smiths medical
bringing technology to life

CASE STUDY

A Road Map to Safer IV Drug Administration: Children's National Health System's Experience with the Medfusion® syringe infusion pump and PharmGuard® infusion management software

"The work that we put in up front in developing the drug library has been powerful. The days of attending A ordering a drug differently than resident B and fellow C are now behind us."

- Brian Jacobs MD, CMIO and CIO at Children's National

Background

Children's National Health System, based in Washington, DC, has been serving the nation's children since 1870. With a community-based pediatric network, eight regional outpatient centers, an ambulatory surgery center, two emergency rooms, an acute care hospital, and collaborations throughout the region, Children's National is recognized for its expertise and innovation in pediatric care and as an advocate for all children. Children's National's hospital is Magnet®-designated, and is consistently ranked among the top pediatric hospitals by U.S. News & World Report and the Leapfrog Group. The hospital houses 303 inpatient beds, including 54 dedicated to the Neonatal Intensive Care Unit, which is recognized by the American Academy of Pediatrics with its highest designation. Children's National has more than 60 intensive care beds and includes the only pediatric Neuro-Intensive Care and Cardiac Intensive Care units in the mid-Atlantic region. Home to the Children's Research Institute and the Sheikh Zayed Institute for Pediatric Surgical Innovation, Children's National is one of the nation's top NIH-funded pediatric institutions.

The Institute of Medicine report, *To Err Is Human: Building a Safer Health System*[1] (2000) raised awareness about medical errors and accelerated efforts to prevent such errors. Although many medical centers have initiated Quality Improvement (QI) programs to reduce medication errors, intravenous (IV) drug administration continues to account for nearly 60% of life threatening medication errors.[2] It is clear that preventable medication errors are a significant clinical issue with substantial morbidity.

As a leading pediatric care provider, Children's National is fully committed to continuously improving patient safety. Implementation of QI initiatives that serve to minimize the potential for human error is key to assuring correct medication delivery to the patient. Children's National leveraged Smiths Medical's Medfusion® syringe infusion system's smart assistive technology to optimize patient safety. Children's National's path to safer IV drug administration is described below.

Smart Pump Implementation Pathway

In 2010, Children's National implemented the Medfusion® 3500 syringe pump (non-wireless) with PharmGuard® infusion management software. At the time of implementation, Children's National realized it needed to thoroughly evaluate how drug ordering and administration was actually being employed. There was incomplete standardization; the staff could order the same medication in multiple different doses, with multiple administration frequencies and injection durations. The lack of standardization led to continual challenges related to variance, safety and quality issues derived from not operating in a consistent manner.

As a first step in addressing the challenges of inconsistency, a drug library was developed with dosage and administration parameters standardized in accordance with best medical practice. Simultaneously, Children's National campaigned internally for consensus with successful results. All stakeholders welcomed the standardized drug library.

As a second step toward consistency, the bedside drug administration environment was addressed. Smart pump drug administration policies and procedures were developed. The capabilities of the PharmGuard® medication safety software align with the "5 rights" of medication administration (right patient, right drug, right dose, right route, right time). The PharmGuard® medication safety software has a variety of configurable clinical alerts, and Children's National makes use of these alerts to prompt staff to specifically double check the syringe in use and assure that the drug

Medfusion® 4000 syringe pump

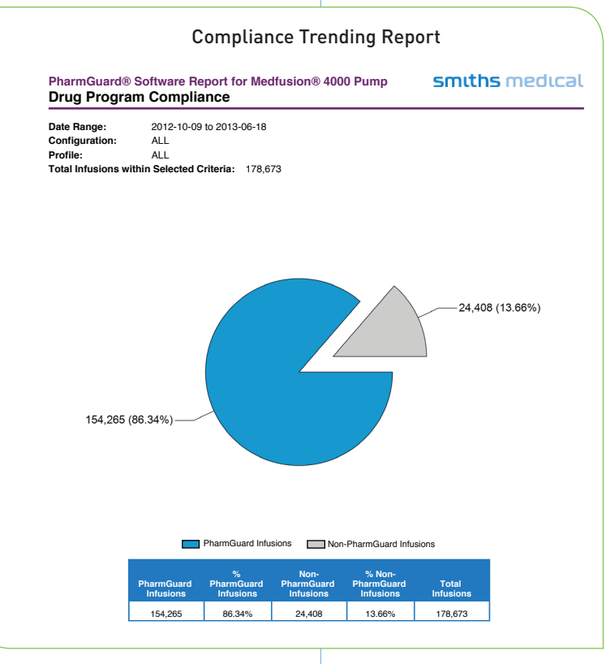
matches the profile selected prior to starting the drug infusion. A frequently overlooked aspect of drug infusion, the right drug concentration (providing the right amount of drug per volume of infusate), really became evident with the implementation of the Medfusion® 3500 syringe pump. It became clear to Children's National that drug concentration is an area quite susceptible to errors, and as a result cross-checks of the right concentration have been emphasized and incorporated into the drug administration procedures.

In 2012, Children's National implemented Smiths Medical's next generation smart pump, the Medfusion® 4000 syringe pump. This smart infusion pump has wireless capabilities, which really enhanced Children's National's QI initiative to improve IV medication administration. The wireless capabilities assure the current, standardized drug library is available on each syringe infusion pump through a network upload, versus the previous tedious "hands-on" pump by pump drug library modifications. The PharmGuard® Toolbox 2 medication safety software is used to update the drug library, add new drugs, adapt easily to drug shortages or substitutions or change dosing limits. The PharmGuard® Server software quickly and easily updates the drug libraries on the pumps and ensures all syringe infusion pumps operate with the most current drug library; eliminating the potential for pump by pump differences and thereby reducing the contribution of outdated drug libraries to medication administration errors.

The Medfusion® 4000 has "really changed the efficiency, accuracy and effectiveness of movement of safety data around the organization."

– Brian Jacobs MD, CMIO and CIO at Children's National

Children's National has been able to document a direct correlation in increased compliance to their education and audit programs, while leveraging another benefit of the Medfusion® 4000 syringe pump's wireless capabilities - the availability and accessibility of all medication infusion data parameters collected by the system and the device-specific reports generated by the PharmGuard® Server software. The 'Compliance Trending' report provides valuable feedback on QI, increasing compliance and thereby reducing medication administration errors and adverse drug events. Children's National uses the 'Safety Event' reports to evaluate drug program safety events, including hard limit alerts (prevention of programming outside of hard limits) and abandoned drug programs in which the infusion was not started. The 'Safety Event' reports determine needed educational topics or drug library updates. Prior to the Medfusion® 4000 pump, Children's National did not have the ability to rapidly analyze any errors, develop an understanding as to why these errors were happening, and obtain expedient feedback on which QI initiatives were being effective. Previously, evaluation data was limited to a subset (~10%) of the raw data obtained directly from individual syringe pumps. Gathering this data would require a few days of labor to manually download the data and another few days to create manual reports based on the raw data.



Children's National understands that medication administration errors are often multi-factorial and *"when we talk about highly reliable organizations, one of the things you should be obsessed with is your failures. You are monitoring and looking to see how things are changing and we need the data from the reports in order to do that." – May-Britt Sten, RN-BC, MSN, Director, Performance Improvement at Children's National.* Implementation of the Medfusion® infusion syringe pump and PharmGuard® infusion management software has resulted in profound progress towards improving patient safety, reducing medication administration errors and eliminating adverse drug events. The PharmGuard® infusion management software systematically detects and prevents errors. The averted errors, or near misses, are electronically recorded, which provides documentation to assist in QI initiatives.

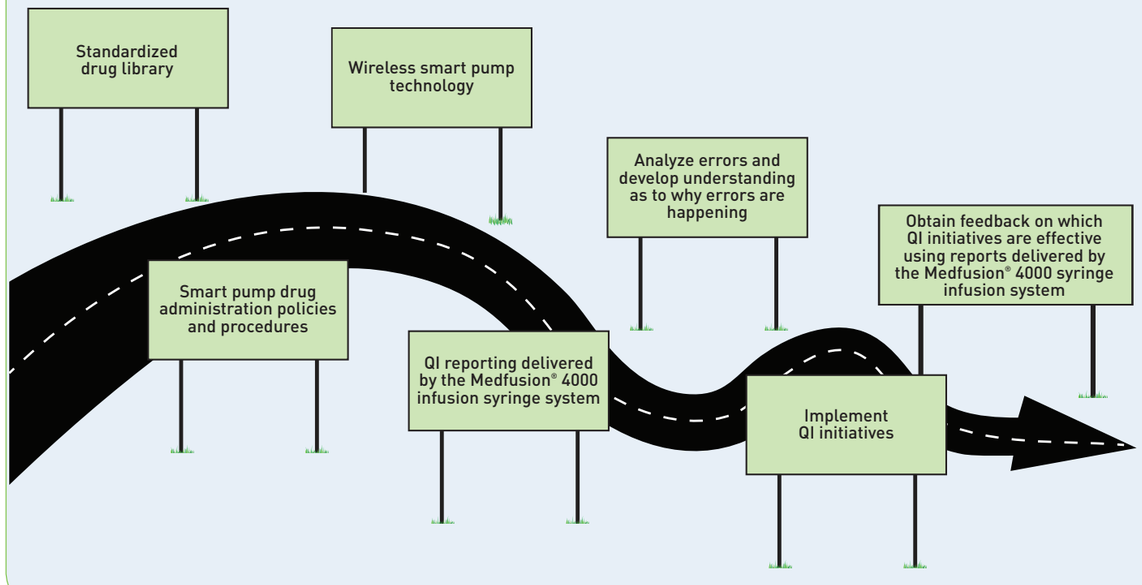
In Summary

Children's National's process of implementing the Medfusion® infusion syringe pump and PharmGuard® infusion management software has been both rewarding and challenging. The steps, which involved multidisciplinary collaboration and a thorough planning and review process, resulted first in a standardized drug library, and smart pump drug administration policies and procedures. Then, these steps were essential to successfully leverage the QI reporting delivered by the Medfusion® 4000 infusion syringe system in order to rapidly analyze any errors, develop an understanding as to why errors are happening, and obtain expedient feedback on which QI initiatives are effective, resulting in drug compliance over 86%.

"The concept is you don't just buy it, implement it and you are done, but actually you start to derive the value after the implementation and it's all about that data acquisition analysis and looking for opportunities, which then disseminate to improvements in the organization."

– Brian Jacobs MD, CMIO and CIO at Children's National

Multidisciplinary collaboration and thorough planning and review process



References

1. Donaldson, MS, Kohn, LT, Corrigan, J. To err is human: building a safer health system. Washington, D.C.: National Academy Press; 2000.
2. Dennison, RD. High-alert drugs: Strategies for safe I.V. infusions. American Nurse Today. 2006 Nov; 1(2).
3. Takata, GS, Mason, W, Taketomo, C, et al. Development, testing, and findings of a pediatric-focused trigger tool to identify medication-related harm in US children's hospitals. Pediatrics. 2008 Apr; 121(4): e927-35.
4. Brennan, TA, Leape, LL, Laird, NM, et al. Incidence of adverse events and negligence in hospitalized patients: results of the Harvard Medical Practice Study I. N Engl J Med. 1991; 324(6): 370–376.
5. Kaushal, R, Bates, DW, Landrigan, C, et al. Medication errors and adverse drug events in pediatric inpatients. JAMA. 2001; 285(16): 2114–2120.

PRODUCT(S) DESCRIBED MAY NOT BE LICENSED OR AVAILABLE FOR SALE IN CANADA AND OTHER COUNTRIES

Smiths Medical ASD, Inc.
St. Paul, MN 55112, USA
Phone:1-214-618-0218
Toll-Free USA 1-800-258-5361
www.smiths-medical.com

Find your local contact information at: www.smiths-medical.com/customer-support

MPAUCA-1093

CE 0473 Rx ONLY

smiths medical