

Innovative infusion pumps with medication error software help busy healthcare workers and prevent harm to patients.

Canadians die each year from medication errors. Some of these mistakes occur when physicians order medications for patients, others while doctor's orders are being transcribed by healthcare workers and still more when medications are being dispensed. However, the greatest number of mistakes happen at the bedside – while busy healthcare workers are administering medications to patients.^{1,2} And, 98 per cent of these errors escape notice until the medication has been administered.^{1,2}

technology overview

Healthcare staff use secondary line infusion pumps with medication error software the same way they do older models. Once the primary and secondary lines are attached to the infusion pump, the healthcare worker must program the correct dosage into the machine. If a secondary line is left closed, an alarm will sound to notify the healthcare worker of the mistake. New technology also takes care of the IV bag head height so that nurses no longer have to lower the primary bag when infusing the secondary line.

Networked pumps can communicate with a central hospital server using wireless or Ethernet cables, allowing updated drug monograph information to be uploaded to pumps in real-time as it becomes available. The infusion pump can verify the programmed dosage is correct, and alarm to notify the healthcare staff if it is not. Medication delivery history can be captured and stored for medical and quality control purposes.

“Medication errors are a serious problem,” reports the Institute for Safe Medication Practices (ISMP), Canada. “In fact, infusion pump errors in particular were ranked as the number one issue by the ISMP for two years in a row.”³

Hospital patients receiving intravenous (IV) drugs and fluids often need more than one medication at the same time. This can easily be achieved by attaching a secondary feed line to the infusion set already inserted into the patient's vein. The patient then has a primary line, and a secondary line, both feeding into the same intravenous catheter – often through a mechanical “infusion pump” designed to regulate the dosage of medicine delivered. Having two lines, however, can more than double the opportunities for error in the delivery of medications.

One common error occurs when busy healthcare workers forget to open the roller clamp regulating the secondary line. When this happens, the infusion pump may draw both dosages from the main line – unintentionally increasing the dose of medication delivered, with potentially harmful consequences. For example, instead of receiving 10ml/hour of medication A through the primary line plus 20 ml/hour of medication B through the secondary line, the patient may receive 30 ml/hour of medication A.

“IV errors can be fatal because many IV drugs are high risk drugs with

serious side effects if given inappropriately or in incorrect dosage. In addition, the medication goes directly into the bloodstream and is thus available for immediate effect on the body. This means there is a small margin for error before a potential negative impact occurs to the patient,” says Patricia Macgregor, Pharmacy Director at Scarborough Hospital in Toronto.⁴

New medical technology, however, is helping healthcare workers avoid these common human errors – assuring that staff give the right medication at the right time. IV pumps with assured secondary line infusion now help prevent mistakes in a number of ways. First, they will sound an audible alarm when secondary lines are inadvertently closed off – alerting the healthcare worker to correct the situation.

Secondly, these infusion pumps are equipped with medication error software that can ensure dosage rates set by healthcare staff operating the pump do not inadvertently exceed recognized minimum or maximum dosages. The system will allow staff to over-ride normal limits only after acknowledging they are doing so. The pumps can be connected to hospital networks so all commands can be logged into the database to capture medication history and potential “lessons learned”.

“Part of the beauty of pumps with secondary lines and medication



error safety software is that they don't change the way healthcare workers do their jobs,” says Julie Baker, Manager In-Patient Surgery of the Ambulatory Care Unit and Fracture Clinic

at Rouge Valley Health System. “Rather, staff continues to do what they know how to do and the equipment double checks to help them avoid errors ensuring safety all around.”

fast facts

Most errors in delivery of IV medications occur at the patient's bedside through incorrect administration. Few of those errors are intercepted in time. Reducing errors at the point of care has the greatest impact on safety and ROI.^{1,2}

1 Wilson K, Sullivan M. “Preventing Medication Errors with Smart Infusion Technology,” American Journal of Health System Pharmacists 61:177-83 (2004)
 2 Taylor B. “Smart Pump Technology Overview.” Technology Insights January, pp.1-28 (2007)
 3 ISMP Canada Safety Bulletin, February 10, 2005
 4 Canadian Healthcare Technology 12(6): (Sep 2007)

	ORDERING		TRANSCRIBING	DISPENSING		ADMINISTRATION	
Percent of Errors	39%		12%	11%		38%	
Errors Intercepted	48%		33%	34%		2%	
Errors Not Intercepted	52%		67%	66%		98%	
Appropriate Technology	CPOE	Pharmacy IS	CPOE	Pharmacy Robot	ADM	Bar Coding	Assured Secondary Line Infusion Pumps with Safety Software
Average Cost (in millions)	\$3-7.9	\$13	\$3-7.9	\$13	\$1	\$0.5-2.0	\$0.5- 1.5
Implementation Time	2-3 years	3-6 months	2-3 years	9 months	4-6 months	6 months	3-5 months