



How IoT Can Improve Infusion Interoperability Clinical Workflow

Francisco Cuesta, BSN
 Manager, Clinical Strategy & Development
 Medication Management Systems
 BD
 francisco.cuesta@bd.com

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This presentation reflects suggested topics of future interest to nursing practice. Any information presented should not necessarily be considered a reflection of BD future product development and may not represent the views of the company.


What is Interoperability?

► Definition in healthcare

"the ability of different information technology systems and software applications to communicate, exchange data, and use the information that has been exchanged".¹

1. Source: HIMSS <http://www.himss.org/interoperability/interoperability-terminology>. Accessed 21 June 2017.

Basic Infusion Interoperability



► Order Pre-Population
 ► Infusion status data sent to EMR
 ► Pump configuration deployment
 ► Infusion data analytics

Before interoperability

► How many steps is the average for manually programming an infusion?

- a. 5
- b. 25
- c. 17
- d. 10

Before interoperability

► How many steps is the average for manually programming an infusion?

c. 17

Source: "Integrating technology to improve medication administration" Pouch AE, Sasse TM, Paoletti RD, Olin SJ, Watts SD. Am J Health-Syst Pharm. 2011 68(9):835-842.

Before interoperability

► Problem

"A total of 426 medications were observed infusing through an IV pump. Of these, 285 (66.9%) had one or more errors associated with their administration. There were 389 documented errors overall; 37 were "rate deviation" errors and three of these were judged to be due to a programming mistake!"

"Compared with other medication errors, infusion programming errors have a greater likelihood of causing injury!"

3. "Heighten the sharp end of intravenous medication errors: implications for infusion pump technology" M. Houch, C. Sullivan, D. Rooney, C. Barnard, M. Fall, J. Clarke, G. Nolan.
4. "Intravenous infusion safety problems: Collaboration, evidence-based best practices, and "smart" technology help to avert high-risk adverse drug events and improve patient outcomes" Mabbott, R. B., et al. In: Henikian, K., et al. (Ed.), *Advances in Patient Safety: New Directions and Alternative Approaches*. Rockville: Agency for Healthcare Research and Quality, 2008.

Solving the problem

► Keystrokes - Opportunity for error

Barcode scans significantly reduce the number of key strokes.



Solving the problem

Poll

► What is the reduction rate of keystrokes with interoperability?

- a. 86%
- b. 53%
- c. 68%
- d. 12%

Solving the problem

Answer

► What is the reduction rate of keystrokes with interoperability?

- a. 86%


Source: "Implementation and Benefits of Interoperability Between the Electronic Medical Record (EMR) and Infusion Pump." ASP 2015 Summer Meeting Poster. Jennifer Bluth, PharmD, BCPS; Lorelei Freneman, PharmD, CDEB; Joan Trullbery, RN, BSN; Jennifer Graves, RN, MBA; Katie Roudsckal, RN, BSN. Accessed 21 June 2017.

Challenges of current state

- Based on barcodes - Old technology
- Is the data where it needs to be when it needs to be?
 - Limited data availability on pumps
 - Connectivity to systems holding that information
 - Patient association
 - Clinician login

How can IoT help?

- Connectivity
 - WiFi
 - Bluetooth Low Energy
 - RFID/NFC



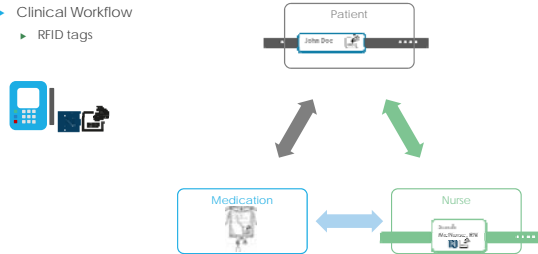
How can IoT help?

- ▶ Connectivity
 - ▶ WiFi
 - ▶ Bluetooth Low Energy
 - ▶ RFID/NFC



How can IoT help?

- ▶ Clinical Workflow
 - ▶ RFID tags



The diagram shows a 'Patient' box at the top with an RFID tag icon. Below it are 'Medication' and 'Nurse' boxes, each also with an RFID tag icon. Arrows indicate communication between the patient and medication, and between the medication and the nurse.

How can IoT help?

- ▶ Clinical Workflow

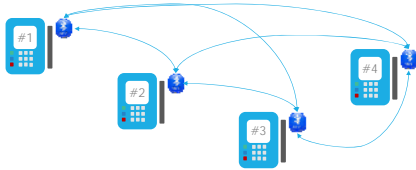


The smartphone screen shows: John Doe, Order #1, Drug: albino, 30mg/250ml, 5mg/16, Sarah McNurse. A 'Confirm!' button is shown next to it.

- ▶ Automated detection
 - ▶ Patient
 - ▶ Medication order
 - ▶ Nurse
- ▶ Order is retrieved and matched on the pump
- ▶ Order and program is verified and confirmed by the nurse

How can IoT help?

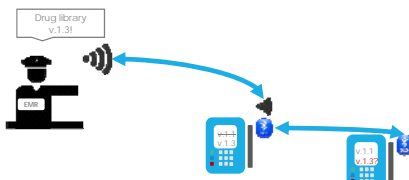
- ▶ Bluetooth
 - ▶ Enables pumps to work as an ecosystem



The diagram shows four smartphones labeled #1, #2, #3, and #4. They are all connected to a central point, representing a networked ecosystem.

How can IoT help?

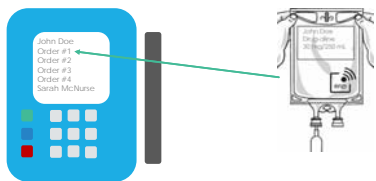
- ▶ Data Availability
 - ▶ Peer-to-peer network between devices
 - ▶ Push data to devices immediately when available



The diagram shows a server labeled 'Drug library v.1.3f' connected via arrows to two smartphones, one of which is labeled 'v.1.3f'.

How can IoT help?

- ▶ Data Availability
 - ▶ Cached data on devices



The diagram shows a smartphone displaying medication order information connected to a medical device (pump) with a screen and various ports.

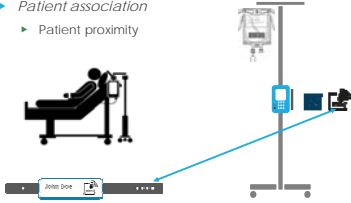
Slide 18

KL21 Need more graphics here to explain what I assume are multiple ways to run infusions? Not certain what this slide is about.

Kelly Larrabee, 6/26/2017

How can IoT help?


- ▶ *Patient association*
 - ▶ Patient proximity



The diagram illustrates patient association through IoT. On the left, a patient is lying in a hospital bed. A blue line connects the patient to a mobile device mounted on a stand. This stand is also connected to a computer monitor, suggesting data exchange between the patient's location and the hospital's IT system.

How can IoT help?

- ▶ Nurse association



The diagram illustrates nurse association through IoT. A nurse is standing next to a mobile device mounted on a stand. This stand is connected to a computer monitor. In the foreground, there is a patient ID card with the name 'Sarah Macintosh, RN' and a photo, indicating that the system is used for nurse verification and patient identification.

Conclusions

- ▶ IoT introduces many possibilities for strengthening infusion safety throughout the enterprise
- ▶ At the bedside, IoT can contribute to enhance the clinician's confidence in ensuring that medications are administered as ordered
- ▶ The value of interoperability is extended by IoT enabling the use of data from infusions in conjunction with other sources of relevant information to drive improvements in clinical practice and operational efficiencies

Questions?

Thank you!

Francisco Cuesta, BSN
francisco.cuesta@bd.com