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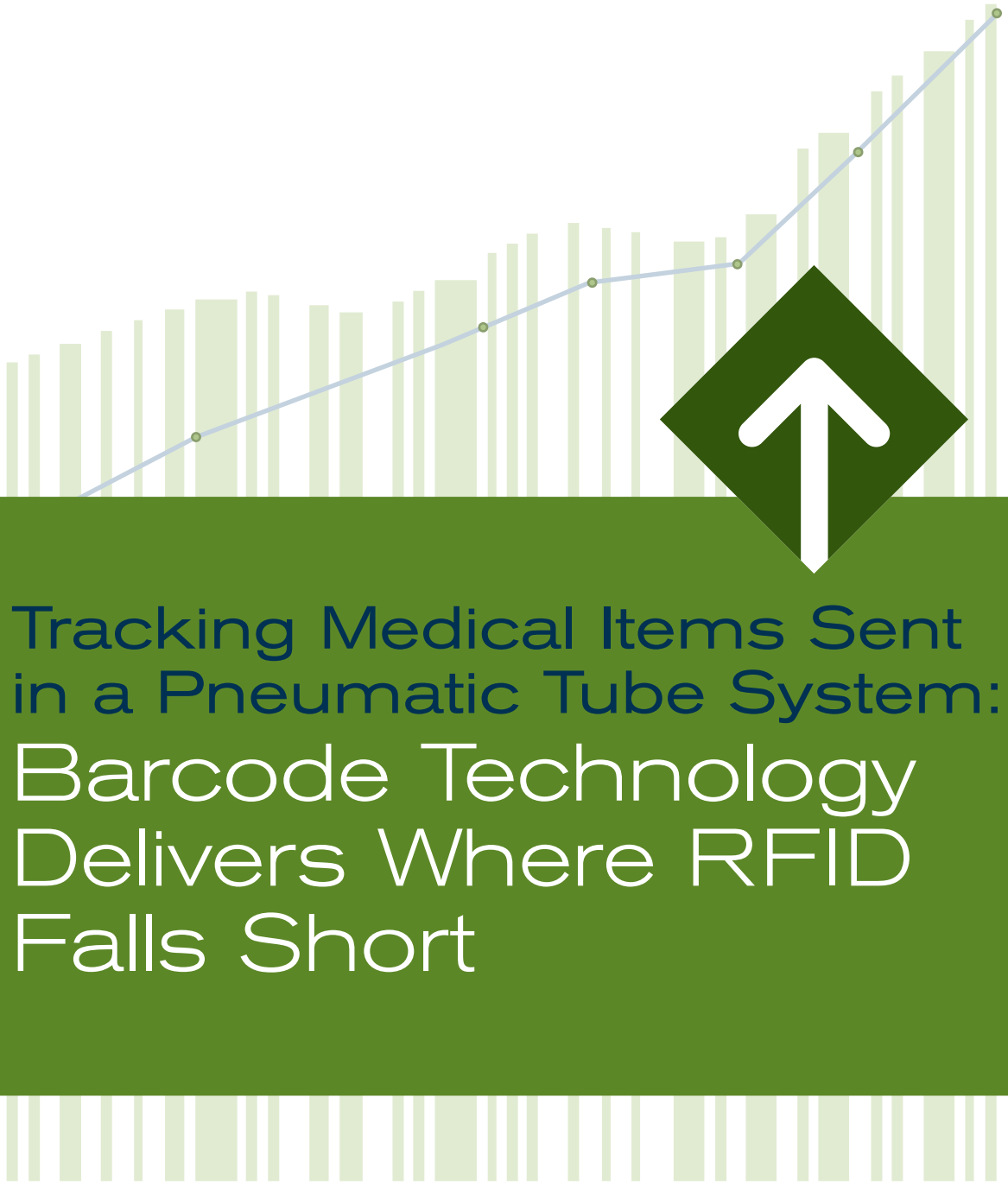

Tracking Medical Items Sent in a Pneumatic Tube System: Barcode Technology Delivers Where RFID Falls Short

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Pevco™ White Paper:

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Introduction

Millions of times each day in hospitals across the U.S., medical items such as pharmaceuticals, specimens and blood products are transported in pneumatic tube systems. Many of these items are extremely valuable to both patients and healthcare staff. Should an item become misplaced in transit, patient care is adversely affected.

For example, a blood component sent from a blood bank could exceed temperature limits and become unusable if the delivery is delayed. If a lab specimen is lost in transit, a new specimen may have to be redrawn from the patient, causing avoidable discomfort and delay. A misplaced drug could adversely affect outcomes and add unnecessary cost to refill the lost item.

In an effort to improve patient safety, reduce waste and ultimately improve patient care, hospital administrators are interested in tracking these valuable items as they travel through tube systems. Misplaced items can result in delays in care, increases in cost and product waste.

Available solutions for tracking clinical items in hospital pneumatic tube systems are barcode technology and radio frequency identification (RFID).

With the FDA mandate that all pharmaceuticals and blood products be barcoded, the technology is widely used in hospitals

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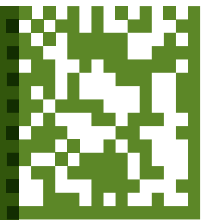
Barcodes, available in 1D and 2D types, are an inexpensive way to keep track of inventory and patients. With the FDA mandate that all pharmaceuticals and blood products be barcoded, the technology is widely used in hospitals of all sizes and specialties.

Passive and active RFID is a wireless communications technology that uses radio waves to identify chips (or tags) attached to objects. Passive RFID technology is now commonly used in hospitals for managing hospital equipment and facilitating device recalls.[1] With passive RFID, tags are dormant until activated by radio frequency.

While RFID has relevance in hospital material tracking, barcode technology is the preferred method to track small medical items in a pneumatic tube system because it:

- is easy to implement
- is cost-effective
- helps accelerate care



Most Patient-Critical Items are Already Barcoded

In 2011, the FDA set in place guidelines that most human drug products and biological products sent to U.S. hospitals must be barcoded. This includes all pharmaceuticals and all blood products.[2] The purpose of the mandate is to increase patient safety and to reduce medication errors, including transfusion errors.

Since the barcoding of all pharmaceuticals is required of drug manufacturers and private distributors, drugs have unique barcodes before reaching the hands of hospital personnel. While the FDA does not require it, many hospitals are barcoding lab specimens. Lab specimen containers are labeled when samples are taken from patients. This reduces human error since

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specimen mislabeling is a problem faced by hospitals when hand - written labels cause inaccurate spelling of patient names or incorrect birth date entry, for instance. Accurate patient identification, including specimen labeling, tops the list of the Joint Commission's Hospital National Patient Safety Goals.[3]

Barcode technology has been a successful tool for hospital labs focused on reducing specimen mislabeling. The implementation of barcode specimen collection at Greater Baltimore Medical Center resulted in the elimination of specimen mislabeling from 2009 to 2011.[4]

Since most clinical items are barcoded either by a manufacturer or by hospital staff, barcode technology seamlessly integrates into the handling of pneumatic tube system transactions.

While the current cost of a barcode is less than 1 cent, RFID tags start at about 10 cents apiece

Barcode Technology is Inexpensive to Implement and Support

The ubiquity of barcodes on medical products makes barcode tracking cost-effective. While the current cost of a barcode is less than 1 cent,[5] RFID tags start at about 10 cents apiece.[6]

As hospitals make strides to reduce operating costs, it is difficult to justify adding RFID chips to medical items that are already barcoded. That additional 10 cents per item quickly adds up when counting the millions of pharmaceuticals and lab specimens processed across the country each day.

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Because medical items are barcoded and not tagged with RFID, there would be additional labor cost to tag them. Since RFID tags must be programmed with information about the medical items to which they are attached, even more labor and cost would be incurred.

The barcode readers needed to utilize barcode technology are also inexpensive. Because the technology is familiar to most staff members and easy to implement, the cost of staff training is minimal.

Barcoding Accelerates Patient Care

With barcode tracking, healthcare professionals are able to track important medical items as they are sent through pneumatic tube systems. Knowing exactly where these items are and when they arrive at stations speeds the pace of patient care because product loss is minimized and hospital personnel are able to get the items to patients quickly.

Because most medical items are already barcoded, healthcare staff can scan barcoded items before sending them in a tube system. A blood bank manager, for example, scans the barcode on a blood component with a reader installed in the tube system station. She also scans a barcode embedded in the plastic carrier that contains the blood product. The data is captured by computer software, which stores information about the carrier and the blood product – and the time they left the station. The clinician at the receiving station scans the blood component and the carrier upon arrival and the system records the time and location they were received.

Only barcode technology provides a timestamp of individual blood product deliveries. With RFID, only the plastic carrier is scanned and tracked

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Both barcode labels and RFID chips on pneumatic tube carriers provide information about when carriers were sent and received — but only barcode technology provides a timestamp of individual item deliveries. With RFID, only the plastic carrier is scanned and tracked.

The argument that tracking carriers is sufficient is best debated with a real-life example. It is no secret that items are occasionally misplaced due to the busy nature of a hospital. Imagine a carrier arriving from the pharmacy to a nurses' station.

One nurse opens the carrier and pulls out a medication. He realizes the medication is not for his patient and puts it on a nearby counter.

A few minutes later, another nurse looks in the station bin and sees that her medication is not in the carrier so she calls the pharmacy to inquire the status.

The pharmacist looks into the data and can verify that both the carrier and the medication arrived at the station. Rather than refill the prescription right away, the pharmacist asks the nurse to check areas around the tube station again. The nurse finds it on the counter and sees that although the medication was not presently in the carrier, it did indeed arrive.

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If the pharmacist did not have available data about both the carrier and the medication, she would not have been able to prove that the medication arrived. This misplaced medication would have wasted time and money – and a delay in patient care.

It should be noted that with technology available today, the nurse would have been able to look into the data herself to confirm the arrival of the medication.

Tracking just carriers, as is the case with RFID, works only under the assumption that things will always go according to plan. The fact that the pharmacy sent the carrier does not mean the medication was also sent. Because RFID technology does not tie carriers to their contents, it cannot indicate if medical items are put into carriers or when those specific items arrive. Therefore, RFID is not an ideal solution for tracking important items in a pneumatic tube system.

Barcode tracking reduces product loss because individual pharmaceuticals, specimens and blood products are always accounted for in real time. When staff are not spending time looking for products and replacing them, the rate at which patients receive care increases.

Summary

Barcode technology is a cost-effective, accurate solution for tracking pharmaceuticals, specimens and blood components in a pneumatic tube system. While RFID has a purpose in hospital material and/or equipment tracking, only barcode technology offers real-time tracking and documentation of medical item deliveries. Barcode tracking is a better solution today and in the foreseeable future because it enables the tracking of individual medical items – reducing loss and ultimately improving patient safety and care.

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Endnotes

[1] Radiofrequency identification (rfid). Retrieved from http://www.fda.gov/Radiation-Emitting Products/RadiationSafety/ElectromagneticCompatibilityEMC/ucm116647.htm.

[2] U.S. Department of Health and Human Services, Food and Drug Administration. (2011). Guidance for industry: Barcode label requirements questions and answers.

[3] Joint Commission. (2103). 2013 hospital national patient safety goals. Retrieved from http://www.jointcommission.org/standards_information/npsgs.aspx

[4] Trask, L. (2012, 04). Barcode specimen collection improves patient safety. Medical laboratory observer.

[5] Learn about barcodes. Retrieved from http://www.barcoding.com/information/learn_about_barcodes.shtml

[6] Stackpole, B. (2013) Identification options for the supply chain: barcodes, rfid, gps. TechTarget.