AS HOSPITALS STRIVE TO MAKE PATIENT safety improvements by implementing system solutions, bar code medication verification is often at the top of their lists. For pharmacy, implementing bar code medication verification presents a tough challenge, due to the extensive amount of labor involved in accurately and effectively preparing to meet the demands associated with bar coding all medications. However, by developing an upfront, detailed strategic plan — such as the one used by Methodist Health System in Dallas — for the transition to bar coded medication verification, your pharmacy can avoid time-consuming and costly roadblocks to success.

Getting Started
The first step toward pharmacy preparation is a comprehensive formulary analysis. Our formulary consisted of approximately 3,000 items. Of these, 57% arrived from the manufacturer with a bar code, leaving 43% to be bar coded by pharmacy.

The preliminary decision was made to purchase automated repackaging equipment. However, there was an interim period between pharmacy preparation and the actual implementation of such equipment, thus creating the need for a temporary solution. Our pharmacy information system, Meditech Client Server, has the ability to support user-defined queries within the drug dictionary. We utilized this functionality to separate the 43% of the formulary into two categories: “needs custom bar code label” and “no bar code needed.” The pharmacy information system was again used to express the NDC entry within the drug dictionary as a bar code. This bar code was then transferred to a 1 by 0.25-inch custom bar code label. The drug dictionary was downloaded from the criteria specified in the user-defined queries. The result was a list of all drugs within the formulary that needed a custom bar code label.

To complete the labeling process, labels were applied to non-bar coded, unit dose medications and bulk items, such as creams, ointments, and tubes, already in our inventory. Each relabeled medication was double-checked and verified by a pharmacist. This double check served as an additional safeguard for pharmacy bar code integrity.

Like many facilities, Methodist Health System utilizes automated dispensing...
ing machines for nursing use, each of which subscribes to particular medications. In preparing for bar code medication verification, we compared the drug dictionary download of medications that needed a custom label against each dispensing machine’s database. The end result was a list of items to remove from each dispensing machine for re-labeling. This ensured that no medication remained in an end-user area without a bar code.

Repackaging Equipment and Services

In preparing for bar code medication verification, outsourcing can also be an efficient way to minimize the impact of pharmacy’s repackaging responsibility. A drug dictionary download was sent to Methodist’s repackaging company as a template. Supplying this information directly from our pharmacy information system ensured bar code compatibility. Many repackaging companies allow the end user to provide bar code expressions, as well as specifications for desired packaging materials. Generally, a drug wholesaler will have the ability to ship drug orders directly to the repackaging company, bypassing the need for additional shipping. Our drug purchaser set up an account number with our drug wholesaler for the separation of drugs that required repackaging. Orders in this account shipped directly from the wholesaler to the repackaging company. Our repackaged drug orders had a two-day turnaround, so usage forecasting above and beyond normal levels was necessary. Direct billing from the drug wholesaler has helped us keep all repackaged drug purchase orders organized. Methodist used Unit Dose Solutions (UDS) for our outsourced repackaging needs. UDS was able to meet all of our bar code specifications and repackaging requirements. All requested data was transferred via spreadsheet for seamless integration into their repackaging operations. Methodist continued to outsource repackaging until all of our automated repackaging equipment was fully implemented. Once we reached a level of efficiency and satisfactory auto-
mated performance in-house, we no longer exercised our option to outsource repackaging. Whether a temporary solution or an integrated part of pharmacy purchasing and operations, outsourced repackaging can be of definite benefit to any pharmacy.

To prepare the pharmacy for in-house packaging, three types of automated repackaging equipment were purchased to accommodate the task of bar coding all medications: an oral solid medication packager, an over-wrap bagger for unusually sized items, and a liquid packager. Nicknamed “Samson,” our Omnicell SafetyPak 500 oral medication packager contains 500 canisters, each of these has a bar code label relative to a drug’s NDC number to ensure the right drug will be placed into the correct canister. Our over-wrap bagger and liquid packager, Medical Packaging Inc.’s Auto-Print Bagging System and Fluidose Unit Dose Packaging System, respectively, operate in a similar fashion. Each medication for repackaging is built into the systems database, and the pharmacy user selects the item for repackaging. Because each item’s bar code is pre-built from the pharmacy information system, this eliminates the possibility of having an unrecognized bar code. Once items are repackaged, they are given to a pharmacist for verification of the package and the bar code.

Repackaging automation equipment greatly increases workflow efficiency. Specifically, the oral solid medication packager is configured to automate the dispensing machine cart-fill. For the majority of our oral medications, there is no longer a need for a manual pick. The amount of time saved, along with workflow enhancements, has proven to be beneficial to administrative and employee buy-in for the purchase of such equipment. Automated repackaging equipment has also proven to be cost-effective, as it provides the ability to purchase many medications in bulk form, eliminating the generally higher cost of unit dose medications. The reduction in drug cost generates a positive impact for pharmacy.

Although the probability of a bar code being recognized is high, it is certainly not guaranteed. Therefore, each item must be verified within the system.
Ensuring Bar Code Integrity

After pharmacy has addressed all bar code repackaging issues, each medication bar code must be scanned into the pharmacy information system. With pharmacist oversight, an experienced technician with system familiarity manually scanned each item into our pharmacy information system.

Similar to most hospital information systems, Meditech has a live ring for operational use, and a test ring for building and experimental testing use. Each item was scanned into the live ring as well as the test ring, as the synchronization of both rings allowed us the ability to ensure bar code integrity. To further aid in verifying bar code integrity, a second scan of the entire formulary was done by a different technician. During the second scan, several items were found that had not been scanned in the first round. Had these items reached the floor, the end-user would have received an error during medication administration.

Whether a temporary solution or an integrated part of pharmacy purchasing and operations, outsourced repackaging can be of definite benefit to any pharmacy.

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Automated repackaging equipment has also proven to be **cost-effective**, as it provides the ability to purchase many medications in bulk form, eliminating the generally higher cost of unit dose medications.

The second scan is a simple method for the prevention of potential scanning errors. Although the intent of bar code medication verification is to ensure patient safety, the mechanics of human scanning must be addressed. When progressively scanning multiple medications, a user must be very careful to verify that the bar code in-hand is being associated with the correct drug dictionary entry. As we discovered, it can be very easy to accidentally populate a drug dictionary bar code from a drug located in a nearby bin. To avoid potential mishaps, each single medication was physically removed from a bin, compared with the drug dictionary entry, scanned for bar code association, and then returned to the shelf. Taking the time to visually check a medication helps decrease the possibility of selecting the wrong medication.

After scanning the complete formulary into the hospital information system, a simple database was created to aid us in ensuring bar code integrity. The complete drug dictionary from each ring was downloaded into an individual spreadsheet with the bar code identifiers expressed as numeric values. Each spreadsheet was inspected using specific Microsoft Access queries to evaluate each bar code identifier. Since it is possible for a drug to have multiple identifiers, additional queries were used to find the same bar code identifier associated with different drugs (duplicate matches) and also find medications that were not scanned. Database verification yielded an error prevention of 1.25%, which translates to approximately 375 items that had a bar code issue. A bar code issue is defined as an incorrect bar code association, a duplicate bar code, or an incomplete bar code identifier. Needless to say, a 1.25% error prevention rate has a significant impact on patient safety.

**The Impact on Workflow**

Although a bar code medication verification project initially affects pharmacy workflow, the post-implementation period of such a project ultimately modifies the end result of pharmacy operations. The implementation of a bar code project forces pharmacy to change the way drugs are received, stored, and dispensed.

A well-defined process for bar code verification within pharmacy lessens the possibility of a bar code not being recognized by the end-user. For a bar code verification project to have an optimal effect on patient safety, each drug order received from the wholesaler must be verified into the pharmacy information system to ensure the bar code is recognized, before drugs are put on the shelf or dispensed to the floor. Although the probability of a bar code being recognized is high, it is certainly not guaranteed. Therefore, each item must be verified within the system. Each manufacturer designates a specific bar code for each of their products, and should a manufacturer change a

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**OTHER SOURCES FOR BAR CODE PACKAGING EQUIPMENT AND SUPPLIES**

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bar code, a process must be in place to ensure the new bar code is recognized by the system. The same would be true in the event of product unavailability and/or ordering from a different manufacturer. In short, pharmacy must take steps to always ensure the integrity of the bar code.

For example, Methodist Health System pharmacies have designated “quarantined” areas for all drug order arrivals. Each medication is separated into a bar coded section and a non-bar coded section. All non-bar coded medications are immediately placed in the pharmacy’s repackaging area, a separate room housing all of our automated repackaging equipment and non-bar coded medications. The remaining “quarantined” bar coded medications are verified with the drug dictionary to ensure bar code compatibility. If a bar code association is not found for a medication, the technician will associate the bar code with the correct drug entry before placing it on the shelf.

Conclusion
Bar code medication verification is about patient safety. Given the busy nature of pharmacy workflow, this fact can easily be forgotten amid the day-to-day responsibilities associated with bar coding medications. In verifying bar code integrity, pharmacy plays an important role in ensuring patient safety and, therefore, must develop a process that ensures accurate bar code verification. The level of patient safety is directly proportional to the process by which pharmacy verifies not only each medication, but also each individual bar code. This process development will be a determining factor for how successful a bar code medication verification project is for any facility.

Samuel D. Holder serves as the senior analyst for pharmacy systems at Methodist Health System in Dallas, Texas. He received his BA from East Texas Baptist University in 2004, and has been in pharmacy practice for over five years. Holder was a pharmacy representative for the implementation of the bar code medication verification project and continues to support post-implementation issues. He can be reached at samuel-holder@mhd.com.