
CHAPTER 7

Smart Pump Technology

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CHAPTER OUTLINE

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KEY DEFINITIONS

Adverse Drug Event—any injury due to medication.¹

Clinical Advisory—a decision-making tool that is identified for a specific medication. Nursing guidelines are often created as an advisory. An example would be a suggestion by the pump to the user to use a 0.22-micron filter when administering a medication.

Dataset—the recommended parameters for each medication programmed into the smart pump software such as dose, dosing unit, rate, or concentration.

Drug Library—list of medications programmed in the smart pump software. The library includes properties such as name, dose, and concentration for each medication listed.

Hard limit—a dose that serves as the absolute limit (high or low) for drug administration by the pump. Once this hard limit is reached, the dose cannot be overridden, serving as a warning to the pump user that the dose needs to be verified prior to drug administration.

Infusion Pump—a device that administers drugs or nutrition to a patient through intravenous, subcutaneous, intramuscular, intrathecal, epidural, or intra-arterial routes. Infusion pumps can administer fluids in very controlled amounts.

IOM—the Institute of Medicine.

Profile—unique set of options and best practice guidelines for a specific patient population.

Smart Pump—a computerized infusion device that can be programmed to include a specific set of data.

Soft Limit—similar to hard limits but can be overridden and a dose can be programmed for delivery.

Introduction

In its 1999 report “To Err is Human,” the Institute of Medicine (IOM) estimated that between 44,000 and 98,000 deaths per year result from adverse events in hospitals. In comparison, approximately 45,000 deaths annually are caused by automobile accidents. In the 2006 publication “Preventing Medication Errors,” the IOM reported that medication errors occur in all stages of the medication use process but most frequently at the prescribing and administration stages. The IOM estimated that at least 1.5 million preventable adverse drug events (ADEs) occur each year in the United States. As a result, they have developed an action agenda for health care organizations to address this issue. The agenda includes adoption of new technologies such as computerized provider order entry (CPOE) and smart pumps.

This chapter will describe smart pump technology and discuss the implementation process associated with smart pumps in health care systems.

What is a Smart Pump?

A smart pump is in very simple terms a computerized infusion pump. Infusion pumps are devices that administer drugs or nutrition to a patient through intravenous, subcutaneous, intramuscular, intrathecal, epidural, or intra-arterial routes. Infusion pumps can administer fluids in very controlled amounts. There are two basic classes of pumps. Large volume pumps can pump nutrient solutions large enough to support a patient. Small-volume pumps infuse hormones, such as insulin, or other medicines, such as opiates.

While traditional infusion pumps are manually programmed by individual clinicians, smart pumps are programmed to include a very specific set of data created by the hospital staff. Part of this data is the drug library. A drug library is a list of medications programmed in the smart pump software. The library includes proper-

ties such as name, dose, and concentration for each medication listed. Smart pump software is customized to “alert you if a programmed infusion is outside of a particular medication’s recommended parameters (or dataset), such as dose, dosing unit, rate or concentration.”² In other words, smart pumps are designed to facilitate medication administration and prevent medication errors that have been associated with more traditional infusion pumps.

There are several manufacturers of smart pumps. B. Braun Medical, Cardinal Health, Hospira, Inc., Smith Medical, and Sigma International all manufacture smart pumps and have developed proprietary smart pump technology. Each system must be evaluated by hospital staff before a decision to acquire the technology is made (see Figure 7-1).

Steps to Implementing Smart Pump Technology

Establishing a Multidisciplinary Team

The pharmacist’s role in this new technology is to be part of a multidisciplinary team that will plan, evaluate, and implement the software and procedures for use. During the smart pump implementation process, multiple teams are assembled to support a successful system go-live. The three teams consist of the core team, clinical team, and implementation team.



Figure 7-1. Example of smart pump. This product allows for programming of soft and hard dose and rate limits.