Pharmaceutical Care Implementation in a Community Teaching Hospital

Lori Blain and Pegi Rappaport

ABSTRACT

The pharmacists at Toronto East General Hospital have been working towards the implementation of pharmaceutical care (PC) since 1991. To facilitate the progression from patient pharmacotherapy monitoring to PC, a structured program was developed to teach the pharmacists the process. Then, each pharmacist set a target of one, two, or three years to provide full pharmaceutical care to 50 patients. At the same time, data were collected to determine if patient screening criteria could be developed and to evaluate the actual time required for initial work-up and patient follow-up.

When this evaluation was performed, pharmacists were, on average, attaining 60% of their targeted numbers of patients receiving full PC. They understood the process, but were limited by the amount of time it took to follow each patient. Data collection for screening criteria did not show any correlation with age or service, but showed a positive relationship with length of stay. The average time per patient to provide PC was 206 minutes per admission. There was a significant correlation between the number of drug-related problems and the time to provide PC. The recommendations from three pharmacy working groups for ways to increase the amount of pharmacist time for direct patient care and increase the efficiency for pharmacists providing PC are presented.

Key words: *pharmaceutical care, workload, patient selection*

RÉSUMÉ

Depuis 1991, les pharmaciens du Toronto East General Hospital ont oeuvré à l'implantation des soins pharmaceutiques (SP) dans leur établissement. Pour faciliter la transition de la surveillance pharmacothérapeutique des patients vers la prestation des soins pharmaceutiques, un programme structuré a été mis sur pied pour montrer aux pharmaciens le processus transitionnel. Par la suite, chaque pharmacien s'est établi un objectif de un, deux ou trois ans pour prodiguer des soins pharmaceutiques complets à 50 patients. Durant cette même période, des données ont été recueillies pour déterminer la possibilité d'élaborer des critères de sélection des patients et pour évaluer le temps réel nécessaire à la prestation initiale des soins et au suivi des patients.

Après avoir pratiqué cette évaluation, les pharmaciens ont, en moyenne, atteint 60 % de leur objectif qui était de prodiguer des SP complets. En effet, malgré que les pharmaciens ont bien compris le processus, ils ont malheureusement eu trop peu de temps àconsacrer au suivi de chaque patient. Le temps nécessaire à la cueillette des données pour les critères de sélection a révélé une corrélation avec la durée du séjour, mais non avec l'âge ou le service. Le temps moyen de prestation des SP par patient était de 206 minutes par admission. On a cependant noté une corrélation significative entre le nombre de problèmes pharmacothérapeutiques et le temps consacré à prodiguer les SP. Les recommandations de trois groupes de travail de pharmacie relativement aux moyens d'accroître le temps consacré par les pharmaciens à la prestation des soins directs aux patients et d'augmenter l'efficacité des pharmaciens dans la prestation des SP sont ici présentés.

Mots clés : *soins pharmaceutiques, charge de travail, sélection des patients*

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INTRODUCTION

Toronto East General Hospital (TEGH) is a 432-bed, community teaching hospital. The pharmacy department was staffed by a total of 46.1 F.T.E. with 19.5 F.T.E. staff pharmacists and 19.2 F.T.E. pharmacy technicians. The department consisted of a central pharmacy that served 404 beds, a satellite pharmacy that served 28 critical care beds and the Emergency department, and a satellite in the oncology clinic. Clinical pharmacy services ranging from patient pharmacotherapy monitoring (PPM) level II to level IV[1] were provided to all inpatient areas. The level of PPM provided depended on staffing levels. Pharmacists had both distribution and

Lori Blain, BScPhm, was the Pharmaceutical Care Coordinator, Toronto East General Hospital, Toronto, Ontario, and is currently an Educational/Site Coordinator, Faculty of Pharmacy, University of Toronto, Toronto, Ontario.

Pegi L. Rappaport, MScPhm, FCSHP, is the Director, Pharmaceutical Services, Toronto East General Hospital, Toronto, Ontario.

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Address correspondence to: Pegi Rappaport, Department of Pharmaceutical Services, Toronto East General Hospital, 825 Coxwell Ave., Toronto, Ontario M4C 3E7

clinical responsibilities with an average of 45% of their work day being allocated to the latter. Workload measurement statistics revealed that on average, 25% of the pharmacists' time was devoted to direct patient care (MIS Pharmacy Workload categories 4100 - 4600 and 10401 - 10404[2]).

In 1991, the pharmacists at TEGH began discussing the concept of pharmaceutical care as described by Hepler and Strand.[3] The department began by incorporating PC into its philosophy, goals, and objectives. After a year of individual attempts to learn to provide pharmaceutical care, the need for a departmental approach was identified. The goals for this structured implementation plan were to:

- teach pharmacists how to provide all components of the full pharmaceutical process to their patients;[4,5]
- evolve from a PPM based practice to a PC based practice for all pharmacists; and
- allow each pharmacist to set individualized goals by selecting a rate at which they would learn, practice, and apply the pharmaceutical care process to their patients.

Although all pharmacists agreed with the philosophy of providing pharmaceutical care to all patients who needed PC, a major concern was the need to make more efficient use of available time and resources. It was decided that data would be collected for patients who received full PC in order to determine:

- screening criteria that would identify patients in greatest need of PC; and
- actual time required for initial work-up and patient follow-up.

METHODS

Pharmaceutical Care Implementation

Educational support included a series of PC training sessions provided by the clinical coordinators from September 1992 to June 1993. Also, the format of pharmacists' clinical presentations was changed to incorporate the PC model. Clinical sharing sessions were held at team meetings. Finally, pharmacists received one-on-one coaching with a clinical coordinator that involved working through the steps of PC for individual patients.

An intensive department-wide effort to implement the use of the pharmaceutical care process was initiated in November 1993. The pharmacists selected from three different options (Table I). In Option I, the pharmacists planned to incorporate PC into their practice over the course of one year, in Option II they did so over two years, and in Option III over three years. The start time of each option was staggered by one month because of workload concerns. Therefore, Option I pharmacists started in November 1993, Option II pharmacists in December 1993, and Option III pharmacists in January 1994. The options were designed to meet the needs of all pharmacists taking into account:

- differing levels of understanding of PC;

Table I: Options for pharmaceutical care learning rates

Option I (Time frame - 1 year)

Month	# patients who receive full pharmaceutical care	Documentation Form
1,2	2 per month = 4	PMDRP*
3 - 6	1 per week = 16	PMDRP
7 - 9	2 per week = 24	PMDRP
10 - 12	1 per day = variable	Abbreviated PMDRP
Beyond 12	All who would receive clinical pharmacy services	Abbreviated PMDRP
Beyond 12	1 per month, new disease states	PMDRP

Option II (Time frame - 2 years)

Month	# patients who receive full pharmaceutical care	Documentation Form
1 - 6	1 per month = 6	PMDRP
6 - 12	2 per month = 12	PMDRP
13 - 18	1 per week = 24	PMDRP
19, 20	2 per week = 16	PMDRP
21 - 24	1 per day = variable	Abbreviated PMDRP
Beyond 24	All who would receive clinical pharmacy services	Abbreviated PMDRP
Beyond 24	1 per month, new disease states	PMDRP

Option III (Time frame - 3 years)

Month	# patients who receive full pharmaceutical care	Documentation Form
1 - 12	1 per month = 12	PMDRP
12 - 24	2 per month = 24	PMDRP
25 - 27	1 per week = 12	PMDRP
28	2 per week = 8	PMDRP
29 - 36	1 per day = variable	Abbreviated PMDRP
Beyond 24	All who would receive clinical pharmacy services	Abbreviated PMDRP
Beyond 24	1 per month, new disease states	PMDRP

* PMDRP: Pharmacist's Management of Drug-Related Problems

- interest in and acceptance of PC;
- communication skills;
- other time commitments including patient loads; and
- complexity of patients' drug-related problems.

Information regarding the patients who received pharmaceutical care, their drug-related problems (DRPs) and subsequent pharmacy care plans were recorded on a 19-page educational tool developed at the Faculty of Pharmacy, University of Toronto called the Pharmacist's Management of Drug-Related Problems (PMDRP).[6] Each option required documentation on the PMDRP for approximately 50 patients. Then the pharmacist would switch to documenting on an abbreviated form adapted from St. Michael's and Peel Memorial Hospitals, both in Toronto. The end-point of 50 patients receiving full PC was arbitrarily selected based on pharmacists' initial progress and was to be re-evaluated as the process evolved.

Pharmacists used a variety of criteria to select those patients who would receive pharmaceutical care rather than PPM. Some examples of selection criteria included:

- patients identified as having at least one potential DRP while providing PPM;
- patients receiving > five medications;
- patients with impaired renal function;
- patients admitted within the last two to three days;
- patients or families able to communicate with the pharmacist; and
- patients identified by another health care professional as needing a pharmacist consult.

The selection criteria were not standardized for the department but were left to the discretion of individual pharmacists. Some pharmacists selected patients with disease processes and therapies with which they were familiar whereas others used this process to learn more about unfamiliar diseases and therapies.

Screening Criteria and Workload

The following data were collected concurrently from the PMDRPs, verified by a clinical coordinator to ensure consistency and tabulated:

- patient age;
- service;
- length of patient stay;
- # DRP;
- type of DRP;
- priority of DRP, as assigned by the pharmacist providing the care to the patient;
- # therapeutic interventions and whether they were accepted, rejected, or not needed;
- initial work-up time to provide PC; and
- follow-up time to provide PC until discharge.

The amount of initial work-up time included initial dialogue with the patient and medication history interview, chart review, identification of DRPs, necessary literature review, development of an initial care plan and documentation. Follow-up time included further dialogue with the patient, discussions with other health care professionals, chart review, revision of DRPs and care plans, when necessary, and documentation.

Data were collected from November 1993 to April 1995. Statistical analysis used linear regression for age and length of stay and analysis of variance for DRP priority, service, and workload data.

RESULTS

Pharmaceutical Care Implementation

All pharmacists completed the formal education component and successfully converted their clinical presentations to the PC format. However, one-on-one coaching was essential for most pharmacists to fully appreciate how to apply the PC process to their patients. As experience was gained, each pharmacist realized the advantages of PC compared to PPM for their patients. At the 18-month point in our three-year plan, they all agreed that PC had irrevocably changed their clinical practice.

Table II outlines the pharmacists' progress with their chosen options. Although there was considerable variability, pharmacists had on average provided PC and fully documented its provision on the PMDRP for about 60% of the target number of patients. In many cases, pharmacists did an initial work-up and started documentation on the PMDRP but all components of the PC process were not provided because patients were discharged. These cases were not counted towards the pharmacists' goals in the options.

Table II: Progress of pharmacists towards achieving their objectives at 18 months (November 1993 - April 1995)

Option	Number of Pharmacists	Target # patients receiving full PC, adjusted for % of completed implementation plan	Actual average # patients receiving full PC ± SD	% Actual vs. Target
Option I	5	46	27 ± 18	59%
Option II	13	36	21 ± 11	58%
Option III	6	16	10 ± 6	63%

Screening Criteria and Workload

Numbers of DRPs – A total of 326 PMDRPs were fully completed and analyzed for patients receiving pharmaceutical care from a total of 24 pharmacists learning to provide all the steps in the pharmaceutical care process. There were 1204 actual or potential DRPs identified in these patients. The overall average number of DRPs per patient was 3.7 ± 2.1 (range: 0 - 13).

Types of DRPs – Stratification of the occurrence of each type of DRP using Hepler and Strand's categories[7] is presented in Table III. The most common type of DRP, accounting for 33% of the total, was that relating to the patient experiencing or having the potential to experience undesirable signs or symptoms because he/she required a drug and was not receiving it.

Table III: Types of drug-related problems (DRPs)

Type of DRP *The patient is experiencing or has the potential to experience an undesirable sign or symptoms because he/she...*	**Number**	**%**
1. ...is taking a drug for which there is no medically valid indication	87	7
2. ...requires a drug and is not receiving it	395	33
3. ...requires a drug and is taking the wrong drug	175	15
4. ...is taking too much of a required drug	136	11
5. ...is taking too little of a required drug	117	10
6. ...is not actually or appropriately taking a drug which he/she requires	90	7
7. ...is suffering an adverse drug reaction	181	15
8. ...is suffering a drug interaction	23	2
Total	1204	100

Priority Rating – As indicated in Table IV the majority of identified DRPs were deemed by the pharmacist providing the care to be of moderate priority. No trend was seen in comparing the proportion of DRPs in each priority category to the total number of DRPs per patient (p=.25).

Table IV: Priority of drug-related problems (n = 1204).

Priority Rating	**%**
A. high; life threatening	12
B. moderate; harmful to patient if unresolved	70
C. low; not ideal but not expected to be harmful to patient	18

Harmful is defined as having a clinically observable or measurable negative impact on the patient that is not life-threatening.

Therapeutic Interventions – The 1204 DRPs generated 1219 suggested interventions. The acceptance rates are shown in Figure 1. The "NA/Not needed" category refers to changes in patients' drug therapy that were made by physicians independent of pharmacists or to drug-related problems that resolved on their own.

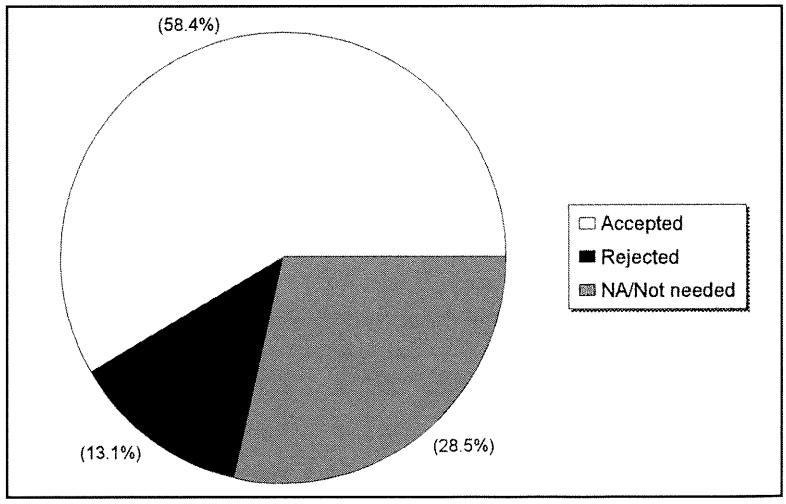

Figure 1: Acceptance rate for therapeutic interventions suggested by pharmacists (n=1219).

Age – The patients' ages ranged from four months to 97 years with a mean of 63 ± 21 years. The majority of patients (68.5%) were 60 years of age or older. This was reflective of the patient population at TEGH. Patients excluded from the age analysis included seven adults with missing age data and 14 pediatric patients. The latter were excluded due to the small sample size in this age range. Figure 2 demonstrates that there was no correlation between age and the number of drug-related problems.

Length of Patient Stay (LOS) – For 315 of 326 patients, data regarding the LOS was available and the average was 14 ± 18 days. There was a statistically significant increase in the number of DRPs as the lengths of patient stays increased (Figure 3). To ensure that patients with excessive lengths of stay did not skew the results, a sub-set with length of stay less than 50 days was analyzed and found to be statistically significant ($y = 0.058x + 3.05$, $r^2=0.088$, p=.0001).

Service – Data regarding service were available for all patients (Table V). The number of DRPs for each service under which patients received medical care was examined using the Fisher Least Significant Difference test. The only statistically significant differences ($p<0.05$) were between pediatric patients and all other services. However, one must bear in mind the small number of patients in the pediatric group.

Workload – The time to complete an initial work-up ranged from 20 to 600 minutes. Follow-up monitoring

until discharge required from 0 to 630 minutes depending on the number of drug-related problems identified. From Table VI, there was a steady increase in the average amount of time to carry out an initial pharmaceutical care work-up and provide follow-up care as the number of DRPs per patient increased (p = .0001 for both).

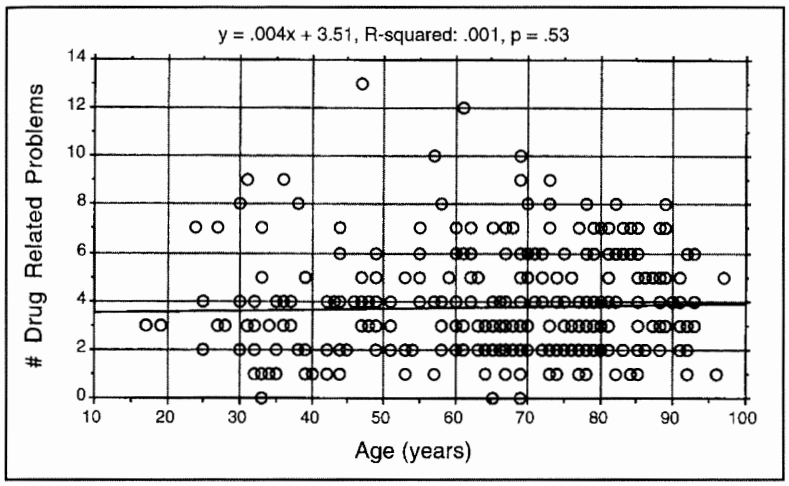

Figure 2: Number of drug-related problems per patient as a function of their age (n=305).

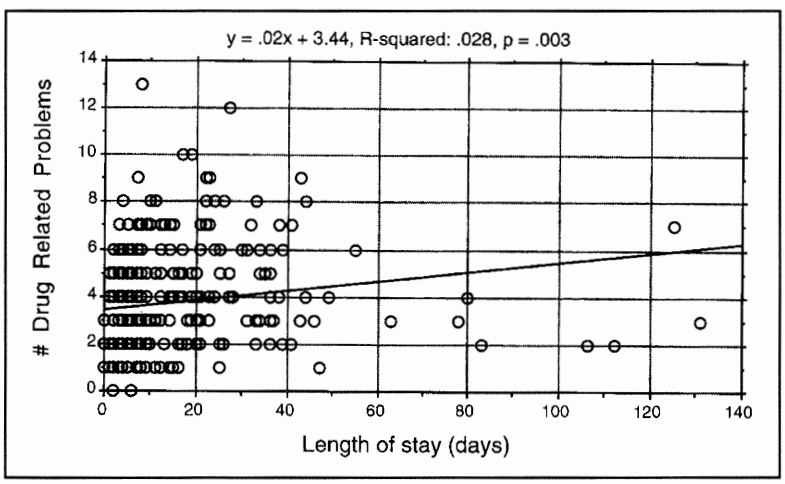

Figure 3: Number of drug-related problems per patient as a function of their length of stay in hospital (n=315).

Table V: Number of patients and number of drug-related problems according to service.

Service	# Patients	Mean #DRP ± SD
Emergency	50	4.0 ± 2.6
Medicine	166	3.7 ± 2.0
Obstetrics/Gynaecology	2	2.0 ± 0
Paediatrics	13	2.1 ± 1.2
Psychiatry	4	2.5 ± 1.9
Surgery	91	3.8 ± 2.1
Total/Overall Average	326	3.7 ± 2.1

DISCUSSION

Pharmaceutical Care Implementation

As shown in Table II, progress through the PC implementation options by pharmacists was variable. Only four pharmacists met their targets for the number of patients, and documented its provision on a PMDRP. Steps to improve efficiency included the development and documentation of therapeutic alternative charts for common DRPs and pocket cards outlining the steps of the therapeutic thought process. However, the time to learn and the time to provide pharmaceutical care were still the most important barriers to implementation. Initial work-ups were reported to take up to 10 hours in cases where pharmacists were unfamiliar with the disease processes and therapeutics. Pharmacists spent about 25% of their time on direct patient care. This meant that they had on average 2000 minutes per month for practicing PC and monitoring patients using PPM. If the average workload per patient using PC was 206 minutes (Table VI) for initial work-up and follow-up, a maximum of only nine patients per month could receive full PC from one pharmacist. This helped explain why many pharmacists had trouble keeping up with their option quotas when they were increased to two or four patients with full PC work-ups per month.

However, the pharmacists wanted to continue with PC implementation and three trends were observed that were encouraging. First, the time for initial work-ups and follow-ups decreased as experience with all aspects of pharmaceutical care was gained. For the two pharmacists who completed the goal of 50 patients with full PC, it took 45-60 minutes for an initial work-up and 30-60 minutes to follow up a patient with at least one DRP. This was approximately half the average time required for pharmacists who were still in the learning phases.

Second, a subjective assessment of the quality of therapeutic interventions performed by the coordinators and pharmacists indicated that they had improved considerably during this implementation period.

Table VI - Time to provide pharmaceutical care versus number of drug-related problems.

# DRP	# Patients	Average Time for Initial Work-up (Minutes ± SD)		Average Time for Follow-up per Admission (Minutes) ± SD	
0	4	89 ± 47		0 ± 0	
1	37	83 ± 38	(n=34)	57 ± 62	(n=33)
2	64	96 ± 43	(n=62)	75 ± 80	(n=62)
3	73	107 ± 52	(n=72)	76 ± 64	(n=72)
4	55	104 ± 53	(n=52)	87 ± 65	(n=52)
5	29	128 ± 54		126 ± 109	(n=27)
6	26	139 ± 105		106 ± 105	
7	22	129 ± 57		147 ± 99	
8+	16	221 ± 159		211 ± 174	
Total/ Overall Average	326	113 ± 71	(n=317)	93 ± 93	(n=314)

Sample sizes noted for groups with missing data.

Third, pharmacists were more committed to the practice of PC and appreciated the value that the patient's perspective brought to their clinical practice. Because of this, in February 1995, we defined a category of care for documentation of clinical workload called "PC Process Patients" where the key elements of PC were used. Clinical services to a patient were documented under this category when the pharmacist spoke to the patient and assessed their drug-related needs using the therapeutic thought process.[4] In the three months from February to April 1995, 358 patients received this type of care. This compared favourably to the 326 full and documented PC work-ups completed in the 18-month study period. Therefore, it was clear that we needed to take another look at the implementation process for providing full PC to patients in order to ensure its success.

Screening Criteria and Workload

The high number of DRPs associated with the patient not receiving a required drug was supported by data collected at St. Michael's Hospital in Toronto. They found that 32% of DRPs in intensive care patients[8] and 25% of DRPs hospital-wide[9] were of this type.

The issue of hospitalized patients not receiving medications that they required arose primarily from one of three scenarios. Upon admission to hospital, physicians are often unaware of all medications patients were previously stabilized on in the community. Previous studies have shown that pharmacists are able to elicit more information from patients during medication histories than physicians.[10] Also, oral medications for surgical patients were often put on hold and might not be reordered when the patient was able to swallow and absorb them. Finally, some DRPs of this type arose from recognition by the pharmacist of unresolved signs or symptoms that could be improved with drug therapy. This last scenario can sometimes lead to conflict with physicians who feel that it is not part of the pharmacist's role to make a diagnosis. The experience at TEGH pertaining to this issue has demonstrated that physicians were more receptive to this role when the evidence that drug therapy was needed was an unresolved symptom and when it was clearly presented as the patient's problem. Thus, it seems pharmacists did have a significant role in ensuring patients received all medications that they required during their hospital stay.

Review of the St. Michael's Hospital data also revealed a small number of DRPs due to drug interactions. It may be that drug interactions were avoided and dealt with by pharmacists in the distribution setting, or they might not be addressed if the clinical significance was unclear.

As stated earlier, one of the objectives in collecting and tabulating these data was to use it as a basis for developing a triage system for deciding which patients are in greatest need of PC. However, the only statistically significant determinant of DRP quantity was patient stay. It may be worthwhile to use the physician's estimated length of stay as one criterion in the decision as to whether a patient is to receive pharmaceutical care. However, as shown by the r-value of 0.3, this association only accounts for some of the variability in the number of DRPs.

It was noteworthy that there was no significant increase in the number of DRPs as the age of patients increased. Advanced age is often used by pharmacists as a criterion for selection for pharmaceutical care or clinical pharmacy services. Also of note, there was no difference in the number of DRPs between surgery and medicine patients. This may be relevant to the triage system for PC since surgical patients are often considered to be a lower priority than medical patients.

There is a need for clinically relevant and validated selection criteria for practicing pharmacists to select patients who will receive PC. At TEGH we are currently unable to meet the goal of providing pharmaceutical care to all patients who desire and require PC. One limitation of this study was that there was no assessment of the total number of patients requiring pharmaceutical care. Further study should include random patient selection from all services in an attempt to accurately measure the number and type of DRPs in the

hospital population. Bias in the method used to select patients for PC and collect the data presented in this report may have influenced the results. Also needed is a measure of the workload per patient or per DRP to determine the number of patients for which a pharmacist can reasonably carry out an initial assessment and provide necessary follow-up once they have become efficient in the provision of PC.

Until more concrete criteria can be developed, pharmacists at TEGH are using a Level I PPM review of the patient's drug therapy to determine which patients will receive pharmaceutical care. Our main focus became the time-related problems described in order to ensure that pharmacists see as many patients as possible.

Application of the Results of the Study

Departmental objectives were developed with the goals of increasing time for direct patient care and reducing the amount of time required to provide full PC to a patient. Three staff teams were formed within the department in May 1995. Two teams were responsible for improving efficiency in the drug distribution systems and delegating more tasks to technicians. The third examined the quality of PC, continuity of care when patients were transfered within the hospital, the PC training options and the tools used in an effort to improve efficiency. These teams have made their recommendations and we are now in the process of implementing them.

The recommendations related to decreasing pharmacist time in drug distribution included:

- Renovation of the central pharmacy to consolidate the order entry areas for oral and I.V. medications that were previously separate. This will improve the turnaround time to process Doctors' Orders and reduce the number of pharmacists required for auditing and order entry.
- Consolidation of distribution services between the central pharmacy and critical care satellite to a single location during evening and weekend hours of service. This will reduce the number of pharmacist hours in the dispensary.
- Increasing technician computer order entry by assigning this task to a specific shift.
- Technicians now check all refill dispensing for orals and all pre-mixed IV dispensing.

Recommendations related to improving the efficiency of provision of PC included:

- Abandonment of the PC options with specified targets for full PC work-ups in favour of individualized learning goals that are established between the pharmacist and their coordinator. As part of this process, pharmacists completed a self-assessment of their PC-related skills to determine where the gaps in their knowledge/practice existed. The department's goal has been revised to state that all pharmacists will be competent in all PC skills by September 1996.
- Revision of the abbreviated PMDRP and using it for both pharmacist training and as a clinical profile.
- Definition of the key components of PC for our department to include: assessments which include dialogue with the patient or family whenever possible; maintenance of a clinical profile; a pharmacy care plan; and a "to do" list for follow-up.
- Consolidation of clinical activities by patient rather than by pharmacy service. For example, one patient might have been seen by three pharmacists under the old system - the unit pharmacist, the TPN pharmacist, and the TDM pharmacist. Under the new system, the unit pharmacist would be responsible for meeting all of a patient's drug-related needs.
- Pharmacists try to get a committed block of at least two hours per day that is used exclusively for PC.
- Alphabetical filing of clinical profiles by patient care area and transfer to the appropriate pharmacist when the patient transferred.
- Evaluation of knowledge-based CD-ROM systems (in addition to MicroMedex) to address the need for more therapeutics information. Also, Drug Information files now include a disease-based section and a drug-induced disease section.
- Developing specialized practice areas for pharmacists, whenever practical, so that they can focus on specific therapeutic areas. This is currently in place for critical care, obstetrics/gynaecology, urology, and haematology/oncology.
- Establishing standards for pharmacist documentation in the patient's chart.
- Re-alignment of clinical teams of pharmacists so that the workload is more evenly distributed. Pharmacists still have approximately 65 new patients per month that would be expected to stay at least 48 hours. It is anticipated that pharmacists will be able to follow about 25% of these patients now and 40% when the drug distribution changes are completed.
- In the intensive care units, all critically ill patients are assessed within 24 to 48 hours of admission.

In conclusion, the department has progressed considerably towards implementation of pharmaceutical care as our mode of clinical practice. It is anticipated that the strategies currently being implemented will ensure the realization of the goal of evolving from a PPM based practice to a PC based practice for all pharmacists. The only screening criteria being used is a Level I PPM assessment. Better estimates of the number of patients that a pharmacist can follow using PC will only be possible after more pharmacists have moved out of the learning phase. Another examination of workload per patient will be conducted later in 1996.

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