

An Analysis of Pharmacist Interventions

Alick Torchinsky and Diane Landry

ABSTRACT

In a 620-bed acute care teaching hospital, the hospital pharmacists are therapeutic specialists and have become integrated members of the health care team working on the nursing units. To determine the extent of cost avoidance and savings achieved by pharmacist monitoring of drug prescribing and administration, a six month study was undertaken in one of five pharmacy satellites. The pharmacists documented each clinical intervention on form designed for this investigation. Cost reductions or cost avoidance accrued due to the pharmacists' clinical interventions, such as monitoring overuse of drugs, unnecessarily prolonged hospitalization, correction of medication errors, and reassessment of prescriptions. This study suggests that pharmacists clinical expertise in drug use can benefit patients, physicians, nurses, and the hospital administrators who are confronted with ever increasing costs.

Key Words: cost avoidance, intervention, pharmacist

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RÉSUMÉ

Dans un centre hospitalier universitaire de 620 lits de soins actifs, les pharmaciens d'hôpitaux sont des spécialistes thérapeutiques et sont des membres à part entière de l'équipe multidisciplinaire oeuvrant sur l'unité de soins. Pour déterminer l'économie réelle et potentielle réalisée, due au monitoring par le pharmacien des prescriptions et de l'administration des médicaments, une étude fut entreprise pour une période de six mois dans l'une des cinq pharmacie satellite. Chaque intervention clinique, fut documentée par les pharmaciens à l'aide de formulaires prévus à cette fin. Les interventions clinique des pharmaciens, telles que: le monitoring de l'utilisation excessive de médicaments, l'hospitalisation prolongée inutile, la correction des erreurs de médication et la réexamen des ordonnances, auront contribué à augmenter l'économie réelle et potentielle. Cette étude indique que les patients, les médecins, les infirmières et les gestionnaires des hôpitaux qui ont à faire face aux augmentations budgétaires, peuvent profiter de l'expertise clinique que les pharmaciens possèdent en ce qui concerne l'utilisation des médicaments.

Mots clés: économie potentielle, intervention, pharmacien

INTRODUCTION

Numerous publications have reported that the interventions of pharmacists serving on the nursing units can enhance patient care, improve drug administration management, shorten hospitalization, and reduce or avoid costs.¹⁻¹⁰

Since 1978, the pharmacists of Sir Mortimer B. Davis Jewish General Hospital of Montréal have been members of the hospital's health care team, closely cooperating with staff physicians and nurses.

In this 620-bed acute care teaching hospital, affiliated with McGill University, the clinical pharmacists have gained complete confidence

as therapeutic specialists. The pharmacists go on daily rounds and review patients' charts. In consultation with the physicians and nurses they carry out interventions such as adjusting dosage regimens, reassessing prescriptions, stopping drug administration past the required period, monitoring allergic or toxic reactions, changing parenteral to oral therapy when appropriate, and correcting prescription errors. Specially trained in therapeutics, pharmacokinetics, and pharmacodynamics of drugs, our hospital pharmacists serve in a field that is becoming ever more complex as new agents and delivery systems are frequently being

introduced. The pharmacy's drug delivery system is a decentralized (satellite) Unit Dose Program, supported by the central hospital pharmacy.

To determine the extent of cost avoidance and cost reductions achieved by our hospital pharmacy, we first carried out a one month pilot study by one pharmacist in one of the five satellite stations. The pharmacist documented each intervention and after one month demonstrated such impressive cost avoidance and savings that we decided to extend the study to six months.

An intervention form completed in triplicate by the pharmacists for

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each intervention provides detailed information about the type of interventions, whether the recommendations were implemented, and the results of follow-ups. The white copy is a communication slip among pharmacists, physicians, and nurses. The yellow copy serves as a follow-up reminder for pharmacists; and the pink copy is for department records to be used for staff evaluation.

This study was undertaken to evaluate the clinical interventions and to determine the cost reductions or avoidance our service achieves.

The study was carried out from January 1988 to June 1988 in one of five pharmacy satellite stations by four hospital pharmacists. This satellite services 152 beds including: internal medicine; geriatrics; orthopedics; plastic surgery; urology; and ophthalmology.

The pharmacists documented each clinical intervention in triplicate, recording the name of the attending physician and the patient; how the communication was transmitted; and what type of intervention was carried out or recommendations made and followed up.

The clinical interventions were classified into three types: minor, important and major. A minor intervention would require no follow-up and include changing mode of administration from intravenous (IV) to oral; reordering supplies. An important intervention would require follow-up and include monitoring anticoagulant prothrombin time and adjusting maintenance dose; recommending or checking laboratory tests; changing dosage regimens; correcting route of drug administration; discontinuing unnecessary drug therapy. A major intervention would also require follow-up and would include reassessment of drug therapy as to rationality, ef-

ficacy and safety; checking prescription transcription errors on nurses' cardexes; definitive recommendations for alternative drugs in case of ineffectiveness, allergic or toxic reactions.

The written communication methods consisted of memoranda to the physicians that are attached to the Clinical Pharmacy Monitoring Forms; notations in the patients' files, on the nurses' information cardexes and on drug information sheets for the patients. Photocopies of published papers, where appropriate, are used to support the recommendations. The cost savings due to the pharmacists' clinical interventions were calculated according to measurable criteria such as:

- 1) actual costs of drugs;
- 2) cost of IV equipment as used in our hospital: large volume control sets/48 hr;

- 3) discontinuation of drug over-use;
- 4) changes from IV to oral treatment on the basis of seven day treatment periods;
- 5) when alternative drugs were recommended, only the difference between costs was calculated.

RESULTS

I. Clinical Interventions Evaluation

From January, 1988 to June, 1988, 1007 therapeutic problems necessitated the pharmacists' clinical interventions; of these, 188 could be measurably assessed for cost savings or cost reductions.

The types of communication used to achieve the interventions are presented in Table I. As can be seen in Table II, during the six month study period, the pharmacists provided extensive services to

Table I: Intervention Communication Methods

	Minor (n = 684)	Important (n = 242)	Major (n = 81)	Total (n = 1007)
Personal comm.	105 (15.4%)	72 (29.8%)	29 (35.8%)	206 (20.5%)
Telephone calls	52 (7.6%)	30 (12.4%)	10 (12.3%)	92 (9.1%)
Written comm.	449 (65.6%)	132 (54.5%)	22 (27.2%)	603 (59.9%)
Pers. + tel. calls	5 (0.7%)	2 (0.8%)	3 (3.7%)	10 (1.0%)
Pers. + written comm.	69 (10.1%)	6 (2.5%)	13 (16.0%)	88 (8.7%)
Tel. + written comm.	4 (0.6%)	—	2 (2.5%)	6 (0.6%)
Pers. + tel. + written comm.	—	—	2 (2.5%)	2 (0.2%)

Table II: Number of tasks performed by pharmacists

	Minor (n = 684)	Important (n = 242)	Major (n = 81)	Total (n = 1007)
Information	595 (87.0%)	175 (72.3%)	35 (43.2%)	805 (79.9%)
Recommendation	119 (17.4%)	153 (63.2%)	9 (11.1%)	281 (27.9%)
Modification of drugs or dosages	28 (4.0%)	46 (19.0%)	43 (53.1%)	119 (11.6%)
Verification of prescriptions	427 (62.4%)	153 (63.2%)	78 (96.3%)	658 (65.3%)

physicians, nurses and patients. The total for the categories in Table II is above 100% as the pharmacists may perform more than one task for a clinical intervention. The pharmacists provided information to the physicians, patients or nurses in 79.9% of clinical interventions. They recommended an alternative drug, a dosage revision, or a laboratory test in 63.2% of important clinical interventions.

Table III presents a breakdown of the type of therapeutic problems necessitating the pharmacists' clinical interventions. The major reasons identified for clinical interventions were related to errors. For example, the selection of wrong drugs, inappropriate dosage regimens or routes of administration, unnecessarily prolonged drug administration, and errors in prescription transcripts on the nurses' cardex files. The item, *nurses' cardex errors*, is of concern since 31 of 34 errors were considered a major intervention.

An analysis of the pharmacokinetic related interventions reveals that in 46 of 75 interventions (61.3%), the pharmacists recommended dose and frequency of administration revisions due to blood concentration determinations and/or nomograms (Table IV).

Table V presents an analysis of the recommendations relating to wrong drug therapy. Duration of therapy was reassessed at the pharmacist's request and stopped in 253 out of 457 interventions (over 55%). In 70 interventions out of 596 (11.7%) the wrong drugs were found to have been selected.

As can be seen in Table VI, physicians and nurses accepted most of the pharmacists' recommendations. One of the reasons cited for not accepting alternative drugs in cases of side effects is that physicians frequently assert that the efficacy of a specific drug out-

Table III: Therapeutic problems necessitating pharmacists' clinical interventions

	Minor (n = 684)	Important (n = 242)	Major (n = 81)	Total (n = 1007)
Omissions of medication history (i.e. allergy)	2 (0.3%)	—	22 (27.2%)	24 (2.4%)
Prescription writing errors	10 (1.5%)	5 (2.1%)	5 (6.1%)	20 (2.0%)
Wrong drug therapy	457 (66.8%)	117 (48.3%)	22 (27.2%)	596 (59.1%)
Wrong route of administration	19 (2.8%)	2 (0.8%)	—	21 (2.1%)
Drug interactions	—	37 (15.3%)	—	37 (3.7%)
Pharmacokinetics	—	75 (31.0%)	—	75 (7.4%)
Blood level determinations and monitoring	22 (3.2%)	1 (0.4%)	—	23 (2.3%)
Patient counselling (noncompliance)	58 (8.5%)	—	—	58 (5.8%)
Detection and report of adverse drug reactions	—	5 (2.1%)	—	5 (0.5%)
Detection of nurses' cardex errors	3 (0.4%)	—	31 (38.3%)	34 (3.4%)
Information request	109 (15.9%)	—	—	109 (10.8%)
Other	4 (0.6%)	—	1 (1.2%)	5 (0.5%)

Table IV: Pharmacists' pharmacokinetic assessments

Important Interventions	n = 75
Recommended changes regarding dose and/or frequency of administration	46 (61.3%)
Determination of adequate dosage regimens	27 (36.0%)
Drug "on hold" for reevaluation	2 (2.7%)

weighs the risks of its side effects.

The study also revealed that nurses made errors when copying physicians' prescriptions onto their cardex files. Twenty-five of 31 interventions (80.6%) were prescriptions wrongly copied. Another discrepancy, detected due to the unit dose distribution system, occurred when the prescriptions were properly recorded in the cardex file but through some oversight the drug was not administered to the patient. This incident occurred in six of 31 patients (19.4%) and required ma-

joor clinical interventions.

Prescriptions are sometimes mixed up and allocated to the wrong patient. In a sample of 20 charts the pharmacist detected errors in five patients, all in the major intervention category. In another sample, a routine review of the therapeutic profile of five patients by their respective physicians and pharmacist revealed that therapeutic changes were required. In another eight patients, the prescriptions were found to be incomplete.

Table V: Recommendations related to therapeutic management

Recommended revisions	Minor (n = 457)	Important (n = 117)	Major (n = 22)	Total (n = 596)
Selection of drug	58 (12.7%)	11 (9.4%)	1 (4.55%)	70 (11.7%)
Dose	—	53 (45.3%)	1 (4.55%)	54 (9.0%)
Frequency of administration	2 (0.5%)	26 (22.2%)	1 (4.55%)	29 (4.9%)
Dose + frequency of administration	1 (0.2%)	23 (19.7%)	—	24 (4.0%)
Administration schedule	1 (0.2%)	2 (1.7%)	—	3 (0.5%)
Duration of therapy	253 (55.4%)	—	—	253 (42.4%)
Mode of administration	4 (0.9%)	—	—	4 (0.7%)
Drug substitution	14 (3.0%)	—	—	14 (2.4%)
Similar therapies	7 (1.5%)	—	18 (81.8%)	25 (4.2%)
Miscellaneous	117 (25.6%)	—	—	117 (19.6%)
Drug selection + doses	—	2 (1.7%)	—	2 (0.4%)
Drug selection + dose + freq. of administration	—	—	1 (4.55%)	1 (0.2%)

Table VI: Acceptance of pharmacists recommendations

Recommendations	Minor (n = 119)	Important (n = 153)	Major (n = 9)	Total (n = 281)
Accepted by physicians	116 (97.5%)	150 (98.0%)	7 (77.8%)	273 (97.2%)
Not accepted by physicians	—	3 (2.0%)	—	3 (1.0%)
Accepted by nurses	3 (2.5%)	—	2 (22.2%)	5 (1.8%)

II. Cost Savings/Avoidance

Of a total of 1007 clinical interventions over the six month period in one pharmacy satellite station, 188 interventions had measurable cost savings: 73 IV infusions were discontinued at \$37.70 (the cost of equipment for 7 days), for a savings of \$2,752.10 and 115 IV infusions were changed to oral drugs at a savings of \$12,773.71. The total savings amounted to \$15,525.81.

DISCUSSION

The data presented suggest the absolute necessity of a double-checking system to detect sub-

optimum drug prescribing, administration and errors. This system requires personal vigilance, monitoring, and interventions by pharmacotherapy specialists who are able to advise on the best medications, adequacy of dosage regimens, drug availability, drug efficacy, duration of treatment, and adverse effects or toxicities. These tasks should be the responsibility of the hospital pharmacist, especially where multiple drug combinations are used.

Although the pharmacists' interventions were not subjected to peer review, all interventions were

documented in detail on a specified form and a copy of each is available for scrutiny in the central pharmacy files.

Included in the evaluations are only those cost saving interventions that could be calculated in dollar values. Verbal communications, for example, between pharmacists and physicians or nurses requiring immediate decisions occur frequently but are not always documented or cannot be assigned a monetary value.

Improved patient care can also not be easily calculated. However, the services pharmacists provide to patients, such as curtailing unnecessarily prolonged hospitalization, adjusting dosage regimens or changing to an alternative medication to reduce adverse reactions, contribute to the patients' well-being and comfort.

The cost saving of \$15,525 was demonstrated for one satellite station only, during the six month study period. Assuming a similarity among satellites, extrapolating this data to the other four satellites for one year, the cost saving would amount to over \$155,000 annually. Although patient mix is not consistent in every nursing unit throughout a hospital, satellite reported in this study covered surgical, medical, and long-term care patients. We feel that it is reasonable to extrapolate the potential cost reductions to include the other satellites. In fact, the characteristics of some of the other units suggest that the calculation of potential cost savings for all the nursing units is conservative.

Thus, this study suggests that hospital pharmacists working in satellite stations close to the nursing units should become members of the health care team in every hospital. ☐

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