

Task and Cost Analysis of Integrated Clinical Pharmacy Services in Private Family Practice Centers

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Costs and activities required for the provision of integrated clinical pharmacy services were examined in private family medicine centers in rural South Carolina. Work sampling and financial data for a one-year period were merged, yielding an average clinical service cost of \$1.65 per center patient visit. Pharmacists in family medicine environments spent almost twice the amount of time in clinical activities as has been shown in studies of their colleagues in chain store environments, and one half as much time in prescription-dispensing activities. A greater proportion of the former's workday was also spent in communication with patients. Costs for prescriptions dispensed in these rural centers combined with the average national net profit per prescription yielded a total cost that was within a few cents of the national average. Hence, costs can be controlled to the extent that maintenance of a competitive prescription-pricing policy is possible. Integration of clinical pharmacy services in family practice centers appears to be an economically viable practice model.

The practice of pharmacy is in an evolutionary phase. Beginning in the 1970s, pharmacy education made a radical shift in orientation from a primary emphasis on physical or chemical properties of drugs to a pharmacological or therapeutic orientation of drug use. Courses in pathophysiology, therapeutics, and behavioral sciences were added to curricula, while time spent in biological sciences and pharmacology was expanded. Students were also introduced to clinical medicine and the therapeutic decision process through expanded clinical clerkships on medical teaching teams. As a

result of this greater patient orientation in the educational process, pharmacists have undertaken expanded roles in health care delivery.

Family medicine has been a focus of many clinical pharmacy programs because of the team concept fostered in these practices. The variety of disease entities seen in family medicine clinics requires that the family physician maintain current prescribing knowledge of many diverse therapeutic agents, giving further justification for pharmacy involvement. Finally, the whole patient concept, which is the focus of family practice, provides a unique opportunity for pharmacists to be involved in patient education activities centering on rational drug use and compliance.

Many of these new roles originated in university settings. Because the primary objectives of these settings are training and research, it is often easier

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to achieve a shared concept of patient care. The integration of these practices into private practice, however, has been slow in developing. When considering the entrepreneurial nature of private practice medicine and pharmacy, the questions of practicality and cost effectiveness are paramount.

Applying academic ideas in noneducational environments is a process that occurs quite slowly. Private physicians and pharmacists, unlike their academic colleagues, face a financial risk. However, some individuals inevitably serve as innovators and promote adoption of new concepts. The study of these innovators' experiences is a necessary prerequisite to widespread adoption of these concepts.

Two prerequisites for the development of new services are (1) an understanding of the activities performed, and (2) information on the cost of the service. Without such information the potential impact and financial risk cannot be assessed, which would make a physician reluctant to adopt or endorse a concept no matter how beneficial it might seem for his or her patients.

Present Study

This study focused on integrated clinical pharmaceutical services in private family practice centers. Unlike traditional pharmacy services, clinical services are not necessarily associated with providing a drug product. Rather, such activities as providing drug information, monitoring therapy, and educating patients fall within the responsibility of clinical pharmacists.¹⁻³

The objective of this study was to document (1) tasks performed by pharmacists, and (2) the cost of pharmaceutical services in family practice centers with integrated clinical pharmaceutical services. Of special interest were the clinical functions and their cost.

There are several private family practice centers in South Carolina, each with one to four board-certified family physicians and a clinical pharmacist. Some of the centers also utilize dentists, social workers, ministers, and nurse practitioners. In addition to the usual dispensing duties, the pharmacist delivers primary care, engages in extended patient counseling and education, and in certain situations serves as the administrator for

the group practice. A pharmacy consultation fee is included as a part of the patient's regular office visit charge to compensate the centers for these expanded duties. Each center also charges an additional dispensing fee to those patients who choose to have their prescriptions dispensed by the center's pharmacy staff.³⁻⁷

Three of the family practice medical centers were examined in this study. All are located in rural communities and employ at least one pharmacist with a Doctor of Pharmacy degree. Each of these centers agreed to permit observers to record pharmacist's activities and to provide financial data on the practice.

Methods

Phase I

The work sampling technique was used to generate data on the pharmacists' activities.⁸ Activities were observed by trained senior pharmacy students at 3-minute intervals and classified into one of 54 mutually exclusive categories. These categories and the data collection form were pre-tested, and any difficulties were corrected prior to the main data collection. The field study began November 1, 1980.

Pharmacists were observed on randomly selected dates over a one-year period. Dates were generated with the specification that each center be represented once for each day of the week. Sampling in this manner effectively accounts for fluctuations due to day of the week or season of the year. This procedure yielded 3,488 separate observations. Approximately one half of these were obtained from center 1, as it was staffed by two pharmacists.

Phase II

The financial analysis phase was conducted after the work sampling phase. Financial statements for the period October 1980 through September 1981 and floor space dimensions were obtained for each practice site. Indirect expenses for the pharmacy departments were allocated by

ratios of either pharmacy area to total clinical area (area factor) or pharmacy sales volume to total clinical revenue (volume factor), whichever was appropriate. The indirect and direct expenses were added to give total operational costs.

Total operational costs were examined further using the results from the work sampling data. To merge the financial and work sampling data, all pharmacist activities were defined as either dispensing, clinical, administrative, or general. Activities were assigned to these four categories by a three-member pharmacist panel. A consensus of their assignments was used as the final classification, yielding 20 clinical, 11 administrative, 16 dispensing, and 7 general activities. General activities included items such as travel, idle time, and unobservable behavior and were proportionately allocated to the other three categories to facilitate the computation of three types of costs: (1) dispensing costs, (2) administrative costs, and (3) clinical costs. Subsequently, each of these costs were allotted on a per prescription basis and, in the case of clinical costs, on a per patient basis. Total costs per prescription and per patient were also derived.

To allocate overhead expenses, two factors are needed: area and revenue. The area factor was computed in two steps. First, shared space (business office and reception) was allocated by the ratio of total pharmacy area to total clinic area. Second, the pharmacy area plus the allocated shared space divided by the total center area was used as the area factor. Area factors for each center are depicted in Table 1.

Sales volume is the second factor needed for cost allocation. The pharmacies in the centers have two sources of revenue: (1) prescription sales and (2) the pharmacy consultation fee charged for patient visits. Consultation fees have no corresponding cost of goods; therefore, these fees directly increase the pharmacies' gross margin. The first step of the sales volume calculations is typical of businesses that sell inventory. Gross margin was determined by subtracting cost of goods sold from all sources of revenue. Next, the pharmacy margin was added to clinic revenue to yield center revenue less cost of goods sold. Cost of goods sold are direct pass-through costs and are not related to services provided by the pharmacist. Since medical services do not have a similar cost component, pharmacy revenue less cost of goods sold can be directly compared with the medical revenue. The

Table 1. Expenses Applied to Each Line of Profit and Loss Statement for Centers (%)

	Center 1	Center 2	Center 3
Direct pharmacy expenses	100.0	100.0	100.0
Indirect expenses—area	18.2	13.2	5.8
Indirect expenses— volume	16.2	6.8	10.4

final calculation was to divide the pharmacy's revenue from services by the total center's revenue, yielding the revenue ratio. Hence, all expenses of the family practice center allocated to pharmacy on a volume basis were allocated by this ratio. Table 1 depicts these for all three centers.

Once the allocation factors were computed, expense items reported on the various centers' profit and loss statements were allocated. Expense items were first multiplied by the appropriate allocation factor. Direct expenses, such as pharmacy salaries, were allocated to the pharmacy at the rate of 100 percent. Indirect or overhead expenses were allocated at the appropriate rate for area or volume expenses. This yielded a line item listing of total pharmacy costs. Most cost of prescription-dispensing studies stop with this calculation. However, in this study, total costs were further allocated by types of pharmacy activities: administrative, dispensing, or clinical. This was accomplished by multiplying each allocated cost item by the percentage of time the pharmacist spent in each of these three activities. An exception occurred in the case of pharmacy technician salaries; these were allocated only to dispensing costs, not to the clinical or administrative costs.

Results

Phase I: Work Sampling

As stated earlier, pharmacists' activities were recorded at 3-minute intervals and classified into one of 54 categories. Pharmacists performed all activities except those dealing with the provision

to achieve a shared concept of patient care. The integration of these practices into private practice, however, has been slow in developing. When considering the entrepreneurial nature of private practice medicine and pharmacy, the questions of practicality and cost effectiveness are paramount.

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Functions	Center 1	Center 2	Center 3	Weighted Average
Administrative	10.5	37.8	16.1	16.8
Clinical	54.5	38.8	54.1	51.1
Dispensing	35.0	23.4	29.8	32.1
Total	100.0	100.0	100.0	100.0

of written information to patients or staff. The most frequently performed activities (weighted average) were patient communication (16.7 percent), idle (8.4 percent), reviewing charts (5.4 percent), and typing labels (5.4 percent). Nonclassified activities constituted approximately 10 percent of the pharmacists' activities.

Pharmacists in center 1 spent approximately twice as much time in clinical activities as their colleagues in the other two study sites. Time spent in communications did not vary significantly from center to center. Observations of communication activities for centers 1, 2, and 3 were 34.5 percent, 32.2 percent, and 35.6 percent, respectively.

Of the 54 categories, the greatest variation among the centers occurred for the managerial category. The pharmacist in center 2 spent the greatest amount of time performing managerial duties. This was not unexpected because of his dual role as clinic administrator.

The 54 pharmacist activities were next aggregated into four categories: (1) administrative, (2) clinical, (3) dispensing, and (4) general. Averages for the three centers were weighted, based on the total number of observations recorded at each center. General functions included such items as travel, idle time, or unobservable behavior and were proportionately allocated to the other three categories. The largest percentage was assigned to the clinical category, since it accounted for the largest proportion of nongeneral functions. The results from this process are shown in Table 2. Note the variation in activities by center. The pharmacist in center 2 spent the least amount of time performing clinical activities and the most time performing administrative activities. Center 2 had the lowest patient load and prescription vol-

ume, and the pharmacist was also the clinic administrator. Pharmacists in the other two centers exercised a lesser administrative role.

Phase II: Financial Analysis

As a result of the financial analysis, pharmacy costs were allocated to clinical, administrative, or dispensing services. Averages were found on a per prescription basis for each of these costs and on a per clinic patient basis in the case of clinical costs. Center 1 had 22,880 patient visits, and the pharmacy dispensed 29,878 prescriptions. A total of 12,870 patient visits at Center 2 yielded 8,861 prescriptions dispensed. Center 3 had 10,552 patient visits, with 15,471 prescriptions dispensed.

Total and average service costs per prescription do not include cost of goods sold. Table 3 shows that the total service costs per prescription ranged from \$2.83 to \$3.65, with an average total cost of \$3.28. Clinical costs averaged \$1.47 per prescription. There was a much wider variation in the costs for clinical services across centers than was the case for either the dispensing or administrative costs. The low cost in center 3 can be explained somewhat by the physical layout of the pharmacy area. This center had a less accessible private consultation area, so many patients were counseled at the prescription window and for briefer periods of time. Since the time spent per prescription was less, clinical cost per prescription was reduced accordingly. Centers 1 and 2 both had easily accessible private consultation rooms. Pharmacists at center 1 counseled each patient who received a prescription from the center's physicians, whereas

Cost per Prescription	Center 1	Center 2	Center 3	Weighted Average
Dispensing	\$1.41	\$1.63	\$1.31	\$1.45
Clinical	1.62	1.61	1.17	1.47
Administrative	.31	.41	.35	.36
Total service	\$3.34	\$3.65	\$2.83	\$3.28
Goods sold	4.82	4.71	4.91	4.81
Total	\$8.16	\$8.36	\$7.74	\$8.09

	Center 1	Center 2	Center 3	Average
Clinical cost per center patient visit	\$2.10	\$1.11	\$1.75	\$1.65
Total service cost per center patient visit	\$4.35	\$2.51	\$4.69	\$3.85

this was not always the case for patients at either centers 2 or 3.

As shown in Table 4, total costs allocated on a per patient basis averaged \$3.85, with a range of \$2.51 to \$4.69. Clinical costs averaged \$1.65 per center patient visit. When the data are examined on a per center patient basis, center 2 has the lowest cost, although its patient volume is similar to that of center 3. The pharmacy in center 3 serves a smaller proportion of the patients who visit the clinic, which may best explain the reversal in the ranking of the lowest clinical cost between centers 2 and 3.

Discussion

Most general practitioners of pharmacy focus their attention toward dispensing and administrative activities. While clinical activities have a high priority, the amount of time most pharmacists de-

vote to them is typically small. Clinical pharmacy practitioners, however, are expected to maintain drug-dispensing skills while assuming an increased responsibility for (1) providing drug information to health professionals, (2) directing patient education, and (3) providing primary patient care. The clinical pharmacists in the present study tended to follow this practice model.

To contrast the practice activities among pharmacists, the work sampling data can be compared with the results of a study of practice activities of general practice pharmacists. Dickson and Rodowskas⁸ observed the practice of pharmacists employed by a large national chain drug store in metropolitan Washington, DC. The data were classified into categories similar to those used in the present study. Pharmacists in integrated clinical practices spent almost twice the amount of time as their chain store colleagues in clinical activities and one half the amount of time in dispensing activities. Average workloads measured by the number of prescriptions dispensed per pharmacist

work hour were similar in the two studies. However, the clinical practitioners utilized supportive personnel to a greater extent, thereby freeing time for clinical endeavors.

A closer analysis of the time spent in clinical activities revealed that direct patient communication was the major time-consuming activity for both groups of practitioners. Of the total work time, chain pharmacists averaged 11 percent of their workday in patient communications compared with 32 percent for clinical practitioners. The latter group spent approximately 6 percent of their time in patient monitoring, reviewing charts, and triage functions, activities not observed in the practice of chain store pharmacies.

Dispensing activities are the primary focus of contemporary pharmacy practice. This orientation is fostered by both chain and independent pharmacies alike. A pharmacist's performance is evaluated on dispensing and administrative abilities rather than clinical practice skills. A change may be in the offing, however, as recent promotional messages have placed greater stress on the pharmacist's educational background and the types of skills it bestows on the practitioner. Moreover, as more clinically trained practitioners are graduated from colleges of pharmacy, the pressure to recognize the importance of time devoted to clinical practice activities will increase.

Data to compare the costs of integrated clinical pharmacy services with traditional pharmacy practice were not readily available. The methods to allocate costs to various activities in the present study are somewhat unique, and the inflation rate in recent years makes comparisons across time tenuous. As a point of reference, however, the total cost per prescription (including the allocated clinical cost) averaged \$8.09 in the three centers studied (Table 3). The national average prescription price as surveyed by the *Lilly Digest* for 1981 was \$8.57.⁹ Assuming a 5 percent net profit before taxes on prescription sales in the national survey, each of the centers' average total cost was within a few pennies of the national average. Hence, it is reasonable to conclude that integrated clinical pharmacy services can be implemented while maintaining a competitive prescription pricing policy.

This finding is not surprising if one considers the economics possible in such practices. The cost of operation can be reduced by improved inventory control and buying practices. Each of the

facilities studied maintains a strict generic formulary. Moreover, the ability to share physical facilities as well as business office staff further reduces the cost of operating overhead. Finally, these family practice pharmacies widely utilize supportive personnel in a manner similar to what is observed in hospital pharmacies to perform most of the clerical and dispensing functions, while community pharmacists have been hesitant to deploy supportive personnel beyond clerical and business functions. This creates a wide differential in personnel costs for dispensing activities.

Conclusions

The integration of clinical pharmacy services in family practice centers appears to be a viable practice model. Efficient use of personnel provides the time for pharmacists to become involved in clinical activities. Efficient use of facility resources and supportive personnel to perform dispensing activities appears to control costs so that prescription prices can be competitive with general pharmacy practices.

References

1. Mauldin RK: The clinical pharmacist and the family physician. *J Fam Pract* 3:667, 1976
2. McKenney JM, Brown ED, Necsary R, Reavis HL: Effect of pharmacist drug monitoring and patient education on hypertensive patients. *Contemp Pharm Pract* 1:50, 1978
3. Leedy JB, Schlager CE: A unique alliance of medical and pharmaceutical skills. *J Am Pharm Assoc NS16:460*, 1976
4. Robertson DL, Groh MJ, Papadopoulos DA: Family pharmacy and family medicine: A viable private practice alliance. *J Fam Pract* 11:273, 1980
5. Juhl RP, Perry PJ, Norwood GJ, Martin LR: Family practitioner—Clinical pharmacist group practice. *Drug Intell Clin Pharm* 8:572, 1974
6. Miller JW: Reimbursement for nondispensing functions: Today's innovation is tomorrow's tradition. *Contemp Pharm Pract* 2:95, 1979
7. Davis RE, Crigler WH, Martin H: Pharmacy and family practice—Concept roles and fees. *Drug Intell Clin Pharm* 11:616, 1977
8. Dickson WM, Rodowskas CA: Pharmacist work activities in a community pharmacy setting. *J Am Pharm Assoc NS10:581*, 1975
9. Deiner CH: The *Lilly Digest '91*. Indianapolis, Ind, Eli Lilly, 1981