



IntelliFill® i.v.
IV Automation and Bar Code
Medication Administration Systems



INTRODUCTION

Medication administration errors represent a large component of the overall medication error spectrum, and perhaps the one that is most easily addressed. Bar Code Medication Administration (BCMA) systems intend to prevent these kinds of errors by enforcing the “five rights” of medication administration:

- Right Patient
- Right Drug
- Right Dose
- Right Route
- Right Time

Patient identification via bar code is routine and many hospitals issue patient wristbands that contain a bar code that positively identifies the patient.

Barcode identification of the drug, dose and route requires that the dose itself be encoded in a way that permits identification of these three features. This provides challenges in that a dose is not always provided by a single medication entity. For example, a 500 mg oral dose of ampicillin may be administered as two 250 mg capsules, one 500 mg capsule or 10 mL suspension at 250 mg/5 mL. Ideally, a BCMA would accept any of these in fulfilling the order. Given the volatility in the availability of drug products, a pharmacy may be required to send different products at different times to fulfill a given medication order because that is all they can purchase at the time.

BARCODE STANDARDS

In an effort to facilitate this checking, the FDA mandated the inclusion of the National Drug Code (NDC) in an industry-standard bar code.¹ The NDC is a 10-digit number that identifies a medication product as a particular manufacturer’s instance of a specific amount of drug in a specific form in a specific package size. It is intended that such a code would permit a BCMA system to identify a dose provided in its original manufacturer’s container as a fulfillment of a medication order. The BCMA system compares the scanned NDC to the list of approved NDCs for medication order(s) being administered and accepts the code if it matches one of the orders.

There are limits to the usability of this implementation in that many doses require over labeling, obscuring the manufacturer’s labeling and, especially in pediatrics and geriatrics, the dose may need to be a mixture of commercially available products or a portion of a commercially available product. For example, the NDC for a 4-oz bottle of phenobarbital elixir could tell you that you had the right drug intended for the right route of administration, but could not verify that you were administering the right dose.

As a result, some BCMA systems place a drug identifier and dose (e.g., L6207 1 gm) in the bar code to represent a drug/dosage form and dose that can be verified against an order.

More commonly, however, the pharmacy system assigns a unique number to each order for a patient, or to each dispensing of each order. For example, MEDITECH pharmacy assigns a unique prescription number to each medication order for a given patient. Similarly, Cerner applies a dispensing identifier that is unique to each issue of each order for each patient. That is, a dispensing ID number represents a dose (or doses) dispensed at a particular date and time for a particular order for a particular patient. Use of this type of system creates difficulties for pharmacies that wish to provide manufacturer's ready-to-administer doses dispensed from unit-based cabinets since such doses cannot be labeled with these patient-specific prescription or dispensing IDs.

IV admixtures represent similar cases. Traditionally, IV admixtures have been manually compounded doses (as opposed to doses manufactured in ready-to-administer form). However, recent pushes by The Joint Commission to eliminate preparation of compounded sterile preparations in patient care areas has increased the use of commercially prepared ready-to-use IV doses. A recent survey of practice by the American Society of Health System Pharmacists indicated that 98% of hospitals purchase and use some form of commercial ready-to-use intravenous medication doses,² even though those doses create considerable additional expense and have known rates of clinical misuse. The result is that BCMA systems that require a patient-specific order or dispensing ID within their bar code still cannot support the use of these commercial products at the bedside without requiring a provider to affix a patient-specific label.

IV AUTOMATION

IV automation, such as the IntelliFill i.v. automated syringe-filling device, offers alternatives that make these BCMA systems more functional. Because they can produce patient-specific IV doses in properly labeled containers at a fraction of the cost of commercial ready-to-use doses, they maximize the safety benefit of BCMA systems that require patient-specific identifiers, while saving cost. At the same time, by providing doses in ready-to-administer format, they relieve nurses of dose preparation activity while helping the hospital meet Joint Commission requirements.

Since there are no standards for the contents of bar codes used by BCMA systems, IntelliFill i.v. has been designed to generate bar codes containing whatever indicators are required by the BCMA system, as long as those identifiers are passed to IntelliFill i.v. in the interface transaction or can be looked up by its software. The bar code can contain an NDC (if appropriate), an order or dispensing ID or any other construct that is desired by the BCMA system and fits on the IntelliFill i.v. label.

BCMA EXPERIENCE

IntelliFill i.v. was installed at the Children's Medical Center of Dallas, to work with a McKesson Admin Rx System, and later converted to support a Cerner BCMA system. No changes in

software were required and minimal configuration changes were built, installed, tested and deployed in less than four hours.

BCMA systems will continue to mature and it is anticipated that the contents of the bar codes, along with the reaction of the BCMA systems to those contents, will eventually become standardized. Until that time IV automation, such as the IntelliFill i.v., must continue to be flexible enough to support a variety of BCMA systems and barcode formats.

IntelliFill i.v. is manufactured for Baxa Corporation by FHT, Inc.

1. Guidance for Industry Bar Code Label Requirements. US FDA. October 2006.
2. Pederson, Craig A et al, ASHP national survey of pharmacy practice in hospital settings: Dispensing and administration – 2005, Amer J Health-Sys Pharm 63 pp327-345 (Feb 2006)