

Experience with a “tech-check-tech” program in an academic medical center

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Pharmacy technicians have served in the role of checking medication unit doses in a number of states throughout the United States for over a decade. This process (commonly referred to as “tech-check-tech” [TCT]) allows a trained pharmacy technician to verify the accuracy of unit dose medications filled by another technician. A growing number of states allow the use of TCT programs, either in their regulations governing the role of pharmacy technicians or through the granting of variance requests to state regulations. These programs have been studied thoroughly, and the literature has consistently demonstrated that pharmacy technicians are as accurate or more accurate than pharmacists when checking unit dose medications and that they are capable of maintaining a 99.8% accuracy rate.¹⁻⁹

This article describes the experience with and benefits of a TCT program that has been in place at an academic medical center since May 2004. The University of Wisconsin Hospital and Clinics (UWHC) is a licensed 493-bed facility that includes

Purpose. A “tech-check-tech” (TCT) program to support unit dose drug distribution at an academic medical center is described.

Summary. In April 2004, the University of Wisconsin Hospital and Clinics implemented a TCT program to provide validated pharmacy technicians with the opportunity to serve as the person checking unit dose medication cassettes that are filled during a 24-hour cart-fill process. This program required special authorization from the Wisconsin Pharmacy Examining Board and included detailed training and validation expectations of the pharmacy technicians, along with quality-assurance oversight by pharmacists who are completing a double check. For initial validation, the technician should attain a 99.8% accuracy rate for at least 2500 consecutive doses checked during at least five separate audits occurring over a minimum of five separate days. During the validation process, a pharmacist artificially introduces errors at

a minimum rate of 0.2% (5 of every 2500 doses). A staff pharmacist performs a final check of the medications before releasing them to the inpatient units. The overall time for pharmacists spent on checking medication doses for cart fill was reduced from an average of 6 hours and 5 minutes per day to 20 minutes per day.

Conclusion. Through the implementation of a TCT program at a university hospital, specially trained pharmacy technicians safely and efficiently checked unit dose medication carts filled by other technicians. The program reduced interruptions in the pharmacists’ daily workflow and allowed pharmacists to spend more time on patient care activities.

Index terms: Drug distribution systems; Education, pharmaceutical; Errors, medication; Personnel, pharmacy; Pharmacists, hospital; Pharmacy, institutional, hospital; Quality assurance

Am J Health-Syst Pharm. 2011; 68:1820-3

the American Family Children’s Hospital. UWHC utilizes an integrated suite of applications for computerized prescriber order entry, an electronic health record, and full bar-

code scanning technology throughout the medication-use process. In 2010, UWHC achieved HIMSS Stage 7 certification¹⁰ in recognition of the technology in place throughout the

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The authors have declared no potential conflicts of interest.

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organization. The pharmacy department maintains a 24-hour cart-fill and centralized distribution process, with 87% of unit dose medications filled using robotic automation and 13% filled manually using the TCT process. The medications that are filled manually (an average of 646 doses daily) require a double check before being delivered to the patient care units. These include medications dispensed from carousels and refrigerators and other medications not dispensed from the robot. Before the implementation of the TCT program, decentralized pharmacists were responsible for checking these medications, which required them to leave their patient care areas to go to the central pharmacy to check doses.

At UWHC, medication orders are entered electronically by providers using prebuilt order sets or individual orders. The orders are then verified by the pharmacist caring for those inpatients and automatically sent to the automated dispensing system via a two-way interface. Medications are automatically routed to the robot, carousels, or automated dispensing cabinets. Medications that have to be prepared or compounded have patient-specific labels. Bar codes are applied to all medications, and the nursing staff use hand-held scanners to scan the medication bar codes and the patient's bar-coded wristband before medication administration.

Program description

Regulations of Wisconsin's pharmacy examining board (PEB) do not specifically allow for the TCT process. A request for a TCT program was submitted in December 2003. The PEB granted preliminary approval in February 2004 and final approval in July 2004. Under Wisconsin regulations, pharmacists providing the final check are still ultimately responsible for the accuracy of the cart-fill medications.¹¹

Several aspects of the TCT program followed standards developed

and approved by the Minnesota State Board of Pharmacy and implemented in hospitals in Minnesota.³ The approved variance for UWHC allowed properly trained and validated pharmacy technicians to check unit dose medication cassette drawers on behalf of the pharmacists during the cart-fill process. A pharmacist must provide a final double check for at least 10% of doses and must review the patient profiles of all patients daily. In addition, another licensed health care professional (i.e., nurse or respiratory care therapist on the patient care unit) is required to check the medication before it is administered to a patient. At UWHC, the medication administration process incorporates point-of-care bar-code-assisted medication administration (BCMA) technology to serve as an additional check in the process. As part of the variance agreement, the pharmacy department is also required to maintain a quality-assurance program with strict expectations for the validation of technician accuracy and provision of annual data on the results of this system to the PEB.

Training. To be eligible to participate in the TCT program, a technician must be a full-time (minimum 0.8 full-time equivalent) pharmacist assistant (internal description for an advanced pharmacy technician) with at least six months of experience working at UWHC or have passed the Pharmacy Technician Certification Board examination and be a certified pharmacy technician. The first part of the training consists of readings and successful completion of the self-assessment questions in an inhouse TCT self-learning packet. Training topics include a review of the medication-use process; dosage-form recognition; a review of look-alike and sound-alike medications, as well as error-prone medications; proper labeling, packaging, and repackaging techniques; a review of medication safety; and basic pharmaceutical calculations. Technicians

are required to score greater than 90% on a written examination that covers the material in the packet.

After the initial training is complete, the technician undergoes practical training with a pharmacist's oversight. The practical training is based on a standardized teaching and training checklist, which reinforces the topics discussed in the self-learning packet. The pharmacist provides direct instruction, observation, and assessment of the technician. After observing and assessing the ability of the technician, the pharmacist provides the technician with daily written and oral feedback, noting additional areas of training needed. The technician is required to complete a minimum of 24 hours of practical training.

Validation process. For initial validation, the technician should attain a 99.8% accuracy rate for at least 2500 consecutive doses checked during at least five separate audits occurring over a minimum of five separate days. During the validation process, a pharmacist artificially introduces errors at a minimum rate of 0.2% (5 of every 2500 doses). The pharmacist coordinating the audit removes all artificially introduced errors before distribution of the medication carts. A pharmacist double-checks the contents of each unit dose medication cassette drawer after it is checked by the technician, and any errors determined to be due to improper checking by the technician are documented on an error log and discussed with the technician. On successful completion of the training program and validation process, the technicians receive an internal title of a validated pharmacist assistant (VPHA). The VPHAs are allowed to participate in the TCT program and receive additional compensation on their shifts when performing TCT responsibilities.

Accuracy rates. When an error is detected by a VPHA, the erroneous medication is removed, and the cor-

rect replacement is retrieved. VPHAs are required to maintain a checking accuracy rate of 99.8%. A staff pharmacist performs a final check of the medications before releasing them to the inpatient units. The final check consists of a computer-generated list containing at least 10% of all the manually filled doses for the total cart fill each day. The total number of doses checked and the number of errors are recorded on a daily cart-fill log. Errors may include missing doses or placing the wrong drug or dosage form, wrong quantity of doses, or expired medications in the cart. The information is entered into a database, used to ensure compliance with the accuracy standards, and reported to the PEB.

If the accuracy of the VPHA falls to less than 99.8% over the lesser of a six-month period or the first 2000 double-checked doses within a six-month period, the VPHA is required to be retrained and revalidated (2500 doses, 99.8% accuracy). If the accuracy of the VPHA is less than 99.8% in two consecutive six-month periods, the VPHA will be relieved from his or her VPHA checking status for a minimum of six months, after which the VPHA may be retrained and revalidated. If the revalidated VPHA has less than 99.8% accuracy for any month during the three months following his or her six-month leave, the technician will be permanently relieved of VPHA duties. Revalidation is also required for VPHAs if more than two months has elapsed since the last time they checked medication doses.

Experience with the program

Pharmacy technicians at UWHC began training for the TCT program in April 2004. Initially, 9 technicians completed the training program. Six technicians were successfully validated, 2 failed to complete the validation process, and 1 technician resigned her position before being validated. One technician was initially validated

and was later removed from the program due to low accuracy rates. In June 2006, a change was made to the pool of pharmacy technicians who would be responsible for checking carts to better accommodate technicians' workflow and schedules. At that time, a different group of 6 technicians successfully completed the program and became VPHAs. Since the program's inception, 16 technicians have participated in the program. Currently, 6 technicians actively participate in the program. From May 2004 to May 2009, the technicians checked medication carts with over 1 million doses. Over 180,000 doses were double-checked by a pharmacist, with 215 errors detected, for a cumulative accuracy rate of 99.88%. The technician's accuracy rates for that time period are displayed in Table 1.

In December 2004, pharmacists at UWHC were surveyed to determine their satisfaction with the TCT program. A total of 29 pharmacists completed a written questionnaire and rated their agreement with the statements on a 5-point Likert scale ranging from “strongly agree” to “strongly disagree.” The survey found that 95% of pharmacists agreed that the TCT program is at least as safe as the previous system of pharmacist checking of medication carts, while 46% agreed or strongly agreed that the system was “safer” than the previous system. In addition, 90% of pharmacists agreed that the TCT program provided them with additional time for patient care activities and reduced their drug distribution workload, 87% agreed or strongly agreed that the TCT program was more efficient than the previous system, and 82% agreed that the TCT program had improved their overall job satisfaction.

Most significantly, overall time for pharmacists spent on checking medication doses for cart fill was reduced from an average of 6 hours, 5 minutes per day to 20 minutes per

day—a 94.5% reduction in the time pharmacists spent checking medication carts. The time saved from checking carts is used by the pharmacists to provide additional clinical patient care and teaching activities.

Discussion

Pharmacy technicians enrolled in the TCT program do not assess the appropriateness of a medication for a patient. They also do not verify the preparation, packaging, or labeling accuracy of a medication. Because the TCT program is only in place for cart-fill medications, most initial doses of medications for a patient are checked by a pharmacist. Cart-fill medications are filled for a 24-hour period once daily, and this process occurs overnight. Cart checking by the technicians and pharmacists occurs in the morning. The initial doses of medications needed before cart fill are picked from the carousel by technicians and checked by a pharmacist before being sent to the inpatient units.

Multiple strategies are used at UWHC to mitigate the risk of an incorrect dose reaching the patient. Based on our internal data, even with all of the cart-fill checks in place, one error occurs each day as part of the cart-fill process. This is why other safety checks are necessary and the use of point-of-care BCMA technology for administering medications has been in place for over a decade on UWHC inpatient care units. UWHC is currently selecting its third generation of hand-held bar-code scanners. Additional changes and efforts have also been made to increase the number of medications that are filled using automation. This involves maximizing the utility of the robotic technology as well as the introduction of medication carousels.

Through the use of the robot, the numbers of doses that need to be checked has varied. As shown in Table 1, the number of doses checked by the VPHAs has changed over time, which

Table 1.
Accuracy of Validated Pharmacist Assistants (VPHAs)

Time Period	No. Doses Checked by VPHA	No. Doses Double-Checked by Pharmacist	No. Doses With Errors ^a	% Accuracy
May 2004–June 2005	200,476	28,654	41 ^b	99.74
July 2005–May 2006	130,061	23,349	29	99.88
June 2006–May 2007	162,752	29,486	14	99.95
June 2007–May 2008	284,516	47,895	48	99.90
June 2008–May 2009	267,712	52,838	83	99.84
Total	1,045,517	182,222	215	99.88

^aOne error may have been counted as multiple errors in these statistics. For example, if the order is for metoprolol tablets 50 mg twice daily but is filled with metoprolol extended-release tablets 50 mg for two doses and this filling error was not caught by the VPHA but caught by the double-checking pharmacist, two errors are counted because the error occurred on two separate doses. However, the checking error only occurred once.

^bThese data do not include validation or revalidation rates. However, they do include the errors made by a technician who was removed from the program.

is associated with improved robot-fill efficiency. In 2006, medication-dispensing carousels were also implemented. Through the optimization of the use of this technology, the filling errors by the VPHAs decreased from 0.65% in the second six months of 2007 to 0.4% in the second six months of 2009, resulting in fewer doses that are filled in error and that are then subsequently corrected by the VPHA.

UWHC has had a decentral-ized pharmacy model since the late 1960s. Pharmacists are an integral member of the patient care team and perform a large number of activities, including interviewing and discharge counseling for all patients admitted, medication reconciliation, patient education, rounding with the patient care team, drug monitoring and documentation in the patients' electronic medical records, and electronic processing of all patient medication orders. The TCT program has

allowed pharmacists to increase these activities and remain available to the patients and medical staff on the patient care units.

Conclusion

Through the implementation of a TCT program at a university hospital, specially trained pharmacy technicians safely and efficiently checked unit dose medication carts filled by other technicians. The program reduced interruptions in the pharmacists' daily workflow and allowed pharmacists to spend more time on patient care activities.

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