By Barry Chaiken, *MD, MPH*

Playing Tag to Enhance Patient Safety

A recent television commercial for a computer company shows a scruffy-looking character in a trench coat walking through the aisles of a supermarket. As he travels down each row, he picks up one item and the next and sticks them in the pockets of his coat. With his garment bursting at the seams with merchandise, he proceeds to exit the store, bypassing the check-out counter. An alarm goes off, and a tall, husky security guard stops the young man dead in his tracks.

You might expect the guard to produce a pair of handcuffs to hold the man for the police. Shoplifting, after all, is a crime. Instead, the guard hands the man his forgotten receipt and thanks him for his patronage. In this scenario, each of the items taken by the shopper has a radio frequency identification (RFID) tag embedded in the item or its packaging. When the item passes through an electronic field scanner, each item is recorded for purchase, while an RFID tag identifies the shopper. The items are automatically charged to the shopper's account and paid for by a registered debit or credit card.

Although this capability is not deployed currently, tags provide significant benefits in a variety of settings today. One major gasoline company offers consumers the convenience of registering a credit card with a tag that can be carried on a car key chain. The tag can then be used to purchase gasoline at the pump or other items inside the company's convenience stores without the use of money or credit cards. Consumers can just swipe, pump, and go.

RFID tags come in many sizes with varying capabilities. Tags can be made as small as a fingernail and as thin as 1mm. Although similar in functionality to bar codes, they can be used in many situations where bar codes cannot. A tag consists of a single, very small computer chip that "responds" when passed through an electronic field. Some tags are read only where they broadcast specific information when exposed to a certain type of electronic field. Others provide write capability where information can both be read off the tag and put onto the tag.

Unlike bar codes, tag information can be made dynamic allowing it to change as different functionality or information is required. Also, dissimilar to bar codes, tags do not require direct line-of-sight interaction between the reader and the tag. Therefore, tags can be embedded within products and are not limited to the exterior.

Most of us have seen tags work as security devices in stores to prevent theft. Those alarms that go off as someone walks out of a store are triggered by security tags that have not been properly disarmed during merchandise checkout.

Using RFID Tags for Identification

Tags hold great promise in healthcare through their use in identification of individuals, equipment, and medications. Patient wrist bands embedded with tags provide valuable potential benefits in care delivery.

At the start of the Iraq war in March, 2003, the U.S. Navy used tags in wrist bands for all patients. As the wristbands give each patient a unique ID, physicians and nurses during rounds use the wrist bands to identify each patient, pull up an electronic medical record and verify that the correct treatment and medications are being given to each patient. Tags allowed medics in the field to uniquely identify each injured soldier while sending that soldier's information off to the designated field hospital so it could prepare for the arrival of the casualty. The Navy is currently testing the system at sites in the U.S.

Tags also can be used to identify medications and blood products, those items recently mandated for bar coding by the FDA. Today, single dose medications can have their packaging identified with tags. In the future, individual pills will have a tag embedded in them, allowing for even more exact checking of medications upon administration. Use of tags assists in the five rights of medication administration by helping to identify the right patient and right drug including route and dose, while also assisting in recording when the

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medication was given and by whom. In addition, using tags to easily identify caregivers during a process allows for the process to be monitored regularly and modified if necessary.

Tags to Prevent Counterfeiting

The FDA estimates that up to 40% of all drugs shipped from Argentina, Colombia, and Mexico are counterfeit. RFID tags embedded in medication shipping boxes or the bottle containers by manufacturers can work to intercept counterfeit products and protect the public from them. As Congress moves toward loosening the restrictions on the importation of drugs, systems to monitor and detect counterfeiting become increasingly more important to protect the public safety. Many pharmaceutical companies have either deployed or are considering using the technology to ensure the integrity of their medication brands.

Tags Can Help Make Processes More Efficient

Efficient scheduling of patients requires significant hospital resources to track the movement of patients through various departments in a hospital. The use of patient tags allows patient movement to be monitored electronically, thereby freeing up staff for other activities. As patients are ready for transport, a tag reader can be used to identify the patient, record the patient's location, and notify transport of the need to move the patient to the next destination. Analysis of this movement can be used to review procedures and modify them to make them more efficient. In addition, staffing levels can be adjusted to better manage patient throughput during peak times.

In addition to patients, certain specialized and expensive equipment can be tracked throughout the hospital, ensuring that it is used efficiently. Again, processes can be modified as needed and additional equipment purchased only when necessary.

Tags to Store Patient Information

As noted above, the newest generation of tags provides both read and write capability. Therefore, important clinical patient information can be written to the tags allowing other caregivers to have access to that information. Details such as allergies, current medications, or recent laboratory results can be used by other clinicians in preparing treatment. In addition, diagnostic and therapeutic equipment that has tag-reading capability can automatically adjust the procedure based upon the information readable on a patient's tag. By recording this information in the tag and offering a level of automation, an additional level of safety is built into the care delivery process.

Conclusion

In a move to enhance patient safety, the FDA mandated the bar coding of medications in hospitals. With the introduction of RFID tags, which in certain circumstances also includes a bar code (e.g., patient wristbands), another technology tool is unleashed to help ensure improved processes and safer care. Although the technology is under rapid development currently, it is clear that tags will become an important tool in the effort to enhance patient safety as well as make the delivery of healthcare more efficient.

References

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