ZEBRA

Barcode Wristbands: Innovative Solutions for Positive Patient Identification

The consistent and accurate identification of patients has long presented a challenge for healthcare organizations across the globe. Why? Because the process of patient identification remains largely manual and persists across the entire patient journey. As such, it is highly prone to errors and can lead to serious patient harm. Automated patient identification systems are essential to correcting this long-standing problem and improving the health and well-being of patients as well as protecting the integrity of the healthcare system.

Highest priority in patient safety goals

Patient identification accuracy

Joint Commission for Accreditation of Hospital Organizations

In many areas of the world, particularly where resources are limited and adequate patient identification systems are not in place, healthcare organizations are susceptible to serious errors. In its patient identification recommendations, the World Health Organization (WHO) highlighted this issue, indicating that "the failure to correctly identify patients continues to result in medication errors, transfusion errors, testing errors, wrong person procedures, and the discharge of infants to the wrong families." The WHO recommended the implementation of automated systems for patient identification.

The WHO recommendations led the Joint Commission for Accreditation of Hospital Organizations (JCAHO) to name patient identification accuracy as its highest priority in its patient safety goals. Additionally, the JCAHO continues to include patient identification accuracy as one of the requirements for accreditation of hospitals in the United States.

Most patient identification errors are the result of accidental mistakes, often caused by oral identification of patients or errors in transcription. All too often, a single misidentification can lead to serious issues as that inaccurate patient information is used in decision making throughout the patient journey.

A PRESSING PROBLEM

In the U.S., patient identification errors are the precipitating factor for 13% of surgical mistakes and 67% of transfusion mix-ups, according to the JCAHO. The Health Information and Management Systems Society (HIMSS) reports that up to 14% of medical records have inaccurate, potentially dangerous patient data that can be traced to incorrect patient identification.*

In healthcare facilities across Europe, where 23% of citizens claim to have been directly affected by medical errors, incorrect or missing wristbands cause most of the incidents involving errors in medication administration.

* https://www.himss.org/news/himss-hhs-collaborate-patient-identification-and-data-matching

Manual Versus Automated Patient Identification

The challenge of positive patient identification starts at the point of admission and registration when manual systems are employed. At admission, when patients register by providing their personal data, physician name and other relevant clinical information, they are usually assigned an identification number that is handwritten or printed on a wristband or a label attached to a wristband.

Adding to the confusion is the practice of oral verification, versus digital, of patient identity at key points or transitions in the care process. In many locations, the method used to identify patients differs from one department to another.

Modern barcodes offer a simple, definitive means of ensuring that the right patient receives the right procedure or the right dosage at every step in the patient journey. In addition to providing greater accuracy and reliability in patient identification than typed or handwritten information, barcodes give caregivers additional data beyond the patient's name and identification number that can improve patient safety.

Once wristbands are barcoded to provide basic patient identification, other tracking and data applications can be added to leverage barcode data entry. When dispensing medication to a patient, for example, the caregiver scans the wristband to identify the patient which automatically calls up the patient's electronic health record. The caregiver can then verify the prescription and dosage against the record before administering it to the patient.

In addition to ensuring the accuracy of patient identification and medication information, barcodes also ensure that critical information is always with the patient as they move throughout the healthcare facility, thus saving considerable time and money for the healthcare organization.

Right patient

Right procedure

Right dosage

ROOM FOR ERROR

The patient experience offers a wide range of opportunities for misidentification and the potential for serious errors.

1. **Handwritten or typed patient identification labels** offer potential for serious errors. In addition to illegibility of handwriting, smudged or damaged labels can render them impossible to read.
2. **Mislabeling or shortcuts in labeling.** Often, healthcare staff skip the step in which patients actively confirm their identity or by prelabeling tubes from multiple patients.
3. **Oral confirmation of patient identification is often not reliable.** Stressed, anxious patients can confirm the wrong information and failure to check the patient's wristband— or to follow other important steps, such as checking patient charts – can result in costly mistakes to both patients and hospitals.

By standardizing procedures around a consistent patient identification process and implementing barcode-based, automated patient identification and specimen collection healthcare organizations can make significant progress toward eliminating labeling errors and improving patient safety.

Technology Review

The two-leading automated patient identification technologies are barcode labels and RFID (radio frequency identification) tags. Barcodes include a variety of symbologies with varying ranges in the quantity of data they can encode and the space required to display that data.

ONE-DIMENSIONAL BARCODES

A traditional one-dimensional (1D) linear barcode is the "picket fence" style barcode that is most familiar to consumers. Originally used for product identification in commercial environments, 1D barcodes are now used in healthcare settings for patient identification as well as for tracking the movement of assets or laboratory test samples.

The 1D barcode can include up to 25 characters. Some 1D barcodes can encode only numbers while others can encode any keyboard character. In each 1D barcode, the information in the code reads horizontally and is read by a barcode scanner. 1D barcodes provide fast data capture, relatively low printing costs and can be integrated into the healthcare organization's database. Yet, 1D barcodes can only be read horizontally and, because they are often printed on labels wrapped around a vial or a patient's wristband, the curvature of the container or wristband can make it difficult for a barcode scanner to read the code.

TWO-DIMENSIONAL BARCODES

Two-dimensional (2D) barcodes encode data both vertically and horizontally, which makes it possible for them to hold 100 times more data about patients in much less space than 1D codes. 2D barcodes use graphic patterns to represent alphanumeric characters and can include up to 2,000 characters.

The use of 2D barcodes for healthcare applications is growing, because they enable quick and effective verification of patient identity and efficient monitoring of the patient's location as they move through the healthcare facility. Because they can be read both horizontally and vertically, they are easier to scan and read. Since there is no need to twist the wristband for scanning, there is less disruption to the patient. 2D barcodes can also be read even when they are damaged, torn or poorly printed.

Quick Response (QR) codes are the newest of the 2D barcodes. QR codes can hold much more data than other 2D barcodes and include unique features that enable faster scanning with greater reliability.

Recent advances in technology have made the use of 2D QR codes much more accessible for end users. There are no special tags needed and they can be easily generated on paper or plastic labels. There is no need for specialized equipment; 2D barcodes can be read with any mobile device equipped with a camera function.

RFID

RFID has been used for many years by drug manufacturers for tracking products through the supply chain. While the cost of RFID tags has historically been prohibitive, some healthcare organizations are using the technology to replace manual inventory management for medication kits and other difficult to track products. As costs decline and capabilities increase, more hospitals are adopting RFID technologies to track all types of healthcare assets, improve inventory control and enhance the overall patient experience.

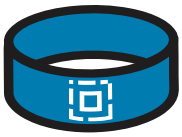
CHARACTERISTICS	1D/LINEAR BARCODES	GS1 DATA MATRIX 2D BARCODES	QR 2D BARCODES
Sample appearance			
How they work	Information is encoded by using varying widths and spacings of parallel lines	Information is stored in two dimensions using rectangles and other geometric patterns that contain many small, individual dots	Information is stored in two dimensions using rectangles and other geometric patterns that contain many small, individual dots
Storage capacity	20-25 characters	• 3116 digits • 2335 alphanumeric characters • 1556 bytes	• 7089 digits • 4296 alphanumeric characters • 2953 bytes
Common applications	UPC barcodes on packages (warehouse/retail applications)	Pharmaceutical and medical device identification	Product labeling, transport ticketing, commercial labeling
Advantages	• Can be read by traditional scanners and camera-based imaging scanners • Can connect to a dynamic database	• Higher data capacity than linear barcodes • Can be read horizontally and vertically, improving user experience • Increased scanning accuracy over linear barcodes • Can be read without data loss even when damaged or smudged • No special device needed to scan and read database	• Higher data capacity than other 2D barcodes • Can be printed in smaller areas or sizes • Can be read and tracked in any direction • Can tolerate bending distortion • Error correction ability to recover up to 30% of the "codeword" (1 codeword = 8 bits) • No special device needed to scan and read

CASE STUDY: A BARCODED MEDICATION ADMINISTRATION SYSTEM MAKES POSITIVE PATIENT ID EASIER FOR FRONTLINE NURSES AT A RURAL HOSPITAL

Southwestern Vermont Medical Center (SVMC), a community hospital serving residents in its rural community, instituted a barcoded medical administration (BCMA) system that includes scanning the medication as well as the patient wristband to decrease the potential for medication transcription and administration errors.

During the transition to the new system, the SVMC team found that standard linear 1D barcodes produced an unsatisfactory scanning experience for the nurse at the bedside when used with a patient wristband. As a result, the team decided to adopt a 2D data matrix barcode, because they store more data and are scannable from any angle. However, because SVMC, like many hospitals, uses legacy blood glucose scanning hardware that relies on 1D barcodes, the hospital needed to include both 1D and 2D barcodes on patient wristbands.

With the combination of the 1D/2D barcodes on patient wristbands and the BCMA system, the hospital reports patient wristband scanning rates in excess of 99% on inpatient units.



Positive Patient Identification Recommendations for Healthcare Environments

With it's large data storage capacity and high scanning accuracy, two-dimensional barcode technology is recommended for healthcare environments. Their technical simplicity and ability to be decoded by a growing number of free programs on mobile devices equipped with camera functions make it possible for a wide range of healthcare staff to scan and read them quickly and easily.

To learn more about moving from manual patient identification and/or handwritten patient wristbands to automatic patient identification using barcode wristbands, visit www.zebra.com/identity

NA and Corporate Headquarters
+1 800 423 0442
inquiry4@zebra.com

Asia-Pacific Headquarters
+65 6858 0722
contact.apac@zebra.com

EMEA Headquarters
zebra.com/locations
contact.emea@zebra.com

Latin America Headquarters
+1 847 955 2283
la.contactme@zebra.com