

Bar Coded Patient Identification White Paper

Wristbands & Labels

Help improve patient safety



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1. Introduction

In 1999, a landmark report was released by the Institute of Medicine spotlighting patient safety. The report brought to light the staggering number of medical mistakes; pointing out tens of thousands of preventable deaths from medical errors and thousands from medication errors. In response to that, healthcare organizations have rapidly implemented bar coded patient identification in wristbands and labels.

FDA bar code regulations went into effect, requiring manufacturers and labelers to place a drug product's National Drug Code (NDC) number in a linear bar code on the drug's lowest level of the container. Bar Code-enabled Medication Administration (BCMA) systems have been installed at a significant number of healthcare institutions.

The focus on medication administration became the first application for bar coding for many hospitals because errors were so prevalent in that area. The national attention focused on the "Five Rights of Medication Administration", which are:

1. Right Patient
2. Right Drug
3. Right Dose
4. Right Time
5. Right Route

However, it is my opinion that much work remains to improve patient safety through bar coded positive patient identification. Many organizations have a variety of issues that take away from the goals of bar coded wristbands and labels. The majority of these issues are related to not looking at all aspects of patient ID as a "system". Rather, each aspect is looked at as a purchase commodity that is often purchased solely on price. The various aspects of a "system" include wristband and label media, printers, scanners, hardware maintenance, data layout, training, and more.

2. Issues Faced

Even with all of the investment and effort at many healthcare institutions, patient identification in the form of bar coded wristbands and labels, is lacking. There are a variety of issues that compromise effective scanning. These are some of the prevalent issues I am seeing:

- Low scan rate - certain wristband products do not produce a good enough quality to achieve a high scan rate.
- Poor durability - wristbands can deteriorate over the length of a patient stay and cannot be scanned.
- A small scan zone makes it difficult for caregivers to get a scan. This can result in reverting to manual entry.
- Bar code that wraps around the wrist. This also creates difficulty getting a good scan and causes interruption of the patient.
- Printers don't produce high quality, print mis-aligned, are dirty, or need maintenance.
- No ability to remake wristband quickly if it is removed for a procedure or is worn. The American College of Pathologists study estimated that missing wristbands account for nearly ¾ of all medical errors.

3. Studies & Articles

There are many studies and articles that point to the need for continuing improvement in patient identification.

- a) A 2013 article in the Journal of Patient Safety estimates 400,000 premature deaths per year in the US resulting from preventable harm.
- b) According to the College of American Pathologies, approximately 169,000 adverse events occur in US hospitals annually due to simple identification errors, with 55% of all specimen ID errors stemming from a primary specimen labeling error.
- c) Misabeled specimens make ECRI Institute's Top 10 Patient Safety Concerns for Healthcare Organizations.
- d) Improving the accuracy of patient identification was made the number one patient safety goal by the Joint Commission in 2009.
- e) The Office of the National Coordinator for Health Information Technology released SAFER (Safety Assurance Factors for HER Resilience) Self-Assessment Guide for Patient Identification. It is available on-line at www.healthit.gov/SAFERGuide.

4. Bar Coded Patient Wristbands

Using bar coded wristbands and labels helps prevent human error to improve patient safety and enhance workflow. The bar coded patient wristband is the foundation for patient safety applications. It provides accurate patient information available at the point of care, and makes it easy for caregivers to confirm a correct patient match. The key "ble" items to consider in choosing a bar coded wristband are:

1. Durable. The wristband must be durable enough to hold up over the length of a patient stay.
2. Scannable. The band should achieve 99% or better successful scan rate.
3. Readable. Information printed on the band should be very sharp and easy to read. Considerations should be made for text font and size.
4. Comfortable. Whether adult, pediatric or infant bands, they should be comfortable and not abrasive to the skin. A variety of wristband sizes, materials and closures are available today.



5. Flexible. The band should be flexible enough to print a variety of data. The printers producing the bands should be flexible enough to change the layout design when needed.
6. Affordable. You need to choose the wristband that can fit into your budget.

5. Patient ID Trends



Healthcare institutions make changes as they find ways to improve. Some common trends that I see in healthcare to improve patient identification include:

- a) Use of 2D bar codes is growing. 2D bar codes are easier to scan and have built in ability to be read even if part of the bar code is damaged. They are ideal for printing into a small space. Multiple data fields can be included in a 2D bar code, which may be helpful if the clinical application requires entry of two or more fields of data. Common 2D bar codes used in hospitals are Aztec and Data Matrix. These bar codes can be automatically read by most scanners sold today.
- b) Printing of multiple 2D bar codes on wristbands. Multiple 2D barcodes printed on the length of the wristband allow for an easier method of scanning with limited interruption of the patient. The caregiver does not have to twist the wristband around to get a scan.
- c) Use of adhesive wristbands. Many hospitals find that adhesive bands are more durable and more difficult to remove than more traditional bands with a plastic snap.
- d) Movement to higher durability bands. Wristbands that fade or deteriorate during a patient stay are dangerous, time consuming to replace, and costly. Many institutions want wristbands that last up to 14 days.
- e) Standardization of patient condition colors/text. Most state hospital associations have recommended standardization of colors & text for patient condition bands. This is to help prevent mistakes that can be caused when a caregiver changes employers.
- f) Desire to limit involvement and time from IT department. Healthcare institutions need the flexibility to print the desired wristband and label layout that works best for them. This includes text font/size, fields of data, bar codes, and 2D barcodes. This layout may need to change from time to time. IT departments are very busy and do not have the time required to make these changes, or have to contract to the main HIS vendor at a high cost. Hospitals are moving toward printers with the built in intelligence that do not require IT involvement.
- g) Need for down-time method if IT system is down. Hospitals are recognizing that they must be able to print temporary bar coded wristbands and labels if the patient registration system is down. Patients must have a bar coded wristband when admitted.
- h) Converting from laser sheets of wristbands and labels to thermal printing. Many institutions find that thermal printing is a lot less expense and provides much better durability and scanning.

6. Security, Accuracy & Privacy

The security, accuracy and privacy of patient data is always a key consideration.

- If a full sheet of patient labels are produced and kept with the patient chart, this creates a concerns of waste (only a few are actually used), privacy (excess labels must be shredded), and accuracy (potential to use old/prior labels).
- Some feel there a benefit to printing the real date/time stamp on the labels when printed. This assures old labels are not being used.

- In the Implementation Guide to Bar Coding and Auto-ID in Healthcare book published by the Health Information Management Systems Society (HIMSS), it is recommended that what & where codes be added to the bar-code on patient labels and wristbands.
 - The A “Where” indicator verifies the scan was from a wristband.
 - The C “What” indicator verifies the data is patient information.
 - An example of the benefit of the indicator code is a caregiver attempting to short-cut the med admin system by scanning a patient label at the nursing unit, instead of the actual patient wristband.

7. Patient Labels

Sheets of laser labels are a big expense due to waste and the need for excess labels to be shredded. Thermal printed labels are less expensive and you can print them as needed. However, you need the ability to print them quickly, without a time consuming log-on to a workstation.

One option is an on-demand label process at nursing units and on carts. In this system, the caregiver scans the patient chart label that contains a 2D bar code with all the needed patient information. One or more labels is then automatically printed.

Patient labels printed with thermal printers generally are printed with a ribbon (thermal transfer) to prevent fading over time when the label is exposed to light.

8. Cost

The calculation of cost needs to include the media (wristbands and labels), number of labels per patient, waste, printer and printer supplies, time to use, and IT support. It is generally viewed that the cost to produce direct thermal wristbands and labels is less expensive than laser sheet wristbands and labels.

The Implementation Guide to Bar Coding and Auto-ID in Healthcare book states that laser toner costs are six times higher when printing bar codes instead of text. Other disadvantages of laser printing cited in this book are:

- Printing labels in sheets results in waste.
- Label and wristband adhesives can ooze from fuser, causing jamming.
- Bar codes require ink, driving up toner costs.
- Output print is susceptible to toner flaking and smudging.
- The media typically requires laminate overlay which can lead to bacteria buildup and smeared images if not properly placed.

9. Printing Technology Considerations

The primary two types of printing technology used today are thermal printing (using small, desktop thermal printers) and laser printers (where a separate tray is used containing the media). This does not include non-recommended, older methods such as imprinting of bands with plastic card, applying a label to a wristband, or handwriting of the wristband.



There are advantages to using laser printers for patient wristbands and labels, namely, no hardware purchase because printers are already deployed, and simplicity of having one sheet produced with a wristband and labels. However, I believe that thermal printing technology has the most advantages.

Ease of Use

Laser toner is not moisture resistant. It requires overlays or insertion into a pouch. Overlays can crease or wrinkle the media causing misreads when scanning. Thermal printers burn the image onto the wristband, requiring no overlays. Thermal printers require no toner or ink. Just load a roll of wristbands.

Lower total cost of ownership

Thermal printers are relatively inexpensive. The cost of direct thermal labels is about \$.004 each compared to almost \$.010 per laser label. Add in the cost of toner and the yearly cost of laser printing is substantially higher. The investment of thermal printer hardware is usually recouped very quickly.

Image durability and scan rate

Thermal printed bar code image durability is much greater than laser. Direct thermal and thermal transfer printing produces the best results for reliable scanning and is optimally suited for 2D and smaller bar codes.

10. Downtime Mode

Hospital IT systems go down from time to time. However, it is critical that patients still be admitted with bar coded wristbands and labels. You must be able to use the wristbands and labels in scanning applications.

Many recommend that a downtime system be in place. The SAFER Self-Assessment Guide recommends "the organization has a process to assign a temporary unique patient ID, which is later merged into a permanent ID in the event that either the patient registration system is unavailable or the patient is not able to provide the required information."

11. Bar Code Babies?

How to bar code babies is a source of much debate in Labor & Delivery and NICU departments. You need to be able to utilize bar code technology, but the size and sensitivity of newborns is a challenge. In addition, traditional pre-numbered mother/father/baby bands are still in use, and most hospitals want to continue using these.



A variety of baby bands or hang tags are now available that are soft and comfortable and hang in such a way to easily be able to scan easily. One option allows for printing on both sides of the tag. Many hospitals are simply attaching the bar coded tag to the traditional handwritten, pre-numbered band.

12. Scanning Applications

A wide range of applications benefit from scanning. This white paper will not review each, but they are extensively covered in the Implementation Guide to Bar Coding and Auto-ID in Healthcare book.

Applications that benefit from scanning include those below:

- Medicine Administration
- Mother – Infant Breast Milk Matching
- Respiratory Therapy
- Smart Fusion Pumps
- Specimen Collection
- Anesthesia

- Point-of-care testing (e.g. Glucometer) Positive ID
- Bedside Blood and Blood Products Transfusion Verification
- Food Ordering & Dietary Management

Scanners today can read a wide variety of bar code fonts. They can read both traditional 1D linear bar codes, as well as newer 2D bar codes. It is important to test your scanners on the various items you need to scan. Reading should be fast and easy. Also test the scanning in low-light conditions, like a patient room at night.

13. Employee ID Badges

One of the five patient rights is Right Route/Caregiver. To assure the right caregiver, a bar code on the employee ID badge should be scanned. It does not appear that many institutions are scanning the ID badge, which can result in problems. Institutions should strongly consider the scanning of the ID badge. The Implementation Guide to Bar Coding and Auto-ID in Healthcare states that scanning the ID badge provides positive identification and ensures secure access to systems based on user privileges. It discusses the need to print an easily scanned bar code on the ID badges.



Linking of the ID badge making system to a clinical IS system (Med Admin) would improve security. Valid caregiver ID numbers would be active in the clinical system, and de-activation would be possible if the employee leaves.

The more difficult it is for nurses to scan, the more likely it is that they will attempt to work around the process. Other printing and implementation tips include:

Selecting unique employee/caregiver identifier. One good idea is to use employee number + a lost card code. This allows use of the same number, but allows for lost/stolen cards to be turned off in physical security systems like door access control.

Placement and orientation of the bar code on the ID badge is an important ergonomic and usability issue. If possible, print the bar code vertically to make self-scanning easier. Print the bar code on the front of the ID badge.

Have badge replacement process and policies in place. Lost or stolen badges need to be replaced quickly, with old badge number turned off. A temporary badge system should be established to deal with the times a badge is left at home and does not need replacement.

14. Patient Safety Color Indicator Wristbands

The use of color coded patient safety indicator wristbands is highly recommended. Examples are Red/Allergy, Yellow/Fall and Purple/DNR. It is vital that the wristband contain both color and text. Most state hospital associations have published recommended standard colors and text.



There are two general choices to be made on what product to use. The most common is a separate, colored wristband. This provides a good visual indication, and it does not have to be replaced if the bar coded wristband is removed or replaced. The downside is that it is a second band on the patient. Another option is an item, like a plastic clasp or label, that is added to the bar coded wristband. This provides the advantage of having just one band. The disadvantages are that it is

less visible (wristband may have to be turned to see if there is an indicator), and if the bar coded wristband needs replacement, then so does the indicator.

15. Maintenance

One of the most important items, and one that is often overlooked, is proper maintenance of the system. Many articles and papers strongly recommend scheduled equipment maintenance. I believe the best approach is quarterly maintenance of all printers that includes cleaning, testing and print head or feed roller replacement if needed. Test media should be printed and scanned.

Part of the quarterly maintenance is to ask the available staff if they have seen any printing or scanning issues, or have had to replace wristbands frequently. A report should be created that lists what was done, and what things need to be done for improvement. For example, one nursing unit may complain about a low scan rate, and it could reveal they have a batch of defective, old or incorrect wristbands. With regular maintenance, you should be able to effectively run the equipment with minimal concerns.

16. Identification Systems Group

A good source for your system is a local dealer that is part of the Identification Systems Group (ISG). The ISG includes 32 Dealers that cover the U.S. and Canada. They are your local experts for patient identification technology. Strong local sales and technical support is provided by all Dealers, and they share common products, knowledge and practices.

ISG Dealers offer the ability to have a single source that provides thermal printers, wristbands and labels. In addition, the ISG Dealers provides training and ongoing maintenance. They even can inventory wristbands and labels for fast delivery. This ability to provide ongoing maintenance is a key to maintaining a good and working system.

ISG Dealers are very unique in the industry. They provide local support, vast expertise and cost effective solutions. Your local ISG Dealer can assist you in determining the best and most cost effective solutions to meet your needs. They are available for on-site presentations and consultation.

To find your local ISG Dealer, go to www.IdentificationSystemsGroup.com and enter your zip code in the Dealer Locator.

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