

# Patient ID barcoding - aspects to consider when implementing barcoding

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Identification of products by barcode has been utilized by industry and business for over 30 years. The use of barcodes in the hospital setting is also well established, but in the patient environment, hospitals are still behind industry. For Point-of-Care Testing (POCT), barcodes are highly desirable. Deanna Bogner, POC Coordinator, gives a basic introduction to barcodes and what they offer POCT together with a list of which aspects to consider when implementing barcoded patient identification based on the needs of POCT and other hospital users.

"Ah!" thinks the POCT coordinator momentarily relaxing in the office. "No messages to return or fires to put out. Maybe I will have a cup of coffee." The phone rings. A nurse asks if she can scan the barcodes on the patient ID bands using a POCT device.

"Barcodes on the patient armband?" the coordinator stutters, "when did this happen? Let me find out and I will call you back."

A barcode system has been instituted in the hospital

without the pathology laboratory's knowledge or input.

The technology of barcodes being read by a computer is ubiquitous and widely accepted. Think of a trip to the grocery store; pick up a bag of rice and there is an identifying barcode. Send a parcel by any courier or postal service and a barcode may also be attached.

The barcode is the "key" to identifying the information "attached" to the item; for example, the price and supplier of the rice, and the destination and desired speed of delivery for the parcel.

The information "attached" to a barcode is held in a computer and only accessed when needed. The barcode is small and compact - a "key" to this information. The computer system may have multiple points of access.

In our example, this is the parcel-tracking number provided to the parcel sender. The same information contained within the barcode is often written underneath it in alphanumeric form. The sender can

use this code to check on the Internet to follow the sent parcel.

### “Speedy accuracy”

Barcodes are widely used in business for the same reasons that hospitals would like to use them. The most common reason is “speedy accuracy”. Barcodes greatly aid in error reduction because of the lack of human intervention in the data entry process [1, 2, 3].

Barcodes can be read in a fraction of a second, using simple and inexpensive readers. Barcodes can also be customized appropriate to the data to be processed. If required, an entire symbology can be developed specifically for the user [4].

A symbology is the way the bars and spaces are established and read. Think of a symbology as an alphabet in a written language. Most languages are capable of writing “dog”, but the written form may look quite different.

Some Internet sites allow samples of each barcode symbology to be printed from the Internet [5, 6]. This article will concentrate on a few symbologies, Code 128, Code 39 (sometimes called “3 of 9”), and Interleaved 2 of 5 (sometimes called “2 of 5”).

An explanation of how barcodes work is unnecessary for the purposes of this article; however some terms will be explained as needed.

### Why barcodes - and why now?

The Health Insurance Portability and Accountability Act (HIPAA) of 1996 is a recent reason why hospitals are now scrambling to institute barcode systems. One purpose of the Act was to lessen healthcare fraud and abuse.

One of the ways to reduce abuse is to track information carefully and completely. The easiest way to accomplish tracking is to start at the beginning. In a hospital, this “beginning” is in the patient admission process.

Other reasons for the hospitals’ rush to barcode are money and error reduction. Shortages of labor in all hospital areas are more pronounced daily. Labor costs are the highest dollar cost item in a hospital budget.

Barcodes boost productivity by saving time and labor.

The Food and Drug Administration (FDA) has recently proposed rules to require barcodes on all prescription and over-the counter drugs as well as vaccines [7]. The system that the FDA visualizes will also require patients to be barcoded.

Hospital department regulators are also interested in any system that can reduce medical errors. The Joint Commission on the Accreditation of Hospitals Organization (JCAHO) has released new patient safety improvement goals for 2003 [8].

The goal directly applicable to barcoding of patients is the requirement that patients be identified by two numbers. These goals may not be directly applicable to the clinical laboratories as they concern JCAHO-surveyed organizations, but the laboratory should be directly involved.

Patient safety is a goal for all departments in the hospital.

Pharmaceutical manufacturers have not settled on a symbology standard as of yet. When they do, it will be this symbology used by the drug manufacturers that will likely become the standard for hospital use.

The rationale for barcodes is now clear. However, in order to implement a barcode system for patient armbands, what are some of the questions to be answered when deciding how to proceed?

### Aspects to consider when implementing barcoding

The goals when designing a barcoding system for use within your hospital should be to create a system which has flexibility, a robust nature, allows for easy change of information, and provides ease of scanning.

To achieve these goals, a number of aspects need consideration.

#### Key aspects to consider

- The barcode symbology chosen should be able to be scanned by barcode readers in all hospital departments, preferably by all devices that use a barcode scanner as a data input device.
- The barcode symbology chosen needs to support the necessary information (e.g. numeric and alphabet characters) for patient identification as required by the hospital.
- The barcode symbology chosen should preferably be compact in size when printed.
- Layout of information on patient ID wristbands should be designed so that barcodes are easy to scan.
- The number of barcodes on a patient wristband should be kept to one if possible. If more than one barcode is necessary, the barcodes should be able to be distinguished from one another quickly and clearly.
- Legibility of barcodes includes consideration of the type of printer to be used to produce them, the direction of printing, and cleaning/maintenance of the printer.
- Involve all hospital departments that expect to use the patient ID barcode in any discussions of barcode symbology choice/use.

#### Which barcode-creation software?

Although third-party barcode-creation software is available, most HIS or LIS programs already include the capability of producing barcodes. Check the capabilities of your hospital's HIS/LIS.

Unless the barcode type is incompatible or does not meet other key criteria (see following) then it is recommended that the existing barcoding capabilities of the HIS/LIS be used.

#### Who will use barcoding?

Seldom is POCT the only department interested in using a barcoding system. Other departments that may use or benefit from the use of barcodes are blood bank, pathology, pharmacy, and medical records.

In some hospitals, POCT may dictate the parameters of the system since other departments may not have systems mature enough to utilize barcodes. In other hospitals, Information Services (IS) may dictate to the end users depending on the computer technologies available (such as the HIS or LIS used).

#### What information is included?

Assuming that numerous departments, especially main laboratory and pharmacy, will utilize the prospective system, we can ask, "What information needs to be in the barcode?" Does the institution use a financial number or a Medical Records number to identify the patient visit?

Further, blood bank is responsible for keeping records indefinitely. In the United States, blood bank reagent manufacturers are in the process of standardizing to Code 128 [9].

Can the same number be used by POCT, other laboratory sections such as automated instrumentation, and pharmacy?

Or, will two numbers be necessary?

Lastly, will the laboratory be able to read the barcode type with the main laboratory analyzers? Is the scanner built into the instrumentation of a universal type? Or will the scanner recognize only a certain symbology and require reprogramming?

## Numeric or alphanumeric?

Does the actual identifier consist of numbers only or are alpha-characters included? Where is the information obtained before it travels to the printer that produces the armband? Identifiers of numbers only that are obtained out of the HIS/LIS might use Interleaved 2 of 5.

Most information systems will print Interleaved 2 of 5 and Code 39. However, Interleaved 2 of 5 is not capable of handling letters.

## Type of barcode dictates size

Hospitals do not currently have a standard symbology. The most common symbology currently in use is Code 39. This is a universally available symbology, easily read by most scanners and capable of accommodating both numbers and letters. It does have drawbacks, however.

Some of the drawbacks of Code 39 are obvious when a sample is viewed. It is a very large and bulky symbology. The resulting armband may be difficult to scan due to the barcode length. To eliminate the problems caused by a long barcode and the curvature of the wrist, a "two-fingered V" approach may be needed for Code 39 wristbands.

This requires the operator to place two fingers under the armband and then to form them into a "V" so that the barcode is stretched out, allowing the reader to scan.

When the armband is placed on the patient, will it be necessary to train the staff not to cover up portions of the armband, or is the wristband layout foolproof in that respect? Will it be necessary to train/retrain staff on how to scan the barcodes?

If barcode scanning is routinely performed, training may not be necessary.

A barcode of any type requires "quiet space." This is ideally a white area about ¼" (5 mm) on either side of the barcode. Think of this as grammar in a language. The first white space tells the barcode reader to start,

like a capital letter indicates the start of a sentence.

The white space at the end of the barcode acts as a period, ending the sentence. The size of the Code 39 barcode may disallow other desired information on the ID band due to lack of room. Interleaved 2 of 5 and Code 128 are more compact.

## Barcode production = generation + printing

How and where are the armbands to be generated? Will they be produced by printers in each unit or only in the Admissions department? Will there be labels printed with each armband so that tubes and forms may be labeled?

Whose responsibility is it to ensure that duplicate armbands are produced and in what timeframe? A duplicate might be necessary in the case of an IV placement that necessitates the removal of the armband.

If two numbers are needed on the armband, how will they be differentiated? Can one be printed vertically and the other horizontally? Can color be used? If the system selected is to be printed in each department via laser printer, will another drawer need to be added to hold that paper stock?

The printed barcode is only as good as the printer that prints it. A clean printer will print a sharp and clear barcode with out any stray marks or lines. What extra maintenance will the printer and/or scanner require? Who will be responsible for these tasks?

Jim Riley, the developer of one barcode system, LaserBand®, has some thoughts on the implementation process. "The preferred symbology for LaserBand is either Code 128 or Interleaved 2 of 5. In our research with numerous customers, these symbologies have shown to be the most trouble-free."

Printing any barcode vertically to differentiate one from the other is definitely not recommended. "In printing a barcode vertically, the quiet zone area may be compromised." He suggests other ways to differentiate

two barcodes, such as colored dots being used on the armband before the protective covering is applied or highlighting one barcode with a color laser printer.

Jim also recommends regular laser printer maintenance, especially of the printer's path. Other recommendations for designing a barcode system are the subject of a booklet authored by LaserBand in collaboration with other vendors of barcodes and point-of-care testing [10].

## Planning

The POC coordinator leans back in her chair with a big sigh. It looks like she may be able to make this barcode solution work for POCT also.

"I wonder why no one asked me what would be helpful or useful?" the coordinator muses. "Aren't all departments important in the implementation of a project, especially on a project that will affect the system as much as patient barcodes?"

The answer to the question the coordinator poses is obviously "Yes". In the process of barcoding patients in a hospital, all parties matter. The planning should be to attain the most flexible system possible with the technology available - involving all hospital departments.

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