

COVID-19 RESPONSE: INFUSION PUMP SHORTAGE

During the COVID-19 crisis, hospitals are experiencing a shortage of many supplies and equipment including infusion pumps. This document is provided to assist in presenting options which can be used in supporting decisions by healthcare providers to move some infusions to alternate devices or gravity flow.

When making the decision to administer IV fluids or medications by gravity rather than a pump, consider the following for infusions that are likely to remain on the pump:

- Medications that require precise dosing and titration to maintain patient status
 - Requiring the +/- 5% accuracy of large volume infusion devices
- Medications with a high potential to cause harm when over or under-infused
 - Consider infusions such as vasopressors, narcotics, sedatives, neuromuscular blockers, anti-arrhythmics, anti-coagulants/anti-thrombotics, insulin, anesthetics
 - Refer to ISMP 2018 list of High Alert meds
 - <https://ismp.org/assessments/high-alert-medications>

Then assess remaining infusions that could potentially be administered by other methods such as gravity (intravenous or subcutaneous) and IV push. This could include infusions such as plain fluids, medications that are not high risk, blood products, and intermittently administered medications such as antibiotics (taking into consideration some that may be high risk per ISMP such as Liposomal Amphotericin B).

1. Intravenous gravity infusion

When converting infusions to gravity there are a number of considerations that staff must be aware of:

- Factors that influence/alter gravity flow rates such as: change in bag height distance to patient, type and size of vascular access, number of lines connected to same access
- Counting drops to determine flow rate
 - Provide guides and/or post in patient rooms
 - See attached drop count guide
- Time tape all gravity infusions and indicate drop factor of IV set on time tape
- Different sets have different drop counts (i.e. 10, 15, 20 or 60) and are listed on package
 - Note: many blood sets are 10 drop
 - Attempt to standardize sets with same drop count when possible to avoid confusion

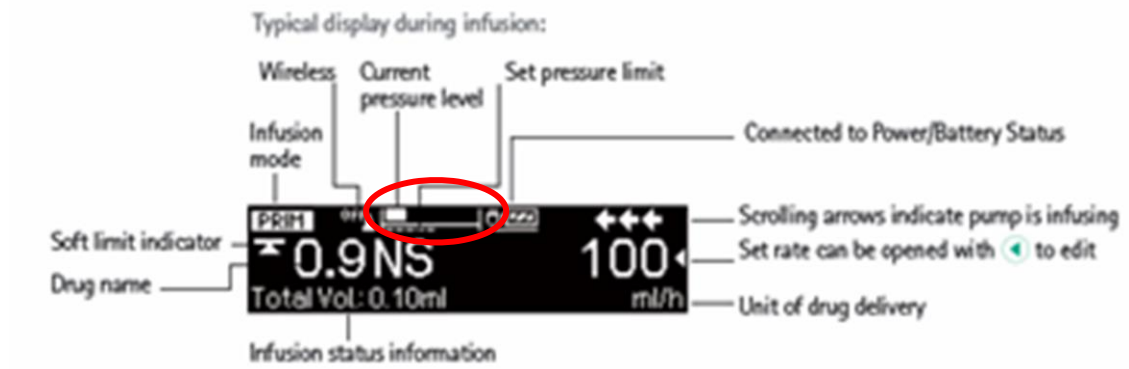
- Flow rate regulators may be slightly more accurate and are easier to adjust than a roller clamp. They are subject to same issues as gravity such as change in bag height, etc.
 - Cannot be used for viscous solutions such as blood
 - See attached guide for rate flow regulator

2. Syringe pumps

When there is shortage of large volume pumps consider switching some infusions to syringe pumps when/if they are more readily available due to things such as cancellation of elective surgeries or fewer pediatric patients. Key factors for nursing staff who are not familiar with the use of syringe pumps, in addition to training on the device, must be aware of the following:

- Priming must be done on the pump
 - Use only validated/approved syringes
 - Confirm both brand and size of syringe on pump to insure accuracy
 - Startup time of an infusion is delayed compared to a large volume pump
- Please note the following:
- The larger the syringe and the lower the flow rate, the longer the startup time
 - Priming on pump helps reduce start up time
 - Startup time delay applies to all newly inserted syringes
 - When changing syringes:
 - Clamp tubing to patient
 - Disconnect tubing from and remove empty syringe
 - Insert and prime new syringe
 - Reconnect patient tubing to new syringe
 - Unclamp tubing and restart infusion
 - Time to occlusion is delayed on syringe pumps. Please note the following:
 - Pressure is measured at the pump drive head, downstream pressure is impacted by multiple factors including, flow rate, length and diameter of tubing, fluid viscosity, filters and y ports
 - The larger the syringe and slower the rate, the longer the time to occlusion
 - Use microbore tubing. Please note the following:
 - The bigger the diameter and the longer the tubing, the longer time to occlusion
 - It is not recommended to add extra length to place a syringe pump outside the patient room
 - Adjust pressure setting to keep white pressure indicator bar in the middle of pressure range on the Perfusor® Syringe Pump. Please refer to **Figure 1.1.**

FIGURE 1.1



- Change in height difference between pump and patient will result in temporary change in flow rate
 - Increasing distance temporarily increases flow, resulting in bolus of infusion and any other infusions in same line depending on point of connections
 - Decreasing distance temporarily decreases flow, resulting in decreased flow of any other infusions in same line depending on point of connections

3. Converting infusions to IV Push

- Provide information that is readily available for the rate of IVP administration
 - Consider label on syringe with number of minutes to administer over
- Establish a flush protocol to ensure all medication is administered in timely manner
 - Particularly important when administered further up the line from IV site
- Change in workload/supplies for pharmacy to convert
- Refer to ISMP Safe Practice Guidelines for Adult IVP medications
 - <https://www.ismp.org/guidelines/iv-push>

4. Subcutaneous gravity infusion

- Subcutaneous infusions can be used for hydration
- Factors that influence/alter gravity flow rates such as change in bag height distance to patient
- "The optimal subcutaneous infusion rate is unknown. Medication infusion rates of 3 to 5 mL per hour are reported, and hydration rates of up to 1500 mL over 24 hours are reported. More than 1 subcutaneous infusion site may be used to accomplish a large infusion volume." ¹

- "Rotate the subcutaneous access site used for hydration solutions every 24–48 hours or after 1.5 to 2 liters of solution has infused and as clinically indicated based on the access site assessment findings"¹
- Use a subcutaneous access device, such as single large gauge i.e. 24 or 27g short catheter or multiple site subcutaneous sets
- For more information see attached Infusion Nurses Society Standards of Practice section on subcutaneous infusions from their 2016 Standards of Practice

5. PO hydration, when feasible, should be considered

Please refer to product labeling for complete instructions for use.

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¹Infusion Standards of Practice 2016