Drug Utilization & Therapeutic Intervention Programs: Pharmacy Services That Pay For Themselves

John H. Condron and James L. Mann

ABSTRACT

This mailed survey was a follow-up to a 1989 study to assess the status of pharmacy-directed, drug-related, patient care programs in response to the Pharmaceutical Inquiry of Ontario (Lowy Inquiry). A specific focus on Therapeutic Interventions and Drug Utilization Review/Evaluation Programs was adopted because the earlier study indicated a significant "financial return" for pharmacist time spent on these initiatives.

A response rate of 62.2% (89 out of 143 hospitals) was achieved compared with an 80% response rate in 1989. Therapeutic interventions were performed by 97.7% of hospitals which identified an average of 184 therapeutic interventions per month and an 84.3% acceptance rate by prescriber. Based on data from 53 hospitals, an average of 29 minutes was taken on each intervention and financial data from 10 hospitals showed cost savings/avoidance of $49.34 per intervention.

Drug Utilization program data was available from 45% of hospitals and specific financial data was provided by 29.2% of institutions. Cost savings/avoidance data demonstrated a return of $29.99 for every dollar invested in pharmacist time performing these activities.

Collectively, both programs were recognized for their value in optimizing pharmacotherapy, improving patient outcomes as well as demonstrating a financial return to the institution. Despite the recessionary times, these programs are easily justified since they more than pay their own way.

Key Words: *Cost Benefit, Drug Utilization Review/Evaluation, Therapeutic Interventions.*

RÉSUMÉ

Ce sondage, effectué par la poste subséquemment à un projet entreprise en 1989, devait évaluer la situation des programmes de pharmacothérapie gérés par les départements de pharmacie à l'issue de l'enquête ontarienne sur les services pharmaceutiques (enquête Lowy). On s'est surtout intéressé aux interventions thérapeutiques et aux programmes de revue d'utilisation des médicaments, l'étude antérieure ayant indiqué un «rendement économique» favorable du temps que le pharmacien consacre à ces activités.

Le sondage a obtenu un taux de réponse de 62,2 p. 100 (89 hôpitaux sur 143), comparativement au taux de 80 p. 100 enregistré en 1989. On avait procédé à des interventions thérapeutiques dans 97.7 p. 100 des hôpitaux, qui ont mentionné en moyenne 184 interventions par mois. L'auteur de l'ordonnance avait reconnu le bien-fondé de l'intervention dans 84,3 p. 100 des cas (modification de l'ordonnance). Selon les données fournies par 53 hôpitaux, on a consacré en moyenne 29 minutes à chaque intervention et les données financières de 10 hôpitaux rélèlent qu'on a réalisé une économie de 49,34 $ par intervention.

Les données sur les programmes de revue d'utilisation de médicaments provenaient de 45 p. 100 des hôpitaux et 29,2 p. 100 des établissements ont fourni des précisions financières sur ces programmes. Les données relatives aux économies réalisées révèlent que chaque dollar investi (temps consacré par le pharmacien à ces activités) a rapporté 29,99 $.

Dans l'ensemble, on juge les deux types de programmes intéressants en ce sens qu'ils optimisent la pharmacothérapie, améliorent les résultats du traitement et accroissent la rentabilité de l'établissement. En dépit de la récession qui nous touche tous, il est facile de justifier ces programmes parce qu'ils se paient d'eux-mémes.

Mots clés: *interventions thérapeutiques, rentabilité, revue d'utilisation des médicaments*

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INTRODUCTION

The financial situation within hospitals has put considerable pressure upon all areas of patient care, and pharmacy services are not exempted. Administrators have high expectations of directors to develop cost containing measures to decrease drug budgets. More recently, administrators have been asking directors to decrease their staffing budgets and also to re-justify the services that they currently provide. Any proposal to management to expand departmental programs

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under current circumstances requires iron-clad selling features. Therapeutic Interventions (TIs) and Drug Utilization Programs (Drug Utilization Reviews [DURs]/Drug Utilization Evaluations [DUEs]) are two services that can be implemented/expanded despite tough economic times and be easily "sold" to the hospital administrator because their cost saving potential is greater than the costs of the programs themselves.

Therapeutic interventions by a pharmacist have been documented as achieving cost savings[1-4]. Although initiated to document the pharmacists' impact on patient care, the cost control features of TIs have recently received some attention[2-4]. In one 692-bed teaching facility, 363 interventions over a three-month period resulted in a cost avoidance of $16,341US[4]. This data calculates out to approximately $45US avoided per TI. The physician acceptance rate was 90% and the level of care provided by the pharmacists was rated very highly by the physicians.

In another study of 1027 TIs performed in a teaching hospital over a five-week period, 983 were prejudged to improve the level of care provided, and 36 were identified as very significant in terms of saving lives or preserving major organ function[5]. Based on the accepted interventions, the cost avoidance including drug costs, monitoring costs, length of stay, and costs attributable to complications of inappropriate drug therapy averaged $242 per intervention. These 36 interventions were also evaluated by physicians who confirmed the positive impact of the pharmacists on drug-related patient care[6].

Bayliff and Einarson[7] used physician review as a method of quality assurance in assessing pharmacist-initiated TIs. The four physicians agreed that 86.7% of the interventions (52 of 69) had a positive effect on therapy. Of the 15 interventions that the physicians assessed in common, it was estimated that eight of these reduced hospital stay by 3.7 days each.

A recent Canadian study at the Hospital for Sick Children conservatively calculated a cost-avoidance of $679 over a two-week period for 361 interventions[2] which represents a cost-avoidance of approximately $18,000 per year. Also, 55.3% of the interventions were shown to decrease drug costs while 35.7% increased direct drug cost. Overall a net cost-avoidance was realized.

Attempts have been made to quantify the impact of TIs in community pharmacies. One Canadian pilot study involving 252 pharmacist interventions indicated that 1.75% of all prescriptions required pharmacist intervention[8]. This was over and above problems dealt with in patient counselling.

Rupp et al[9] conducted a study which quantified TIs in 89 U.S. community pharmacies, which indicated that 1.9% of 30,011 new prescription orders required pharmacist intervention. Three expert evaluators judged that 28.3% of the identified problems would have resulted in patient harm had the intervention not been made. The same experts also placed an average direct cost-avoidance of medical care of $122.98US per intervention or $2.32US per each new prescription[10]. This shows the direct impact of the community pharmacist on patient care as well as the financial value of interventions.

Currently in Canada, the Canadian Pharmaceutical Association is completing an extensive community-based study (Community Pharmacist Intervention Study: CPhIS)[11] to document the impact of the pharmacist upon patient care.

Drug Utilization Review/Evaluation programs have resulted in cost savings and cost-avoidance by reducing sub-optimal prescribing within hospitals[12]. A DUR[13,14] is a continuous quality assurance program that judges prescribing against predetermined criteria, introduces corrective procedures as necessary, and typically results in cost savings as well as improved drug therapy[15,16]. Other program benefits may include identifying questionable practices, educating health professionals, identifying medications which are misused, or perhaps to study the use of certain classes of drugs within the institution[14].

The program's ability to enhance financial savings through drug utilization has caught the eye of several provincial ministries that are working to establish province-wide, community-based DUR programs[17]. In Ontario, this is a joint effort between the Ministry of Health, Ontario College of Pharmacists, the Ontario Pharmacists' Association, the Ontario Branch of the Canadian Society of Hospital Pharmacists (OB CSHP) and the Faculty of Pharmacy, University of Toronto. It is expected that the Ontario Programs will demonstrate similar success to projects in British Columbia[18], and Saskatchewan[19].

In 1989, the Ontario Hospital Association (OHA) and the OB CSHP conducted a survey of pharmacy departments in Ontario hospitals[20]. Key elements from this survey were included in this group's third submission to the Pharmaceutical Inquiry of Ontario. One of the most remarkable figures indicated that for every dollar invested in pharmacist time to conduct DUR/DUE programs, approximately $20 was saved/avoided in drug costs alone for the hospital.

In March 1993, directors of hospital pharmacies in Ontario were resurveyed in order to quantify the current therapeutic and financial impact of TI and DUR/DUE programs. The purpose of this follow-up survey was to provide current data and to assess changes

since the original OHA/OB CSHP effort in 1989[20].

METHODS

On February 26, 1993, a mail survey was sent out to 145 directors of hospital pharmacy departments in Ontario in order to assess their perceptions/status in responding to the recommendations of the 1990 Lowy Inquiry. Further, this study was designed to quantify the impact of pharmacy services such as TIs and DURs/DUEs. (Appendix A)

The hospitals surveyed included all of the teaching hospitals and community general hospitals but excluded those facilities without a pharmacist (as per 1992 Canadian Hospital Directory). Confidentiality was ensured by not coding or marking the surveys. The surveys were received until March 15, 1993 at the Faculty of Pharmacy, University of Toronto. The data were interpreted using descriptive statistics.

RESULTS

Out of the 145 surveys distributed, 89 were completed and returned within the stated time, yielding a response rate of 62.2% (89 out of 143)[a]. The mean hospital size was 296.7 beds. The response by hospital size was evenly distributed between small and large hospitals.

Therapeutic Interventions (TIs)

Therapeutic Interventions were performed by 97.7% of the respondents with each department completing an average of 184 TIs per month with a mean acceptance rate of 83.4% by physicians. Based on data from 53 hospitals, pharmacists spent an average of 89 hours per month performing interventions which extrapolated to 29 minutes per TI. Therapeutic interventions were documented by 83% of responding hospitals with 93% of departments recording these in the pharmacy records, but only 53% documenting their recommendations in the patients' charts. No documentation in any format was performed by 17% of the respondents. Financial data provided by ten hospitals showed a combined cost savings and cost-avoidance of $1,089,410 per year which resulted in an average savings of $49.34 per TI (Appendix B).

Drug Utilization Reviews / Drug Utilization Evaluations

Although drug utilization programs were conducted by 45% (40 out of 89) of the hospitals, usable financial data was only available from 26 hospitals. A total savings of $2,483,404 ($1,369,927 cost savings, $1,113,477 cost-avoidance) resulted in $29.99[b] return for every dollar invested in pharmacist time performing DURs/DUEs (Table I).

DISCUSSION

A survey was employed to collect information on the financial impact of TIs and drug utilization programs performed by pharmacists in Ontario hospitals. Surveys offer the advantage of being relatively easy to complete and require limited resources. They do, however, have limitations and some of these were apparent in our survey. First, there was likely a reporting bias with those institutions which participate in these programs completing the survey. Secondly, the response rate of approximately 60% was less than anticipated and indeed financial data on TIs were calculated from only ten facilities. This small number likely reflects the difficulty in determining the cost impact of TIs and the lack of agreed upon definitions for calculation of cost savings or cost-avoidance for these programs. This does limit the generalizability of the results.

Our intent was to collect data on existing programs in Ontario. To set criteria in an attempt to aid in consistent documentation would likely have further diminished the number of participating centres and the amount and value of the information collected. Nonetheless, this too represents a limitation of our study.

Comparing the 1989 OHA/OB CSHP survey to the 1993 survey, the average time spent by a pharmacist on TIs per month increased from 34 hours (n=56) in 1989[20] to 89 hours (n=53) in 1993. The physician acceptance rate also rose slightly from 80.0% (n=78) in 1989[20] to 83.4% (n=80) in the current survey. It is important to note that 17% of hospitals did not document TIs and another 33% document them only in the pharmacy department. Documentation of direct patient care

TABLE I: Drug Utilization Review/Evaluation Financial Impact Data

		Results 1993 (n=26 hospitals)	Results 1989[20] OHA/OB CSHP
1	Total pharmacist hours per year	3,312	4,428
2	Pharmacist wages per hour	$25.00	$20.00
3	Pharmacist cost per year (1 x 2)	$82,800	$88,560
4	Cost Savings per year	$1,369,927	$990,517
5	Cost-Avoidance per year	$1,113,477	$770,377
6	Total Savings per year (4 + 5)	$2,483,404	$1,760,894
7	Return on Investment (6 ÷ 3)	$29.99	$19.88

[a] Two surveys were not delivered.
[b] Detailed calculation in Table 1. Individual hospital data in Appendix C.

activities helps to increase the visibility of such programs while providing a database to support presentations to administration. Although the data are limited, it is noteworthy that ten hospitals who supplied financial impact data on TIs, achieved a total cost savings of $1,089,410 in 1992, which extrapolated to a mean gross savings of $49.34 per TI.

Drug utilization reviews (DURs) were targeted by Lowy[21] to increase prescribers' accountability for their pharmacotherapy and it was recommended that DURs be integrated into continuing medical education. Inappropriate drug use is not only an impediment to patient care, but also a financial waste for institutions and the health care system.

Twenty-six hospitals supplied financial impact data showing a total savings of $2,483,404 per year from drug utilization programs. Applying cost-benefit principles, the benefit of these programs over the cost to provide these programs is approximately 30:1. Despite the magnitude of financial impact, it is worth noting that 55% of respondents have not yet implemented a DUR service. This may be due to a lack of standardized DUR protocols and because of this, the very time consuming tasks of establishing criteria and collecting these data. Ministry of Health (M.O.H.) incentive funds which supported regional efforts such as the OHA district 7 initiative (Peterborough and area), as well as the Ottawa Valley Regional DUR program have helped to overcome this barrier. Implementation of province-wide criteria would allow all hospitals to participate and, therefore, result in enormous savings and greatly improved pharmacotherapy.

The goals of implementing both programs is to optimize pharmacotherapy and to improve patient outcomes. Although financial impact is not a primary goal of pharmacy services, drug cost savings help to justify program expansion and increased investment in pharmacist positions. By assuring that the patient is receiving the most appropriate therapy for their specific condition, it is apparent that savings to drug budget can also be affected.

The financial impact data provided on TIs and DURs/DUEs clearly indicate that these pharmacy services pay for themselves. Documentation of these services is imperative to demonstrate the impact of pharmacy services on both patient care and our fiscally strapped health care system.

Hughes stated in 1967 that "if our profession does not produce a satisfactory solution to the present problem (focus on distribution, not clinical services), a solution will be found by others, and this could well be one which we could find to be most unsatisfactory."[22] Therapeutic interventions and DUR/DUE programs focus the pharmacist's activity away from the dispensary and towards direct patient care. This survey demonstrates that implementation of these programs provides significant financial return as opposed to the financial burden that accompany most other programs.

Current financial pressures are challenging pharmacists to focus not only on the best drug therapy for the patient but also that which is least costly. This survey can, therefore, be used to support the expansion of clinical pharmacy programs by addressing individual patient's drug-related problems.

REFERENCES

1. Levy DB. Documentation of clinical and cost saving pharmacy interventions in the emergency room. *Hosp Pharm* 1993;28:624-7, 630-4, 653.
2. Strong DK, Tsang GW. Focus and impact of pharmacist's interventions. *Can J Hosp Pharm* 1993;46:101-8.
3. Torchinsky A, Landry D. An analysis of pharmacist's interventions. *Can J Hosp Pharm* 1991;5:245-8,270.
4. Masters MA. Positive effect of pharmaceutical care interventions in an internal medicine inpatient setting. *DICP Ann Pharmacother* 1992;26:264-5.
5. Hatoum HT, Hutchinson RA, White KW, et al. Evaluation of the contribution of clinical pharmacists: In patient care and cost reduction. *DICP* 1988;22:252-9.
6. Hatoum HT, Hutchinson RA, Elliot LR, et al. Physicians' review of significant interventions by clinical pharmacists in inpatient care. *DICP* 1988;22:980-2.
7. Bayliff CD, Einarson TR. Physician assessment of pharmacists' interventions - a method of estimating cost avoidance and determining quality. *Can J Hosp Pharm* 1990;43:167-71.
8. Chung M. Patient counselling pilot study - does counselling make a difference? *On Cont Pract* 1991;18:2-4.
9. Rupp MT, DeYoung M, Schondelmeyer SW. Prescribing problems and pharmacist interventions in community practice. *Med Care* 1992;30:926-40.
10. Rupp MT. Value of community pharmacists' interventions to correct prescribing errors. *DICP Ann Pharmacother* 1992;26:1580-4.
11. Anon. A study of pharmacist's interventions with prescription and non-prescription medications. Canadian Pharmaceutical Association. July, 1993.
12. Hoffman RP. A strategy to reduce drug expenditures with a drug utilization review program. *Hosp Pharm* 1984;19:7-12.
13. Lazor-Bajcar JM, Fowler R. The development and implementation of a drug utilization review program. *Can J Hosp Pharm* 1988;41:11-6.
14. Blackburn JL. Impact of drug utilization reviews on drug utilization. *Pharmacoeconomics* 1993;3:14-21.
15. Hlynka JN. Getting the biggest bang for your buck. *Can Pharm J* 1988;121:746-51.
16. Einarson TR, Segal HJ, Mann JL. Drug utilization in Canada: An analysis of the literature. *J Soc Admin Pharm:* 1989;6:69-82.
17. Anon. Drug Programs Framework for Reform (Consultation Paper) Drug Programs Reform Secretariat, Ministry of Health of Ontario, June 1993.

18. Malyuk R. Hospital Pharmacy Practice in the British Columbia Health Care System. British Columbia Branch, Canadian Society of Hospital Pharmacists. 1990.
19. Blackburn JL. Downey FW, Quinn TJ. The Saskatchewan program for rational drug therapy: effects on utilization of mood-modifying drugs. *DICP.Ann Pharmacother* 1990;24:878-82.
20. Ontario Hospital Association/Ontario Branch Canadian Society of Hospital Pharmacists. Results of Survey of Hospital Pharmacy Services. Third Submission to the Pharmaceutical Inquiry of Ontario. July 1989.
21. Lowy FH. Prescriptions for Health (Report of the Pharmaceutical Inquiry of Ontario). Queen's Printer. 1990.
22. Hughes FN. Pharmacy's future role - clinical or distributive? *Can Pharm J* 1973;119:116-24.

Appendix A

Survey Questionnaire

2.2 THERAPEUTIC INTERVENTIONS (TI)

DEFINITION: ANY CHANGE IN A PATIENTS DRUG THERAPY INITIATED BY A PHARMACITS. AN INTERVENTION IS CONSIDERED TO HAVE BEEN ACCEPTED BY A PRESCRIBER IF IT RESULTS IN A CHANGE TO THE DRUG ORDER IN QUESTION.

2.2.1 DOES YOUR DEPARTMENT PARTICIPATE IN TI's ☐ YES ☐ NO —>GO TO 2.3

2.2.2 HOW MANY TI's ARE COMPLETED IN AN "AVERAGE" MONTH? _____

2.2.3 WHAT IS THE PHYSICIAN ACCEPTANCE RATE?_____%

2.2.4 HOW MANY PHARMACIST HOURS ARE SPENT ON TI's PER MONTH?_____

2.2.5 DO YOU DOCUMENT TI's? ☐ YES ☐ NO

IF SO, WHERE? ☐ PATIENT CHART
☐ PHARMACY DEPARTMENT
☐ OTHER

2.2.6 DO YOU HAVE FINANCIAL IMPACT DATA FROM THIS PROGRAM?

☐ YES ☐ NO —> GO TO 2.3

IF YES, IS IT COST SAVINGS? $_____ /ANNUALLY

OR

COST AVOIDANCE? $ _____ /ANNUALLY

Drug Utilization Reviews

2.5 THE LOWY INQUIRY ALSO IDENTIFIED **DRUG UTILIZATION REVIEWS (DUR's)** AS A RECOGNIZED CLINICAL SERVICE. DEFINED AS:

"AN AUTHORIZED, STRUCTURE, ON-GOING PROCESS FOR IMPROVING THE QUALITY OF DRUG USE AND ULTIMATELY, PATIENT CARE WITHIN A HEALTH CARE ORGANIZATION. DRUG USE IS EVALUATED AGAINST PRE-DETERMINED CRITERIA DEVELOPED AND APPROVED BY THE MEDICAL STAFF AND IS EXPRESSED AS A PERCENT DEVIATION FROM THE STANDARD. EDUCATIONAL EFFORTS ARE INITIATED TO CORRECT PATTERNS OF INAPPROPRIATE DRUG USE."

DOES THE DEPARTMENT PROVIDE SUCH A SERVICE? ☐ NO —>GO TO 3.0
☐ YES

IF YES, PLEASE COMPLETE WHERE AVAILABLE:
(EXAMPLE: ANTIBIOTICS, FIBRINOLYTICS, CARDIOVASCULAR AGENTS, ANAESTHETICS, CONTRAST MEDIA, DIGOXIN, THEOPHYLLINE...)

DRUG	NUMBER OF PATIENTS PER MONTH	TOTAL PHARMACIST HOURS PER MONTH	COST SAVINGS PER YEAR	PROJECTED COST AVOIDANCE THIS YEAR

Appendix B

Therapeutic Intervention - Financial Impact Data

1.	Total savings per year (n = 10)		**$ 574,410**
	Avoidance	+	**$ 515,000**
	Total		**$1,089,410**
II.	Number of interventions per year	=	**184/month x 12 months x 10 hospitals**
		=	**22,080 interventions per year**
III.	Total savings per intervention	=	**$ 1,089,410** / 22,080 interventions
		=	**$49.34**

Appendix C

Individual Hospital DUR/DUE Cost Savings Data (1993)

Hospital (n = 26)	Number of patients in DUR/ DUE/per month	Pharmacist hours spent on DUR/ DUE per month	# of drugs in DUR Program	Cost savings per year	Cost-avoidance per year
1	42	18.5	5	20,000	20,000
2	31	3	4	80,000	135,000
3	20	15	2	—	54,600
4	10	3	1	3,000	2,500
5	50	19	5	72,000	70,000
6	10	12.5	5	38,000	—
7	37	22.6	2	53,000	5,000
8	93	13	4	67,500	18,500
9	18	2	1	3,000	1,500
10	10	6.1	1	30,000	30,000
11	50	40	1	10,000	12,000
12	85	9	3	5,000	139,000
13	31	12.5	10	147,000	—
14	51	11.5	4	98,000	124,500
15	19	7	3	43,400	53,000
16	8	2	1	—	1,522
17	31	6	3	26,300	67,800
18	62	12	6	78,000	139,500
19	17	7	5	45,500	61,000
20	45	10	4	73,000	139,500
21	16	7	2	13,000	15,255
22	14	3	3	3,622	9,500
23	28	11	3	42,500	87,600
24	89	15	7	121,600	140,000
25	10	2.5	2	6,500	2,550
26	23	6	4	33,555	40,100
TOTAL	917	276	91	1,113,477	1,369,927