

PHARMACY PRACTICE



Pharmacy Technician Refill Checking: Safe and Practical

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INTRODUCTION

Pharmacists are taught throughout their training that they should be responsible for the final check of medications being dispensed for patient use. In certain situations this dogma may not be valid. Does holding a pharmacist licence or the education that a pharmacist receives make him/her more qualified to do a final check of repackaged medications than a well-trained pharmacy technician? Various trials and pilot projects have shown that pharmacy technicians have equal or better ability in checking the accuracy of unit dose cassettes compared to pharmacists.^{1,2,3}

If institutional pharmacy practitioners wish to implement pharmaceutical care in times of fiscal constraint, ways must be found to better utilize limited staff resources. One strategy to improve cost effectiveness is to rely more on pharmacy technicians to take on responsibilities that were previously the responsibility of a pharmacist. As long as the quality of service is the same and the safety of the patient is ensured, the category of personnel utilized should not be a factor. Nevertheless, many concerns arose among the staff of our department while discussing the idea of having

a pharmacy technician do the "final check".

To determine the current status of pharmacy technician checking of other technicians' dispensing, a preliminary survey was conducted of pharmacy departments in all hospitals with over 350 beds in Canada. The results of

this survey (Table I) showed that a number of hospitals have technicians performing checking functions. It appears that the extent of technician checking of products is inversely related to the perceived potential harm associated with an error. For example, approximately 22% of Canadian hospitals have

Table I: Results of a survey on functions checked by pharmacy technicians in Canadian hospitals with greater than 350 beds

Survey Response	Number of hospitals with pharmacy technician checking procedures
Number of hospitals surveyed	116
Number of hospitals that responded	86 (74%)
Non-Sterile Products:	
Unit dose packaging	
oral solids	16 (19%)
oral liquids	11(13%)
Refills	
traditional multi-day supply	10 (12%)
unit dose cart fill	16 (19%)
Bulk manufacturing	23 (27%)
Compounding	22 (26%)
Sterile Products:	
Batch preparations	
vial reconstitution	10 (12%)
minibag admixtures	8 (9%)
large volume admixtures	8 (9%)
syringe medications	3 (3%)
other sterile products	7 (8%)
Individual Products	
minibag admixtures	10 (12%)
large volume admixtures	7 (8%)
syringe medications	4 (5%)
other sterile products	7 (8%)
total parenteral nutrition	6 (7%)
chemotherapy	3 (3%)

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This project was completed as partial fulfilment of the requirements for a hospital pharmacy residency program by Gordon A. Klammer.

Acknowledgments: The authors gratefully acknowledge the assistance of Luisa Michael, Ian Quinn and the other pharmacy staff at St. Paul's Hospital in the completion of this work.

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some form of technician checking in the area of bulk manufacturing and compounding (which may be less critical to patient care if an error is made) while only 3% of Canadian hospitals have technicians checking other technicians' preparation of chemotherapy products (which may have a greater risk to the patient if an error is made). Reasons for technicians performing checking functions included a shortage of pharmacists, the need to better utilize the staff in the department because of limited funding, and increased opportunity for pharmacists to practise pharmaceutical care.

This study was conducted to determine if it is reasonable to have pharmacy technicians perform functions currently performed by a pharmacist. The functions evaluated were the checking of refills of unit dose packaged medications and IV admixture refills. Three hypotheses were evaluated: 1) Pharmacy technicians have equal or better ability to check refills as compared to pharmacists; 2) Pharmacy technician checking will decrease pharmacy costs; and 3) Pharmacy staff will be comfortable with the revised checking responsibilities of technicians.

METHODS

Facility

St. Paul's Hospital is a 591-bed teaching hospital located in Vancouver, B.C. The pharmacy department operates from four inpatient satellites that service thirty-three wards and one ambulatory satellite providing service to specific patient groups. The pharmacy department is open 24 hours a day, seven days a week and provides extensive clinical services, a traditional distribution service, an IV admixture service,

and is actively involved in undergraduate and Pharm. D. clinical training as well as having six hospital pharmacy residents. The pharmacy department is fully computerized using BDM pharmacy software (BDM Information Systems, Saskatoon).

Accuracy of Checking Refills

Two trials were conducted to compare the accuracy of pharmacy technicians with that of pharmacists, in the checking of unit dose medication refills and parenteral admixture refills. Each trial was composed of two phases. In the first phase, the refills were filled by a pharmacy technician with checking by a pharmacist. In the second phase, the refills were filled by a pharmacy technician with checking by a second pharmacy technician who was trained to check refills (a "qualified" pharmacy technician). Verifying the accuracy of the checking was conducted by the investigator in both phases, and by a pharmacist or a qualified pharmacy technician on a crossover basis. In each trial an error was defined as one occurrence (i.e., if six wrong tablets were found in a refill container, this was one occurrence). If two separate errors were found with the same refill (i.e., wrong drug and missing auxiliary label on a patient specific container), it was considered two occurrences.

Unit Dose Medication Trial

The pharmacy department dispenses a three-day supply of medication for all inpatients. The medications are dispensed in unit dose packages and are refilled every three days by using computer generated labels. Normally, a pharmacy technician prepares the refills and the

pharmacist checks them. The trial was conducted over a four-week period and involved two weeks of pharmacist and two weeks of technician checking. A number of pharmacists who regularly check refills and one qualified pharmacy technician were involved. Both the pharmacist and the pharmacy technician knew their checking was being assessed for accuracy. The responsibilities of the person checking were the same in the first and second phase. They checked for: drug name; drug form; dose of drug; expiry date; number of tablets/capsules/etc.; and auxiliary labels. The person checking then initialled the label to show that the refill had been checked. Assessment of the accuracy of the checking for the pharmacist and the pharmacy technician used the same criteria.

Parenteral Admixture Trial

All first and interim doses of new parenteral solution orders are prepared/labelled in the satellite pharmacies by a pharmacy technician and then checked by a pharmacist. All refills needed for the next 24 hours are prepared in the central IV room. Normally, a pharmacy technician prepares/labels the IV admixtures and a pharmacist checks them. The trial was conducted over a four-week period and involved two weeks of pharmacist checking and two weeks of pharmacy technician checking. Both knew their checking was being assessed for accuracy. The responsibilities of the person checking were the same in the first and second phase. In the case of reconstitution/manufacturing from a drug vial or ampoule, checks were made for: drug name; strength; expiry date; package size; part vial (i.e., label affixed with correct concentration and expiry date); volume contain-

ed in the syringe; type of needle used; the diluent solution name; volume; and expiry date. In the case of a recycled IV admixture, checks were made for: drug name; strength; name of diluent; volume of diluent; and expiry date. If an additional drug was added to a previously prepared IV admixture, the checking procedure for reconstituted/manufactured from a drug vial/ampoule was carried out. In the case of premixed/batched IV admixture, checks were made for: drug name; strength; name of diluent; and expiry date. The person checking then initialled the label to show that the refill had been checked. Assessment of the accuracy of the checking for both the pharmacists and the pharmacy technician used the same criteria.

Analysis

An analysis of the sample size required to identify a difference between 98% and 99% with power of 0.8 using a chi square test ($p < 0.05$) indicated a need for a sample of 2,500 in each phase of both trials.

Cost of Checking Refills

The cost for a pharmacist to check both unit dose medication and IV admixture refills, was based on an average pharmacist salary of \$25.69/hour (Grade I, Level 4 in the Health Sciences Association contract) plus 32% benefits and using an estimate of 3,468 hours per year required to check. The cost for a pharmacy technician to check both unit dose medication and IV admixture refills was based on the salary for a senior pharmacy technician of \$18.23/hour, (PC-19, Step-2 in Hospital Employees Union contract) plus 32% benefits and using the same estimate of 3,468 hours/year to check. In addition to pharmacy technician

salary costs, the cost of a Quality Assurance Program and implementation and maintenance of a technician refill checking procedure was calculated based on a three-day training session (with one pharmacist instructor for one technician) for three technicians annually (\$3,913 per year) plus one hour of pharmacist time per day based on a five-day work week (\$8,816 per year).

Pharmacy Staff Survey of Attitudes to Revised Checking Procedures

After the results of the two trials were tabulated, a poster was presented at a BC Branch CSHP event and then was placed in a visible area of the department. To determine pharmacy staff attitudes regarding pharmacy technicians performing the final check of refills, a survey of all pharmacists and technicians (including managers and supervisors) was conducted. The survey asked the question: "Would you feel

comfortable having a qualified pharmacy technician do the final check with regard to: 1) unit dose packaging; 2) oral medication refills; 3) bulk manufacturing/compounding; 4) sterile batch preparation; 5) IV refills; and 6) TPN/Chemotherapy refills?"

RESULTS

Accuracy of Checking Refills

During the unit dose refill trial, seven types of errors were identified (Table II). The total number of errors committed by pharmacists was significantly greater than that by technicians, (chi-square test, difference; $p = 0.002$). During the IV admixture trial, four types of errors were identified (Table III). There was no significant difference in the total number of errors committed by pharmacists or technicians in the case of IV admixtures.

Cost of Checking Refills

The cost for a pharmacist to check both unit dose medication and IV

Table II: Unit dose refill trial – Comparison of errors

Error Type	Number of Errors	
	Pharmacist	Technician
Incorrect drug	1	0
Incorrect strength	1	0
Expired drug	0	1
Not initialled	0	3
Missing auxiliary label	7	1
Wrong auxiliary label	4	1
Wrong number of doses	7	0
Total refills assessed	1960	2376
Total errors (percent)	20 (1.0%)	6 (0.3%)

Table III: Intravenous admixture refill trial – Comparison of errors

Error Type	Number of Errors	
	Pharmacist	Technician
Wrong diluent	0	1
Wrong expiry date	1	0
Not initialled	0	2
Different patient's medication grouped together*	1	0
Total doses assessed	2617	2560
Total errors (percent)	2 (0.1%)	3 (0.1%)

* an error found in the trial that was not anticipated

admixture refills was \$117,603 per year. The cost for a pharmacy technician to check both unit dose medication and IV admixture refills was \$83,453 per year. The additional cost of a quality assurance program (\$12,729 per year) resulted in a total cost of \$96,182 per year for a pharmacy technician checking system. The net savings to the pharmacy department from implementation of pharmacy technician checking system was therefore estimated at \$21,421 per year.

Survey of Pharmacy Staff Attitudes to Revised Checking Procedures

The results of a survey of pharmacy staff attitudes regarding final checking by a qualified pharmacy technician are summarized in Table IV. Concerns raised as a result of the survey and

possible ways of addressing those concerns are shown in Table V.

DISCUSSION

The results of this study demonstrate the ability of qualified pharmacy technicians to accurately perform the role of

checking unit dose and IV admixture refills. In fact, in the unit dose refill trial the pharmacy technicians made significantly less errors than the pharmacists. These results are similar to other published studies where the error rates by pharmacy technicians

Table IV: Pharmacy department survey regarding technician checking

Question asked: Would you feel comfortable having a qualified technician do the final check with regard to the following duties?

Staff surveyed:	Technicians		Pharmacists	
	Yes (%)	No (%)	Yes (%)	No (%)
Unit dose packaging	81	19	91	9
Oral medication refills	69	31	100	0
Bulk manufacturing/ Compounding	75	25	75	25
Sterile batch preparation	56	44	76	17
IV refills	62	38	82	13
TPN/Chemotherapy refills	31	56	43	48

* 65 surveys were distributed with 39 people responding

Table V: Concerns of pharmacy staff regarding final check by a pharmacy technician.

CONCERNS	ADDRESSING THE CONCERNS
Can pharmacy technicians assume checking responsibility without compromising patient care?	<ol style="list-style-type: none"> 1. Current trials demonstrated technicians have similar abilities compared to pharmacists in checking refills 2. Quality Assurance program – no quality assurance program at present but will incorporate if technician checking is implemented 3. Literature – Studies show that technicians have similar accuracy rates with respect to refills/cart fills^{1,2,3} 4. Nursing staff – opportunity to double check drugs being given to patients because oral solid medications are in unit dose packages
Who is liable for mistakes that might potentially happen?	<ol style="list-style-type: none"> 1. Pharmacy Director ultimately (managers will need to give appropriate feedback if system does not work efficiently) 2. System itself/Correction along the way 3. Quality Assurance Program
Is technician checking legal?	<ol style="list-style-type: none"> 1. No clear guidelines for hospital pharmacy 2. Licensing body – discussed with inspector and as long as there is adequate quality assurance they are not opposed
Will there be adequate monetary compensation for increased responsibility?	<ol style="list-style-type: none"> 1. Qualified checking technicians would be paid at a rate equal to that of instructor technicians
What if there is multiple variables/multiple steps in checking refills?	<ol style="list-style-type: none"> 1. Will have procedures in place to deal with multiple variables/steps
Pharmacist sometimes reviews the refills for appropriateness	<ol style="list-style-type: none"> 1. Patient profiles are reviewed daily by ward pharmacists 2. Should have enough time to review profiles to catch gross errors because refills are processed three days later
IV admixtures are harder to rectify than oral medication if errors occur	<ol style="list-style-type: none"> 1. This is true no matter if a technician checks or a pharmacist checks 2. If confident in the process, then the personnel involved should not be a concern
There is too much of a "judgement call" in checking chemo/TPN	<ol style="list-style-type: none"> 1. If a clear procedure is in place, there will not be judgement calls 2. Clinical appropriateness is not being checked

were 0.32-0.87% compared to 0.86-1.85% for pharmacists^{1,3}. In the IV admixture trial both the technicians and pharmacists made a similar number of errors. The trials were not blinded to the participants because a technician would not normally check refills, so to minimize bias both groups were told their checking was being assessed for accuracy. A quality assurance program (available on request from the authors) is essential to ensure the accuracy of refill checking by a pharmacy technician. It is essential that prior to implementing a pharmacy technician checking procedure: 1) procedures are in place to indicate how the task of checking refills must be carried out; 2) technicians must successfully complete a training program (specific to the institution's needs); and 3) a quality assurance program must be in place to monitor the process and personnel.

Most errors found would not likely seriously harm the patient. The only errors that could potentially cause harm to the patient were related to the incorrect drug or the wrong strength of a drug being dispensed. These errors may subsequently be detected by the nurse administering the medication, although this does not relieve pharmacy of the responsibility for accurate dispensing.

Given the very low error rate in dispensing it could be argued that the whole process of checking each refill is not cost effective and that a quality assurance program involving random checking would suffice. Another study could be designed to determine if such a quality assurance checking program was feasible.

The estimated savings to the pharmacy department by utilizing a pharmacy technician to check were considerable. If a technician replaces a pharmacist in this checking role, the department could use the savings to add additional clinical programs or to reduce the overall operating budget. Each hospital would need to make an assessment based on their own circumstances. The savings calculated in this study are estimates only and pertain specifically to our institution. Savings may not be as great in smaller hospitals that do not spend much time checking refills, and it would still require substantial training of pharmacy technicians and implementation of a quality assurance program.

The majority of technicians and pharmacists felt comfortable with a technician doing the final check of unit dose packaging and oral medication refills. The majority of respondents felt uncomfortable having a technician check TPN or

chemotherapy refills probably because of the perceived increased risk for harming the patient if an error is made. When comparing pharmacists and technicians as separate groups, the responses were similar the majority of the time.

A few institutional pharmacy departments in Canada already have some form of technician checking. The results of this study suggest that it may be reasonable to have pharmacy technicians check both unit dose medication refills and IV admixture refills. Implementation of technician checking should be explored in order to free up resources to facilitate the introduction of pharmaceutical care by hospital pharmacists. ☒

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