

PPE Conservation Strategy: Infusion Pumps Outside the Patient's Room

Site Applicability

Providence Health Care St. Paul's Hospital and Mount Saint Joseph Hospital critical care areas

Practice Level

Basic Skill

RNs working in critical care units.

Requirements

The safety risks of using intra-venous (IV) extension tubing to locate IV pumps outside a patient's room when the patient requires airborne and contact precautions must be assessed each shift. Only initiate or continue using this strategy when every effort has been made to minimize safety risks, AND the benefits continue to outweigh the potential risks.

Need to Know

- The use of extra-long intra-venous (IV) extension tubing attached to IV pump tubing to bring the IV pump outside the patient's room is not routine practice.
- This practice has been implemented in an effort to minimize staff exposure to an airborne pathogen and to conserve Personal Protective Equipment (PPE) **during a pandemic** when there is a prolonged increase in global demand for PPE. Reserve this practice **only** for patients who are on airborne isolation precautions AND who are in need of frequent medication titration.
- Moving IV pumps outside the patient's room comes with increased patient safety risks such as: line dislodgement, occlusion, or breakage; infection; and medication errors. While there are many strategies one can use to make this safer, those risks are not eliminated.
- There are also impacts to IV pump function such as: reduced maximum achievable flow rates; delayed medication delivery at low flow rates, and delayed pump alarms.
- All of these factors need to be taken into consideration when making the decision of when to initiate or continue using this strategy.

Equipment and Supplies

- (MRI) Extra-Long extension tubing (microbore is preferred, but macrobore tubing is acceptable if microbore supplies are limited);
- Additional IV tubing labels (to label the IV pump tubing lines and both ends of the extra-long extension tubing lines);
- Ultrasound probe cover;
- Tubing securement tools (3" of suction tubing cut lengthwise, clear cable cover, cable hooks, tape, etc.)
- Bifuse Extension set (to create an additional access port closest to the patient)



Guideline

There are tools and strategies that can be used to mitigate safety risks associated with this guideline. RNs need to be adaptable to the patient needs and physical environment.

- Patient rooms are different, may need to adapt to the physical environment (i.e. through sliding door vs swing door in ante room).
- Patient IV infusion needs can evolve. One can also only use this strategy with IV infusions that require frequent titration AND are infusing at rates within the recommended flow rates (i.e. 10

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to 300mL/hr for a central venous catheter [CVC] and 25 to 300mL/hr for a peripheral intravenous catheter [PIV]).

Safety Risk	Mitigation Strategies
Medication Error	<ul style="list-style-type: none"> Label both the pump side, and the patient side of each IV tubing Perform a 2-RN check of IV infusion bag labels, tubing labels, and IV pump infusion pump programming at handover. Ensure each connection point is tightly secured. Be aware that some medications (i.e. insulin) may be absorbed into the plastic of the extension tubing, especially at very slow infusion rates, therefore the actual dose a patient receives may be less than the intended dose. For example, you may find you need to titrate insulin infusions up after adding in extension tubing or be attentive to reduced need for insulin after removing extension tubing.
Delays in Medication Delivery	<ul style="list-style-type: none"> Ensure an access port is available close to the patient by adding a Bifuse Extension Set to the extra-long extension tubing at the point closest to the patient, in case there is the need to administer emergency medication. Add in ('Y' connection) in a flush (i.e., Driver) line to ensure a minimum rate of 10mL/hr in the extension tubing line. Consider selecting concentration of the medication bag as well.
Tripping Hazard	<ul style="list-style-type: none"> Ensure IV tubing is kept off the ground or protected from contact with the ground. Bundle multiple extension tubing together in an ultrasound probe cover with the closed end cut open so you can run tubing through it. Reduce or coil any excess IV tubing length. Add additional labels to make IV extension tubing more visible even in low light.
Line Dislodgement	<ul style="list-style-type: none"> Mitigate tripping hazard Ensure IV line (PIV or CVC / PICC) is secured to the patient with sutures, a securement device and covered with an adhesive dressing. Secure lines to avoid being caught or pulled by swinging or sliding doors Assess IV access sites (PIV or CVC/PICC) regularly (i.e., with initial assessment, check site during routine q4h mini-assessments and PRN).

Safety Risk	Mitigation Strategies
Line Occlusion or Breakage	<ul style="list-style-type: none"> Use additional protection (i.e. 3" length of suction tubing) to protect tubing from being pinched in door jams and frames. Open/close doors gently and with caution.
IV Pump Factors: <ul style="list-style-type: none"> maximum & minimum recommended flow rates are between 10 mL/hr & 300 mL/hr 	<ul style="list-style-type: none"> Use driver lines or flush lines to ensure the flow rate through the extra-long extension tubing is greater than or equal to 10 mL/hr. IF infusion rates of 300 mL/hr or greater are needed, avoid using the extension tubing, instead keep the IV pump inside the patient's room.
Nuisance Pressure Alarms <ul style="list-style-type: none"> Frequent nuisance alarms due to higher flow resistance with extension tubing. 	<ul style="list-style-type: none"> Consider adjusting pressure limits to reduce nuisance alarms or changing the mode of the pressure alarms from the default "Occlusion Pressure Limit" to the "Pump Pressure Mode" when infusions are greater than 30 mL/hour. See Appendix A for instructions on how to adjust pump settings. When removing extension tubing, check the alarm settings and revert to default alarm settings (i.e., Occlusion Pressure Limit) if needed.
IV Pump Factors: <ul style="list-style-type: none"> Delayed Alarms 	<ul style="list-style-type: none"> Assess lines frequently for loose connections, kinks, twists, pinches, and breaks (i.e., during regular assessments and PRN). Ensure clear lines of site for patient, IV site and tubing and monitor closely.

Assessment

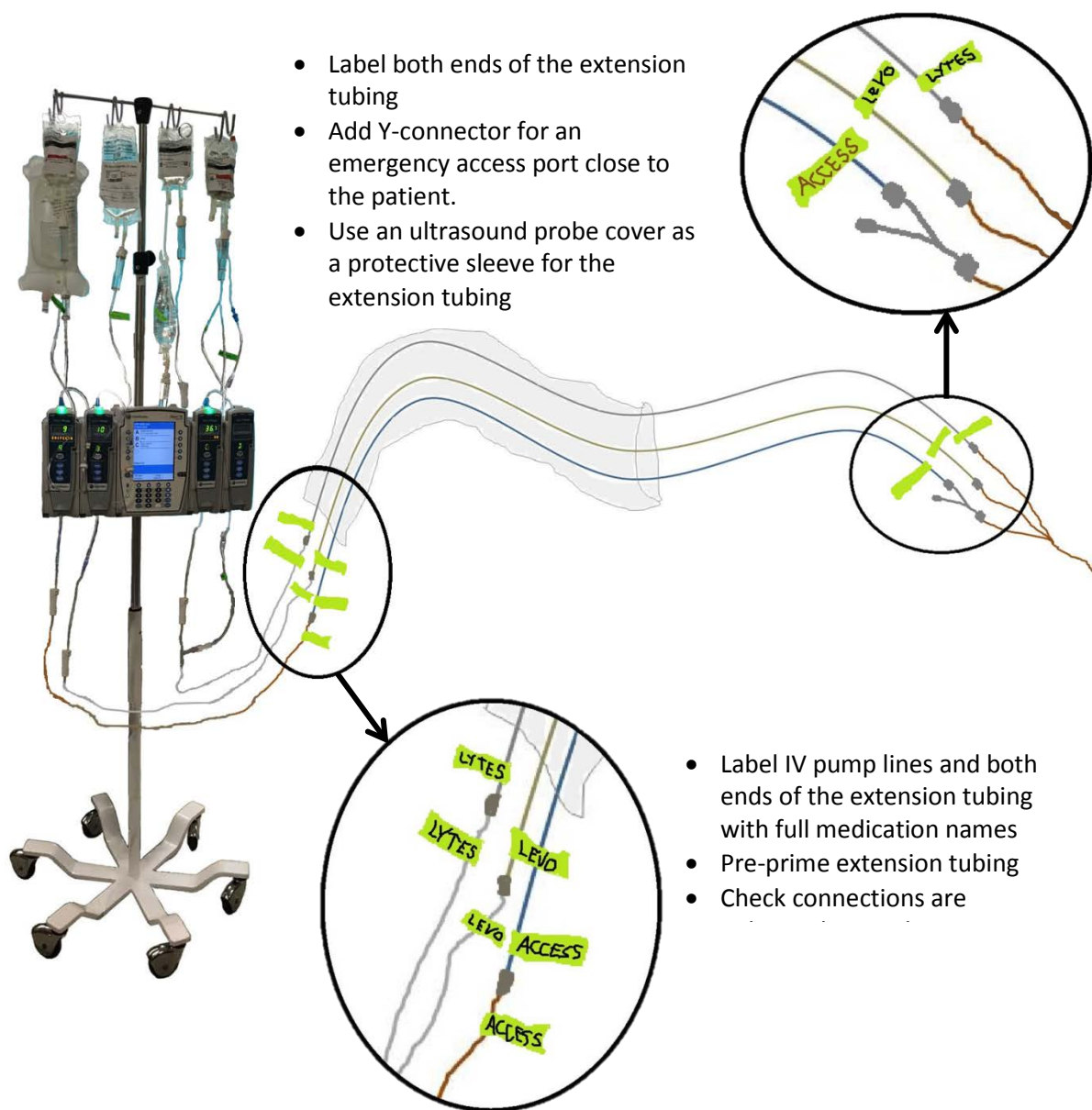
Assess for appropriateness: The intent is to minimize staff exposure and conserve PPE, therefore reserve this practice for patients on airborne isolation precautions who are in need of frequent medication titration.

- Not of benefit if no frequent or unpredictable titration of IV medication is needed.
- Recommended minimum and maximum flow rate are between 10 mL/hr and 300 mL/hr.
- Not of benefit if the patient is highly unstable, and medications and other interventions are needed frequently such as procedures, emergency events and/or code blue events.

Set-Up

- Gather all your supplies.
- LABELS:** label both ends of the extra-long extension tubing identifying the medication line.
- PRE-PRIME:** each of the extra-long extension tubing with the medication fluid.
- ACCESS PORT:** Add in a Y-connector to the Access medication line. This is to ensure there is an access port available for emergency medication close to the patient's central line port.

- **COVER SLEEVE:** Consider using the ultrasound probe cover with the end cut open as a sleeve to protect the extension tubing at high touch points such as in doorways.
- **CHECK CONNECTIONS:** Connect extension tubing from the IV pumps to the patient's central line, ensuring all connection ports are tightened securely.
- **SECURE LINES:** Secure lines with tape, ties or other devices to prevent accidental dislodgement, pulling, occlusion or tripping. Keep the lines off the floor. Protect lines from pinching or occlusion especially in doorways.

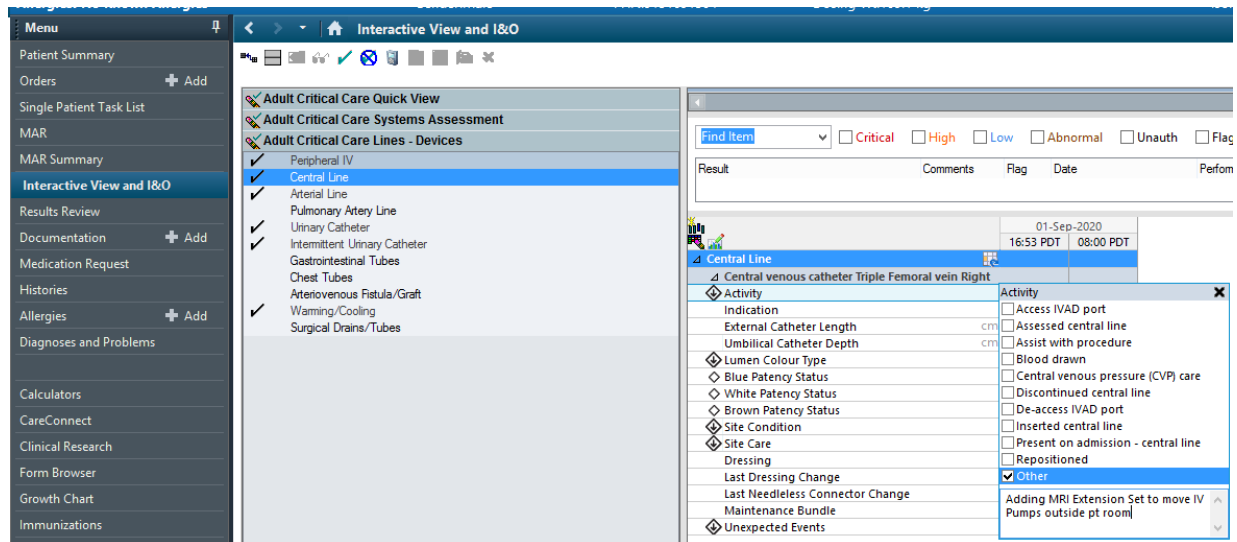


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Documentation

Document adding or removing MRI extension tubing in “**Interactive View and I&O**” under the “**Adult Critical Care Lines - Devices**” section indicating the appropriate line.

Document the details under “Activity” and select “Other” to include details about the procedure (i.e., “Adding/Removing Extra-Long Extension Set to move IV Pumps outside/inside patient room”).



Patient and Family Education

Inform patient (if awake) and family to the rationale on why this strategy has been implemented, and caution them to move around lines and tubing with great care and/or with assistance.

Evaluation

Reassess the risks and benefits of moving the IV pumps outside the room daily as the clinical context changes. Only utilize this strategy when the benefits, outweigh the risks.

Related Documents

Guidelines/Procedures/Forms

- ([BD-00-12-40045](#)) Non-Tunneled Central Venous Catheter (NT-CVC) – Basic Care and Maintenance (Adult)
- ([B-00-12-10007](#)) Alaris®PC Care Fusion Edition Infusion Pump with Guardrails

References

1. BD Alaris. (2020). COVID-19 Clinical Considerations: Using extra-long extension sets with the BD Alaris™ Pump Module and Alaris™ Syringe Module (pp. 6). <https://www.bd.com/a/77514>
2. Emergency Care Research Institute. (2020). Large-Volume Infusion Pumps - Considerations When Using with Long Extension Sets Outside Patient Rooms to Help Reduce Staff PPE Use: Emergency Care Research Institute (ECRI).
3. Furman, A., Sparnon, E., Cohen, M., & Mandrack, M. (Producer). (2020, August 15, 2020). Managing Infusion Therapies in the Age of COVID-19. [Recorded Online Webinar] Retrieved from <https://www.ecri.org/landing-covid-infusion-therapy>
4. Griffin, K. M., Karas, M. G., Ivascu, N. S., & Lief, L. (2020). Hospital preparedness for COVID-19: a practical guide from a critical care perspective. American Journal of Respiratory & Critical Care Medicine, 201(11), 1337-1344. doi: 10.1164/rccm.202004-1037CP
5. Institute for Safe Medication Practices. (2020). Clinical experiences keeping infusion pumps outside the room for COVID-19 patients. Acute Care: ISMP Medication Safety Alert, 25(6 (Supplement)), 1-4.
6. Kaplan, L. J., Rausen, M., & Yang, J. J. (2020). Configuring ICUs in the COVID-19 Era. In N. A. Halpern (Ed.), (pp. 34). New York: Society of Critical Care Medicine.
7. Shah, A. G., Tanduran, C., Friedman, S., Sarosky, K., Jones, M., Victory-Stewart, M., . . . Yimen, M. (2020). Relocating IV pumps for critically ill isolated coronavirus disease 2019 patients from bedside to outside the patient room. Critical Care Explorations, 2(8), e0168. doi: 10.1097/CCE.000000000000168

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First Released Date:	23-NOV-2020
Posted Date:	23-NOV-2020
Last Revised:	
Approved By	PHC
	Professional Practice Standards Committee
Owners:	Critical Care

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Appendix A: BD Alaris™ Pump Module Occlusion Pressure Settings

(Excerpt from the "COVID-19 Clinical Considerations: Using extra-long extension sets with the BD Alaris™ Pump Module and Alaris™ Syringe Module"; BD Alaris™, 2020)

Section II Occlusion Pressure Settings

Extra-long small bore tubing may increase resistance downstream, which may lead to:

- Increased occlusion alarms at higher rates (higher volume is being forced through long narrow tubing)
- Increased time to alarm (takes longer for pressure to build in the line and reach limit threshold)

The BD Alaris™ Pump Module has two (2) **Occlusion Pressure Limit** programming modes.

Pump Pressure Mode: the occlusion pressure limit is a function of the flow rate and is automatically determined by the device. The downstream occlusion alarm threshold is 10.2 psi (~525 mmHg) for rates of 30 mL/h and above. For rates less than 10 mL/h, the alarm threshold is 3 psi (~150 mmHg). For rates between 10 and 30 mL/h, the occlusion pressure limit is rate-dependent for a faster response to occlusions.

Selectable Pressure Mode: The downstream occlusion alarm threshold can be adjusted in 25 mmHg increments, from 50 mmHg to the maximum occlusion pressure of 525 mmHg.

If the infusion rates are above 30 mL/h, consider using the **Pump Pressure** mode, which automatically adjusts the occlusion pressure limit to 525 mmHg. This is particularly relevant if multiple infusions of higher rates are connected to one long extension line. This mode will reduce the number of nuisance occlusion alarms that may occur due to a higher resistance in the IV line setup.

If the infusion rates are less than 30 mL/h, and the pump is alarming for Downstream Occlusion without an apparent cause (nuisance alarms), consider changing to **Selectable Mode** to manually increase occlusion pressure limits to a higher setting.

How to change the Occlusion Pressure Limit for the BD Alaris™ Pump Module:

1. Press **CHANNEL SELECT** key
2. Press **OPTIONS** key
3. Press **Pressure Limit** soft key (Figure A)
4. Press either **Pump** or **Selectable** pressure soft key. (Figure B)
5. Press **Selectable** to change the occlusion pressure limit either Up or Down.

