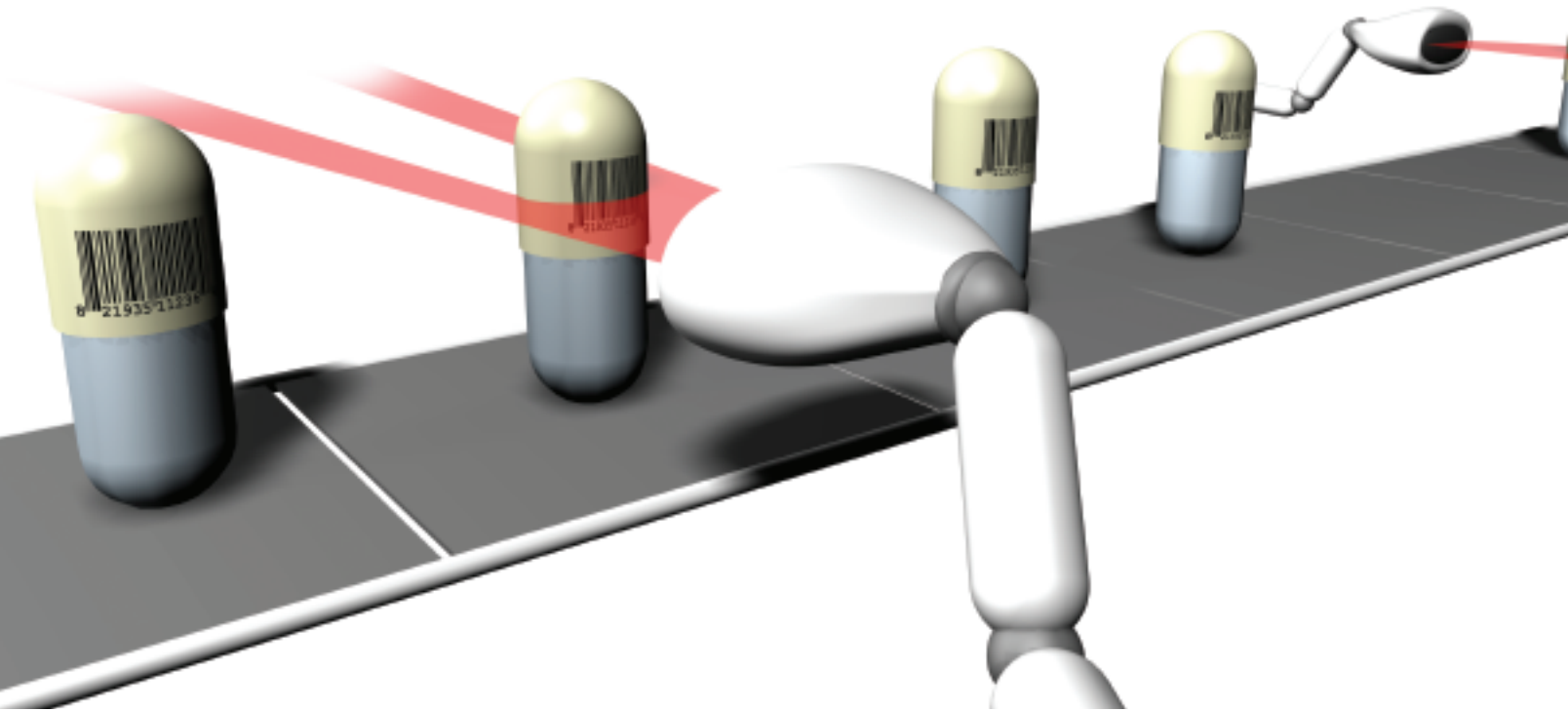


Pharmacy Automation



As the population of active and retired U.S. military personnel and their families continue to grow, the military health system has had to respond to correspondingly greater demands on its human and other resources. A focal point of this demand has been the military pharmacy system, which has responded with the rollout of state-of-the-art automation.

The program, now in various phases of deployment throughout U.S. Air Force bases domestic and abroad, involves the use of bar codes, automatic dispensers and robotic systems. The robotics are in the earliest phases of deployment, while the use of automatic dispensers and bar codes have already been put in place in virtually all Air Force facilities. All aspects of the program are slated for implementation by the end of 2004, according to Lieutenant Colonel Scott Sprenger, health benefits and policy analyst for the Office of the Air Force Surgeon General.

The actual date for total implementation is affected by many variables, observed Colonel Ardis Meier, pharmacy consultant to the Air Force Surgeon General and flight commander for Malcolm Grove

BAR CODE, ROBOTIC AND DISPENSER TECHNOLOGY IMPROVES PATIENT SAFETY AND DELIVERS FASTER SERVICE FOR THE AIR FORCE—AND SOON THE OTHER SERVICES MAY BENEFIT FROM THE TECHNOLOGY AS WELL.

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"Some of those [variables] we have no control over," Meier commented. Pharmacy renovations, post September 11 security concerns, and contractor objections to the bidding process have caused slight delays so far, she pointed out. Enhanced security procedures, in particular, have taken longer to put in place than anticipated.

According to Sprenger the process started out as a pharmacy optimization program and was funded because it offered an opportunity to improve care to beneficiaries while upgrading the margin of safety.

The military has increasingly been under pressure to optimize various aspects of operations, including those at military treatment facilities (MTF). The current program, titled "Enhancing Patient Safety in the Medication Dispensing Process,"

began implementation in spring 2002 and is slated for rollout over a three-year period. The Department of Defense has allocated \$25 million for the program, according to Meier.

There are five stated objectives for the program, with the emphasis on patient safety. The first objective, said Meier, is standardization of medication error reporting procedures. "Unless you have a standardized reporting system you can't identify areas in need of improvement," she commented. Standardization allows comparison of like-to-like data.

Anonymity is a key characteristic, "which avoids finger pointing," Meier said. If there is a major, life threatening medication error, the systems send out a medication alert. This provides facilities with the data needed to modify their procedures to avoid further potentially life threatening

medication errors, or to correct such errors if they have occurred.

In the past, said Meier, if there were several major errors they would be reported up the chain of command and a "notice to airmen" would be issued alerting pharmacies of the problem. Under the old system, however, an isolated error, even a serious one, might never have made it up the chain of command, she explained. The new system has greatly improved cross communication about errors.

The most frequent errors have included dispensing an incorrect dosage or incorrect medication, dispensing a medication to the wrong patient, or physician prescribing errors (e.g., failure to account for patient drug allergies or interactions). The enhanced database greatly minimizes the probability that such errors will occur. The system, for example, has a database capable of identifying common drug interactions, and provided the patient has provided accurate information on his or her drug allergies, it would alert the pharmacist if the patient were prescribed a drug to which he or she is allergic.

The second objective is to ensure that drug information sheets are dispensed with all new prescriptions from every MTF, Meier said. "In the past, we didn't have the equipment to do it" but the new program included purchase of laser printers which produce a standardized medication label for each new prescription at an MTF. This part of the system is virtually failsafe, since the top part of the printout contains the prescription label and the bottom the information sheet, "so that you can't fill a prescription without the patient getting adequate information." This aspect of the program has already been fully implemented throughout the Air Force, according to Meier.

The third objective is the installation of automatic dispensing and checking systems that provide medication identification and a picture of each drug and prescription on a computer screen. "If it is a hard copy prescription it is scanned in or if it is phoned in the pharmacy inputs the data," Meier said. "All of the automated dispensing units are controlled by the same checking and dispensing system. You can't retrieve a medication from the dispensing unit until you scan the bar code on the bottle and then it will open only the correct dispenser." The medication is then automatically counted out and dispensed.

The detailed provision of medication information has become "the standard of care in the pharmacy industry," observed Sprenger. Similarly, the use of bar codes is fast becoming standard procedure. In March, the Food and Drug Administration (FDA) announced that it would require bar codes on all medications in the hospital setting, so that health care workers could use scanners to make sure patients get the correct dose of the right drug. In a press release highlighting the announcement, Dr. Mark McClellan, FDA commissioner, said that the bar code requirement, introduced as a proposal expected to gain final adoption after a 90-day public comment period, would prevent an estimated 400,000 adverse drug events over the next 20 years with savings estimated at \$3.9 billion annually.

The Department of Veterans Affairs (VA) and some other facilities already employ bar code systems. Under these systems, physicians enter prescriptions for hospitalized patients into a computer, which instantly checks relevant variables including the patient's age, weight, diagnosis and other medications taken.

Within the military, the use of bar codes and automatic dispensing has resulted in a significant error reduction, according to Meier. When errors do occur, she said, they happen in one of three ways. One way is incorrect manual input, for example when a pharmacist misreads a physician's prescription or the physician prescribes a different drug from the one intended. The second source of errors is manual override, which now requires two people, either pharmacy technicians or pharmacists, to execute. Finally, it is still possible to give a medication to the wrong patient.

The system has been enthusiastically received throughout the Air Force and at those Army and Navy bases where it has been installed. As a result, said Sprenger, it now appears that the DoD will fund the program throughout the military.

Because the database extends throughout the military, it is now possible to send a medication error alert to virtually all DoD sites. This could prove particularly important in time of war, when notification of troops receiving medications, including vaccines, is crucial. Because the system is Web-based, medication alerts could quickly reach deployed troops provided that a field commander had access to the Web, Sprenger said.

In addition to enhancing patient safety, the new system provides an opportunity for significantly greater efficiency. There is considerable overlap between functions in the VA and active duty treatment facilities, which currently results in redundancy, Sprenger observed. For example, since both the VA and DoD have national mail order prescription programs, one option would be to have the VA consolidated mail order pharmacy (CMOP) fill prescriptions for military treatment facilities, said Sprenger.

If the workload of doing refills could be displaced from MTFs to the CMOP, skilled personnel would be free to handle new prescriptions. "In the event of a large deployment, where there are many active duty military deployed out of the military health system, there will be fewer people stateside to provide care." There is a clear need to eliminate redundancy and increase the efficient use of resources, Sprenger stressed.

"We are now fully engaged in implementing the automation across the Air Force pharmacy and we are just getting ready to implement the first phase of the robotics portion," said Sprenger. "There are a number of AF facilities that have a large workload, and the robotics can clearly benefit such facilities, particularly in the refill department."

One idea was that "perhaps we could create our own regionalized refill center," Sprenger explained. About 10 to 12 percent of patients choose a mail order option, which leaves about 90 percent who seek refills through onsite programs. If it were possible to consolidate prescription refills at one automated center, prescriptions could be filled at the central facility and couriered back to the MTF where the patient usually picks up his or her prescription. "Not only is there a potential benefit from better use of manpower, but it may also be possible to be use your prescription drug inventories more efficiently." The robotic system would allow for a smaller inventory at the local MTF with the larger inventory maintained at the central refill facility.

Sprenger estimates that by fiscal 2005 the \$25 million investment in the system overhaul should return savings of approximately \$54 million. The "driving force, however, is that this is a way to improve patient safety throughout the entire dispensing process," he emphasized.

"The first phase [standardized error reporting], is right on schedule" whereas

the automation and robotics program is about six months behind due to the increased security requirements in the post September 11 environment, Sprenger said. "But we are back on track and moving forward. By spring 2004, I expect the automation to be fully in place, including at all overseas bases." The robotics aspect, which is separate, depends on the outcome of the pilot program at the United States Air Force Academy in Colorado Springs, Sprenger added. "If that works well the robotics will be phased in by the end of 2004—that's our hope."

The fourth objective, according to Meier, is to implement the most cost-effective use of robotics in outpatient prescription processing, which represent 90 percent of Air Force prescriptions filled. As of March, this part of the program was still in its pilot phase, which has been dubbed the "Colorado Springs Refill" project. The facilities involved in the pilot phase, all in the Colorado Springs area, include the Air Force Academy, Peterson Field and Fort Carson.

"The refill equipment we're putting in integrates with the equipment we are installing for initial prescription dispensing," Meier said. The difference between the systems in the pilot program and the wider automated systems already installed is that the pilot includes a robotic arm and conveyer belt in addition to the equipment employed for automatic dispensing, label printing and bar code reading.

Although early results for the Colorado Springs project are promising, it is still considered a pilot "because we don't know how well it's going to work pulling resources from three different bases," Meier pointed out. "We aren't completely sure how it's going to be accepted by the pharmacy people at the different installations. It doesn't affect the customers because they never see it," Meier added. The customer picks up his or her prescription from a full service pharmacy. From the patient's perspective, the centralized processing facility is invisible.

The cost of the robotic equipment is included in the \$25 million appropriation. "With the \$25 million our projection is we will be able to do all the dispensing and checking systems in the Air Force pharmacies except where they have relatively new preexisting equipment," Meier said. Various pieces of equipment were field tested over the past two years before specific models were selected. "We tried to be extremely fair

and put practically every brand out there at different pharmacies in order to get the best system for the money."

The last objective is to put automation equipment into the pharmacy training centers where the military pharmacy technicians are trained prior to entering practice, Meier said. The original timeline anticipated complete installation by the summer of 2003 at Shepherd Air Force Base in Wichita Falls, TX, where all new Air Force pharmacy technicians are trained as part of the 882nd Training Squadron.

"By improving the efficiency and quality of the products we provide patients we are hoping that patients who live near our facilities will use them more because we are more cost effective for both patients and the government," Meier concluded.

While people like Meier and Sprenger are critical to the assessment and analysis of the new pharmacy system, it is people like Master Sergeant Lawrence Eischen, pharmacy technician, who deal with the consequences daily. Eischen based at Keesler Air Force Base in Biloxi, MS, he is the noncommissioned officer in charge of the base exchange pharmacy. The pharmacy handles all refills for both military and civilians entitled to use the facility.

Eischen has been a military pharmacy technician for 18 years, so he has had an opportunity to see dramatic changes in the way pharmacy functions are fulfilled. "In the last five years things have really changed a lot," Eischen said. "For the first 13 or 14 years [of my tenure] most of the technology was the same." Within the last five years, however, the technology has started to change significantly, he added.

In terms of daily operations, automation has made a big difference, Eischen said. In the past, most medications were dispensed in counting trays, which meant it wasn't very clean and there was a much greater possibility for cross contamination from residues in the counting tray Eischen noted.

Under the automated system, each pill has its own dispensing chute. "The good thing about the system we have now is that it identifies everything—ointments, cream, drops and pills. That is something we've never really had in a filling capacity before."

In the past, "the main errors resulted because it was a monotonous job," Eischen said. As busy as these pharmacies are—for example in this pharmacy alone we fill 1,900 to 2,200 per day with a staff of 10 to 15 people—it is difficult for pharmacy

employees to remain entirely vigilant Eischen said.

In the past it was possible to put any medication in the dispenser, since medications were manually transferred to a dispenser. This sometimes resulted in what Eischen characterized as "the most wrenching error," which was to have an entire dispenser filled wrong. When this happened, it became necessary to go back over hundreds of records stretching over several days and then contacting every affected individual, hopefully before anyone could take the medication, he recalled.

Among the most common errors that occurred prior to automation were the dispensing of look alike medications in lieu of the intended drugs, or dispensing the wrong dosage, he noted.

Now the wholesale medication bottles arrive bar coded and unless they arrive mislabeled it is very difficult for a dispensing error to occur. Now there are three people to look at a prescription, starting with a window technician who also inputs the prescription Eischen explained. The window technician talks to the patient, asks if the prescription is for that patient, whether or not the patient has taken it before and other relevant questions, said Eischen. There is an Air Force wide database, the Composite Health Care System (CHCS), that stores patient information for every prescription filled, including drug allergies, prior adverse reactions and potential drug interactions.

The system (absent the robotics) has been in place at most Air Force locations since January 2002, and Eischen said he knows of no system errors to date. "Basically, the only way you could make an error in the system is if you type it wrong at the beginning," Eischen added. An error might still occur if a pharmacy technician incorrectly deciphered illegible physician handwriting.

Because the system is more efficient, Eischen said it has been very well received by patients. "The patients just love it. Our average waiting time under the old system was 45 minutes and now it's down under 20 minutes." Although Eischen greatly appreciates the new system's efficiency, it would be worthwhile for "the safety alone," he added.

He is looking forward to further refinements, but appreciates the progress to date. "It is something we've needed for a long time," Eischen commented. "It's a tremendous improvement." ★