Institute for Safe Medication Practices Canada
REPORT MEDICATION INCIDENTS
Online: www.ismp-canada.org/err_index.htm
Phone: 1-866-544-7672

A KEY PARTNER IN
CMIRPS Canadian Medication Incident Reporting and Prevention System
SCDPIM Système canadien de déclaration et de prévention des incidents médicamenteux

ISMP Canada Safety Bulletin

Volume 15 • Issue 7 • August 26, 2015

Selection of Incorrect Medication Pump Leads to Chemotherapy Overdose

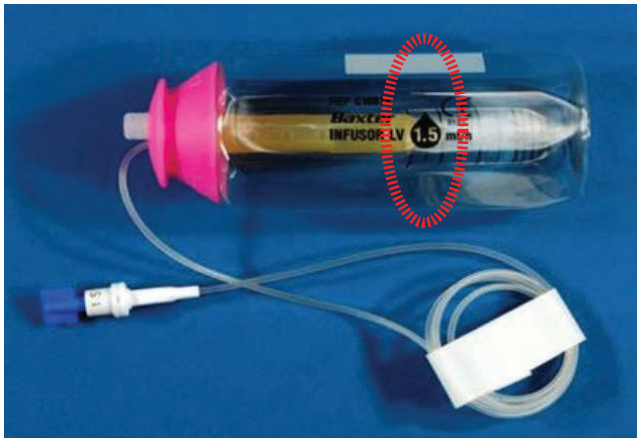
Elastomeric infusion pumps: *Using a checklist at the point of care promotes systematic completion of safety steps, in the presence of the patient, with his or her engagement.*

ISMP Canada received a report about an ambulatory patient who received a chemotherapy drug that was administered more rapidly than prescribed via an elastomeric infusion pump (a type of pump that contains the medication in an elastic "balloon"). Following this incident, the reporting facility developed and implemented a point-of-care checklist in addition to a number of other strategies to reduce the risk of a reoccurrence of this type of incident. This bulletin focuses on the benefits of the point-of-care checklist to improve patient safety.

Incident Description

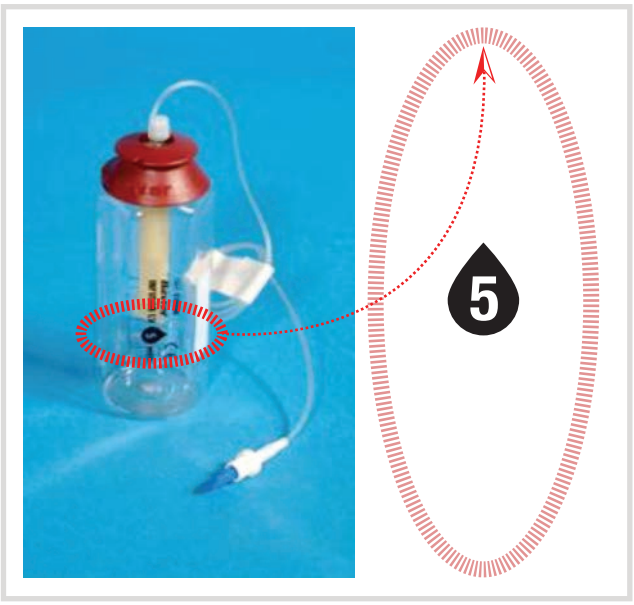
A patient with rectal cancer receiving concurrent chemotherapy and radiation was prescribed fluorouracil 3000 mg, to be administered intravenously (IV) via an elastomeric infusion pump over 7 days at home. The patient was informed that the total volume of medication in the device would infuse over 7 days at the rate of 1.5 mL/h (see Figure 1).

Figure 1. Example of an empty elastomeric infusion pump that delivers the medication at a rate of 1.5 mL/h. The rate of infusion is marked inside a black teardrop-shaped symbol (circled in red).



During the second day of treatment, the patient noticed that the pump was empty, and returned to the cancer centre for assessment. The clinical team determined that that the fluorouracil had been prepared in an elastomeric infusion pump that delivered the medication at a rate of 5 mL/h instead of 1.5mL/h (see Figure 2). Use of the incorrect pump had resulted in administration of the medication over 46 hours instead of the intended 7 days. Consequently, the patient was admitted to the hospital for observation for 2 days and was then discharged. Chemotherapy and radiation therapy were re-initiated the following week.

Figure 2. Example of an empty elastomeric infusion pump that infuses medication at a rate of 5 mL/h. The rate of infusion is marked inside a black teardrop-shaped symbol (circled in red). The symbol is rotated and illustrated to the right of the picture.



Background

Fluorouracil is commonly used to treat colorectal cancer and other cancers of the gastrointestinal tract. Dosage regimens and duration of administration vary considerably depending on the cancer type, protocol used, patient response, and concomitant therapy.[1] Lower doses may be given as IV bolus injections, whereas higher doses are usually given by continuous IV infusion over periods ranging from 22 hours to 21 days.[1] In the event of an error resulting in overdose, the potential for severe harm is correlated with the dose administered.[2] Administration of chemotherapy by continuous IV infusion using a portable device such as the elastomeric infusion pump allows a patient to complete the treatment at home. After the oncologist orders the medication, it is supplied by the pharmacy (with the medication prepared either in the pharmacy or purchased from an outsourced supplier) and then delivered to the cancer centre for administration by the clinic staff. The clinic staff is responsible for providing patient education, including the expected duration of the treatment with the pump.

An elastomeric infusion pump operates by using the deflation pressure from the "balloon" to push the medication through the tubing at a constant rate into the IV catheter or port.[3] These infusers are non-electronic and do not require additional equipment such as batteries or programming before use.[3] They are available in multiple sizes and with a variety of flow rates. The choice of elastomeric infusion pump is based on the volume of medication to be administered as well as the intended duration of infusion. Flow rates are identified by markings on the side of the infusion pump (see Figure 1). Progression lines on the side of the outer plastic housing line up with the balloon inside to help the patient and clinic staff view that the medication is infusing.

Discussion

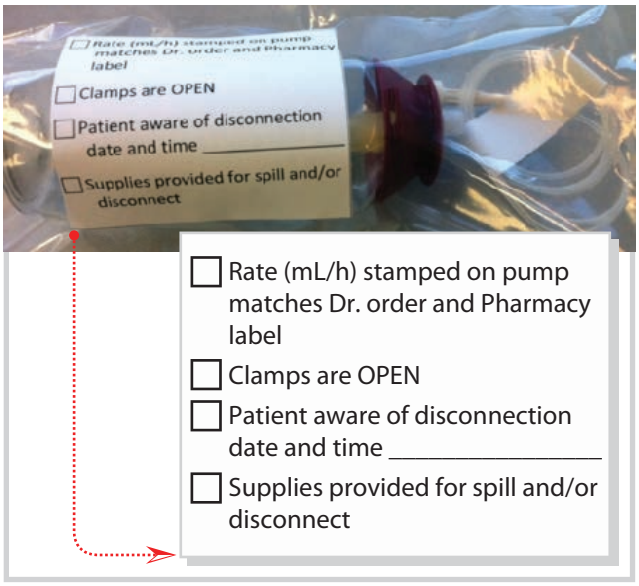
Although such pumps are viewed as safer than electronic infusion pumps in certain instances, their use also presents potential hazards.[4] The facility involved their human factors team in the incident review and the identification of contributing factors. Although several strategies were developed and implemented to reduce the likelihood of similar errors, a significant process improvement that the facility wanted to share was the implementation of a point-of-care checklist. Checklists represent a proven safety strategy, widely used in other industries, which are becoming more common in healthcare (e.g., Surgical Safety Checklist of the World Health Organization[5]). A checklist embedded into the medication order was already in place; subsequent to this incident, it was further developed to be used at the point of care.

Point-of-Care Checklist

With input from human factors experts and front-line staff, a point-of-care checklist was implemented. The checklist is attached to the elastomeric infusion pump at the point of care by the healthcare provider and discussed with the patient and their family and/or caregivers. The visible checklist has enhanced the safety checks required for pumps with medications at the point of care. This new approach has helped to mitigate potential errors associated with incorrect infusion rates for this type of pump. This checklist is designed to provide a visual cue when checking this

infusion pump (Figure 3). It is affixed to the outer plastic wrap of the pump so that information on the pharmacy label such as the patient name, drug name, dosage, duration and rate of infusion (in mL/h) also remains clearly visible on the pump.

Figure 3. The safety checklist affixed to a bag containing an elastomeric infusion pump; the bag is intended to stay with the pump. The checklist contents are shown below the picture and are accessible at the point of care.



A key safety strategy is the involvement of the patient throughout the check list process, as this creates an additional verification opportunity. Instead of being a nursing tool only, the checklist verification process helps improve the patient's and caregiver's knowledge and understanding of the pump and the treatment plan. The checklist remains with the pump at all times, with a visible list of the relevant information (see Figure 3).

Conclusion

Using a checklist at the point of care promotes systematic completion of safety steps in the presence of the patient, with his or her engagement. Use of a checklist, together with specific patient teaching, provides an opportunity for the patient and nurse to partner in appropriate safety checks and to develop a common understanding of the unique aspects of an elastomeric infusion pump. Providing the checklist as a point-of-care label, rather than just embedding it in the medication order or in a chart, makes it visible to the patient. Equally important, the checklist remains with the pump, allowing all healthcare providers, family caregivers, and the patient to easily refer to and confirm completion of steps to promote medication safety.

Elastomeric infusion pumps offer convenience for practitioners and patients. However, they require safeguards to ensure that the correct device is selected every time and checked at the point of care. Incorporation of human factors experts and front-line team members in incident analysis and solution development led to an innovative solution—the checklist highlighted in this discussion. ISMP Canada is working with Health Canada and a Canadian manufacturer of elastomeric infusion pumps to identify additional safety strategies that manufacturers could incorporate to improve device differentiation.

Acknowledgements

ISMP Canada gratefully acknowledges the following individuals for their expert review of this bulletin (in alphabetical order):

Flay Charbonneau, RPh BScPharm, Manager, Pharmacy, Odette Cancer Centre, Sunnybrook Health Sciences Centre, Toronto, ON; Janice Chobanuk, BScN MN, Director, Community Oncology, CancerControl, Alberta Health Services, Edmonton, AB; Jill Craven BSc Phm MA, Director, London Health Sciences Centre, London, ON; Claudia Harding, BSc Pharm, Clinical Pharmacy Manager-Oncology, Surgery and Research, Halifax, Eastern Shore and West Hants, Nova Scotia Health Authority, Halifax, NS; Roxanne Dobish, BScPharm, Pharmacy Manager, Cancer Network, CancerControl, Alberta Health Services, Edmonton, AB; Munira Jessa, Human Factors Specialist, Alberta Health Services, Calgary, AB; Marilyn Landry, RN, BN, MEd, Interim Health Services Manager, Systemic Therapy, Victoria General Hospital, Nova Scotia Health Authority, Halifax, NS; Kathy Vu BScPhm PharmD ACPR RPh, Clinical Lead, Safety Initiatives, Cancer Care Ontario, Toronto, ON.

References

1. Fluorouracil [drug monograph]. In: Drug formulary [database on Internet]. Toronto (ON): Cancer Care Ontario; 2014 Oct [cited 2015 Apr 16]. Available from: https://www.cancercare.on.ca/cms/one.aspx?portalId=1377&pageId=10760 [search on drug name]
2. Keiser LW. The role of pharmacogenetics in the management of fluorouracil-based toxicity. J Commun Support Oncol. 2008;5(Suppl 12):1-8.
3. Baxter Elastomeric pumps: clinician guide. Mississauga (ON): Baxter Corporation; 2010 [cited 2015 Mar 31]. Available from: http://www.capca.ca/wp-content/uploads/Baxter-Elastomeric-Pumps-Clinician-Guide11.pdf
4. Improving the safety of ambulatory intravenous chemotherapy in Canada: full report and recommendations. Toronto (ON): Canadian Association of Provincial Cancer Agencies; 2011 Jan 14 [cited 2015 Apr 16]. Available from: http://www.capca.ca/wp-content/uploads/IV-Ambulatory-Study-Final-Report-ENGLISH-Jan-14-2011_small.pdf
5. Surgical safety checklist. 1st ed. Geneva (Switzerland): World Health Organization; 2008 [cited 2015 Apr 16]. Available from: http://www.who.int/patientsafety/safesurgery/tools_resources/SSSL_Checklist_finalJun08.pdf

CMIRPS SCDPIM

Canadian Medication Incident Reporting and Prevention System

Système canadien de déclaration et de prévention des incidents médicamenteux

The Canadian Medication Incident Reporting and Prevention System (CMIRPS) is a collaborative pan-Canadian program of Health Canada, the Canadian Institute for Health Information (CIHI), the Institute for Safe Medication Practices Canada (ISMP Canada) and the Canadian Patient Safety Institute (CPSI). The goal of CMIRPS is to reduce and prevent harmful medication incidents in Canada.

HIROC

The Healthcare Insurance Reciprocal of Canada (HIROC) provides support for the bulletin and is a member owned expert provider of professional and general liability coverage and risk management support.

ISMP CANADA

The Institute for Safe Medication Practices Canada (ISMP Canada) is an independent national not-for-profit organization committed to the advancement of medication safety in all healthcare settings. ISMP Canada's mandate includes analyzing medication incidents, making recommendations for the prevention of harmful medication incidents, and facilitating quality improvement initiatives.

Report Medication Incidents

(Including near misses)

Online: www.ismp-canada.org/err_index.htm
Phone: 1-866-544-7672

ISMP Canada strives to ensure confidentiality and security of information received, and respects the wishes of the reporter as to the level of detail to be included in publications. Medication Safety bulletins contribute to Global Patient Safety Alerts.

Stay Informed

To receive ISMP Canada Safety Bulletins and Newsletters visit:

www.ismp-canada.org/stayinformed/

This bulletin shares information about safe medication practices, is noncommercial, and is therefore exempt from Canadian anti-spam legislation.

Contact Us

Email: cmirps@ismp-canada.org
Phone: 1-866-544-7672