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Smart Pumps Offer a Bounty of Benefits

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BUILDING A PLUG-AND-PLAY FUTURE FOR HEALTHCARE

Smart pumps offer a bounty of benefits for both OEMs and patients. But interoperability could make these devices even smarter.

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Technology and Medication Errors

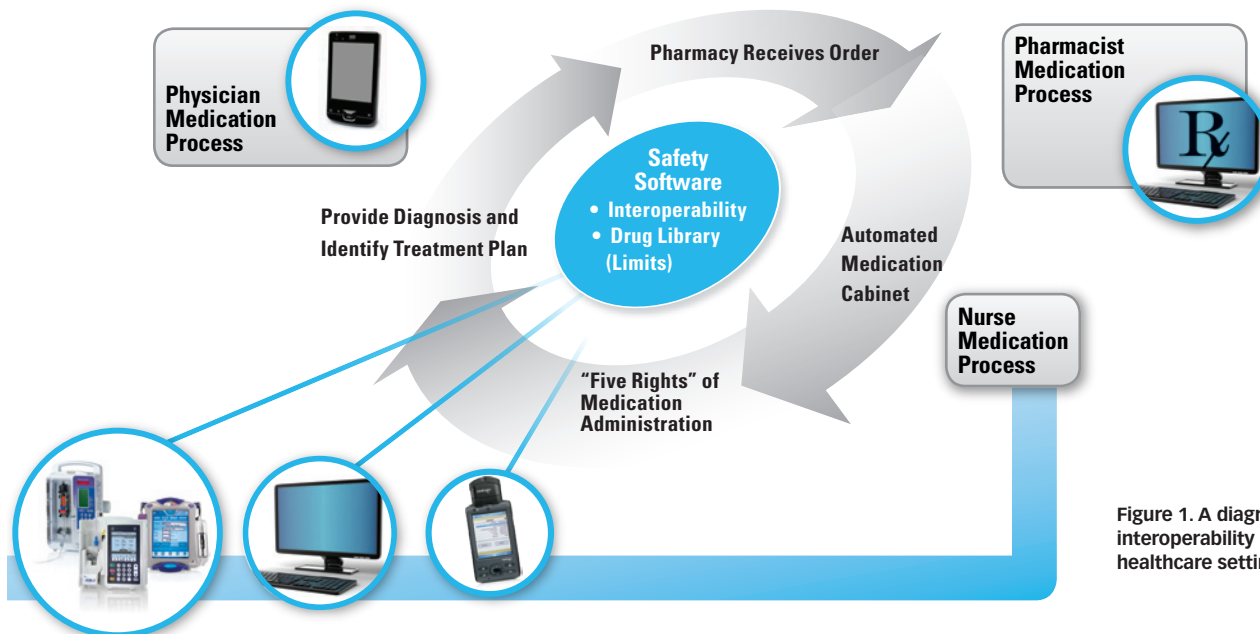


Figure 1. A diagram of interoperability in the healthcare setting.

Smart pumps generally incorporate multiple comprehensive libraries of drugs, usual concentrations, dosing measurement units, and dose limits. In late 2009, Lancaster General Health in Lancaster, PA, reported significant improvements in efficiency and work flow when smart infusion pumps were integrated with a bar code medication administration (BCMA) system. For instance, the amount of time that nurses spent programming pumps was down 24.8%; the number of steps needed to program a pump was cut from 17 to 7; and manual editing of pump programs, or reprogramming, was reduced by more than 90%.¹

The efficiency of smart pumps is no surprise. Technologically advanced pumps simplify the process needed for clinicians to administer intravenous (IV) therapy. With the vast majority of hospital patients requiring some form of IV treatment, many hospitals have adopted the technology over the past decade. Lancaster has been using smart pumps since 2005, but the reported improvements were achieved through the more recent use of pumps that are interoperable with Lancaster's BCMA and electronic health record (EHR) systems—demonstrating that smart pumps can be even smarter when integrated with other important systems.

OEMs Must Drive Interoperability

Vendors of pumps and related devices and systems should take note. Healthcare providers are paying closer attention to information technology than ever before. As they upgrade systems, more providers are realizing the benefits of pumps that can easily “plug and play” with other systems (see Figure 1). OEMs can get ahead of the game by manufacturing pumps and other devices that support open standards that enable seamless communication with any vital hospital system—including those made by other vendors.

Lancaster's autoprogrammed smart infusion system was implemented with products from two vendors: Cerner, which provides a broad portfolio of healthcare information technology products, and

Hospira, a specialty pharmaceutical and medication delivery company. The implementation occurred through a partnership that ensures that the companies' products are interoperable.

But such partnerships are rare. One other example is the Sedasys system, a computer-assisted personalized sedation system manufactured by Ethicon, a Johnson & Johnson company. This product is designed to provide minimal to moderate sedation levels with propofol. The system also continually monitors patient parameters such as oxygen saturation, respiratory rate, heart rate, and blood pressure to respond to signs of oversedation. The devices used to monitor these parameters were, for the most part, developed outside of Ethicon. Over the past few decades, OEMs have developed a staggering array of medical technologies, but most are stand-alone, proprietary products that are not fully meeting the demand for information at the bedside because they cannot be integrated with other healthcare technologies.

For instance, interoperable safety software can be used to electronically transfer a patient's drug information through a hospital's network to a smart pump. This type of connectivity between the technologies helps medical professionals check the “five rights” of medication administration: the right patient is receiving the right medication at the right dosage, through the right route, at the right time. The five rights verification has been shown to generally reduce medication errors by 65–86%.² This method offers an effective avenue to help eliminate some of the 400,000 preventable drug-related injuries that the Institute of Medicine estimates occur annually at hospitals.

Yet, while use of both smart pumps and BCMA systems has grown significantly in recent years, only 14% of health system facilities have linked BCMA systems to smart pumps, according to a 2009 survey of health system pharmacy managers by Pharmacy Purchasing & Products.³ For the healthcare industry—including patients, providers, and equipment manufacturers—to realize the full benefits of smart pumps, OEMs must drive interoperability.



Interoperability can be a boon for medication dispensing.

Reasons for Resistance Are Short-Sighted

Far too many OEMs have been slow to embrace the idea of interoperability. Their resistance is primarily financial. A completely interoperable medical environment would mean vendors could no longer control integration with their own systems; therefore, many device makers see the open architecture approach as relinquishing control. Such a move could mean giving up revenue—at least in the short term. Some vendors also view the costs of modifying existing devices to meet interoperability standards as another potential hit to their bottom lines rather than an investment in future business.

Many healthcare providers are just as reluctant. Some hospital administrators say they are concerned about information-exchange capabilities of interoperability, such as sharing records outside of their networks, citing the HIPAA Privacy Rule. They are concerned about competition, too. Having already invested heavily in proprietary information systems, providers worry that the easy transfer of health records could increase the chances of well-insured patients switching to competing healthcare providers.

Although these concerns are legitimate, they are short-sighted. Like other industries, healthcare is increasingly filled with professionals who are accustomed to devices that easily work together in their daily lives, such as wireless headsets that connect with mobile phones, remote controls that operate multiple electronic devices with one click, or wireless computer keyboards and mice that connect to computers simply by inserting a plug-and-play USB drive. As more of these tech-savvy professionals become key decision makers, they will demand similar technology in their work lives. Vendors that do not meet those demands run the risk of becoming obsolete. As for privacy, electronic sharing of information can be more secure than

physically removing records from a hospital. And patients whose providers are able to share information about them are more likely to avoid duplication of tests or procedures, which reduces cost to the system and results in better quality of care for the patients.

Smarter Pumps Mean Safer Care

The benefits of interoperable devices like smart pumps outweigh the reasons for resistance. With 56% of medication errors in health-care attributable to improperly administered IV medications, fully integrated smart pumps are one obvious solution.⁴ In addition to facilitating the five rights, integrated pumps offer other safety features, such as notifying supervisors when a nurse overrides a safety alert from a pump's drug library. Smart pumps include drug libraries, although not all pumps use drug libraries. Smart pump technology has been integrated into 60% of hospitals, and 63% of those hospitals have built their own drug libraries.³

The automated exchange of vital information between pumps and other devices at a patient's bedside can also increase clinician productivity and improve patient care. For example, a 2008 time and motion study by Ascension Health and Kaiser Permanente found that nurses spend two and a half hours per 10-hour shift logging in patient information—leaving them little one-on-one quality time with patients.⁵ Standards-based interoperability could provide real-time, comprehensive population of EHRs from pumps and other devices, improving nurses' work flow and effectively giving those two and a half hours back to patient care.

In the future, wireless data transfer could help improve productivity by allowing clinicians to remotely access information from medical devices, such as the status and volume of medication infused for a particular patient, without needing to walk to individual hospital rooms to obtain patient information.

Today, interoperable systems can notify pharmacists of real-time drug administration, allowing them to prepare the next bag for an infusion that is about to end. The integration presents opportunities for pharmacists to learn about how drugs are being used in practice and to help educate nurses on the proper use and rate of delivery of drugs that are difficult to administer.

Interoperability would also give users of smart pumps more flexibility—enabling them to select best-of-breed integration components from various sources. By the same token, medical equipment and device vendors would no longer be limited to selling only to providers using certain technology.

Interoperability: Effects on Industry

The benefits of interoperability extend beyond smart pumps. Interoperable medical devices also enable hospitals to treat more people in their homes, reducing the cost of treatment and eliminating some hospital stays or office visits. Such devices can be connected to in-home equipment such as blood pressure monitors or glucose meters. These connections enable clinicians to remotely monitor elderly patients or others living with chronic conditions. Interoperability would also allow data from the devices to be automatically included in the patient's electronic medical record, making the information available to other health providers who interact with the patient.

Although there are existing interoperable devices that are already improving patient safety and likely saving lives, the potential is even greater. Interoperability would enable OEMs to bring important new

products to market faster, cheaper, and on a broader scale. For instance, while various self-monitoring devices currently exist, they do not operate with most other devices already used in patient care. If such products could easily plug and play with other equipment at the point of care, costs of upgrading technology would be lower and innovative products would be used by more healthcare providers.

It takes effort to integrate disparate devices, due to the lack of interoperability. Custom interfaces are time-consuming and generally not transferable from one customer to the next. OEMs with devices currently on the market that were not designed with built-in interoperability would have to expend some effort to update their products to make them interoperable, but the payback comes in no longer having to create custom interfaces. If manufacturers bringing new medical devices to market would design them to be interoperable from the start, there would be no significant addition to project timelines in most cases.

To be sure, a move away from proprietary standards and toward open standards would likely drive industry consolidation along with innovation. Interoperability requires many OEMs to evolve their business models—rethinking how they charge providers and what they charge them for. But OEMs that embrace interoperability will have first-mover advantage and be positioned to thrive as various factors, including the Obama administration's push for EHRs, makes interoperability inevitable.



Smart pumps enable clinicians to spend more one-on-one time with each patient.

The Future of Smart Pumps

The \$2 billion smart pump market is ripe for interoperability.⁶ A little more than half of U.S. hospitals are currently using smart pumps, and of those that have not adopted them, 62% plan to do so within the next three years. Like Lancaster, facilities that are using interoperable features are reporting positive results. For instance, while only 38% of hospitals with smart pumps were using wireless data transfer in 2009, among those using it, 88% reported satisfaction with this method.³

As more facilities adopt smart pumps and compatible technologies, providers and OEMs can identify opportunities for future enhancements. These upgrades may include automated alarm communication between infusion pumps and hospital paging systems as well as asset management for pumps, including real-time location, battery status, and usage.

Broader technological advances will affect the future of smart pumps, too. For instance, the Healthcare Information and Management Systems Society is leading a global initiative that is working with various healthcare stakeholders to develop a framework for interoperability for all kinds of hospital technology. As medical device standards continue to evolve, clinicians will come to rely on one central computer location to analyze vital signs, medication administration status, medical charts, and relevant allergies. Likewise, device-to-device communications will enable diagnostic products to help control therapy. Pump makers are evolving and likely will adhere to a common set of standards in the future. As the market for interoperable smart pumps grows, smart OEMs will grow along with it.

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6. Figure based on MDI, IMS Hospital Supply Index, Millennium Research Group, other syndicated and company reports, and internal Hospira analysis.

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