5.1 Using the ▲ or ▼ keys (“chevron” keys as on above image), enter rate of infusion in "ml/hr"

5.2 Select and press “VTBI” key

5.3 Enter the total volume in the syringe; press “ok”

5.4 Select “stop”. This means the pump will stop after the VTBI is complete. The pump will alarm to let you know that there is less than 10 minutes volume left. Push “ok”

**NOTE:** The KVO feature is not enabled on Child Health Alaris pumps

5.5 Push “start” (green button)

5.6 Pump will ask you to “rate lock”, yes or no. (see 8.0)

### 6.0 To Program using the Drug Library:

6.1 The pump is pre programmed with protocols for specific medications. As per WRHA policy, safety software, when available, must be utilized. See WRHA policy 110.170.030 Parenteral Drug Therapy.

6.2 **NOTE:** Programming of the pump with high risk/high alert medications is a 2-person check. See policy “Medications: Preparation And Administration Of Medications Requiring An Independent Double-Check And/Or Verification (Child Health)”

**Programming example: Insulin infusion**

6.3 A 50 kg patient requires an infusion of insulin at 0.1 units/kg/hr. The insulin is mixed to a final concentration of 1 unit/ml.

i.e. 0.5 mL (50 units) of insulin with 49.5 mL of normal saline

6.4 Prime the syringe tubing with the insulin.

6.5 Turn the pump on and follow the basic steps for syringe loading
6.6 Go to the option button “?”
6.7 Scroll (using the A or V buttons) and select “DRUGS AND DOSING”
6.8 Select “OK”

6.9 Scroll to the medication, e.g. “Insulin”, and select “OK”
6.10 The pump will prompt to “USE PROTOCOL”
6.11 Select “Yes”
6.12 The pump then prompts for the patient’s weight. Enter the amount in Kg and select “OK”
6.13 The pump then prompts for the diluent volume. Enter the total volume of fluid before priming the tubing (i.e. 0.5 ml or 50 units insulin + 49.5 ml saline = 50 ml). The pump should display “50ml”
   **NOTE:** This is the total volume of drug and fluid in the syringe, not the volume in the syringe after priming the tubing.
6.14 The pump prompts for the drug amount. Enter the **Dose** of insulin added to the syringe using the A or V buttons. E.g. 50 units
6.15 The pump should now display: 50.0u 1.0u/ml. Press “ok”.
   • **NOTE:** the pump uses the abbreviation “u” for units.
   • **TIP:** Whenever the “side arrow” is displayed in the right hand box, input (data or data confirmation) is required.
6.16 Using the A or V buttons, adjust the dose rate to the dose ordered (i.e. 0.1 unit/kg/hour). Press “ok”.
   **Note:** This step is particularly important with some medications:
   • Insulin: The pump default is .01units/kg/hr.
   • Epinephrine – pump is programmed to mgs and epinephrine infusions are ordered in mcg – the nurse has to make the conversion.
6.17 So... using Insulin at a concentration of 1unit/ml the pump should now be set to infuse at 5ml/hr at a dose rate of 0.1 unit/kg/hr
6.18 A dosing summary screen will confirm the patient’s weight (e.g. 50 kg), the drug concentration (e.g. 1unit/ml) and the dose (e.g. 0.1unit/kg/hr). Press “ok”
6.19 This screen must be accessed at change of shift as a safety check.
6.20 Select VTBI and enter the volume of solution in the syringe. This is the amount in the syringe after the priming.
6.21 Select “stop” for end of infusion.
6.22 Press green “start button.”

### 7.0 **Infusions Outside Drug Library Limits:**

7.1 In some circumstances, the ordered doses of infusions will fall within the limits of the Child Health monographs, but are outside of the low or high limits programmed into the Drug Library. Doses within the monograph limits may be administered, but the drug library can not be used.

7.2 For example, the doses being ordered by the Pediatric Acute Pain Service for Ketamine are very low and fall outside the lower limit of the pre-set safety software protocols in the Drug Library.

7.3 See appendix B for an example of infusions outside of the protocol
8.0 Rate Lock Feature:
8.1 The rate lock feature is selected to prevent inadvertent rate and dose adjustments.
8.2 To select the rate lock feature, press YES when prompted.
EXCEPTION: PICU does not select the rate lock feature due to the constant supervision of their patients.
8.3 Rate lock must be de-selected to:
   - adjust the rate, adjust dose, purge or administer a bolus, turn the pump off
8.4 To de-select “rate lock” press the option button “?” and select “UNLOCK RATE LOCK”.

9.0 Volume over Time:
9.1 This feature allows a specific volume to be infused over a specific time.
9.2 Turn the pump on, and load the syringe (see 2.0)
9.3 Leave pump on HOLD, or press red/orange hold key (see image) to place on hold
9.4 Go to “?” and select “SET VTBI OVER TIME”. Press “ok”
9.5 Enter total volume to be infused (VTBI) (e.g. 10 ml) Press ‘ok”
9.6 The pump displays “DURATION” over which the volume is to be infused
9.7 Enter the time in minutes (e.g. 20 minutes) Press ‘ok”
9.8 The pump displays options (e.g. “stop”, “kvo” or “continue”) for the action desired at the end of the infusion. Select “STOP”. The pump will default to “stop”
9.9 The pump automatically calculates the rate and time of the infusion and will count down in minutes and volume.
9.10 The pump will display “VTBI DONE” when the pre-set Volume To Be Infused is complete.

10.0 Turning the Pump “Off”:
10.1 Select the white “on/off” button
10.2 Press and hold to power down
10.3 The pump will retain the programmed settings until patient set up is cleared.

11.0 Auto Set Pressure Feature (see appendix for poster)
11.1 The pressure alarm defaults at a pressure of 200 mmHg, indicating an obstruction to flow.
11.2 At low infusion rates it can take hours before 200 mmHg is reached and the alarm is activated. This can be a potentially dangerous situation.
11.3 After a stable pressure has been achieved over a short period of infusion the pressure alarm level is automatically calculated by the pump. The alarm level will be based on a typical margin above the current operating pressure.
11.4 To adjust the pressure using the auto pressure feature:
   After the infusion has been running for several minutes:
   - Check the pressure level by pressing the “=” button on the right side of the pump (the display will change). The display with change to show a 20 minute pressure trend graph displaying the pressure alarm and the current pressure level.
• Press the auto soft key. The line pressure and alarm pressure limit will be displayed
• Press the “OK” soft key to exit.

12.0 To Manually Adjust the Pressure Alarms:
12.1 Press the chevron keys while in this feature to increase or decrease the pressure alarm level. The new level will be indicated on the display.

13.0 Purge:
13.1 This feature is designed to assist only with purging the tubing and **MUST** not be used when connected to a patient
13.2 The pump must be “ON HOLD”
13.3 Ensure the pump is not infusing or connected to a patient
13.4 Push the purge/bolus button (see image to right)
13.5 The pump display will indicate “PURGE”
13.6 Press and hold the purge button until fluid flows and the purging of the IV tubing is complete.
13.7 Release the PURGE key
13.8 Press QUIT to exit back to the main display

14.0 Bolus feature: Critical Care use only
14.1 The pump must be “Infusing”
14.2 Push the purge/bolus button
14.3 Pump will indicate “BOLUS”
14.4 Press and hold the BOLUS button until the desired volume and dose of fluid and/or medication is delivered. The maximum amount of medication that can be infused in one bolus 1.0 mL.
**EXAMPLE:** Fentanyl is infusing at a concentration of 10 mcg/ml. To deliver a bolus of 20 mcg, two boluses of 10 mcg each would need to be administered.
14.5 **Forgot how much you bolused??** Press the options “?” button. Go to “EVENT LOG’ and select ok. The screen displays a summary of how much fluid or medication was infused.
14.6 Once the pump is infusing, change the dose by using the ▲ or ▼ buttons (the rate lock feature must be disabled first). Confirm each change by pressing the green start button.

15.0 Regular Checks:
15.1 Hourly: check the position of the syringe plunger (the volume in the syringe) and compare with the digital read-out of the volume to be infused (VTBI) whenever the volume infused is recorded
15.2 Beginning of shift: check the auto pressure alarms are set.
**NOTE:** the above checks relate to additional checks for a syringe pump. They do not preclude completing checks required as per policy, including ”Medications: Preparation And Administration Of Medications Requiring An Independent Double-
Check And/Or Verification (Child Health)

16.0 Reviewing Dosing Summary:
16.1 Perform at the start of each shift as part of your safety check
16.2 Reviews the concentration of the drug programmed into the pump, and patient’s weight.
16.3 Compare this to the syringe to ensure correct concentration is used for programming the pump.
16.4 Push the option button “?”
16.5 Select dosing summary
16.6 Press "OKAY"
16.7 Press “QUIT” to exit out of screen

17.0 Minimal Flow Rates:
17.1 The manufacturer cannot confirm rates can be delivered lower than the following table:

<table>
<thead>
<tr>
<th>Syringe Size</th>
<th>Minimal Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 ml</td>
<td>0.5 ml/hr</td>
</tr>
<tr>
<td>20 ml</td>
<td>0.3 ml/hr</td>
</tr>
<tr>
<td>10 ml</td>
<td>0.2 ml/hr</td>
</tr>
<tr>
<td>5 ml</td>
<td>0.1 ml/hr</td>
</tr>
</tbody>
</table>

18.0 References
18.1 Alaris CC pump syringe manual.
http://www.alarismed.co.uk/c/pdf/dfu/ns/Alaris%20CC%20DFU/1000DF00003/1000DF00003.pdf

19.0 Resources
19.1 Nurse Educators, Child Health program
19.2 Units CK5 and CK3, Child Health
Appendix A: Programming the Alaris pump with the Auto Pressure Feature

Why use the Auto Pressure Feature: The Alaris pump pressure alarm defaults at a pressure of 200 mmHg. At low infusion rates it can take hours before this pressure is reached and the alarm becomes activated. This can be a potentially dangerous situation.

How it works: After a stable pressure has been achieved over a short period of infusion the pressure alarm level is automatically calculated by the pump. The alarm level will be based on a typical margin above the current operating pressure.

How to activate the Auto Pressure Feature: After the infusion has been running for several minutes:
1. Press the “=” button on the right side of the pump (the display will change)
2. Press the auto soft key (line pressure and alarm pressure limit will be displayed)
3. Press the okay soft key to exit.

Confirm auto pressure alarms have been set at the beginning of each shift.
Appendix B: Quick Guide to ASENAA Pump Set -Up (Outside Drug Library Limits)

Example: Ketamine

The doses being ordered by the Acute Pain Service for Ketamine are very low therefore they fall outside the lower limit of the pre-set safety software protocols on the Asena pump. Follow these steps:

1. Press pump on
2. Clear Set-up
3. Confirm syringe type
4. Press “?”
5. Scroll to Drugs and dosing, press okay
6. Scroll to Ketamine
7. Press “No” to protocol because the dose ordered for the patient is most likely below the protocol of 0.05 to 4.00 mg/kg/hr (if it is between these limits say yes to protocol and skip to 10)
8. Press “Yes” for dosing
9. Scroll to the dosing settings (usually done in mg/kg/hr for Ketamine), press “Ok”
10. Program weight, press “Ok”
11. Program the volume of diluent Pharmacy has indicated on the syringe medication label, press “Ok”.
12. Program the total amount of drug in the syringe Pharmacy has indicated on the syringe medication label, press “Ok”.
13. Program the dose/kg/hr as written on the Physician’s Order sheet, press “Ok”.
14. Review the dosing summary for accuracy, two nurse check, press “Ok”.
15. Press VTBI, program the total volume in the syringe, press “Ok”.
16. Select “stop” when the syringe is getting empty, press “Ok”.
17. Press green to start the infusion.

Anytime you want to check the dosing summary press “?” scroll to dosing summary and press “Ok”.

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