Pharmacy FAQ

Infusor Rate Errors Checklist

We occasionally encounter elastomeric infusors that have either run too fast or too slow. We recently had an incident where the incorrect infusor was selected for a patient. We had another incident where normal saline was selected as diluent instead of D5W. How can we determine what caused the rate error, and prevent other sources of error, when providing infusors to patients?

A patient may report that their Baxter Infusor™ balloon is smaller or larger than expected (could be infusing too fast or slow), their balloon, tubing or outer case has burst, cracked or is leaking (they may notice the leak, or dampness on themselves, the carry bag, tubing or their dressing). The following checklist can be used to prevent and determine possible causes of deviations from the expected infusion rates for Baxter Infusors™:

Elastomeric Infusor Checklist for Identifying Causes of Rate Errors	
	Patient Safety
☐	**Was the deviation from rate within the expected tolerance range?** Infusors flow within plus or minus 10% of the labelled flow rate. For example, it is generally considered acceptable for 46- or 48-hour infusors to run out within 5 hours of the intended infusion time. If an infusor runs out too quickly, determine if the patient was given an overdose. A *fluorouracil infusor overdose* is defined as the administration of fluorouracil via infusor at greater than or equal to 2 times the intended rate, with completed delivery of greater than 50% of the intended total fluorouracil dose. In the event of an overdose, follow procedures as outlined in BC Cancer Management Guidelines – *Management of Fluorouracil infusion overdose*.

	Patients may be at risk of mild to life-threatening toxicities such as stomatitis, nausea, vomiting and diarrhea, ocular toxicities, myelosuppression and cardiotoxicity. If an infusor runs out faster than the expected tolerance range, but not fast enough to be considered an overdose, the patient is still at risk for adverse effects. The ordering physician should be consulted to make a clinical decision about whether any action is required.
	Infusor Preparation Issues
☐	**Was the correct infusor selected?** Compare the Infusor code on the BC Cancer pre-printed order to the one on the infusor (SV2, LV1.5, LV2, LV5 or LV10). **SV** Small volume (maximum capacity of 130 mL) **LV** Large volume (maximum capacity of 300 mL) **1.5** 1.5 mL/hr fixed flow rate **2** 2 mL/hr fixed flow rate **5** 5 mL/hr fixed flow rate **10** 10 mL/hr fixed flow rate Therefore an Infusor labelled as **LV5** would be a large volume infusor that runs at a fixed rate of 5 mL/hour. Protocols may use different sized Infusors with different rates depending on the dose volume, and infusion duration needed. In all cases, care should be taken to select the correct rate Infusor to allow the fluorouracil dose to be infused over the time interval specified by the protocol. See the *Infusor Selection FAQ* for more information. NOTE: The option to use SV2 Infusors no longer exists in BC Cancer protocols or pre-printed orders. Most BC Cancer protocols have been standardized to use LV5 Infusors where possible. Additionally, all gastrointestinal protocols that include a 46-hour infusional fluorouracil treatment have been standardized to include dose banding with Baxter LV5 Infusors™. See the *Dose Banding FAQ* for more information.
☐	**Was the infusor filled with the correct volume?** In practice the final volume is determined by the ordered duration of infusion. Infusors should be filled to at least 81% of the nominal fill volume. An under-filled infusor (< 81% of the nominal fill volume) will infuse faster than the

	intended rate. Note: a higher minimum volume (90% of the nominal fill volume) is listed on the Baxter Infusor™. See the *Infusor Selection FAQ* for more information.
☐	**Was the correct diluent used?** D5W is the diluent used to prepare fluorouracil Infusors. Normal saline would make the infusor run approximately 10% faster than with the intended D5W due to differences in viscosity.
☐	**Were there any leaks in the device or obstructions to the flow?** If leaks were present, this could contribute to an infusor running out early. During preparation inside the biological safety cabinet, pharmacy staff remove bubbles from the delivery tubing and allow 3 drops of D5W to flow from the restrictor to ensure there is no air obstructing the flow. A winged luer cap is then attached to close off the delivery tubing and the infusor is visually inspected for leaks. There should be no solution exiting the device until it is connected to the patient. Refer to *Safe Handling Manual – Module 1 – Checklists* for more preparation information. If a patient calls to report any leaks or dampness, they are instructed to immediately close the clamp on the infusion tubing, disconnect the device if possible, and place the Infusor and tubing in a ziplock bag to contain any leaking fluid (while following patient safe handling guidelines).
☐	**Was the access system (i.e. catheter) used to connect the Infusor 22 gauge or larger?** Anything smaller than 22 gauge may decrease the flow rate.
	Patient Issues
☐	**Was the infusor positioned correctly on the patient? Including at night?** The elastomeric infusor should be stored close to the same height as the distal luer lock connector. While the patient is awake, the infusor is generally kept in a fanny pack carried around the waist. At night, when the patient is asleep, the infusor is kept at bed height. Under the pillow is often recommended. If the infusor is placed on the floor or lower than the bed, the flow rate will be decreased approximately 0.5% per every one inch of distance. If it is placed on a

	dresser that is higher than the bed, the flow rate will be increased approximately 0.5% per every one inch of distance.
☐	**Was the infusor kept at room temperature?** Baxter Infusors™ will infuse faster in the heat, and slower in the cold due to changes in the viscosity of the solution. Ask the patient if the Infusor was exposed to prolonged cold such as an ice pack or heat such as from direct sunlight, heating pad, hot tub or sauna, or if they exercised for a long duration.
☐	**Was the flow restrictor taped securely to the skin to maintain the correct temperature?** If the flow restrictor is not taped securely to the skin, the temperature may drop leading to a decreased flow rate due to changes in viscosity of the drug solution. Flow rate is most accurate at 31.1°C or 33.3°C, depending on the device. It will respectively decrease or increase by approximately 2.3% per 1°C temperature drop or increase. Patients should be given extra tape with instructions on how to re-tape the flow restrictor if it comes loose.
☐	**Were any sources of obstruction present that could slow or stop flow?** Perform a visual inspection for possible sources of obstruction such as: ▪ Infection (redness, firmness or swelling at the IV site) ▪ Kinks or clamps in the tubing ▪ Air in tubing

References:

1. Baxter elastomeric pumps patient guide. Mississauga, ON: Baxter Corporation; 2010.
2. Baxter elastomeric Pumps Clinician guide. Mississauga, ON: Baxter Corporation; 2010.
3. Adam Jones, Personal communication. Baxter Corporation, Sr. Marketing Manager Elastomerics.27 March 2017.
4. BC Cancer Agency Management Guidelines Management of 5-fluorouracil (5FU) infusion overdose
5. Accidental Overdoses Involving Fluorouracil Infusions. ISMP. June 18, 2015.
6. BC Cancer fluorouracil monograph. Cancer Drug Manual.
7. BC Cancer Pharmacy Practice Standards for Hazardous Drugs (Safe Handling Manual). Module 1 Module & Checklists.