

# Tracking: The Critical Link in Patient Safety



## What You'll Learn:

- How identification and tracking will improve patient safety and reduce operating costs
- The hard costs associated with non-compliance
- Why identification and tracking must be at the front end of any Hospital Information System (HIS)
- Key technologies that can be used to secure the "5 Rights of Patient Safety"

## Introduction

Although information technology (IT) is applied to diverse vertical markets there are always common objectives. The ability to track people and assets is one common foundational objective. For example, the retail industry tracks products along the links of the supply chain and through their point of sale. The package delivery industry tracks parcels from point A to point B and every stop in between. As we apply information technology to healthcare applications we quickly see the emergence of this common tracking objective. In fact, it can be stated that the goal of tracking patients, medications and data is already playing a significant role in healthcare's evaluation and adoption of IT.

Tracking starts with capturing unique identification, a bar code for example, and ends with reliable access to data. The start and end of this tracking ecosystem is connected by reliable and secure communications. The resulting improvements in patient safety and reduced operating costs are specifically tied to the ability to apply these common tracking principles to the unique requirements of the hospital environment.

## Background

Tracking patients, medications and data through positive identification has risen substantially on the healthcare agenda since the year 2000 when the Institute of Medicine launched its landmark report, *To Err is Human: Building a Safer Health System*. The IOM's findings delivered shocking estimates regarding the occurrence and effect of medical errors. The report estimated:

- 2 million serious medical errors occurred annually
- These serious medical errors resulted in an estimated 44,000-98,000 deaths
- Of these deaths, an estimated 7,000 were due to adverse drug events (ADE)

The IOM report moved the safety issue, more than any other single factor, into the forefront of the healthcare industry and the mainstream public. Accordingly, important industry drivers have emerged. To enable the positive identification of drugs for potential correlation to medication orders, the Federal Drug Administration (FDA) has established a ruling requiring drugs used in the hospital to be bar coded with the National Drug Code (NDC) at the unit dose level. This ruling directly affects pharmacies, manufacturers, re-labelers and re-packagers. Those affected are required to comply by April, 2006. With this ruling, the FDA is influencing hospitals to implement medication tracking systems to help automate and document the dispensing and administration of drugs.

Furthermore, the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) views positive patient identification as critical. JCAHO, the organization that, among other initiatives, annually establishes national patient safety goals, has consistently defined positive patient identification as a primary improvement goal. JCAHO also established and manages the Sentinel Event Program- this program records and analyzes the frequency and cause of adverse patient safety events. When appropriate, a Sentinel Event Alert message is delivered to all accredited organizations describing the event, root cause and corrective action. JCAHO reports the Sentinel Event Program has aggregated more than 2500 sentinel events since the program's inception in 1996. Among the most frequent types of sentinel events is medication error. Two of the top root causes for medical errors are incomplete or inaccurate patient assessment, which often means patient identification and verification, and unavailability of patient information.

Finally, an important market-based driver is the need for hospitals to reduce their operating costs. Market analysis firm Frost and Sullivan claims the top two challenges for the healthcare industry are the elimination of medical errors and cutting costs without cutting quality. While not all ADEs are preventable given the complexity of drug interaction, studies reported in the Journal of the American Medical Association (JAMA) indicate 30%-38% of all ADEs are, in fact, preventable. Beyond the social cost of ADEs, a medication error presents significant direct cost to a hospital. According to a study in JAMA, the increased patient stay resulting from a preventable ADE averages 4.6 days with an increased cost of \$4,685. The study goes on to estimate the annual costs attributable to preventable ADEs for a 700 bed teaching hospital is \$2.8 million. These estimates do not include the cost of injuries to patients or malpractice costs. For the year 2000, the American Medical Association (AMA) reports 30% of all malpractice suits include drug related injuries. The average compensation award was \$668,000. The social, ADE and malpractice costs are a few of the underpinnings for the FDA estimate that implementation of bar code technology represents \$93 billion in value for the healthcare industry over the next 20 years.

Compliance with the FDA and JACHO initiatives, as well as the need to reduce hospital operating costs, requires change in many cases - difficult change. The impediments to improving patient safety range from organizational, cultural and technical, to procedural and financial. To add to the complexity, healthcare decision makers need to navigate through real-world facility issues:

1. In many hospitals, it may not be clear exactly where the patient safety initiative fits in.
2. It is likely unclear how well caregivers will accept new procedures and work tools required for improved efficiency and patient safety.

3. Today, the existing hospital IT infrastructure may be old, and the information systems may not be integrated across departments.

4. Finally, these changes take money, expertise and time. Hospitals are faced with the classical chicken and egg scenario – investing in identification and tracking solutions will significantly reduce costs – but how and where do they start in light of budget constraints?

These are important issues that are not easily solved and information technology cannot level all of them. However, the deployment and use of information technology for identification and tracking provides the foundational enablement critical to any improvement agenda. Healthcare facilities that deliver the appropriate information infrastructure, front-end work tools and on-going support will proactively enable the change required to improve patient safety while driving operating costs down.

## Point of Care - The First Critical Link in HIS

Like no other time, technology is available to provide this foundational enablement and it must start at the point of care. Modern hospital information systems (HIS) integrate the order entry system, administrative system, and departmental subsystems within a hospital. They enable easier access to more accurate patient information allowing for quicker and more accurate patient care. However, regardless of the HIS capabilities, access to, and use of, the patient information starts with positive identification at the frontline of care. Innovative technology like bar code scanners, mobile computing terminals, and wireless local area networks (WLAN), all work together to deliver positive patient and medication ID at the point of care, thereby enabling accurate integration of the patient information by the balance of the HIS.

## 5 Rights of Patient Safety

The key driver for frontline IT around the bedside is the 5 Rights of Patient Safety. The “5 Rights” require:

- The Right Patient receives...
  - The Right Drug at...
  - The Right Time in...
  - The Right Dose in...
  - The Right Form (oral, IV, etc)

Regardless of the specific frontline IT tools, any process that delivers the “5 Rights” must have the following basic components:

- Accurate identification of the patient
- Accurate identification of the drug
- Verification that the patient, drug, time, dose and form all correlate with the order

## Using IT to Secure the 5 Rights

Figure 1 below illustrates a contemporary means to administer the “5 Rights”. Serving as the central workstation, the caregiver uses either a mobile computer or a handheld scanner linked to the mobile cart to read the bar code on the patient wristband. The bar code positively identifies the patient to receive the drug. Also, the bar code on the drug, which contains the National Drug Code (NDC) number, is read. The patient and drug identification is delivered to a function of the HIS that confirms the “5 Rights” are consistent with the doctor’s electronic order. Once confirmed, the caregiver is given a visual indication to administer the drug. If an inconsistency is found between the “5 Rights” and the doctor’s order, the caregiver is visually informed of the problem on the mobile computer or the mobile cart’s workstation display.

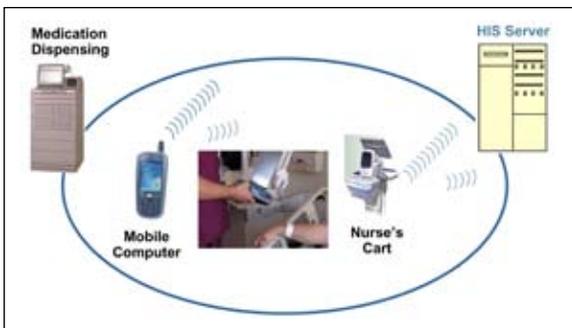


Figure 1

## Making it All Work

Easy and reliable bar code reading over a broad range of circumstances is critical to the success of this solution. Reading the patient and drug bar codes are the critical interface points between the caregiver and this “5 Rights” process. The entire suite of technology can be shelved if the very first step, reading the bar code, is difficult and frustrating to the caregiver. A method of wristband marking and reading has emerged enabling efficient patient identification without requiring the caregiver to manipulate the wristband or disturb the patient. Two-dimensional bar codes, especially when printed repetitively on a wristband, are emerging as the preferred method of patient identification marking due to the bar code’s tolerance to curvature and damage. An execution of this method is shown below in Figure 2.

In Figure 1, the patient and medication bar code identifiers are read by either a mobile computer or handheld scanner attached to a mobile workstation. The mobile computer, through a user-friendly touchscreen and keypad, guides the caregiver through the steps necessary to administer the “5 Rights”. The mobile



Figure 2

computer suitable for the “5 Rights” application is designed with a reliable and secure WLAN connection, extended battery life and rugged mechanics to withstand unintended drops to the floor. The handheld bar code scanner used with the workstation cart is also designed to withstand a demanding physical environment. The handheld scanner is likely linked to the cart via a short-range wireless connection so that it can be maneuvered around the bedside, unencumbered by a cord.

A WLAN is essential to the process illustrated in Figure 1. The WLAN provides a high bandwidth, reliable and secure connection between the HIS and either the mobile computer or workstation on the cart. WLANs have become commonplace in a wide variety of enterprises including hospitals. The most common uses of WLANs within healthcare are:

- Access to and updating of electronic medical records from the bedside
- Matching wristband and medication packages to the physician order
- Wireless badges for voice communication

An important addition to the concept illustrated in Figure 1 is the addition of wireless enabled healthcare devices around the bedside - including infusion pumps and vital signs monitors on the WLAN that permit a high level of patient data acquisition and safety. In Figure 3 below, as networked healthcare devices are added to the WLAN the data resident to the IV pumps and vital signs monitor can be wirelessly delivered to the HIS. Upon request from the HIS, or at some pre-determined interval, the information can be sent from the device to the HIS. In the case of the IV pump, the settings can be verified by the HIS to be consistent with the doctor’s order, thereby mitigating a significant candidate for human error. Wirelessly enabled IV pumps are currently an important and growing trend since the AMA estimates 56% of ADEs involve an IV pump. The vital signs monitor can periodically or upon request electronically deliver patient vital signs into the appropriate electronic medical record. Not only are the patient and drug verified, but the IV pump settings can also be verified to be consistent with the doctor’s order.

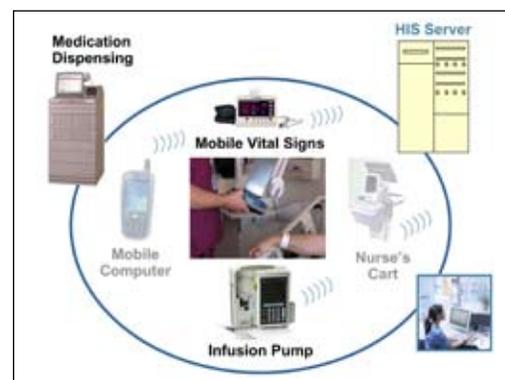


Figure 3

## Tracking the Investment

Expected return on investment and duration to break even are difficult to generalize without being misleading. Each hospital's current IT status is different. Not all hospitals have the same urgency to implement cost reduction programs. However, there are typical direct cost drivers to capture when considering an IT upgrade in the hospital to improve patient safety and to drive down operating costs. They include:

- General state of IT infrastructure (capacity and health of wired networks, wireless networks, servers, etc)
- State of IT in the admissions department (i.e., printing bar coded wristbands)
- State of IT to support order entry system (i.e., electronic access to doctor's orders)
- State of IT in the pharmacy (i.e., ability to bar code repackaged or prepared medication)
- Current state of bar code scanners (i.e., ability to read modern bar codes)
- Current state of IT support staff (i.e., need to manage updates, upgrades, operating problems)
- Training of caregivers (i.e., training agenda to facilitate change)

With these investments, the degree of benefit will vary depending on each hospital's current state of safety and efficiency. Besides the safety and cost benefit of reducing preventable ADEs previously addressed, the following benefits should also be captured for a complete return on investment analysis:

- Reduced medication inventory due to better tracking
- More accurate charge capture and allocation
- The benefit of automated and structured documentation of drug administration and other patient care
- Automated collection of vital signs data
- Real-time access to patient records
- Extending medication safety IT tools to address a host of applications ranging from assuring the right patient receives the right medication to blood transfusion verification.
- Extending medication safety IT tools that correlate the patient and ordered medication to bedside specimen collection and tracking.

## Summary

While patient safety and reduced hospital operating costs stay firmly on the healthcare industry's improvement agenda, IT, in the form of HIS systems, bar coding systems, WLANs, and other tools, have emerged to deliver the tracking benefits critical to delivering the needed improvements. Both the impediments and opportunities toward adoption are significant, and tracking related IT tools cannot level or deliver all factors, however, they do provide the required foundation to enable the improvement agenda. The specific costs and benefits vary widely across hospitals, and accordingly hospitals sense varying degrees of urgency to update or upgrade their IT systems. So, while the technology, processes, financing and implementation can seem daunting, the road to improvement begins with addressing the first link in the system – accurate identification and tracking at the point of care - tracking patients, tracking medication, tracking data.

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