ECONOMIC IMPACTS OF SHARED SERVICE ARRANGEMENTS

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FOREWORD

This study of the economic impacts of shared services is an extension of previous work performed under Contract No. HRA 230-75-0062: "Methodologies for Health Planners to Evaluate Shared Services."

The study focuses on the economic impacts of a shared service arrangement, which are most generally all changes in the allocation of real resources among alternative uses and users, all changes in the distribution of products among consumers, and all changes in the distribution of resource costs in the community. These changes at all community levels involve analyses of economies of scale; capital availability; capital threshold levels; cash flow aspects; monopoly power and monopsony power (achieved through collective bargaining and purchasing); increased consumer demand; improvement in planning owing to reduction in random fluctuations; improvement in the spatial allocation of resources; and improvement in the quality, accessibility, and availability of care.

The study is designed to assist planners at many levels to be more effective in understanding and analyzing the present or potential economic impacts of shared arrangements. The primary audience of this study was intended to be the comprehensive health planning agency planner; however, institutional planners, representatives of shared service organizations, and representatives of state and metropolitan hospital associations may also find the document useful.

Although this volume may be read alone, the health planner and other readers are advised to read also the first four volumes produced under this contract. Volume 1 provides some basic descriptions and analyses of sharing from a national perspective. Volume 2 presents case studies of 16 shared service arrangements. These case studies provided information for the construction of methodologies (presented in volume 3), for identifying and analyzing existing shared service arrangements, for identifying and analyzing the potential for sharing, and for initiating shared services. An annotated bibliography, presented in volume 4, covers the literature on shared services and closely related topics from 1970 to 1975.

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INTRODUCTION AND PURPOSE

Multihospital organizational arrangements, such as mergers, management contracts, and shared services, are stressed in P.L. 93-641 as being priority methods for evolution in the delivery of health care. Four of the 10 national priorities listed in the law directly relate to multihospital arrangements.

Some long-range studies of multihospital systems have been undertaken.[1] The behavior of individual systems over time has been demonstrated. However, little knowledge exists about the impact of a large and growing number of multihospital systems and their organizational arrangements on the health care marketplace. It would be highly desirable to measure quantitatively the impact of various linkages to make sure that the national policy, at the very least, is not deleterious in the long run.

Shared services have undergone increasing scrutiny in this decade. There is good evidence that, in general, shared services are cost effective. However, if a local geographic area is comparatively saturated with all the shared services that are deemed feasible, a question arises about the long-run behavior of shared service arrangements in such a saturated situation. If an area has few or no shared services, it is necessary to inquire what services, if any, should be shared to improve health care delivery.

Subsidiary questions also arise, such as: (1) What is the nature and strength of the various forces that the shared service arrangements exert on the wider economy? (2) How does the wider economy respond to shared services? (3) What changes can be expected within departments and cost centers of an institution participating in a shared service? (4) Are monopoly or monopsony emerging concepts in this field?

In the previous four volumes on shared services[2] a series of methodologies was developed to permit planners to take an active part in the stimulation of shared services for their area. The volumes contain an extensive annotated bibliography for further background reading, sketch 16 case studies of operational shared service organizations to acquaint planners with the intricacies of sharing, and provide some national level analyses. In addition, a series of actions are recommended that planners could undertake to further shared services where appropriate. The present volume augments the previous four volumes by focusing on the economics of sharing rather than on the organizational, psychological, and qualitative aspects of sharing.

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1 Health Services Research Center. Multihospital Systems: An Evaluation. Chicago: The Center, 1975.

2 Health Services Research Center. Methodologies for Health Planners to Evaluate Services Shared by Health Care Organizations. Four volumes. Chicago: The Center, January, 1976. All references in the text to the previous volumes on shared services relate to this publication.

The purpose of this study is to highlight economic factors to be considered by planners addressing the potential for, and the implementation of, shared service arrangements (SAs) among health care delivery organizations. This study structures the factors and reports on the empirical work performed to evaluate the impact and importance of the various factors. The major effort has focused on some shared service arrangements in which the economic impact of sharing can be expected to have major consequences and the implementation may be more easily initiated and successfully completed. Various risks, detrimental situations, and undesirable consequences are discussed, as well as areas where major long-range benefits can be expected. It is anticipated that health care planners will be able to use the conceptual framework and methodologies of these analyses and the methodologies of volume 3 to examine the potential for and the implementation of shared services

Shared Services

Shared services can be defined as those clinical or administrative functions which are common to two or more health care institutions; which are used jointly or cooperatively by them in some manner for the purpose of improving service, containing cost, and/or effecting economies of scale; and which hold all the participating parties at risk in the sharing venture. This definition is in contrast to what has been called contracted or purchased services where only one party is at risk and the secondary parties buy services or products without a stake in the survival or financial success of the venture.

The actual number of definitions in use in the field are almost as great as the number of references in the bibliography of volume 4 on shared services. The core of all definitions is that the participating hospitals yield the solo position and instead interact with and are dependent upon one another to some extent for the provision of the services. A summary working definition for this report is "a service provided as a result of the cooperative efforts of two or more health care organizations."

Two motives are fundamental for most shared services:

1. Improvements in quality and scope of health care services, in cluding such components as: comprehensiveness; availability; accessibility; acceptability; distribution of appropriate services, manpower, and facilities; and the responsiveness to participating institutions' expectations and demands.

2. Cost containment and productivity improvements resulting from: improved management, planning, and evaluation; reduction in duplicate facilities and services; increased utilization of previously underutilized services and facilities; standardization; economies of scale; replacement of obsolete or obsolescent facilities and equipment; and technological innovations, combined negotiating strength; and impacts on markets, for instance, by competitive bidding.

Historically, most shared service ventures arose from a need perceived by hospital administrators or by physicians. Less frequently, comprehensive health planning agencies, Hill-Burton agencies, and regional medical programs have been the initial motivators. Once the idea is suggested, a core group of leader hospitals tends to develop. If these indicate their willingness to participate in a shared service venture, others tend to follow suit. Interpersonal relationships, if they already exist among the several administrators of hospitals in the area, among the physicians, or between the two groups, can greatly enhance the development of a shared service. In those instances where there has been little communication among these groups, a concerted effort to exchange nonthreatening information among themselves frequently leads to active dialogue, appreciation of one another's problems, and respect for the concerned individuals. Once that level is achieved, it is possible to establish a common goal relating to a sharing of services. The implementation then requires nothing more except hard work. Part of that work is the projection of the economics of sharing.

Structure of the Following Sections of this Volume

The following two sections provide a discussion of the economic factors to be considered by health planners and a summary of the principal findings concerning the economic impacts of sharing. The subsequent three sections contain the theoretical and methodological basis on which the empirical work was built. The final section presents six case studies each with a detailed summary of findings.

RECOMMENDATIONS AND IMPORTANT ECONOMIC FACTORS TO BE CONSIDERED BY HEALTH PLANNERS EVALUATING SHARED SERVICES

The six case studies offer some useful information for specialists in health planning. In an important respect this contribution is independent of the value of the studies for testing hyphotheses about voluntary hospital cooperation. Health planners may be most interested in the preconditions for viable sharing arrangements and the environmental conditions that foster or reduce economic benefits to the community.

Before these interests are addressed more specifically, limitations of the entire study should be explained. The six sites are not a random sample of all SAs in the country. In fact, they tend to be sites with plentiful data, stable organizational growth, and a pronounced willingness to expose their operations to outside scrutiny. There was no attempt to assess economic impacts of all shared services at a site. Thus, the importance of broad commitments to sharing by each hospital tends to be underestimated. Finally, it is crucial to observe that the agreements under study arose voluntarily.

In each case study there appear one or more tentative measurements of the degree to which a shared service is less costly than other alternatives available to individual participants. Payroll costs seemed to rise more slowly (in comparison to the national average) in a state in which the state hospital association had a modest but broadly inclusive labor relations program. Central laundries at two sites offered substantially lower costs than commercial or in-plant alternatives. A cooperative printing facility demonstrated secure competitive viability in a well developed printing industry and generated a surplus of net income allocated to members. A blood bank demonstrated a convincing historical pattern of cost reduction of several types. Consolidation of obstetrics and pediatrics reduced costly excess capacity at individual hospitals.

The magnitudes of these benefits were given careful scrutiny. It is anticipated that the specific methods of assessment will prove useful in planning. It is more relevant to the present discussion that at these sites, which may be experiencing better results than elsewhere, the technological and behavioral basis for the economic benefits seems fairly convincing.

At each site, the findings emphasize that the long-term financial commitments of major hospitals, the structure of charges for service, the perceptions of demand for expansion of patient care, and the repercussions for various physician groups seem to be related to the cost and viability of the shared service.

General Considerations and Recommendations

1. Administrators, trustees, and/or physicians should realize and believe that a SA for a particular service is the right solution for the problems facing the service. Some alternative arrangements might be mergers, management contacts, or maintenance of individual services.

2. The basic problem faced by a service should be one of excess capacity/underutilization, lack of sufficient concentration, or maldistribution or lack of distribution, so that the elimination, expansion, addition, or reallocation of the facilities through the SA will correct the problem.

3. The overall support and financial commitment of the participating institutions and the professional groups associated with the particular service are required for a successful SA.

4. Planners should recognize the strong self-interests of the participating institutions and their corresponding members associated with the service and should not disregard those interests.

5. Mechanisms that identify the consequences of the SA for all relevant participants and mechanisms that compensate the "losers" should be established.

6. The direct involvement of planners in the final round of discussions and negotiations during the initiation and implementation process might become necessary. For this reason, planners should try to be informed about the potential problems during this time and be ready to participate.

These general recommendations involve many economic factors and impacts that a health planner should consider in assessing the initiation and/or implementation of a shared service arrangement. These economic factors and impacts vary greatly depending upon the type of service, the type of arrangement, the market area, and the participants and nonparticipants involved.

When a service is basically administrative in nature, then the most likely type of arrangement to be considered is one that is nonexclusive (that is, easily permits the entry of nonparticipants) and symmetric (all participants receive essentially the same quality and nature of service). In some shared administrative services, the initial commitment by the participants needs to be strong and binding. This is especially true for those services which initially require a large capital expenditure by the participants. Some examples from the case studies are laundry/linen, printing, blood banking, and EMI brain scanner (volume 2 of the previous study). After the initial capitalization has been recovered (in the sense of net worth in the SA or repaid long term loans), then the commitment need not be as binding and participants may be freer to leave the SA if they desire.

Some administrative services which do not need large capital investments, such as personnel/collective bargaining, management engineering, dietetic services, and some types of education and training (for instance, in management and supervisory skills), do not initially need binding commitments from the participants to remain in the SA.

In most administrative service studies, the creation of an SA does not involve extensive behavioral problems with the medical staff. These services tend to be managerial in nature. As long as the medical services are not disrupted or affected, the medical staff tends to be uninterested. The trustees are often involved in the ultimate decision because long-run contractual and financial commitments by the hospitals are usually part of the arrangement. Consequently, any administrative service must be shown to reduce costs and/or increase the prestige of the participating hospitals.

The medical services studied are usually much different in their initiation, implementation, and economic impacts from administrative services. In the first place, some or all members of the medical staff are intimately involved in the service, and any changes usually affect direct patient care. For this reason economic/behavioral factors must be integrated prior to the initiation or implementation of a sharing arrangement.

The type of medical service arrangements also tends to be different. The arrangements are often more exclusive than those for administrative services in the sense that new members are not encouraged. Indeed, some of the medical service SAs, such as consolidation of obstetrics or medical pediatric services, are often designed to handle the demand capacity of the participants. There is little room for expansion. The arrangements tend not to be symmetric; that is, the service is often located at one or a few host hospitals which grant staff privileges to the physicians at the other hospital or hospitals. In essence, this situation makes the host institution more attractive for the service than the other participants. Finally, the arrangements tend to be binding either because the service required a large capital outlay, for instance, for an EMI brain scanner or a cobalt therapy unit, or the nonhost participants closed their own departments, such as obstetrics and medical pediatrics.

The market area and the effects on nonparticipants are larger factors in the area of medical services. If there are many unmet health needs, then expansion of the quality and/or quantity of medical services may have little noticeable effect on the nonparticipants, although the expansion would contribute greatly to the total community welfare. When there are not many untapped demands, the impact of a shared medical service on nonparticipants is less clear.

At times the effect of an SA on nonparticipants may be favorable. For instance, the number of their obstetric patients may increase because the obstetric department at one of the SA hospitals was closed. At other times the effect on nonparticipants may be unfavorable if the SA draws a better quality of staff physicians or patients from the nonparticipants. Then the nonparticipants may feel forced to counteract the losses.

The cost savings of the medical service SAs studied sometimes are directly passed on to the patients in the form of lower charges. More often the savings are used to upgrade the quality of care and the range of services available or to subsidize other loss-type activities.

In the initiation of medical service SAs, not only the medical staff but also the administrators and trustees are deeply involved. For these groups, the SA must demonstrate cost savings, cost containment, higher quality, and/or greater prestige to the participating hospitals.

Specific Recommendations

For administrative services the most important economic/behavioral factors that the health planner must assess are:

1. Capital needs to initiate the service.
2. Working capital needs to maintain the service.
3. Income prospects of the service in the short and long run.
4. Commitment of the participants to the service.
5. Ease of entry into the SA by nonparticipants at a later date.
6. Short-run and long-run costs of the service--potential economies and diseconomies of scale.
7. Availability of skilled personnel to administer and operate the service.

Other, lesser factors that must be assessed are:

1. The level of random variations in the demand for the service at the participating hospitals, prior to sharing and at the SA if it is initiated.
2. The effects of the SA on the medical staffs and the patients in the participating hospitals.
3. Community impacts of the service and on the service in terms of accessibility and availability of service, job opportunities for health care personnel, unmet health care needs, and geographic compactness of the service area.
4. Economic effect of the service on nonparticipants, especially in terms of utilization, costs, and medical staffs.

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3. Economic effect of the service on nonparticipants, especially in terms of utilization, costs, and medical staffs.
4. Capital needs to initiate the service.
5. Working capital needs to maintain the service.
6. Income prospects of the service in the short-run and the long-run.
7. Commitment of the participants to the service.
8. Availability of skilled personnel to administer and operate the service.
9. Short-run and long-run costs of the service--potential economies and diseconomies of scale.

Other, lesser factors that must be assessed are:

1. Level of random variations in the demand for the service at the participating hospitals prior to sharing and at the SA if it is initiated.
2. Ease of entry into the SA by nonparticipants at a later date and the desirability of such entry.

These specific recommendations resulted from observations made in the 6 cases studied for this volume and, to a small extent, the 16 cases studied for the prior four volumes. The next section summarizes and synthesizes the findings from the 6 case studies.

SUMMARY AND SYNTHESIS OF THE PRINCIPAL FINDINGS FOR ECONOMIC IMPACTS

This study addressed five distinct shared services in six case studies. These services were chosen so that at least six important economic aspects of sharing could be investigated. The economic aspects were formulated on the basis of an overall conceptual framework of shared service arrangements. Project staff members visited six different geographic areas to gather data for the analyses of the economic aspects. Later sections of this volume explain how and why the economic aspects were formulated and chosen and how the shared service sites were selected.

The five shared services studied were: personnel/collective bargaining, blood banking, laundry and linen, obstetrics and pediatrics, and printing. In addition, some segments of shared purchasing were included where appropriate.

The economic impact of a shared service arrangement is most generally all changes in the allocation of real resources among alternative uses and users, all changes in the distribution of products among consumers, and all changes in the distribution of resource costs in the community. These changes at all community levels involve analyses of economies of scale, capital availability, capital threshold levels, cash flow aspects, collective monopoly and monopsony power (through collective bargaining and purchasing), increased consumer demand, improvement in planning owing to reduction in random fluctuations, improveement in the spatial allocation of resources, and improvement in quality, comprehensiveness, accessibility, and availability of care.

The findings as presented cut across the case studies in terms of the analyses mentioned in the preceding paragraph. Detailed summaries are included in each case study.

Findings from the Case Studies

Economies of Scale

For essential daily services which hospitals can easily perform themselves and which tend to be administrative rather than medical in nature, such as laundry processing, linen purchasing, printing, blood banking, and purchasing of supplies, hospitals consider sharing arrangements primarily to achieve lower costs. However, in blood banking, there is another primary reason for sharing, that is to obtain a more dependable supply of blood. These SAs most often permit open entry by other hospitals. They involve an essentially equal commitment by all the hospitals involved. If the capital investment is small, usually these SAs allow member hospitals to leave the SA easily, if they wish to do so.

In the case studies, lower costs have been achieved for laundry processing, printing, blood banking, the purchase of certain supplies, through economies of scale. As the volume of these activities increase the cost per unit decreases and, in many cases, decreases significantly. Cost savings are then passed on to the participating hospitals in several ways. The most direct way is lower unit prices. A second way is the increased net worth and solvency of the SA (owned by the participating hospitals). A third way is the subsidi-

zation of other jointly shared services, which are often too costly for individual hospitals to support because the volume is insufficient to permit economies of scale. Some of the services which are often subsidized are education and training, management engineering, dietetics, warehousing, radiology, EMI brain scanning, and emergency medical services.

Specifically, economies of scale were noted in the following cases.

1. In shared laundry processing the primary reason for the scale economies is that increased units of production (pounds of laundry in this case) can be processed without a similar increase in the fixed costs. The magnitude of the benefits appears to be related to the difference in volume between the centralized unit and the inhouse hospital units. Managerial effectiveness appears to be a prerequisite for realizing the direct economies as well as other advantages, such as standardization and mass purchasing of linen. Finally, economies of scale tend to be understated, in that most cost calculations do not consider the alternate use of the released resources when a hospital joins a shared service. Significant space can be freed, and some reduction in personnel may occur at each participating hospital.

2. The blood banking case study also demonstrated significant economies of scale. There, the savings from the spreading of fixed costs was further augmented by more efficient inventory control and the reduction of the large presharing fluctuations between the supply of and the demand for blood and blood components at the individual hospitals. However, the cost of donor recruitment appears to have some built-in diseconomies, partly because of the lack of overall regional coordination of recruitment efforts and of the competition for donors from nonparticipating hospitals and other blood banks.

3. In the procurement of such supplies as anti-sera, blood bags, and RIA test kits (in the blood bank study) significant volume discounts were realized. The discounts were passed on directly in the prices charged to each hospital by the SA. In the laundry studies any volume discounts from linen purchasing were included in the per pound laundry charges. However, a significant additional cost for centralized linen services resulted from the large loss of linen supplies (presumably caused by hospital employee theft). Strong management controls would need to be instituted in order to keep this cost down; however, such controls may be expensive and possibly not cost effective.

4. In shared printing services, there can be very large economies of scale if the participating hospitals are willing to standardize many of their forms and/or if they order in large quantities. Too often, however, each hospital desires a slightly different form, and a large setup cost is thus incurred in its production. Also the hospitals do not wish to place large orders, possibly because of their tight cash flow situation but more likely because of their desire not to have large inventories of forms which they may wish to change at a later date.

In general, the cost savings realized by economies of scale persist over the long run. These cost savings may be passed on by the participating hospitals to the patients directly in the form of lower bills or indirectly in the form of expanded or higher quality services at the hospitals. In this way the patient community and/or insurers and taxpayers benefit from the cost savings.

In the cases reported in this study, there were no apparent overall diseconomies of scale owing to some segments of the costs per unit increasing faster than others decreased as the volume rose. It is conceivable, however, that as the services expand beyond certain volume levels, larger per unit costs of transportation, information processing, and administration could in the long run result in diseconomies of scale.

Capital Requirements

The availability of large amounts of capital to a consortium of hospitals and the lack of capital or the undesirability of a large debt for an individual hospital may contribute to the creation of an SA so that hospitals may obtain needed services. In the cases studied, if a large capital investment was needed for its formation, the SA tended, at least initially, to be somewhat exclusive in membership and to require rather binding relationships among the participants. If the service was primarily administrative in nature, the service was fairly equally shared by all participants. On the other hand, if the service was primarily medical in nature, it was centered at one or a few participants and utilized by the others. In either event a significant reallocation of resources was involved. One shared medical service discussed in the previous volumes was the purchase of an EMI brain scanner. In the case studies discussed in this volume, services needing a sizable capital investment were blood banking, laundry, and renovation of existing obstetric facilities.

Specifically, large capital requirements were noted in the following cases.

1. In order to start a centralized blood service, each of nine participating hospitals invested $100,000 for the procurement of facilities and equipment, rental of space, and working capital for initial operations. Because of the previously mentioned economies of scale and the large net surplus realized, the debt is expected to be repaid in four years, and at the same time the SA is expected to be operating at more than 60 percent net worth.

2. In the shared obstetric service study, one hospital faced a capital investment of more than $1,500,000. Rather than make this large investment for a medical service which was declining in volume and experiencing low and erratic occupancy, the hospital decided to combine the service with the obstetric department of another hospital in the SA and to locate the service at that hospital. In this manner a large capital outlay was avoided, and the facilities were used for other profitable purposes. For a moderate capital outlay, the obstetric-related facilities at the host hospital were upgraded and expanded to provide for the increased utilization.

The agreement for this consolidation is essentially exclusive and binding because the obstetric facilities at the one hospital were eliminated and the host hospital is operating at high occupancy levels.

3. One of the centralized laundry processing services studied required an initial capital investment of about $2,000,000 to serve 10 hospitals, and the other about $1,000,000 for 6 hospitals. In the former case the initial capital was raised by a long-term loan from a commercial bank. In the latter case the hospitals contributed about $400,000, with the remainder coming from Hill-Burton funds. Because of the large capital commitments, the agreements tend to restrict withdrawal by the original participants. Furthermore, each participant receives about equal value (relative to its size) from its agreements. However, the SAs are not exclusive in that new members are encouraged to join. As partial compensation for the initial capital commitment of the original participants, the new participants are charged a slightly higher fee for service.

In the long run, owing to economies of scale, the large initial capital outlays will be repaid, and the SAs will be able to pass on the increased savings directly or indirectly to the participants in the ways previously mentioned--lower costs, higher quality, and/or additional services.

The direct and indirect effects of the resource reallocations (caused by the large capital needs of shared blood banking, laundry, and obstetric services) on the nonparticipants and the community are more logically explained through the analysis of economic phenomena other than capital needs. For this reason the impact on these groups is discussed in the following pages.

Unified Strength for Pricing and/or Negotiating

If a more unified or united approach is taken to certain services and activities performed in hospitals, greater short-run benefits may accrue. These services often involve a consolidation of power or approach, so that the combined strength or unity of the hospitals is exercised through collective voices in such areas as billings to patients, purchasing of supplies, and labor relations. In the first instance the collective strength takes the form of monopoly power in setting prices. In the other instances the collective strength is manifested as monopsony power when the SA deals with supplies, employees, and labor unions.

In none of the case studies was monopoly power evident as a means for achieving economic benefits through shared services. However, as only individual services were examined, it was not possible to infer whether monopoly power is a significant element in the success of the SA as a whole - for example, in basic negotiations with reimbursers.

Monopsony power, exerted overtly with clear direction and cohesion, also was not observed. In the purchasing area, the cost savings resulted from volume discounts rather than from a single buyer and many suppliers. In the labor relations study, the SA did not want a statewide or even a multihospital labor

agreement, like that of the New York League of Voluntary Hospitals. Instead, the unifying approach taken was to disseminate all wage and benefit information collected from participating hospitals (both organized and nonorganized), to conduct educational forums on labor relations, and to aid in negotiations at individual hospitals when requested to do so. The economic benefits of this approach have been an averaging of wage-benefit levels in the state (except for urban-rural differences) and a 2 percent lower rate of hourly wage increases for registered nurses relative to the national average for 1970 to 1974. These benefits have occurred without a reduction in hours or quality of care.

The labor relations program of the SA is nonexclusive and not binding on the participants, that is, they may join or leave as they desire. Furthermore, all benefits are equally available to all participants who desire them.

The nonparticipants in the state (there are only a dozen or so) have possibly benefited indirectly from the SA, in the sense that the overall state level of wage and benefits paid has been lower than the national level and, consequently, lower in nonparticipating as well as participating hospitals.

The community has benefited from lower hospital charges without reductions in the quality or level of care.

Reduction of Formerly Unmet Health Needs

It is doubtful that patient demand has increased because of the existence of any of the shared services studied. In the obstetrics and pediatrics study, there was a significant relocation of demand from some hospitals to others. It is possible that some increased demand was experienced at the hospitals with the consolidated facilities, owing to an upgrading in quality and an expansion of the facilities, rather than just a transfer of demand from those hospitals which closed or downgraded the scope of their facilities. However, it is not possible to assess the amount of this increased demand or to tell whether it was merely a transfer from nonparticipating hospitals or was newly emerging formerly unmet needs.

It is clear, however, that a small but significant amount of the former patient demand at the hospitals which closed their facilities went to nonparticipants in the SA. In this sense, the nonparticipants benefited from the existence of the SA.

Reduction in Random Fluctuations

In the medical shared services studied--obstetrics, pediatrics, and blood banking--there has been a significant improvement in planning and scheduling (both medical and administrative) because of reductions in the random fluctuations of patient demands. The reductions occur because of the larger volume of activity in each service without any significant increase in the variability of the activities. Indeed, in blood banking the coefficient of variation is much lower because the supply of and the demand for blood and blood components are pooled.

Specifically, reductions in demand fluctuations were noted in the following cases:

1. In the obstetric service the host hospital of the SA received more than half of the demand formerly handled by the hospital which closed its obstetric service. This increase came at an opportune time because obstetric admissions had been steadily declining and occupancy would have been a serious problem in the future.

2. A similar phenomenon occurred in medical pediatrics. Specifically, medical pediatric cases at the host hospital were increased by more than 100 percent during the postconsolidation period (1970 to 1975).

3. The sharing of blood banking services leads to large reductions in the fluctuations of supply and demand. Much of the supply is drawn by phlebotomists on mobiles. Often the number of units at these drawings is large. Because whole blood and packed red cells expire in 21 days, an individual hospital cannot use all of the supply in a three-week period. Spread over many hospitals, however, the supply is easily used.

   Demand for blood and components at any single hospital varies greatly from day to day. When the daily demands for many hospitals are added together, the variation evens out. Because of these smoothing effects, shared blood banking services handling a volume of 40,000 or more units can realize a reduction of blood shortages to the 0 to 1 percent level and of outdates to the 2 to 4 percent level. Independent nonparticipating small or medium-sized hospital blood banks often have much higher shortages and outdates at the 15 to 20 percent level.

Spatial Reallocation of Resources

In most of the case studies there has been a spatial reallocation of resources. There was a complete spatial reallocation of medical pediatrics and obstetrics from the hospitals closing these services to the host hospitals of the SA. In laundry processing and printing, the spatial reallocation of the service is virtually complete. That is, very few laundry or printing activities have been retained by the participants, and most of the work is performed at the SA location.

The shared blood services have resulted in less spatial reallocation of resources. Most participants retain some donor services and small processing capabilities. All participants still need facilities for inventory storage and crossmatching. Some even retain full phlebotomy facilities.

Specifically, spatial reallocation of resources was noted in the following cases.

1. The hospital which closed its obstetric department used the facilities to expand the available number of beds for another department which had a very high occupancy rate. Because there was an excess demand for beds in this department, the new beds were needed and used. Thus, the consolidation turned a money-losing obstetric department into a nonloss activity.

The medical pediatric facilities at the hospitals which closed this department were used for the exapnsion of other medical and surgical pediatric departments.

The obstetricians and medical pediatricians whose departments were closed were given full privileges at the host SA hospital. However, there was considerable dissatisfaction among these physicians about the consolidation, and a few of them essentially withdrew their practice from the consortium.

2. Even though some of the participating hospitals in the laundry processing SAs still maintain small laundries for specialty items, they have physical space available for other activities. A few participants have converted the old space to marginal uses, but even these participants have benefited by not allocating space in new construction or renovation for laundry processing.

3. In the blood banking activity, the small amount of space freed because handling, processing, and donor service activities are performed at the SA, has often been used for the routine growth in other blood bank activities or to expand the laboratory facilities of the hospital. The medical technicians who handled blood processing in the blood bank were reassigned to the laboratory or to other blood banking activities. Because many of the donor recruiters were volunteers, their services were used elsewhere. Finally, the phlebotomists were usually absorbed in the system to perform other tasks (often they were only partially assigned to phlebotomy even before the SA was organized.)

The spatial reallocation of resources caused by the creation of the SAs had little effect on the nonparticipating hospitals, except in the case of obstetric and medical pediatric activities. Some of the obstetricians and medical pediatricians moved their primary practice to nonparticipating hospitals. Although the data are not clear, perhaps the host SA hospitals may have received some of their increased demand at the expense of the nonparticipants, because the shared facilities were upgraded and expanded. In these activities, the spatial reallocation of resources has also caused some transportation and scheduling problems for the physicians and the patients formerly affiliated with the hospitals which closed their facilities. Indeed, the host hospital for obstetrics is located in a different county, so many welfare patients go to nonparticipating hospitals in their own county.

All of the foregoing benefits and disadvantages of the spatial reallocation of resources have resulted in the few years since the consolidations. In the long run, it is anticipated that there will be little change in the effects of these reallocations in laundry, printing, or blood banking. However, the long-run effects in obstetrics and medical pediatrics are not clear. Unfortunately it may be difficult to measure the long-run effects because of other factors, such as social values and regional changes in demographic characteristics, which will tend to confound the analysis.

Quality, Comprehensiveness, Accessibility, Availability, and Acceptability

Economic effects such as improvements or reductions in the quality, comprehensiveness, accessibility, availability, and acceptability of services provided by SAs were extensively discussed in the earlier four volumes. The effects in the case studies included in these volumes, have been discussed in this section. In general, the SAs tend to provide a wider range and mix of services than any one hospital can economically provide by itself. Furthermore, the quality of these services is usually as high as or higher than the quality of the services provided by the participants prior to sharing. In services such as laundry/linen, printing, blood banking, and labor relations the accessibility, availability, and acceptability present no problems, and, indeed, these services are usually very well received by the participants. The reallocation and transportation difficulties in the obstetric and medical pediatric consolidations have presented accessibility and acceptability problems, as has already been mentioned.

In summary, the SAs studied in this report have been quite successful in achieving their short-run economic objectives through the realization of economies of scale; the obtaining of needed capital and working cash; collective negotiating with suppliers, employees, and unions; better planning because of reduced random demand fluctuations; improvement in the spatial reallocation of resources; and improvement in the quality, comprehensiveness, accessibility, availability, and acceptability of their services.

Most of these short-run benefits will carry over to the long run because they are based on economies of scale, higher productivity, and improved profit and cash positions. Furthermore, the existence of most of the services does not threaten, and in some cases actually enhances, the position of the nonparticipants. Because many of the services are nonexclusive, some nonparticipants have later joined the SAs.

Most of the economic benefits are passed on directly to the patients (and indirectly to the community and taxpayers) through lower costs and higher quality and range of services. Some of the benefits are indirectly passed on by subsidization of other services and activities.

There are, however, some disadvantages and disruptions owing to some of the sharing activities. Several of these appear in the consolidation of obstetrics and medical pediatrics, where the long-run benefits and impacts on patients, physicians, and nonparticipating hospitals are not clear. In the printing area, many of the potential benefits are not realized because of the various hospitals' desire to have different forms and to make changes on reruns. The purchasing of linen by an SA appears to result in a greater loss problem than if the hospitals own their own linen. However, purchase of linen by the SA results in greater volume discounts, and there is no need for the SA laundry to sort each hospital's linen by name after laundering.

In most cases the economic benefits of sharing greatly outweigh the disadvantages if the shared service is well managed and the participants are willing to yield some of their autonomy. Nonparticipants are in large measure unaffected by the sharing of administrative services, and the community, in

general, tends to benefit. Nonparticipants appear to benefit from the medical pediatric and obstetric consolidations. The community, in general benefits from higher quality, up-to-date service, but some patients must travel farther to obtain care.

CONCEPTUAL FRAMEWORK

This section is a systematic conceptual discussion of the possible economic effect of shared service arrangements (SAs) on participating institutions, nonparticipating health care organizations, and areawide health care delivery. The conceptual framework for the study of the economic impacts of shared service arrangements is defined. "Working" definitions of some economic terms used through this volume are also given.

On the basis of the definitions of economic terms, the conceptual framework is expanded from a brief definition into many major components and interactions. At the end of this section, a diagram summarizes the expanded conceptual framework for the study of the economic impacts of SAs.

Definition of the Conceptual Framework

A satisfactory conceptual framework is a set of assumptions and consensus observations which are combined into one or more models with these properties:

1. The models must be basically consistent with the researchers' current knowledge about SAs.

2. Predictions may logically be derived from the models, and appropriate statistical tests may be designed.

3. The models must show that some statistical investigations and some measured variables are more crucial than others because they test assumptions with widespread implications.

4. The explicit analysis of the models resolves uncertainty as to whether a complete set of empirical tests has been considered and further clarifies the limited scope of the entire project.

The health care industry has many distinguishing characteristics. Each characteristic is a complex of interrelated variables, not all of which can be exhaustively enumerated, let alone quantified. To make possible some insight into the industry, the characteristics are, in this work, related to economic theory, especially market theory and game theory. The relationships between the characteristics of the health care industry and market theory are in part derived from empirical findings in shared services and other interorganizational linkages in the health care field. Human factors are accounted for by relating these characteristics and empirical findings to realistic behavioral postulates in part derived from game theory concepts. The interaction of the market environment with the behavioral postulates generates important issues and testable hypotheses. The proposed tests in this project take a case study approach. The findings from the case studies address the issues and hypotheses from the perspective of shared service organizations, nonparticipating providers, and the health care market area.

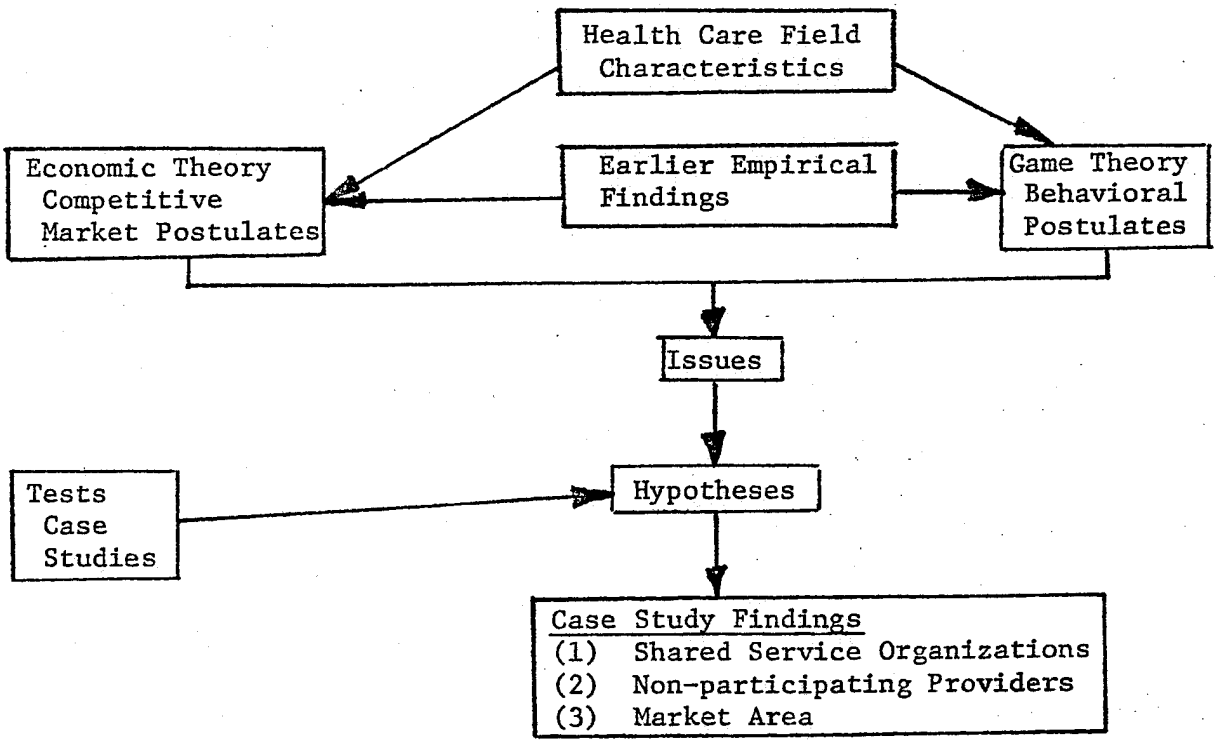

Figure 1. Schema of the Conceptual Framework

Other Working Definitions

The economic impact of a shared service arrangement is most generally all changes in the allocation of real resources among alternative uses and users, all changes in the distribution of products among consumers, and all changes in the distribution of resource costs in the community.

More specifically, it is possible to observe the quantity and degrees of various health services provided in a community, the accounting costs of health service providers, the amounts of various inputs in the production of health services, the incomes of health professionals, and the payments for health service by patients directly, by prepaid subscribers to health insurance, and by taxpayers in support of government expenditure. There are inherent obstacles

to the direct measurement of the quality of health service and the job satisfaction of health professionals. Nevertheless, the subjective costs and benefits were not ignored when hypotheses about economic impact were developed.

Every shared service arrangement has participating health service organizations (HSOs) which engage in expressed or implied contracts to delegate some individual autonomy in the production of services.

A market area is defined by the population served jointly by a variety of HSOs, private physicians, and government agencies. Any one institution may partly overlap adjacent market areas, so that in practice conventional geographic areas have been defined by government programs. Within a market area, a shared service arrangement may or may not include all providers of a particular service, or all users of a particular input. A competing HSO or private provider may offer substantially the same service as the participants in a shared arrangement or may hire the same inputs. Competing HSOs are often called nonparticipating providers or nonparticipants. A supplementary provider, by contrast, offers services which tend to be sought in conjunction with the services offered by the shared service arrangement.

A reimbursement authority is a means by which subscribers or taxpayers pay a large share of the costs of health care. Agreements on reimbursement typically involve direct negotiation with an HSO as well as rules defining reasonable and prevailing unit costs.

A contract is a voluntary agreement by participants that commits them to a future course of action. A side payment is a supplementary benefit, monetary or nonmonetary, to one participant sufficient to obtain his agreement to the contract. (These definitions are not guided by legal precision but rather facilitate the description of behavioral interaction.).

A shared service arrangement is said to be exclusive if it does not permit the addition of new participants. It is nonexclusive if HSOs are permitted to join easily.

An SA is said to be binding if it is difficult for a participant to withdraw because of a legal, strong financial, and/or strong ethical commitment to remaining a member. The arrangement is nonbinding if a participant may withdraw from the arrangement easily.

An SA is said to be symmetric if all participants yield about the same amount of autonomy to the SA and receive about the same quality and nature of benefits from the SA. It is nonsymmetric if one or more participants have more authority and/or receive a higher quality or nature of benefits than the other participants. An example of a symmetric SA would be shared laundry processing, an example of a nonsymmetric SA would be a consolidated obstetric department.

Expansion of the Conceptual Framework

As volumes 1 to 4 of this study show, the economic impacts of SAs were primarily on costs, revenues, capital investments, cash flow, and improvements in quality, comprehensiveness, accessibility, acceptability, and availability of the shared service organization to its members. The economic analysis was not complete because (1) the primary concern of the first four volumes was not the economic impact of SAs, (2) there was a lack of readily available economic data, and (3) even in the economic analysis that was performed only an ad hoc framework was used in an attempt to conceptualize the results. In this volume a conceptual framework is presented to enhance the understanding of the potential impact of an SA on the participating hospitals through the identification of all the important variables and their interrelationships.

In addition, the earlier volumes did not cover in any depth the significant economic impacts of SAs upon nonparticipating providers and upon the community and health care delivery market area. Consequently the analyses of the economic impacts of SAs at all community levels involve analyses of economies of scale, capital availability, capital threshold levels, cash flow aspects, monopoly power and monopsony power (through collective bargaining and purchasing), increased consumer demand, improvement in planning owing to reduction in random fluctuations, the improvement in the spatial allocation of resources, and the improvement in quality, accessibility, and availability of care.

In order to understand better the changes in the allocation and distribution of resources and products and their economic impacts, it is necessary to investigate the motivations and interests of the three principal groups responsible for the operation of a single hospital--trustees, administrators, and admitting staff physicians. These motivations and interests form the background of the game theory-behavioral postulates (interacting with the health care field characteristics) of the conceptual framework.

Behavioral and Competitive Market Postulates

A trustee is assumed to desire large budgets, small or zero deficits, and the relative prestige of his institution. An administrator is thought to share these desires and, in addition, to want career security -- an objective which in practice, he may achieve through breadth of contracts and working relationships, accumulation of new skills, and scope of responsibility. An admitting physician's income and prestige depends on the input intensity of hospital service, the range of available specialty facilities, and the areawide staffing and referral patterns. Of course, not all persons are motivated in the same manner or have the same interests and objectives. At times, altruistic and moral-ethical factors influence decisions. However, for the most part, SAs represent business decisions only secondarily related to their implications for patients, (except perhaps in a few of the medical SAs such as consolidation of obstetric and/or pediatric services). The personal interests of the three major decision-making groups tend to be the principal explicit or implicit motivational factors in determining the initial participation in a SA. Furthermore this initial participation in a SA is postulated to require that individuals in the three groups benefit directly or through side-

payment to the extent that they are affected and have blocking power. This fundamental postulate makes it clear that an adequate theoretical model generates hypotheses both about the existence of particular SAs and about the economic impact.

At initiation not all services involve a conflict situation and side payments. A review of relevant economic characteristics of the hospital industry suggests that there do exist some services offering potential unanimous benefit to all participants. A service of this type would be blood banking. In shared blood banking the physicians benefit because of a less random supply, the availability of more types of components, usually easy access to the advice of a highly qualified hematologist and/or immunohematologist, and earlier introduction of new research concepts in blood therapy. The administrators benefit from fewer donor problems, somewhat less physical space for the blood bank, often lower costs, and easier patient scheduling because elective surgery need not be postponed for lack of proper blood supplies. The trustees benefit in a smaller way from the lower costs, but their prestige and interests are not affected by the sharing of blood bank services.

Thus in the initiation of an SA the behavioral characteristics of the major participants play a large role. Over time, as the SA progresses, other economic and market characteristics may become important for the long-run survival of the SA. These characteristics form the background of the economic theory-competitive market postulates (interacting with the health field characteristics) of the conceptual framework.

In order to understand the long-run survival of an SA, it is necessary to take up the general question of the stability of the SA, or the long-run versus the short-run economic impact. The particular individuals involved with the operation of a single hospital will change over time; thus the requirements for survival of the SA may well differ from the requirements for initiation. Indeed, it is postulated that, for the long-run survival of the SA, it is likely that the perceived benefits, economic and/or noneconomic, which were originally anticipated must be, or at least must be thought to have been, realized and maintained. These perceived benefits would include the continuing satisfaction of the behavioral interests of the three major groups and the quality and quantity of economic benefits resulting from the SA. Initially the economic benefits may be passed on to the patients through lower costs, slower rise in costs, or higher quality and comprehensiveness of care. Or the economic benefits may be passed on to the staff (administrators or physicians) in terms of higher salaries or fringe benefits. A third possibility in the short run is that there is no net economic benefit to the market area but rather the members of the SA may realize short-term gains at the expense of the nonparticipating providers. In the third case the gains for the SA are merely transfers from the nonparticipants because of their exclusion from the SA or because of the exploitation of collective negotiating strength (monopsony and monopoly). Consequently two other important postulates are: (1) in the case of increased net market economic benefits to all affected parties, there are no social forces tending to reverse the short-run impact, but (2) in the transfer case, the SA may not survive or it may be significantly less effective if there is sufficient retaliation by nonparticipants or if political power is exerted on behalf of suppliers and consumers.

In SAs not affected by countervailing forces such as unions, reduced numbers of suppliers, stronger third party payers, or other SAs, the short run economic benefits resulting from economies of scale and improved spatial allocation should continue into the long run.

However, long-run effects may be adversely affected because the reason for sharing no longer exists (for example, less expensive technology has replaced older technology) or management is poor and inefficient, leading to high costs and frustration among the three major groups--trustees, administrators, and admitting staff physicians.

Health Care Field Characteristics and SA Classifications

"Health care field characteristics" and "earlier empirical findings" play an important role in the conceptual framework. Some of these characteristics in relation to the three principal interest groups in the hospital and to the nature of the competitive hospital market have already been mentioned. It is now useful to discuss some additional characteristics.

The first set of characteristics of importance is the attributes of shared service arrangements. Since SAs can be categorized or classified by their attributes, the choice of which attributes and categories are significant depends upon what is to be studied and tested. In the first four volumes one of the classifications was by the type of agreement--multi-sponsored, regional, referred, or purchased. From an organizational and legal perspective this classification was useful. However, when the economic effects of SAs are assessed, this classification has little value.

From an economic perspective a more useful categorization is whether the commitments are exclusive, binding, and/or symmetric. Exclusive arrangements make joining difficult, binding arrangements make leaving difficult and symmetric arrangements maintain all participants in relatively equal positions. Each of these attributes plays a role in the economic impact of an SA. Moreover, particular services are likely to be shared mostly in agreements with particular attributes.

Another important feature of the health care field characteristics is the market area conditions that are relevant to the economic impact. Some of these market area conditions are whether (1) suppliers and professional health manpower have a narrow range of alternative employment, (2) reimbursement authority is highly concentrated in a small number of agencies or firms, (3) there are extensive unmet health needs and potential demands, and (4) the market area is geographically compact.

These characteristics of a market area tend to affect the nature of SAs that are initiated and survive. For example, when condition (1) holds, there is larger potential benefit to the hospitals from monopsony strength, which makes wide and binding participation more rewarding. When condition (2) holds, there is an analogous motivation for collective strength in reimbursement negotiations. When conditions (3)and (4) hold, there is less incentive to exclude, and it would appear to be more difficult to enforce exclusion on economic grounds.

In addition, the market characteristics themselves have direct implications for economic impact. When (1) and (2) hold, the role of the staff physicians is likely to be reduced. Hence any potential cost savings are more likely to be passed on to patients than to be used for increases in quality or comprehensiveness of care or compensation to staff. When (3) holds, there are likely to be fewer repercussions for nonparticipant institutions.

Thus, the market area conditions in conjunction with the SA attributes and economic/behavioral postulates lead to testable aspects concerning SAs. However, more characteristics of SAs are needed before a full set of economic issues and hypotheses can be presented. These characteristics are a classification of the shared services themselves on the basis of the principal group which interacts with the services.

Particular Services and the Nature of Arrangements

In a 1971 survey of hospitals engaged in sharing,[3] the most frequently shared services were the following:

(1) Administrative services
- Purchasing of medical/surgical supplies
- Data processing
- Purchasing of linen and housekeeping supplies
- Purchasing of drugs
- Purchasing of laboratory supplies

(2) Medical services
- Laboratory professional staff
- Blood bank

(3) Selected public services
- Disaster planning
- Emergency radio network

In the previous volumes all services were classified as administrative, medical, manpower, or training. A slight rearrangement of the earlier classification is given here because of the focus on economic impacts. Administrative services are thought to raise no conflicts with the staff physicians, and the potential benefits involve internal cost savings and monopsony power (that is, collective bargaining and purchasing power). The sharing or consolidation of medical services may initially require that the blocking power of physicians staff members be overcome, and some of the benefits may hinge on binding and/or exclusive agreements and monopoly results. A competitive industry may tend to undersupply public services because the benefits are diffused throughout the community. A particular institution may not be willing to undertake a full program on its own. To the extent that public ser-

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[3] See Astolfi, A., and Matti, L. Survey profiles shared services. Hospitals, J.A.H.A., 46; 61, Sept. 16, 1972.

vices had been supplied by individual institutions, the SA has potential for internal cost saving and improved spatial allocation. Improved spatial allocation represents a cost saving to patients, with possibly increased utilization and better health outcomes.

The initial list of services must be expanded in recognition of the 1974 survey of sharing organizations and the 1975 study of 16 important sites.[4] The 1974 survey covered 157 formal sharing organizations (nearly all such organizations listed in the 1974 edition of the American Hospital Association Guide to the Health Field.) Among the services most widely offered by these sharing organizations, in addition to those already listed, were the following:

Education and training	37%
Personnel/collective bargaining	25%
Credit and collections	23%
Management engineering	22%

It is clear that all but the first item belong in the administrative category. Furthermore, the study found that, for the most part, the educational services represented new activities for most of the participants.

Because formal sharing organizations have typically not included clinical medical services, the set of 16 case studies in volume 2 gave special attention to agreements involving obstetrics, pediatrics, and emergency medical services. The third item is classified as a public service. Radiology, another important shared medical service, was extensively treated in the first volume.

The economic/behavioral postulates, interacting with the health field characteristics, the arrangement attributes, and the shared service categories, lead to interesting and important questions and conjectures concerning the economic impacts of shared services.

Because the sharing of administrative services is not likely to affect directly the number and mix of patients using the hospitals and because there is a possibility of internal cost savings for each participant, it can be predicted that exclusive agreements will not generally be required when administrative services are initiated. The 1974 survey indicated that the average number of hospitals in sharing organizations sponsored by regional associations was more than 60; the number was only slightly less for other sharing organizations. Wide participation is desirable for shared service organizations wanting monopsony strength or countervailing power vis-a-vis health manpower unions or wholesale distributors. Sharing agreements for administrative services are symmetrical because no hospital typically would need or want to give up administrative autonomy for these nonexclusive benefits. Whether the agreements are strongly binding may affect the collective negotiating strength against suppliers,

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[4] The 1974 Survey is analyzed in volume 1 of Health Services Research Center. "Methodologies for Health Planners to Evaluate Services Shared by Health Care Organizations." Chicago, the Center, January 1976. The 16 case studies are analyzed in volume 2.

but there is no compelling argument that a binding agreement is required for the existence of sharing. However, in the long run, so that economies of scale in purchasing or smaller wage increases in collective bargaining may be achieved, strong binding agreements are usually more effective.

The medical services are predicted to have quite a different pattern of management attributes. Here an arrangement tends to include the elimination of a service by some participants and expansion by others and therefore is most often nonsymmetric. Because the blocking power of physician staff members will typically have to be overcome with some type of side payments, exclusive binding agreements are anticipated in this area. The fact that none of these services is covered in sharing organizations with a wide range of services tends to confirm this hypothesis. (Exceptions to this conjecture include blood banking and other services such as radiology. There are different expectations because, as was mentioned earlier, there are benefits to be realized by trustees, administrators, and staff physicians when such services are shared.

For the category of public services, spatial allocation is expected to change insofar as it is permitted by regulatory agencies. Therefore, binding commitments are anticipated, but there is no reason to suppose that exclusion would be desired. However, this hypothesis is not wholly borne out by prior evidence concerning educational services. Case studies in volume 2 show that the particular educational services were new for all participants, and therefore there was no concern with redistributing costs. With regard to in-service training programs for nurses and technicians, a question remains as to whether such programs are found in strong agreements tending to reallocate training and redistribute cost. The greater coordination of planning in the public service area is suggested as an attractive component of improved collective negotiating strength with reimbursement agencies, and hence this provides another argument for nonexclusive agreements.

A high degree of exclusion may affect nonparticipant providers in different ways. In the event that quality, comprehensiveness or accessibility of care is improved for SA members, nonparticipants may expect to lose a share of their market. The cost savings at the SA may merely be transfers (that is, cost rises at the nonparticipating institutions). The nonparticipants may then attempt to regain their market share of patients by improving their facilities or by joining exclusive agreements of their own.

However, the exclusive agreement may have been formed to guarantee a reasonable capital input and a base of utilization by each participant in the SA. The exclusion may be necessary because the shared service is at near capacity, the nonparticipants have a different philosophy concerning health care (such as: pro-abortion versus anti-abortion or proprietary versus not-for-profit), or the nonparticipants may be so large as to dwarf or overwhelm the participants.

In these cases, the nonparticipants may not be adversely affected and indeed may benefit from the existence of the SA. For example, the participants in an SA may agree to merge obstetric facilities into one location. This consolidation will free space at the locations no longer having obstetric facilities and allow them to use the space for more "profitable" services than high-cost, low and erratic volume obstetric service. The facility with the

consolidated obstetric service should benefit from a less erratic volume, lower costs, and higher revenue owing to higher occupancy and higher quality and comprehensiveness of care. However, the nonparticipants may also benefit if some of the displaced obstetricians and/or pediatricians move their business to the nonparticipating hospitals. The entire market area may benefit from higher quality and comprehensiveness of care and possibly lower costs. Of course, the added time for travel and the reduction in accessibility for some patients and physicians provide an implicit extra cost of the consolidation.

When agreements are strongly binding on the participants, it may be easier for them to exercise monopoly and monopsony powers, at least in the short run. In the long run these powers may be diluted because they bring forth countervailing powers, such as unions or the withdrawal of suppliers from the market (in the case of monopsony), or political pressures or coordinated third party payers (in the case of monopoly). However, strongly binding agreements may be needed not to permit the SA to exercise monopoly or monopsony power but rather to guarantee at all times a sufficient capital input and volume of activity to justify the existence of the service. For example, the SA may purchase an EMI brain scanner or other highly sophisticated expensive equipment because the volume of activity for a single institution is small.

In general, symmetrical, nonbinding, and nonexclusive arrangements which predominate in the administrative area suggest primarily an improvement in spatial allocation and the actual realization of potential scale economies. By contrast, for medical services it is anticipated that potential economies of scale will not be reflected in total cost reduction but rather will be exploited for quality enrichment, comprehensiveness of care, and compensatory programs.

With the use of the framework provided by the economic/behavioral theory and the relationships among the services, agreement attributes, and market area conditions, several propositions were derived concerning the dynamics of sharing. These propositions are presented in the next section as twelve testable aspects of shared service arrangements which affect the members, the nonparticipants, and the total market area.

At the beginning of this section a diagram of a conceptual framework was presented (Figure 1). Figure 2 is a detailed expansion of Figure 1.

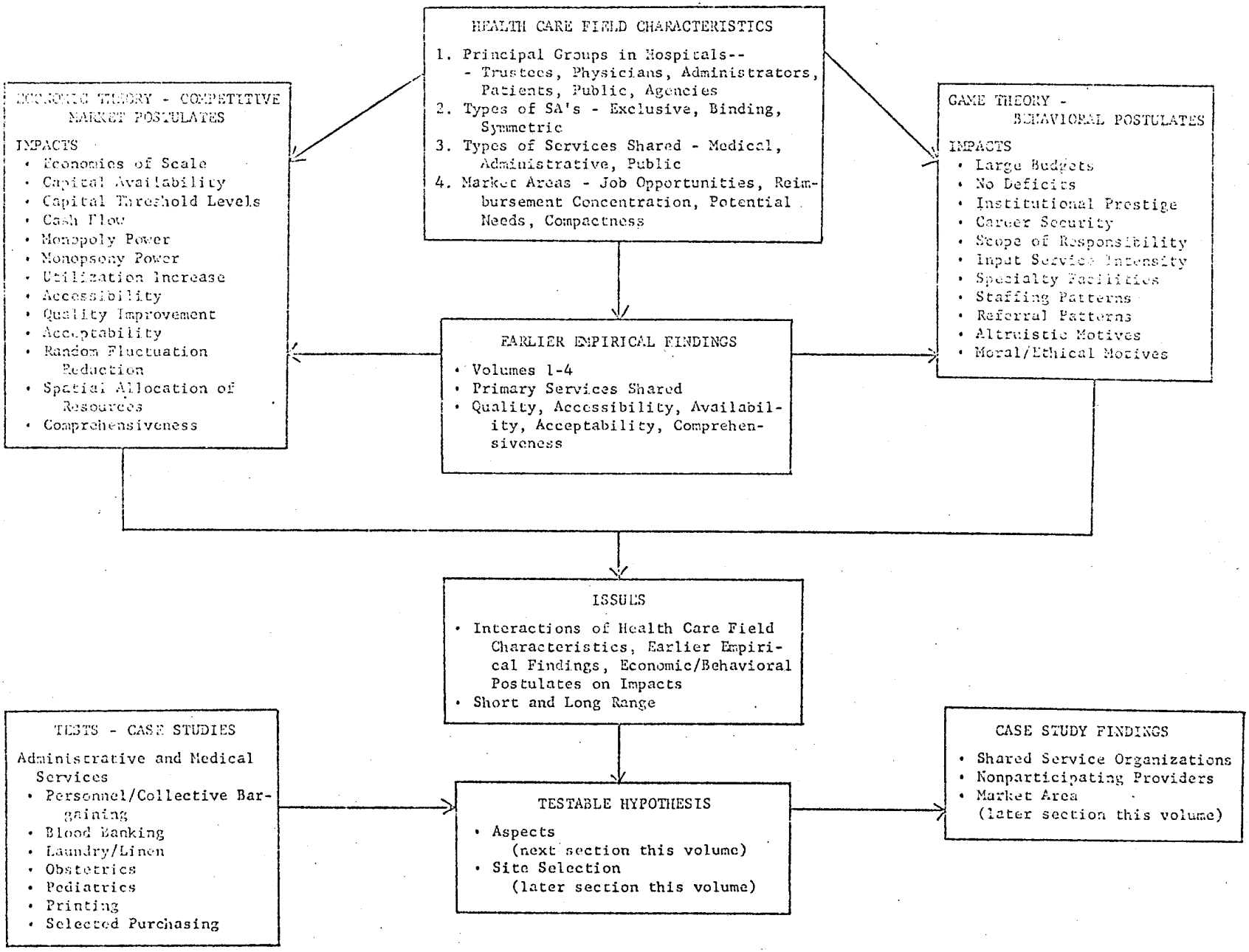

Figure 2: Detailed Schema of the Conceptual Framework

TWELVE SPECIFIC ASPECTS FOR DETERMINING ECONOMIC IMPACTS

On the basis of the previous analysis of the potential economic impacts of shared services, there are many specific aspects of shared service agreements (Sas) which can be formulated and testsd. These aspects (or anticipated effects) apply to the SA, the nonparticipants, and economic impacts in the market area. The aspects relate to the interaction of the types of services, the agreement attributes, the market conditions, the participating and nonparticipating hospitals, consumers, and third-party payers with respect to economies of scale, monopoly and monopsony power, spatial allocation of resources, comprehensiveness, and quality of care as well as to many other economic benefits. For ease of analysis, the following aspects have been categorized by administrative, medical, and public services and by market area and dynamic (or long-term) effects. The contract required that six aspects be selected as the basis for the case studies.

Administrative Services (Aspects 1, 2, and 3)

The first 3 specific aspects of economic impact are concerned with administrative services generally found in nonexclusive, symmetrical SAs. For none of these services, which are indirect in the delivery of health care, are any significant effects on nonparticipating health services organizations (HSOs) anticipated. Benefits to participating HSOs are expected to arise from potential economies of scale (fewer inputs per unit of output) or from collective negotiating strength in supply and manpower markets (monopsony).

1. For activities involving significant investment in capital equipment or specialized personnel, such as data processing, laundry and credit/collections, sharing permits larger scale facilities with consequent lower average operating cost.

2. To the extent that the geographical area is large and administrative and transportation costs are substantial, the potential savings from scale economies may be outweighed by increases in these other expenses. However, the sharing may be beneficial because of reduced capital needs or reallocation of space.

3. Sharing of administrative activities such as group purchasing and personnel/collective bargaining can lead to cost savings by virtue of volume (negotiated) discounts and reduced internal competition for employees. Some of these benefits (cost savings) may be of short duration, while others can be realized continuously. The magnitude of these benefits depends on the nature of the service, the size of the SA, and the structure of the input market, including the number and size of the nonparticipating providers.

   To the extent that collective bargaining might enable hospitals to pay a lower employee wage rate, the participants will benefit. However, to the extent that employees realize that they are receiving a lower wage, they may be motivated to form a union as a countervailing power. In this sense, the economic benefits accruing to participating hospitals may be of a short duration.

If, on the contrary, the employees have a union already, through which they are receiving a higher wage rate, the increased negotiating strength provided by the SA might enable the participating hospitals to pay a competitive wage in the future. This benefit can be considered, then, a long-term one.

In the case of group purchasing the SA can achieve volume discounts from suppliers which otherwise would not be available to each participating hospital. These discounts may be received over a long period of time because volume purchases may reduce the sales/distribution costs of the suppliers. Discounts will also be permanent to the extent that the suppliers had previously charged excessive prices owing to a monopoly type of market.

Medical Services (Aspects 4, 5, and 6)

For medical services in general, it is anticipated that binding and usually exclusive agreements will be found. In addition, these agreements will usually be structured in such a way as to overcome physician blocking power or excessive capital investment for a single institution. The exception to this anticipation would be a service such as blood banking which is a blend between medical and administrative. While internal cost savings are expected for two reasons--economies of scale and reduced variability--these savings may not be passed on to the community because of incentives to raise input intensity and/or the quality and comprehensiveness of care.

4. Cost savings, increased quality, comprehensiveness, and availability of care, the introduction of new research concepts, and the attraction of specialized personnel seem to be strong motives for the consolidation of such services as blood banking in nonexclusive agreements. In particular, more efficient donor recruitment, promptly available special blood types and/or types of components, smaller physical space requirement, easier patient scheduling for surgery, and the attraction and utilization of a hematologist and/or immunohematologist are benefits generally thought to occur from the sharing of a blood bank service. The participants and the patient community are expected to benefit from this type of SA. There are no a priori reasons to suggest that nonparticipating institutions will be affected negatively (except possibly in donor recruitment).

5. Direct or final medical services consist of strongly binding and nonsymmetrical agreements, which usually are exclusive. Improved capacity utilization, economies of scale, and a reduction in the random fluctuation in the demand for these services are expected to yield savings which may or may not be passed on to the community in the form of reduced prices. Whether costs and/or prices for the services go down or up will depend on the extent to which input intensity (quality) and comprehensiveness of care rise. It is obvious that the participants will benefit directly and indirectly from this type of SA. The patient community utilizing the services of the SA is expected to benefit from the savings and the improved quality and comprehensiveness of

care. However, patients may lose in terms of the availability of and/or accessibility to the service. In addition, there is the potential risk of monopolistic power being exercised by the SA if the participants are inclined to use it and the market conditions allow it. (The participant might be the only one offering the service.)

6. The impact of sharing final medical services (inbinding, exclusive, and nonsymmetrical agreements) on nonparticipating hospitals is more difficult to judge on a priori theoretical considerations and must be investigated empirically. For example, consider two hospitals offering, among other services, services X and Y. Suppose that these hospitals enter an agreement by which one will maintain service X and drop service Y, while the other will maintain service Y and drop service X. In the short run, no impact on nonparticipating hospitals would be expected if the physicians on the staffs of these two hospitals specializing in services X and Y are fully compensated. However, to the extent that some of these physicians decide to utilize the services of the nonparticipating hospitals (either because they were not fully compensated or because of the change in the location of the service), nonparticipating hospitals will benefit in terms of increased utilization. Even if some physicians move their services to nonparticipants, the participants in the SA may still benefit from lower costs owing to reduction in demand fluctuation, better spatial allocation, or increased quality and comprehensiveness of care.

   On the other hand, in the short run it is possible, under certain conditions, that the share of the nonparticipants in the market might be reduced. This might happen if the participating hospitals specialize in services X and Y, expand them, improve their quality and comprehensiveness, and, as a result, attract more physicians and patients. The possible negative impact on nonparticipants will depend on the relative dimensions of size, growth, quality and comprehensiveness of services X and Y offered by the participants and the nonparticipants.

   The nonparticipants' share of the market may also be reduced in another way. When a participating hospital has closed a department, the facilities may be converted to other patient care uses. To the extent that such a hospital has a large waiting list or a short mean stay for other types of patients, its increased facilities for patient care will not affect nonparticipants. However, if the new facilities attract patients from the nonparticipants, then the latter's market share will be reduced.

   The short-run benefits realized by the SA may not carry over to the long run if the nonparticipants have been adversely affected. Furthermore, the net benefit of such agreements to patients, subscribers, and taxpayers will depend on whether potential cost savings are outweighed by unwarranted expansion in other outputs and physician rewards.

Selected Public Services (Aspects 7 and 8)

This category of services represents activities which are intermediate to the final production of health services, but the rationale for sharing is unlike that for administrative services. Two examples of public services are education and coordination of emergency medical services. In the absence of such activities at any one site, a single hospital could continue to provide acceptable health care.

Any hospital undertaking public service activities on its own generates benefits to other hospitals and to the patient community. Some staff members at a training or coordinating institution will eventually leave and find positions at other hospitals. Better coordination and spatial allocation result in fewer delays in the treatment of patients. A single hospital often cannot afford the large costs of a comprehensive program; hence some definite cost-sharing arrangement is usually required before an institution can engage in public service activities.

7. For a group of hospitals that sponsored few public service activities, such as specialized training, before an SA was established, effects are expected to occur in some degree. Costs for the new services will tend to be shared widely among the participating members, perhaps even more widely than the utilization of the services. The SA will attract new grant funds and permit higher allowable costs for the services, which potentially will raise the quality of health care throughout the patient community. Nonparticipants appear to lose little from such agreements and even to gain from eventual commingling of professional staffs.

8. Where public service activities existed prior to sharing, as in the case of emergency medical services, the new arrangement permits better coordination and spatial allocation. That is, particular institutions tend to specialize in particular types of patients or particular functions in an overall emergency system. Costs of such an activity tend to be redistributed and to increase overall. The level and quality of final health care output can be expected to increase, and the pattern of inpatient admissions may change as patients are more quickly directed to the most appropriate source of care.

Market Area Characteristics (Aspects 9 and 10)

Variations in market conditions affect the incentives to form and exploit sharing arrangements.

9. In areas where the supply of health manpower and/or intermediate products is inelastic, there are greater potential benefits from such activities as group purchasing and collective negotiating strategies. There are areas where suppliers or health personnel have fewer alternative opportunities. Gains from sharing would be tested to determine the amount of cost reduction that results from factors not related to scale economies. Nonparticipants are likely to gain from lower prices of inputs. By similar reasoning, in areas where a reimbursement or regulatory authority is more concentrated, the incentive for collective negotiating strength is stronger.

10. Some areas present indications of relatively extensive unmet health needs and potential demand for care. In these areas, cost increases for whatever reasons are more likely to be tolerated so long as the output of health care expands. Nonparticipating institutions are less likely to be affected by sharing, even with exclusive agreements.

Dynamic Long-Term Effects (Aspects 11 and 12)

The age or duration of an agreement will affect the measured economic impact. This has been established in the case of mergers, and a parallel expectation for sharing appears justified. For example, the elimination of specific administrative or medical services will not typically lead immediately to the reduction of related personnel.

The following aspects consider the feedback behavior leading to evaluation, long-run change, and/or dissolution of an SA. It is possible that agreements which do not offer widespread long-term net benefits will not survive. Although there is no basis in theory for expecting such a result, some conditions under which an agreement would tend to dissolve or to evolve with a long-run impact differing from the short-run results can be indicated.

11. Agreements more highly predicated on exclusion or on highly sophisticated changing technologies are more likely to dissolve or to call forth countervailing forces in reaction to the effects of the exclusions. Previously the incentive for institutions in exclusive agreements to use potential cost savings for purposes of expanding their market share at the expense of nonparticipants was discussed. Once the nonparticipants attempt to restore their utilization rates, the basis for the initial agreement is weakened. So long as this newer competition does not overturn the earlier consolidations, the general community could expect to benefit.

12. Agreements that are embodied in formal sharing organizations should lead to the usual economic incentives for expansion such as economies of scale, monopoly or monopsony power, spatial allocation, reduction in fluctuations, and improvements in quality and comprehensiveness of care. It is anticipated, however, that the addition of more and more shared services would tend to include activities whose costs and benefits are redistributed rather than improved for all participants. Such growth would threaten the extent of participation to the degree that it is easy to form newer and more limited agreements.

Criteria for Aspect Selection

Only six sites were to be included in the study. For the sites eventually selected, it was desired that at least six specific aspects be studied.

It would not have been possible to investigate any aspect requiring several sites for adequate analysis. In addition to the desire for generality of results, it was important that the minimal set of six aspects

1. Address the economic impact on nonparticipants and market area,
2. Address significant items in total hospital costs,
3. Test underlying theoretical assumptions about motivation and incentive,
4. Include a meaningful variety of particular services, and
5. Include aspects of importance and interest to health planners.

On the basis of these general criteria and in view of data and time constraints to be discussed later, it was suggested that the minimal set of six aspects include the following components:

Aspect Number	Topic
1 and 3	Address administrative services, investigate scale economies and collective negotiating strength, and analyze items of significant cost impact.
4 and 6	Address medical services with and without exclusion, effects on nonparticipants, role of quality and utilization increases, important tests of behavioral model, and sources of cost savings and economic benefits.
9 or 10	Investigate an important market area feature.
11 or 12	Investigate dynamics of impact which are of high interest in theory and practice.

Before the aspects finally selected for study are discussed, it is useful to consider the site selection process because the availability of data and the ease of entry to the site played an important role in the final selection of aspects. The site selection process and criteria are considered in the next section.

SELECTION OF STUDY SITES

The project required that six sites be selected for an analysis of aspects of the economic impact of shared services. Abstractly, each site has three components: (1) a shared service arrangement with its participating members, (2) nonparticipating health or health-related delivery organizations, and (3) the larger market area within which the sharing arrangement operates. The selection of appropriate sites for the empirical research was a crucial step in this project. A three-phased process was utilized: (1) initial selection, (2) screening, and (3) final selection.

Initial Selection

Theoretically, the whole universe of sharing arrangements could be used for the selection of sites. That universe can be divided into two parts: the "unknown" and the "known" arrangements. The "unknown" universe for purposes of this project consists of those arrangements among health care delivery organizations which have not published their existence, are not part of the American Hospital Association's or Health Services Research Center's responder universe in varied shared service surveys, or have not in any other way come to the attention of the Health Services Research Center. The magnitude of this universe is undetermined, but there is speculation that this universe represents a significant activity. Probably it takes the form of informal agreements that one hospital in an area will become the main provider of a service. Because the contract for this study required the use of existing data concerning shared service arrangements, this "unknown" universe was not investigated.

The "known" universe is divided into two parts: the "accidentally" known and the systemically known. The former consists of those arrangements that the Health Services Research Center or the American Hospital Association staff has discovered through chance conversations or meetings or from a reference in some publication. This "accidentally" known universe is non-classified, usually has not been described in any publication, and is known only through one individual's one-time exposure to the information without further follow-up. This part of the known universe of shared service arrangements was too incoherent to be a valuable corpus of knowledge for this project.

The systematically known universe of sharing arrangements is identified through two surveys: (1) the 1971 National Survey of Shared Services and (2) the ongoing 1976 American Hospital Association (AHA) Survey of Shared Services Organizations. The 1971 National Survey collected information about sharing from all short-term community hospitals.[5] It offers no insight into the nature of the arrangements, does not specify the provider of the service shared, and does not indicate the participants in the ventures. In addition, the data are outdated, and hence the 1971 Survey was also inadequate for the purposes of this study.

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[5] Astolfi; and Matti. Op. cit.

The systematically known universe of sharing arrangements used in this project was the list of 157 shared service organizations also used in the previous work under this contract. A full description and profile of that universe can be found in volume 1 of this study. The description is based on an ongoing AHA survey which is updated at least annually. The survey provides information on the tax and legal status, the number of participants/members, the services shared, and the type of arrangements for each organization.

Criteria for Selection

For site visits to be effective, each site had to meet some minimum criteria.

1. The site must provide an operational, serious effort in sharing. All the shared service organizations in the universe, by the original definition of that universe, are operational in some sense. It must, howeverm be established that an organization is indeed a serious effort in sharing.

2. There must be presumptive access to data pertaining to sharing. It cannot be assumed that all sharing arrangements, their participants, and other elements in the market area are willing to divulge information. Accessibility to data from nonparticipants is a random phenomenon in that the sharing arrangement (shared service organization) has no voice in the policy of nonparticipants. Therefore, this criterion applies only to the shared service organizations. They can to some extent, influence their members to provide access to data for the research team. There must be presumptive availability of pertinent data for the sharing. "Availability" has two components: (a) that data exist or (b) that data could be compiled from sources with reasonable effort. The level of data collection varies greatly among shared service organizations. This criterion stresses that no undue effort should be expended in new raw data collection and that existing data should be used for the study.

To be eligible for the initial selection process, each site had to meet at least one of the three requirements established for each criterion. The requirements for the first criterion, that the site provide a serious effort in sharing, were:

- At least one person on the project staff had sufficient personal knowledge of the shared service organization to attest to the fact that its activities were significant and that the organization was not just a holding company.

- The activities of the organization had been documented in the published literature at least once, with enough detail provided to make a judgment possible.

- At least one person on the project staff had sufficient personal contact with, and trust in, the chief executive of the shared service organization to warrant the assumption that the sharing was a serious effort.

Requirements for the second criterion, that the shared service organization and its members grant access to data, were:

- Prior cooperation with the Health Service Research Center in some project.
- A previously expressed willingness to cooperate with the Health Services Research Center on some project.
- A justifiable belief that personal contacts between project staff or American Hospital Association staff and the shared service organization's chief executive officer could be utilized to gain cooperation and especially access to data on sharing.

Requirements for the third criterion, that pertinent data be available to the research team, were:

- A demonstration of the availability of data by a previous site visit.
- Published evaluation studies for the site, with the studies made by staff members or by some external agent.
- Presentation of evaluation or feasibility studies by representatives of the site to a large audience at a conference, institute, or other major meeting. A member of the HSRC research staff had to hear such presentations personally and judge them to be, at face value, acceptable as to the availability of data.

Very little was known about some of the shared service organizations in the set of 157 SAs from volume 1 of this study. The SAs were initially screened on the basis of the first criterion. It is recognized that many worthwhile organizations were eliminated by this step. This was primarily a result of incomplete communication and does not reflect negatively on the organizations not meeting the criterion. The second and third criteria were then applied, with reductions occurring with each step.

A total of 28 shared service organizations survived the initial selection process. These organizations constituted the set for the next phase.

Screening

The screening process laid the groundwork for the final selection of potential sites. Each of the 28 shared service organizations in the set was examined in detail, and further information about each was obtained. A profile of each organization was compiled so that the final selection could be based on known variables.

The Process

The following variables for each organization were collected:

- Membership size
- Distribution of members (geographically)
- Types of members
- Type of arrangement
- Tax/legal status
- Location

In addition, the service category and specific service(s) of major interest were specified. On the basis of some knowledge of the shared service organization and the service(s) of interest, the major specific aspects of economic impact, as described in an earlier section, were chosen for each site. Finally, the 28 potential sites were rated for their overall desirability for the purposes of this study. The ranking included some a priori judgments:

- The service(s) and aspect(s) are interesting theoretically and/or valuable for planners.
- The service(s) and aspect(s) are adequately quantifiable.
- The topic(s) for a site are "manageable" within the resource constraints.

Outcome

A fivefold rating scheme was developed. The sites were distributed as follows:

Rank	Number of Sites
Top sites	4
Highly desirable sites	7
Desirable sites	2
Acceptable sites	11
Inadequate sites	4

The 13 most desirable sites (ranks 1 to 3) formed the basic set for the final selection.

Final Selection

Six sites were chosen for in-depth case studies. The 13 sites mentioned in the previous section offered a wide diversity of important economic topics, services shared, types of arrangements, memberships, geographic location, and so forth. It is clear that not all potentially fruitful areas could be examined in the course of this project. Choices had to be made. There were two possible approaches to making a final selection of sites.

The first approach was to choose six sites that would all focus on identical, or very similar, issues. For instance, all the chosen sites could focus on administrative services provided in urban settings. The virtue of such an approach would be that crosscomparisons among sites would be facilitated, and final results, stemming from six sites, might be more reliable. The drawback would be that the results would not include a large segment of the whole field of shared services. Therefore, this approach would not achieve the underlying purpose of the study, which is to sharpen the intuition about the effects of sharing, to demonstrate some possible trends and directions, and to alert planners to possible consequences of such arrangements.

The second approach, which was the one actually employed, recognizes that the number of important variables exceeds the capacity of the study for establishing valid controls. The approach, therefore, attempted to make the final constellation of the six sites be an acceptable representative overall configuration of sites, services, and membership size. It is further recognized that, given the trade-offs, the acceptability of any one site finally chosen may be debated; the representativeness of the configuration of the six as a totality became the goal.

Criteria for Final Selection

It was agreed that the six sites collectively should have the following characteristics or variables:

1. Not all sites should be in the same major geographic regions of the country.

2. There should be some urban, some rural, and some urban/rural arrangements.

3. Medical services, administrative services, and public services should be included, if possible.

4. Some arrangements should have a narrow or limited range of services; others should be diversified.

5. Some arrangements should be small and "exclusive" in membership; others should have a large membership.

6. Not all sites should be the subject of previous case studies under this contract.

The six sites finally chosen provide geographic coverage of the East, the Midwest, and the South. The arrangements have diversified services, cover medical and administrative services, are urban, urban/rural, or rural in membership, and have from 4 to 200 participants. Three of the sites were not in the previous study (volumes 1 to 4). The sites cover aspects 1, 2, 3, 4, 5, 6, 9 and 10, even though the contract required only 6 to be covered. Two significant omissions should be noted. Aspects 11 and 12, those dealing with the dynamic effects of sharing, were not studied. An attempt was made to study aspect 12 at a site which appeared to be in danger of imminent collapse. However, after the site was contacted, it was learned that efforts were under way to save the SA and that the administrators did not wish to have the site studied at that time. The other omission is a coverage of aspects 7 or 8 dealing with shared public services. Because shared public services such as emergency medical services have been thoroughly researched, it was decided that these aspects were less important than the others at this point and should therefore, be omitted.

Case Study 1

STATE HOSPITAL ASSOCIATION, INC.

Case Study 1

STATE HOSPITAL ASSOCIATION, INC.

INTRODUCTION AND PURPOSE

As the nation has experienced an unprecedented period of rapid growth in demand for hospital care, it is not surprising to find that groups of hospitals are attempting to counteract inflationary pressure that is beyond the control of any one member. A common group approach is to share certain services in the hope of realizing economies of scale or of achieving collective negotiating strength. More and more groups are being formed to obtain a more unified, cohesive control over spiraling wage-benefit demands. Indeed, many state hospital associations employ at least one specialist in labor relations and bargaining to advise individual members on policies affecting payroll costs and benefits.

The purpose of this case study was to analyze the economic impact of the labor relations program of State Hospital Association, Inc. (SHA), a voluntary state association with more than 140 hospital members. The general hypothesis to be tested was that reduced payroll cost inflation can be achieved by hospitals through coordinated wage and bargaining policies. The more specific statistical analyses actually undertaken were contingent upon knowledge of the history and current operation of the program.

The site selected, SHA, involves a mixture of hospitals from urban, suburban, and rural settings. The hospitals are primarily general, acute-care, not-for-profit hospitals with the usual extensive range of skilled personnel from registered nurses to medical technicians to housekeeping and maintenance employees. SHA has had more than 6 years of direct program experience in personnel/collective bargaining negotiations and more than 10 years of other activity in collective bargaining.

SHA is located in a state with many educational facilities and, in particular, many nursing schools. Consequently, there does not appear to be a shortage in the supply of health manpower; indeed there may be an oversupply of persons with certain skills. For this reason, plus the fact that SHA has an experienced labor relations staff, it seemed likely that reduced payroll cost inflation could be achieved by the hospitals through coordinated wage and bargaining policies. It may not be possible to achieve in other parts of the country the results attributable to SHA's labor relations program.

The offices of SHA were visited in early June 1976. Because of the ready availability of data at SHA, telephone interviews only were conducted with executives at several member hospitals for supplementary information.

Although many of SHA's participating hospitals negotiate personnel/collective bargaining agreements with more than 40 skill classes of hospital personnel, this case study focuses only on registered nurses. Compensation of registered

nurses currently comprises more than one-fourth of hospital expenses, and, in many localities, a small number of hospitals are still the major employers of nurses. Indeed, nationally, short-term, acute-care hospitals employ more than 60 percent of working registered nurses. This situation was occasionally stereotyped in older textbooks as an example of monpsony--one buyer operating strategically against competitive sellers. The example is clearly out-of-date today because job opportunities for nurses have expanded dramatically and job mobility has increased. Also, the growth of public subsidies for health care and of private insurance coverage has made it possible for hospitals to reward their employees more generously. Finally, collective bargaining units are now more prevalent in the industry in general and for nursing groups in particular.

SUMMARY OF PRINCIPAL FINDINGS FOR ECONOMIC IMPACT

A summary of evidence obtained through the case study follows:

1. From 1970 to 1976, the average hourly rate of pay for registered nurses in SHA's participating hospitals rose about 6 percent, compounded annually. This rate appears to be about three-fourths of the national rate for registered nurses and for all hospital employees. Prior to 1970, there is evidence that SHA wage inflation was much closer to the national average.

2. This lower increase in average hourly rate of pay for registered nurses at SHA's participating hospitals cannot be explained by differences between the rise in the general cost of living index in the state and the rise in other areas of the nation. Nor is it true that wages in the state were already much higher than the national average and that the other areas in the United States were catching up to SHA's participating hospitals. However, the oversupply of some personnel with nursing skills in the region may have had some effect on the lower rate of increase.

3. Within the state, there was little significant relative variation among hospitals in the growth of wage rates during the 1970-76 period, except that maximum hourly rates increased faster than minimum rates. Relative variation among hospitals in any one region of the state was quite low and remained low over time.

4. Within the state, salaries for registered nurses in 1976 were lower outside the metropolitan area and in hospitals with less generous vacation benefits. A multiple regression analysis showed that the following factors had no significant effect on hourly rates: size of hospital, other fringe benefits, unionization, or formal use of the SHA staff. The explanation for the absence of such correlations may simply be that the institutions tended to follow the lead of certain hospitals in formulating wage policies and desired to resist the growth of unions.

5. For the years 1970 to 1974 the success of union organizing activity was dramatically lower in hospitals using the SHA program. New federal legislation in 1974 may have an impact on this trend; however, it is still too early to ascertain the full effects. During the 1970-74 period participants were more than twice as likely as nonparticipants to defeat a union petition.

6. The activities of the SHA staff most clearly associated with counteracting inflationary pressures were: (a) the collection and organized presentation of a survey of employee wages and benefits, (b) the collection and distribution of the collective bargaining agreements of the hospitals with organized unions, (c) the presentation of personnel/collective bargaining educational programs to participating hospitals, and (d) a quick response to requests for special analyses of unique bargaining situations.

7. The total cost of the SHA program has been kept much lower than it would have been if the organization had sought out and conducted bargaining negotiations on behalf of a large number of individual member hospitals.

HISTORICAL BACKGROUND

The state hospital association administers many services for various subgroups of its members. Some of these services are handled by separate but wholly owned subsidies and others by the parent corporation. The tax status of the parent corporation is 502(c)(6). The personnel/collective bargaining service is administered by the parent corporation, State Hospital Association, Inc.

SHA is governed by a board of directors. The president of SHA and various councils report to the board. The council on personnel is concerned with policy questions concerning personnel/collective bargaining.

Collective bargaining in the hospitals in the state began in 1964. In voluntary hospitals, the registered nurses, the licensed practical nurses, and other skilled classes of employees began to organize under separate statewide organizations. At the time of the study several unions and professional organizations represented more than 60 bargaining units involving about 15,000 organized health personnel in hospitals.

In 1968, SHA hired a chief administrator to replace a law firm that had previously been retained to advise and occasionally represent individual hospitals. This administrator had wide experience in labor relations in private industry and as a hospital trustee. His initial duties were to aid in the negotiations between participating hospitals and organized bargaining units. Because 14 of these 17 to 18 hospitals did not have bargaining units at that time, he also undertook an assessment of their potential bargaining activity. At the time of the study some employees had organized at five of the hospitals. The other nine had no bargaining units. By 1970, the SHA labor relations program had become fully operative. The program provides many services to its participating hospital members. Among these services are: fast response to requests for consultations on any labor relations problems by SHA legal, labor relations, and accounting-financial experts; the provision of up-to-date information on wages, benefits, and collective bargaining agreements and annual summary reports of wage-benefit information; the provision of educational forums for the discussion of labor relations and bargaining agreements and tactics; and special analyses of unique situations.

The SHA deliberately opted against seeking a master agreement for all organized participants such as that of the New York League of Voluntary Hospitals. There was some fear of standardizing the agreements and eliminating differentials among urban, suburban, and outlying hospitals. These differentials are economically justified in terms of the local job markets because there are differences in the supply, demand, and working conditions by area. The approach at SHA has been to conduct educational forums for all hospitals on matters relating to collective bargaining and wage benefit trends. In this manner the SHA staff can present an informed picture of what most hospitals are doing throughout the state. The staff also reports on labor agreements made at hospitals that have been organized. Originally these forums or seminars were only for the organized hospitals, but since 1973 many nonorganized hospitals have participated. In 1976, attending the labor relations forum were representatives of 51 hospitals that have been organized and 39 hospitals that are not organized.

In July 1974 the federal laws were changed. Charitable hospitals are now covered by the federal Labor Management Relations Act, which takes precedence over the state laws. SHA staff members see this as an improvement because the federal labor relations board has clearer policies on representation, labor relations, and fair and unfair labor practices.

In 1968, SHA was funded by a basic annual fee to participants of $10 per bed as well as by charges covering most of the cost of any individual negotiations. In 1970 the financing of the labor relations program was completely revised. Half of the annual budget now comes from SHA membership dues. In addition, hospitals that use the services of the legal staff pay about $35 per hour for consultation. Some 39 hospitals have recently been billed for services; of these 15 employ SHA staff members as bargaining representatives. There are cases in which, after employing the SHA staff, a hospital is then able to conduct its own negotiations or to find appropriate private attorneys. The SHA policy is to expect a gradual attrition of formal users of the staff in negotiations. It is believed that many nonorganized hospitals will readily call upon the staff if they eventually must deal with collective bargaining or union petititons.

Only about a dozen voluntary hospitals in the state refuse to participate in the annual survey of compensation and the forums on industry labor trends, even though all institutions have an inducement to participate because of the dues contribution. To date it does not seem that the nonparticipants are pursuing individual policies likely to frustrate the activities of the 122 participants.

ANALYSIS OF THE DATA

A major indicator of trends in salaries for hospital employees is the change in the hourly rate for registered nurses on the general staff. Detailed surveys of salaries at SHA hospitals and general surveys for the remainder of the country are available for 1968 to 1976.

Table 1.1 shows the growth in hourly wage rates for registered nurses before and after 1970 in the study state. The growth rate slowed after 1970, which was by no means the end of the post-Medicare boom. It is well known that hospital cost inflation was lowered by the federal stabilization program in 1972-73, but subsequent years have seen a return to higher inflation rates nationally.

National trends in salaries for registered nurses are described in table 1.2. In the early period, 1966 to 1969, the rate of growth in the study site was reported to be nearly identical to the median of nine major population centers in the country. From 1969 to 1975, a reasonable estimate of national growth rate in salaries for registered nurses is about 8 percent. The SHA rate for 1970 to 1976 was about 6 percent. This comparison has acceptable validity because the national 1975 estimate is for December, while the state estimate is for early 1976. Moreover, 1969 and 1976 are years of similarly high cost inflation. Table 1.3 shows that the national growth rate of salaries for all hospital employees during the 1970-75 period was nearly the same as the 8 percent annual average growth rate for registered nurses' salaries.

Within the state, it would be expected that percentage relative variation in wage rates for registered nurses would fall, owing both to collective agreements and to counter-organizing policies. Table 1.4 does not indicate that this occurred but does show that relative variation was quite small at the beginning of the period and remained small thereafter.

The small amount of variation in hourly rates in 1976 was subjected to multivariate regression analysis to test whether the presence of collective bargaining, use of the SHA legal staff, generous fringe benefits, or other factors had significant independent effects. (see table 1.5). Except for a small effect of fringe benefit packages, the only significant factor explaining the variations in 1976 hourly wage rates for registered nurses was the location of the hospitals. It appears that the hospitals which pay higher wages also give better fringe benefits, such as partial or total tuition for continuing studies and fewer years of employment before the nurses receive three weeks of vacation.

The SHA staff compiled the following summary of the results of petitions for collective bargaining before and after the labor relations program became fully active:

Years	Petitions	% Defeated Petitions		
		ALL	SHA Users	Nonusers
1964-69	35	6%		
1970-74	88	42%	58%	22%

This is an impressive record in view of the possibility of selection bias--hospitals with the worst individual prospects on their own calling upon the SHA staff. During the last year reported, 1974, users of SHA's negotiating services defeated about as many petitions as nonusers. This 1974 result

Table 1.1. Compound Annual Growth of Hourly Wage Rates for Staff Nurses (RNs) in the Study State

Area and Period	Annual Growth Rate		
	Minimum	Maximum	Average[a]
Metropolitan			
1968-1970	7.1%	7.6%	7.4%
1970-1976	5.4	6.6	6.1
Nonmetropolitan			
1968-1970	7.6	8.2	7.9
1970-1976	5.5	6.3	5.9

[a] The average growth rate in 1976 was precisely half way between the minimum and the maximum reported in the SHA surveys. The midpoint of the range for earlier years was therefore used as the average.

Table 1.2. National Growth in Salaries for Registered Nurses, Compound Annual Rate

Period	Annual Growth Rate	Geographic Area
1966-1969	11.9%	Median of nine metropolitan areas[a]
	11.7	Siteone Metropolitan, as reported in national survey
1969-1972	8.9	Median of nine metropolitan areas[a]
	7.8	Siteone Metropolitan
1972-1975	7.3	Bed size 200-300, salaries for December of year[b]
1969-1975	8.1	Composite, national estimate

[a] American Nursing Association. Facts About Nursing. Kansas City, Mo.: ANA, 1972-73, p. 134.

[b] Hospital Administrative Services, semiannual releases.

Table 1.3. Growth of Average Annual Salaries of All Employees in Community Hospitals

Year	Increase From Preceding Year
1969	9.4%
1970	10.1
1971	10.3
1972	8.0
1973	4.5
1974	5.7
1975	10.9
	Annual Compound Rate of Growth
1968-1970	9.7%
1970-1975	7.8

Source: American Hospital Association. Hospital Statistics. Chicago: AHA, 1973, 1975.

Table 1.4. Staff Nurse (RN) Index of Hourly Wage Rates at Hospitals Participating in State Hospital Association, Inc.[a]

Area and Period	Minimum	Relative Variation[b]	Maximum	Relative Variation[b]
Metropolitan				
1968	1.000	6%	1.192	9%
1970	1.148	3	1.381	8
1976	1.572	5	2.028	12
Nonmetropolitan				
1968	0.934	5	1.053	8
1970	1.082	7	1.233	9
1976	1.494	6	1.777	9

[a] The Metropolitan 1968 Minimum Hourly Wage Rate was chosen as the base for the index.

[b] Standard deviation as a percentage of the mean.

Source: SHA Surveys

Table 1.5. Multiple Linear Regression of the Average Hourly Wage Rates for Registered Nurses in Hospitals in 1976, with 14 Variables for Each Hospital

Independent Variable	B Coefficients	F Statistic	Acceptance Level
1. Number of beds at hospital	.0001	.03	86.4%
2. RN bargaining unit at hospital (0 if no, 1 if yes)	-.030	.03	86.8
3. Age of RN bargaining unit (in years)	.006	.04	83.7
4. Region 1 location of hospital (0 if no, 1 if yes)	-.501	5.03	4.0[b]
5. Region 2 location of hospital (0 if no, 1 if yes)	-.516	5.73	3.0[b]
6. Region 3 location of hospital (0 if no, 1 if yes)	-.506	3.70	7.4[b]
7. Region 5 location of hospital[a] (0 if no, 1 if yes)	-.606	7.48	1.5[b]
8. Region 6 location of hospital (0 if no, 1 if yes)	-.407	3.09	9.9[b]
9. Original SHA participant (0 if no, 1 if yes)	.058	.08	77.8
10. SHA current agent for hospital (0 if no, 1 if yes)	.038	.02	88.4
11. Current SHA participant (0 if no, 1 if yes)	-.033	.03	86.0
12. Partial or total tuition paid (0 if no, 1 if yes)	.298	2.42	14.0
13. Days of sick pay	.006	.01	90.7
14. Year when RN receives three weeks' vacation	-.091	4.69	4.7[b]
(Constant)	5.62	83.16	0.0[b]

[a] Region 4, the major metropolitan area, was the default category.

[b] Significant at the 10 percent level.

could just be a statistical variation for that year, or there may have been an effect of the 1974 federal legislation on hospital collective bargaining negotiations. It is still too early to distinguish the effects of the legislation.

In conversations with several local hospital personnel officers, project staff members inquired about other special local changes that may have contributed to wage increases being smaller than the national average. Personnel staff members said that the number of newly graduating nurses had increased relative to the number of positions, particularly in the last two years, and that there seemed to be lower out-migration of nurses from the state than from other states. There are no studies of the migration of registered nurses available by states at the present time. Nationally, there has been a large increase in the number of newly graduated registered nurses, particularly from associate degree programs. Also the widespread and severe recession of 1974-75 resulted both nationally and in the study state in fewer nurses resigning from their positions and in more licensed but not working registered nurses returning to the labor force.

Because the recession, fewer resignations, and increases in the number of registered nurses graduating are national phenomena, the fact that the hospitals in the study state had smaller wage increases than the national average is quite likely attributable to the SHA shared service program. However, without more good national data on migration and unfilled positions for registered nurses, it was difficult to draw this conclusion strongly at the time the study was made.

The final aspect of the program described in this report is the latest annual budget (see table 1.6). The cost of the program is not fully reflected in the budget because hospitals have put the effort into completing detailed surveys and attending forums.

The $35 per hour consultation fee is less than prevailing legal fees. The membership dues assessment for the labor relations program is about $400 per hospital. Therefore, the cost per participant for the survey, the forums, and the maintenance of a library of current contracts is little more than the cost for one day of legal expenses. The services are of great benefit to an administrator who wishes to analyze the wage and benefits policies for all 40 or more employee classes in his hospital.

CONSIDERATIONS FOR HEALTH PLANNERS

It is already common for state hospital associations to employ a specialist in labor relations. This case study suggests that a small, relatively inexpensive program of information dissemination, education, and representation is all that is needed to moderate inflationary pressure in hospital labor markets. Basically, what seems essential is that information on benefits and contracts be effectively pooled and distributed to the majority of local institutions, that educational forums on good labor relations be held, and that representation at bargaining sessions be provided when it is requested.

Table 1.6. Labor Relations Program Budget, Oct. 1, 1975-Sept. 30, 1976

Item	Percent Distribution
Revenues	
Membership dues	52.4
Program fees	47.6
Total revenues	100.0
Expenses	
Salaries and related	69.8
Meeting and travel	8.2
Rent, utilities, equipment depreciation, fees, insurance	5.0
Printing, postage, telephone, supplies	5.9
Dues, fees, publications	1.4
Program staff support	3.7
Administrative charges	6.0
Total expenses	100.0

In order to achieve extensive hospital participation in the program without relying entirely on revenue from fees for service or from somewhat arbitrary charges based on numbers of beds, the organization finances a significant share of expenses from membership dues.

Hospitals actually represented by the shared service staff should not be expected to show differentially lower inflation of payroll costs than other hospitals in the area. There obviously is a tendency for the staff to concentrate on hospitals with the poorest alternative prosepcts, and the overall diffusion of information also leads to a leveling of wages and benefits.

The benefits of any such labor relations program may be evaluated in comparison with payroll costs, turnover rates, and degree of unionization in other parts of the same geogrpahic region.

Case Study 2

CENTRAL BLOOD SERVICES, INC.

Case Study 2

CENTRAL BLOOD SERVICES, INC.

INTRODUCTION AND PURPOSE

The goal of any blood service is to assure an adequate supply and the efficient management of safe, high-quality blood and blood products to meet the needs of the patients. There are many ways to achieve this objective; however some approaches are less economical than others. Indeed, because the supply of blood in a geographic area is limited and the demands for blood and blood products are growing at a compounding rate, the pressures on individual hospital blood banks are becoming managerially and economically severe. The pressures and problems have been well known in the blood banking community for some time. As a result, the sharing of blood banking services was one of the earliest of all of the services shared by hospitals. In fact, a 1971 national survey of shared services conducted by the Health Services Research Center of the Hospital Research and Education Trust and Northwestern University indicated that blood banking was the most frequently shared service.

In 1974 Congress, at the urging of the Department of Health, Education, and Welfare, promulgated the "National Blood Policy," which laid the basis for the investigation by the American Blood Commission (ABC) of methods for achieving that policy's objectives. In 1976 the ABC's Task Force on Regionalization published a report dealing with the broad topic and general concepts of regionalization of blood services. But, as is evident in the task force's report and in other central blood banking studies, many of the economic impacts of shared blood services are not well understood.

This case study is concerned with the economic impacts of the blood services program of a medium-sized central blood bank with ten member hospitals. It is presumed that the sharing of blood services leads to cost savings; increased quality, comprehensiveness, availability, and accessibility; easier introduction of new research concepts; and the attraction of specialized personnel to the central bank and the member hospitals. These economic benefits would presumably result from large-scale operations and a reduction of the fluctuation in supply and demand, leading to more efficient blood and blood product management, promptly available blood and blood products, smaller physical space requirements, larger equipment and more mechanized processing, volume purchasing, and easier and more dependable access to expert advice from hematologists, immunohematologists, and pathologists.

The site selected, Central Blood Services, Inc. (CBS), contains a mixture of rural and suburban hospital members. Most members tend to adopt readily new medical therapies utilizing blood and blood products. This accounts for rapidly increasing demands on the blood service system. Central Blood Services, Inc. is one of several central blood banks in a metropolitan area. Its operation interacts with the operation of the other central blood banks, hospital blood banks, and transfusion services in the area.

Project staff members visited the office of CBS and some of its members in the summer of 1976. Data were obtained from CBS, from a regional blood banking agency, and from the Hospital Administrative Services (HAS) records for hospitals in the greater metropolitan area.

SUMMARY OF PRINCIPAL FINDINGS FOR ECONOMIC IMPACT

1. There were economies of scale for Central Blood Services, Inc. These economies persisted for volumes of blood and components up to 40,000 units annually[1] and quite possibly beyond, but data were not available for larger volumes.[1] Illustrative of these economies, at 21,400 units the unit cost was $24.28, and at 37,400 units it was $21.04.

2. The economies of scale occurred in the functional areas of processing, administration, transportation and inventory control, and phlebotomy on mobiles. There were diseconomies of scale in donor services and phlebotomy at CBS.

3. In 1974 prices paid for blood and blood components by the CBS member hospitals were about the same as the prices paid to other central banks by hospitals in the region. However, the prices paid by CBS hospitals to CBS included a net surplus earned at CBS, whereas the prices paid by the other hospitals were the actual costs. At these competitive prices, CBS realized a substantial increase in net worth to 62 percent of assets, so that its financial position was on a sound basis after only three years of full operation.

4. There were sizable cost savings (more than $42,000 in 1975) through group purchasing of anti-sera, blood bags, and RIA test kits.

5. The quality of blood and components was high and met all inspection standards. The participating hospitals found that the services of CBS were easily accessible and available to them. The increasing use of these services demonstrated their acceptability.

6. A comprehensive set of services available to the member hospitals included the furnishing of blood components, anti-sera, and supplies; coordinated recruitment procedures and materials; and the consultation services of physicians.

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[1] The economies for 40,000 units are applicable to the technology applied by CBS. A different mix of labor and equipment might show different levels of economies of scale. Also, a word of caution: Some of the reductions in costs and increases in productivity may result from increased efficiency as personnel learn to perform tasks better and/or from better procedures being followed in the different departments. It is not possible to separate these learning curve effects from economies of scale.

HISTORICAL BACKGROUND

Central Blood Services, Inc. is a not-for-profit corporation established in 1972 as a subsidiary of a larger parent shared service organization. It has a 501(c) (3) tax status.

The purpose of CBS is to operate a blood bank and related services for all the hospitals and patients located within the geographic area served by the parent corporation. At the present time, ten of the twelve member hospitals of the parent corporation that have blood services participate in the blood center. (See figure 2.1 for the geographic configuration of the hospitals involved.) In addition, one nonmember hospital utilizes the full services of CBS.

All of the services of the parent corporation and of CBS are available to all hospitals, including those institutions from a wider geographic area that are not members. Hospitals are not held to participation in or utilization of a particular service. The operating philosophy of the parent corporation and of CBS is that, if they do a good job, their services will be used. Participation, therefore, is strictly voluntary. Institutions usually have one of the following reasons for not participating: The hospital would do better on its own, or it has an existing contract, or to change would be too traumatic. Apparently the administrators of the member hospitals are committed to the parent corporation and to CBS. This feeling of commitment permeates each hospital at least to the level of middle management. Indeed, the study showed that the advantages of participation exceed the disadvantages.

The parent corporation, on behalf of its member hospitals, set up a task force in 1969 to review blood banking services of individual hospitals. A number of problems with existing blood bank services were identified, including:

- An excessive number of units of outdated blood
- Lack of availability of whole blood and components
- Paid donor blood
- Excessive cost of blood service

In 1971 the parent corporation contracted on behalf of six of its member hospitals with a commercial blood bank to meet the needs of participating hospitals for improved blood bank services. In 1972 the parent corporation purchased the commercial blood bank service and formed a corporation, "Central Blood Services, Inc.," owned and operated on a shared basis by participating member hospitals. A separate corporation was needed it was decided, because of the technical and specialized nature of the service. In order to effect the purchase, CBS received a loan of about $100,000 (total) from eight member hospitals. Each hospital's share of the $100,000 was proportional to the annual volume of blood used by that hospital. This loan is being repaid over a period of four years from operating revenue. At the time of this study, CBS was generating revenues in excess of expenses. In the last fiscal year it realized a gain in equity of well over $100,000. At the time this study was made the current ratio, that is, the ratio of current assets to current liabilities, was 3.5, which indicated a very strong financial position for meeting current

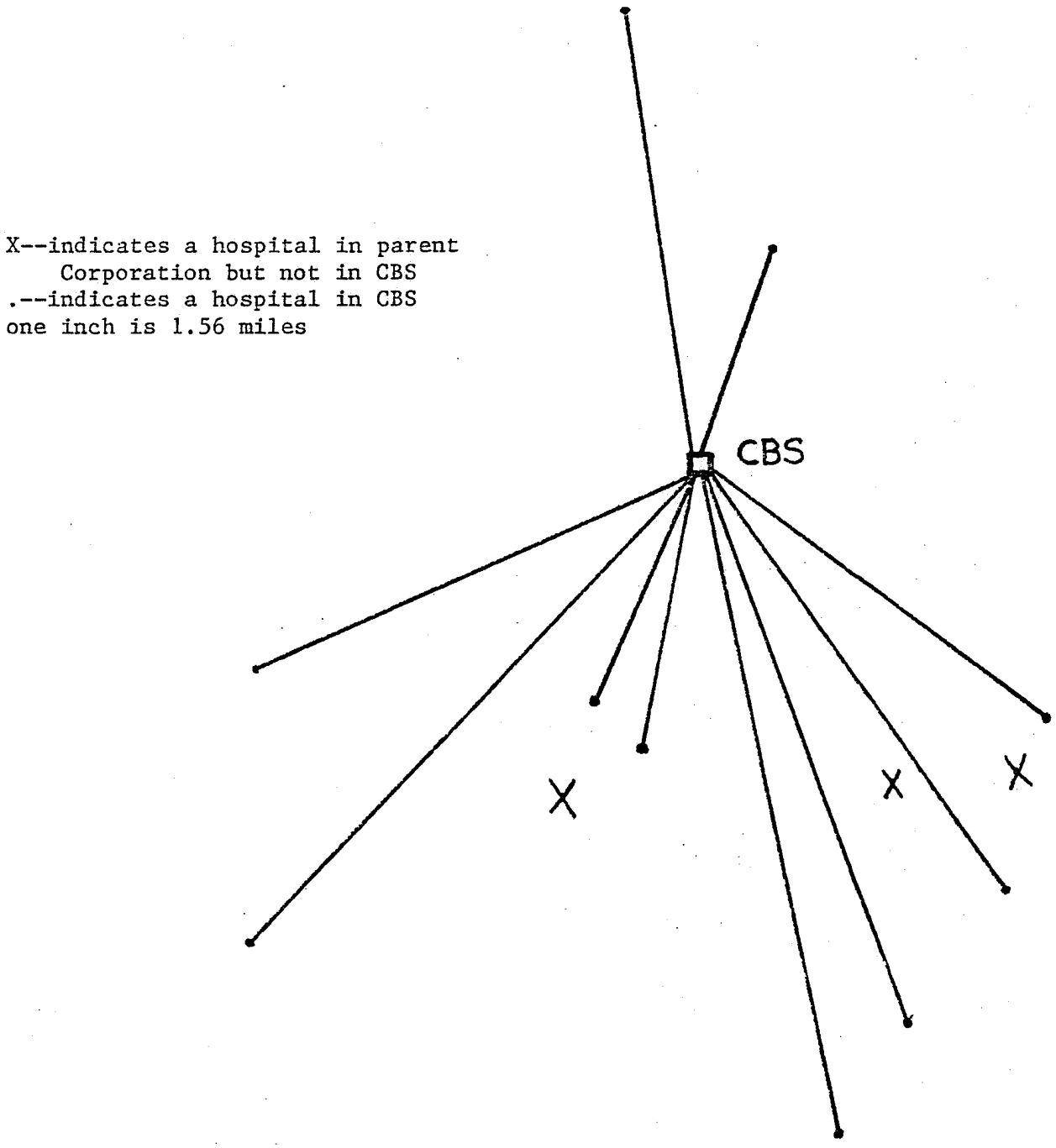

Figure 2.1. Geographic Configuration of the Hospitals Involved With the Shared Services of Central Blood Services, Inc. (CBS) and Its Parent

liabilities. The ratio of current liabilities to total net worth was .33, which indicated that the blood center was in a very secure financial position with little financial risk to its creditors or parent corporation. (See table 2.1 for the CBS balance sheet in percentages.)

CBS is governed by a board of directors which includes the executive director of the parent corporation and other directors appointed from the executive and medical staffs of the participating hospitals. The full-time administrator and the part-time medical director of CBS report to the executive director of the parent corporation. A medical advisory committee, composed of pathologists and laboratory personnel from hospitals participating in the blood center, acts in an advisory capacity to the board of directors of the blood center. In addition, two physicians serve part-time on the staff and are available for consultation on blood-related problems of donors and/or recipients.

CBS has developed a planning and evaluation process to meet long-term and short-term goals established by the member hospitals. Long-term goals for the center include:

- Accommodate increased demand for services from participating hospitals
- Provide new services as needed by participating hospitals
- Accommodate additional hospitals that wish to participate in the center
- Increase volunteer donor recruitment
- Expand facilities as required
- Expand group purchasing of blood center supplies, services, and blood derivatives
- Sponsor research and educational activities

The annual planning and evaluation process includes development of a budget for the blood center, setting program objectives, and conducting feasibility studies which are approved by the board of directors. The blood center receives continuous input from participating hospitals regarding day-to-day operation of the service.

Through the medical director and the medical advisory committee, the board of directors receives periodic reports regarding the quality and scope of services provided to participating hospitals by the blood center.

Blood and blood components available to participating hospitals from the blood center include whole blood, packed red cells, platelet concentrate, fresh frozen plasma, cryoprecipitate, and frozen red blood cells (obtained on request by contract with another blood center). Approximately 90 percent of the blood inventory (a six-day to seven-day supply) is maintained in the participating hospitals. There are effective inventory control and communications and distribution (transportation) systems for the blood center and participating hospitals. CBS purchases supplies (such as blood bags) and some blood derivatives on a volume basis, thereby making them available to members at reduced prices.

In 1972 the blood center was moved into offices 4,000 square feet in size. Facilities include donor interview rooms, blood drawing rooms, a processing area, space for inventory storage of whole blood and components, and dispatching, clerical, and administrative offices. All blood is drawn from volunteers at the blood center, at locations in the community to which the blood

Table 2.1. Balance Sheet of Central Blood Services, Inc., in Percentages (Aug. 31, 1975)

Assets

Current Assets	
Cash	37%
Accounts receivable	37
Inventories	12
Total current assets	86%
Equipment	12
Other assets	2
Total assets	100%

Liabilities and Equity

Current liabilities	25%
Long-term debt	13
Equity	62
Total liabilities and equity	100%

center sends blood drawing personnel, or at participating hospitals. The blood center has little space available for the expansion of its own phlebotomy facility; however, the other departments can be expanded to some extent as future needs increase.

Hours of operation of the blood center for processing purposes are 8 a.m. to 5 p.m. Monday through Friday and 8 a.m. to noon on Saturday. The blood center provides scheduled distribution of blood and blood products to participating hospitals during regular working hours and emergency distribution to participating hospitals 24 hours a day, seven days a week. CBS collects and processes well over 2,000 units of whole blood per month and also prepares blood components. The annual outdating rate of blood is 3½ percent. The blood center is staffed by 37 full-time equivalent (FTE) personnel, including medical technologists, phlebotomists, technicians, dispatchers, drivers, and clerical and administrative personnel.

Hospitals participate in the blood center on a fee-for-service basis determined by the type of blood products used. Fees are developed by the blood center on the basis of cost accounting of fixed and variable operating costs related to providing whole blood or individual blood components. Operationally, all units of whole blood and packed red cells remain the property of CBS. Members are not billed until the blood is transfused to a patient. CBS has the authority to tranship or pick up units at the member banks and make them available to other members or other transfusion services. All outdating of units more than 21 days old is the responsibility of CBS. Blood components, on the other hand, become the property of the member hospitals when they are received at their blood banks. For this reason, components are billed to the members on shipment.

One major hospital in the parent corporation delayed its decision to become a member of the blood bank. When CBS was first formed, the hospital operated its own large blood bank facility. In addition to the hospital's reluctance to abandon partial use of this investment in facilities, there was some medical staff resistance to participation because of apprehension concerning the quality of the new service. Nevertheless, the hospital did provide assistance to CBS in its early days by allowing the hospital's blood bank director to be part-time director of CBS. Eventually the participation by the hospital's blood bank director assuaged his fear and the fear of the medical staff that the quality of the CBS product would be inferior to that provided by the hospital. This plus the reduction in CBS costs that would result from the additional volume, led to the hospital's decision to participate in the shared blood bank service on technical and economic grounds. CBS has reduced the price per whole blood unit three times. The pre-sharing price per unit of whole blood was about $38; the price has now been reduced to $36 in spite of inflation.

Central Blood Services, Inc. is one of several central blood banks in the greater metropolitan area. Although the interaction of each central bank with the others is often friendly and cooperative, occasionally there are disagreements with regard to the recruitment of donors. However, because almost every blood bank at some point experiences the need for supplemental sources of blood and components, the general atmosphere is one of cooperation. Each

central bank tends to respect the others' donor areas. At the present time there are regional attempts to coordinate donor recruitment and phlebotomy activities. With the ever-increasing demands for blood, and components, this need to coordinate donor drives and drawings takes on greater significiance, as more donors are needed to give blood more frequently.

ANALYSIS OF THE DATA

The economic impacts of shared blood banking services discussed here relate to economies of scale, the quality of products and services provided, the comprehensiveness, availability, accessibility and acceptance of the services, and the reduction of fluctuations in supply and demand. Each of these impacts was analyzed separately for the shared service organization, Central Blood Services, Inc., and for the market area insofar as data were available.

Economies of Scale and Productivity

CBS was essentially established in 1972, when it moved into its present quarters. Shortly thereafter the chief administrator began collecting summary data on costs and man hours by department, the locations at which blood was drawn, the quantities of blood drawn, the quantities of blood and components processed at CBS and purchased from and sold to other banks, and the units of whole blood and packed red cells transfused and outdated. Consequently, for this analysis good data on CBS and its members are available from Sept. 1, 1973 to May 31, 1976. This period covers fiscal years 1974 and 1975 and most of 1976. Simple projected weighted adjustments were made to some of the 1976 data in order to show the adjusted figures for the entire year.

In tables 2.2 and 2.3 the man hours and total costs are shown for the different functional departments at CBS. It can be observed that costs are increasing. Some of the increases result from rising wages and inflationary increases for supplies, equipment, services, fuel, and electricity. Other increases are a result of the increased volume of activity in the blood center. The figures in table 2.4 illustrate the main growth in work load experienced at CBS. The whole blood drawn has risen from 20,700 units in 1974 to about 29,500 units in 1976, while the volume of components processed has risen even faster. Over the same period total costs have risen by 51 percent from $556,000 in 1974 to a projected $841,000 in 1976. In view of these rates of increase in volume and total costs and also the slower rate of increase in the number of man hours worked (table 2.2), economies of scale and increased labor productivity were anticipated and achieved as the volume increased. (See figures 2.2 and 2.3.)

Figure 2.2 shows that overall productivity increased substantially as the volume increased. When the volume was 21,400 units, about 3.03 man hours were needed to handle each unit; at 27,900 units, about 2.55 man hours were needed; and at 37,400 units only 2.06 man hours were needed. A similar phenomenon occurred with respect to costs. At 21,400, 27,900, and 37,400 units, the total unadjusted cost per unit dropped from $24.28 to $21.82 to $21.04

Table 2.2. Man-hours Worked Annually by Functional Department at Central Blood Services, Inc. (CBS)

Functional Department	1974	1975	1976[a]
	(Hours Worked)		
Donor Services	4,160	6,240	7,280
Phlebotomy			
Mobiles	19,760	21,840	26,000
At CBS	2,600	3,120	3,640
Processing	10,400	11,960	11,960
Administration	6,240	6,240	6,240
Transportation and inventory control	21,840	21,840	21,840
Totals	65,000	71,240	76,960

[a]Projected to annual level

Table 2.3. Total Costs Annually by Functional Departments at Central Blood Services, Inc. (CBS)

Functional Department	1974	1975	1976[a]
	(Thousands of Dollars)		
Donor Services	$ 41	$ 55	$ 72
Phlebotomy			
Mobiles	88	137	190
At CBS	22	29	39
At Hospitals	35	52	55
Processing	137	161	188
Administration	118	121	169
Transportation and inventory control	116	108	128
Totals	556	663	841

[a] Projected to annual level

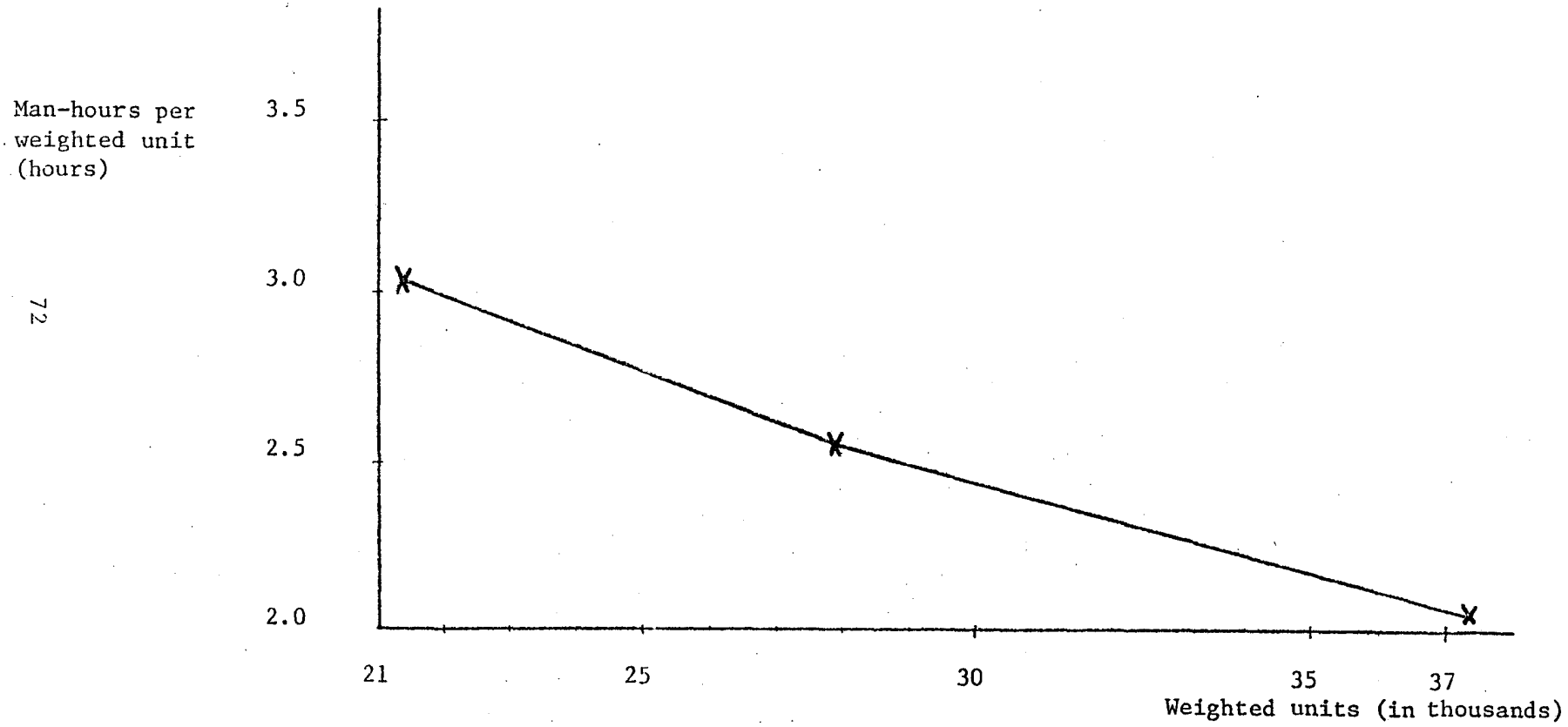

Figure 2.2. Total Man-hours per Weighted Unit vs. Weighted Units [a]

[a] See Unit Definitions Appendix

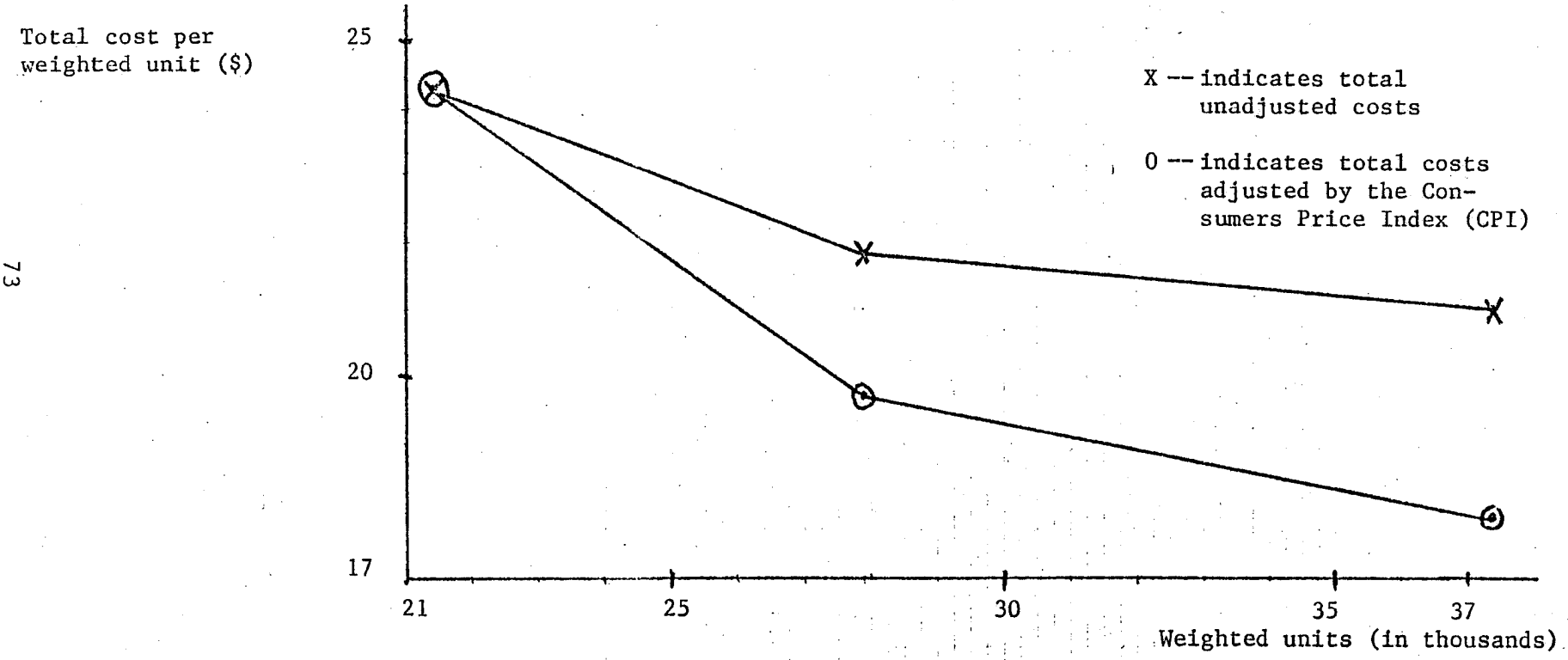

Figure 2.3. Total Costs per Weighted Unit vs. Weighted Units [a]

[a] See Unit Definitions Appendix

Table 2.4. Volume of Whole Blood and Components at Central Blood Services, Inc. (CBS)

Components	1974	1975	1976[a]
Whole blood drawn		(Units)	
Mobiles	13,200	16,900	21,400
At CBS	1,300	900	1,500
At hospitals	6,200	6,100	6,600
Packed red cells	1,800	8,000	13,400
Platelets	2,100	3,100	5,000
Cryoprecipitate	340	170	230
Fresh frozen plasma	660	1,290	1,990
Frozen red cells	10	150	200

[a] Projected to annual level

per unit respectively. Perhaps as interesting is the drop in dollars adjusted for the inflation of 1974 to 1976. The curve in figure 2.3 after adjustment depicts total adjusted cost per unit declining from $24.28 to $19.72 to $17.97 for 21,400, 27,900, and 37,400 units respectively.

These significant reductions suggest that there are scale economies and productivity increases as the volume of blood and blood components handled increases. Caution must be used, however, in extrapolating any of these gains to higher volumes than are shown here. It is possible that for some levels beyond 37,400 units the unit cost and unit labor may continue to decline. It is also apparent that the rate of decline will continue to taper off. Indeed, at some point or range of activity at much larger volumes, there will be scale diseconomies owing to increased costs of administration, information processing, and long-distance transportation. This point has not been reached by CBS. An investigation of much larger shared blood banking organizations may be needed to determine when the point is reached.

Breaking down the costs and the man hours used for the various functional activities helps to make the origins of the scale economies and increases in real productivity understandable. Figures 2.4 through 2.18 indicate where economies and diseconomies and increases or decreases in productivity occur.

As volume increased there was little need to expand the administrative or delivery staff of CBS. It is difficult to anticipate at what future levels of diversification of services and products more administrators will be needed.[2] Some studies in governmental agencies and for-profit corporations have been undertaken to determine when it is necessary to add another layer of managerial staff and to decentralize the administration of the organization. In these studies it was found that, once the organizations passed a certain size relative to work load supervision and decision making, direct top-management supervision was difficult, and it was necessary to create a middle management level. Then the costs per unit and man hours per unit made a jump increase. This situation could develop in shared blood banking, but the data at CBS do not indicate that it is happening yet.

The delivery staff will grow as more delivery vehicles are added to the fleet. This will be necessary only if the time per delivery increases greatly (which may occur when the volume at each stop increases substantially), if the daily number of deliveries or transhipments among members increases significantly, or if more members are added to the shared service agreement.

In general, the vehicle fleet size tends to be determined by the number of stops and the mileage travelled per vehicle per day. Once the present vehicles reach their capacity, it will then be necessary to add another vehicle and another driver. For this reason economies of scale and productivity increases will occur for large increases in volumes delivered only as long as the number of stops or the mileage does not increase; that is, as long as only the units per stop increase. Once stops and/or mileage start to increase beyond a certain point needed expansion of the fleet may cause diseconomies and decreases in productivity.

The addition of the new large member to CBS in 1975 and the increase in volume overall did not make necessary an increase in administrative or delivery staff. In these functional areas economies of scale have been realized. Furthermore, the volume increase has been per stop rather than in terms of an increased number of stops or of increased mileage.

An unanticipated and sizable economy of scale was also realized in the inventory control area. In spite of the increased volume and consequent growth in record keeping, the inventory control staff did not increase over the three years. Possibly this area was overstaffed earlier, and now employees can utilize their time more effectively. This possibility is difficult to isolate from the data. It is known, however, that some inventory controls and procedures have changed so that perhaps employees can now do the increased work more efficiently.

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[2] Chandler, A.D. Strategy and Structure Cambridge, Mass., MIT Press, 1962. Dale, E. Planning and Developing the Company Organization Structure, New York; American Management Association, 1952. Morris, W.T. Decentralization in Management Systems, Columbus, Ohio; Ohio State University, Press, 1968.

When the information concerning transportation and inventory control is examined (figures 2.4 and 2.5), it is apparent that the man hours per unit and the unadjusted cost per unit have dropped from .85 hours and $4.50 in 1974 to .59 hours and $2.91 in 1975 to .41 hours and $2.40 in 1976. Furthermore, adjusted costs per unit have fallen from $4.50 in 1974 to $2.62 in 1975 to $2.06 in 1976. These drops represent scale economies (figure 2.6) as over the years the volume has considerably increased.

Blood processing is the only other functional area where there appears to be scale economies and productivity increases. As the volume increased from 22,800 to 30,300 to 38,700 process equivalent units, the costs per unit and man hours per unit dropped from $6.00 and .46 hours to $5.30 and .39 hours to $4.85 and .31 hours. These downward trends are shown in figures 2.7 to 2.9. With predetermined processing procedures, such rapid drops in the unit cost or time for processing might not be expected. Some savings of fixed setup times would be anticipated, but perhaps the greater savings come from the use of larger, more sophisticated machines that are capable of performing more and faster testing and more component fractioning per hour. Indeed, many of these machines are uneconomical if used for small volumes as they are idle much of the time. For large volumes the tradeoff between labor hours and machine hours results in economies of scale and increased productivity.

The three remaining functional areas relate to donor activities. Each area shows a diseconomy of scale, and two of the areas show decreased productivity per man hour. The unadjusted cost per unit for donor services (which involves recruiting, advertising, and scheduling) has risen from $1.97 to $2.28 to $2.45 as the number of units drawn has gone from 20,700 to 24,000 to 29,500. (See figures 2.10-2.12). The task of expanding the donor is increasingly difficult, partly because other blood banks are also trying to expand their donor bases. Donor recruitment is not regionally coordinated to any large extent so that the advertising and recruiting campaigns of the various blood banks often overlap and at times possibly are counterproductive. If more regional coordination is achieved, some economies of scale may be possible in this area also.

The phlebotomy activities show some unusual volume-related behavior. On the mobiles the number of man hours per unit dropped considerably as the volume of drawings increased. Figure 2.13 indicates this drop from 1.50 hours to 1.29 hours to 1.21 hours as the number of units drawn on mobiles has gone from 13,200 to 16,900 to 21,400. Most of these man hour savings have resulted from the fact that a rather fixed number of persons is needed to staff mobile operations. The increased volume of drawings has resulted in less idle time. On the other hand, the adjusted and unadjusted costs per unit have increased with volume. (See figures 2.14 and 2.15). The adjusted cost per unit has risen from $6.63 to $7.32 to $7.60 for the previously mentioned volumes. Labor costs did not cause this rise; the main source of the increase was in blood bag costs. The unadjusted cost of blood bags has risen dramatically at CBS from $1.49 per unit drawn in 1974 to $2.87 in 1975 and $3.17 in 1976. Most of this rise is attributable to about a 50 percent increase in blood bag costs from 1974 to 1976. Indeed, because blood bags comprised about 21 percent of the total cost in 1974 and 33 percent of the total cost in 1976, the inflationary price rise in this item has been the major factor in the rising cost

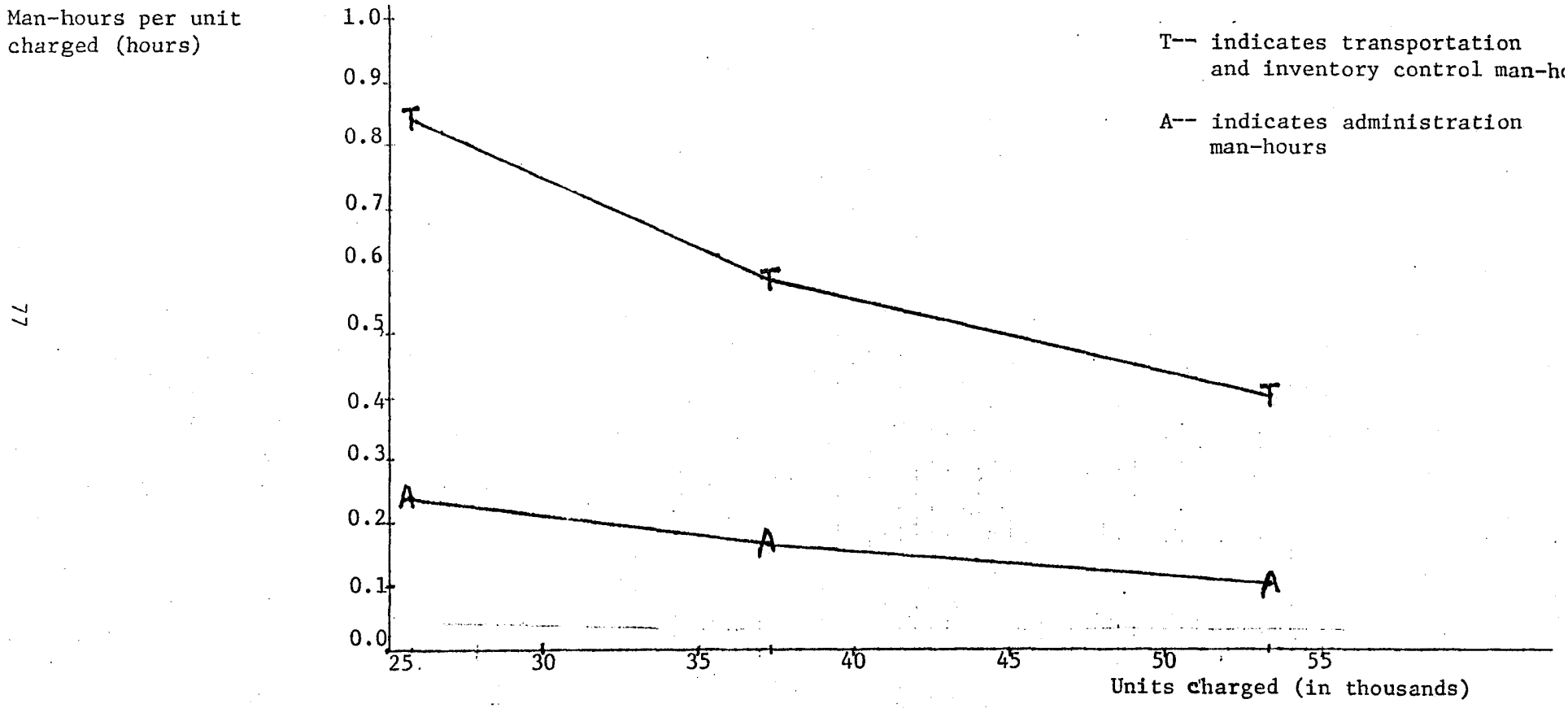
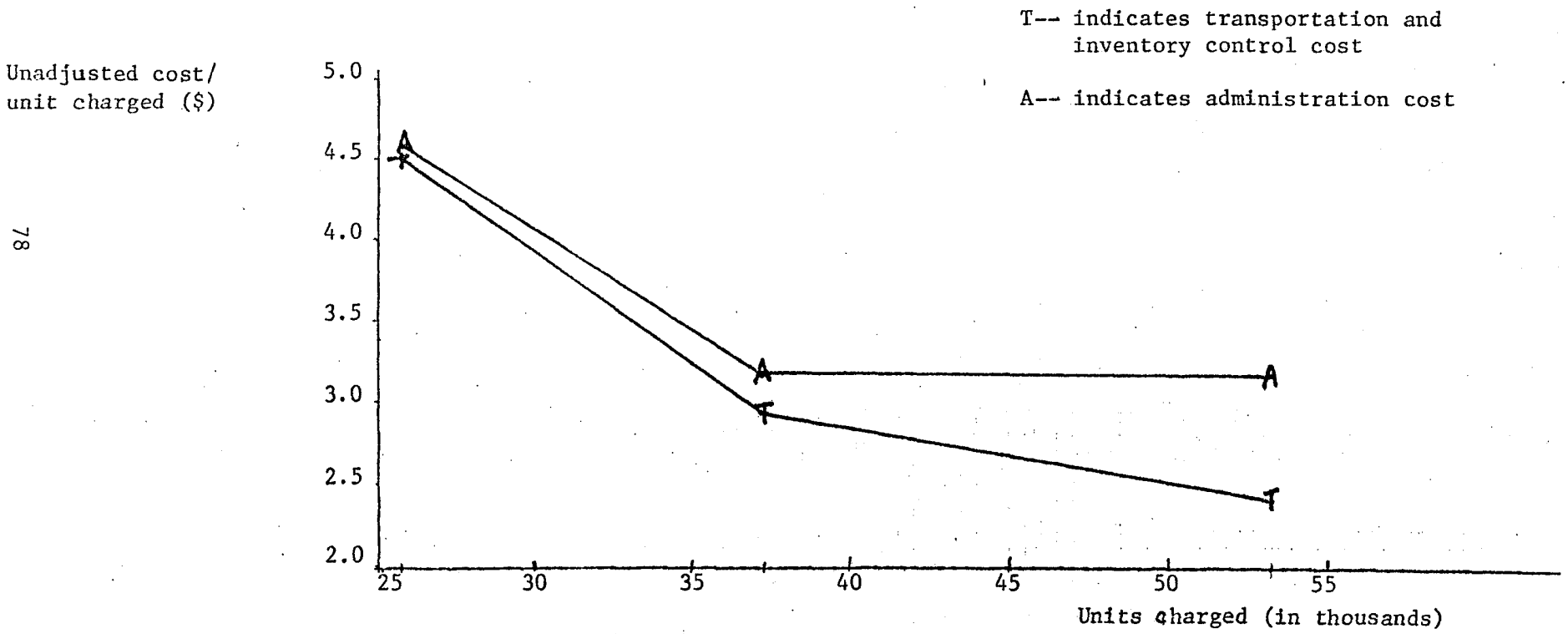


Figure 2.4. Transportation and Administration Man-hours per Unit Charged vs. Units Charged [a]

[a] See Unit Definition Appendix



Figures 2.5. Unadjusted Transportation and Administration Costs per Unit Charges vs. Units Charged [a]

[a] See Unit Definition Appendix

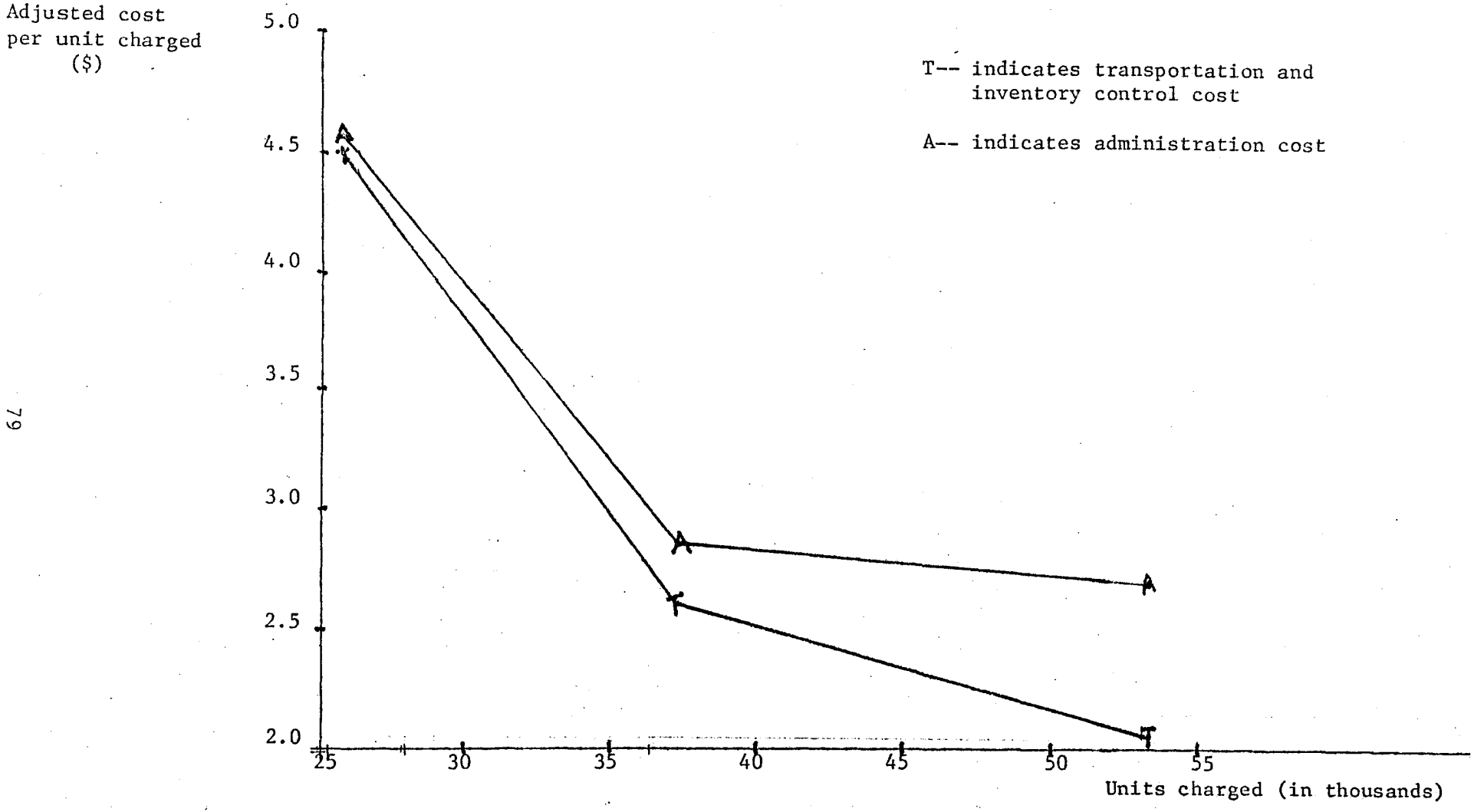


Figure 2.6. Consumer Price Index Adjusted Transportation and Administration Costs per Unit Charged vs. Units Charged [a]

[a] See Unit Definition Appendix

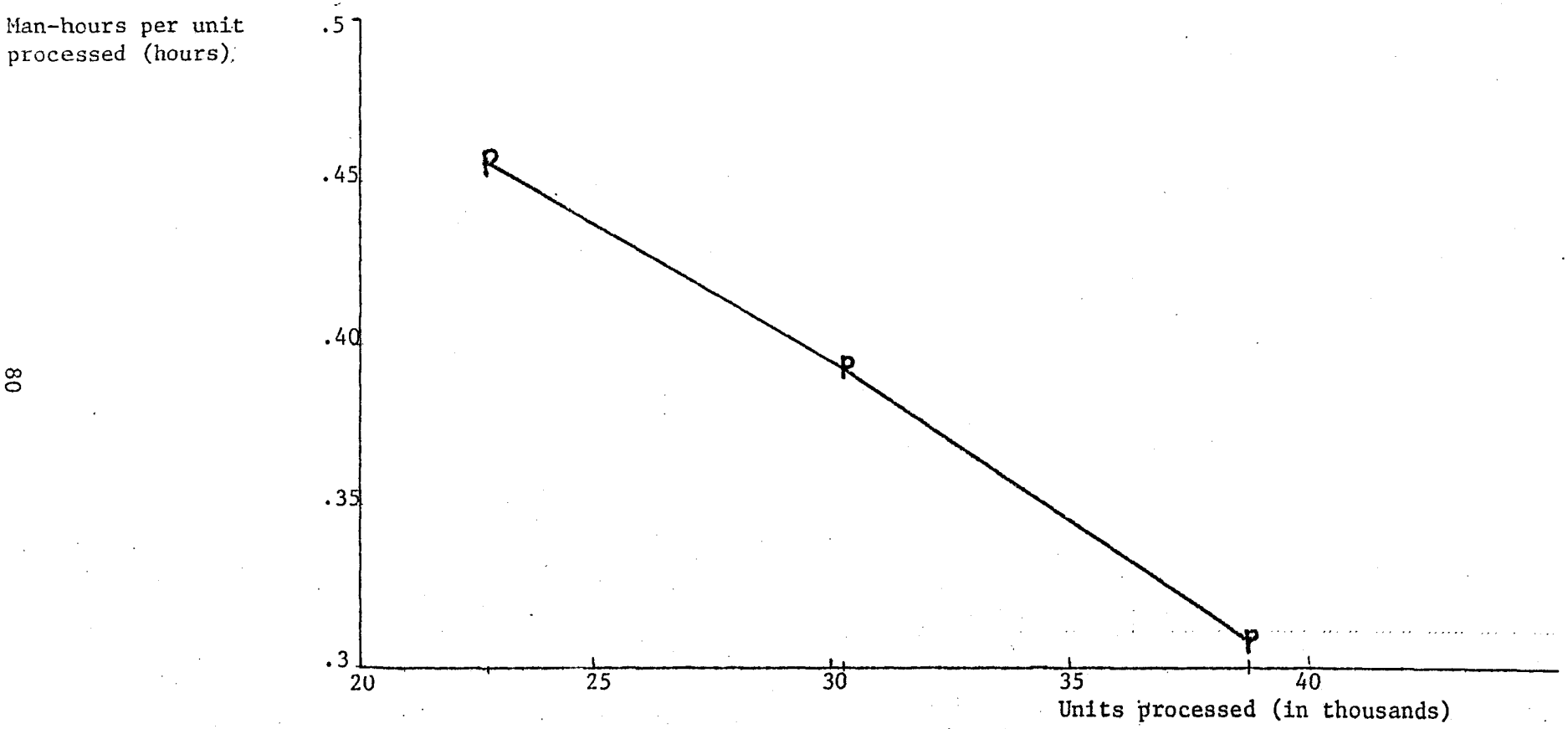


Figure 2.7. Processing Man-hours per Unit Processed vs. Units Processed [a]

[a] See Unit Definition Appendix

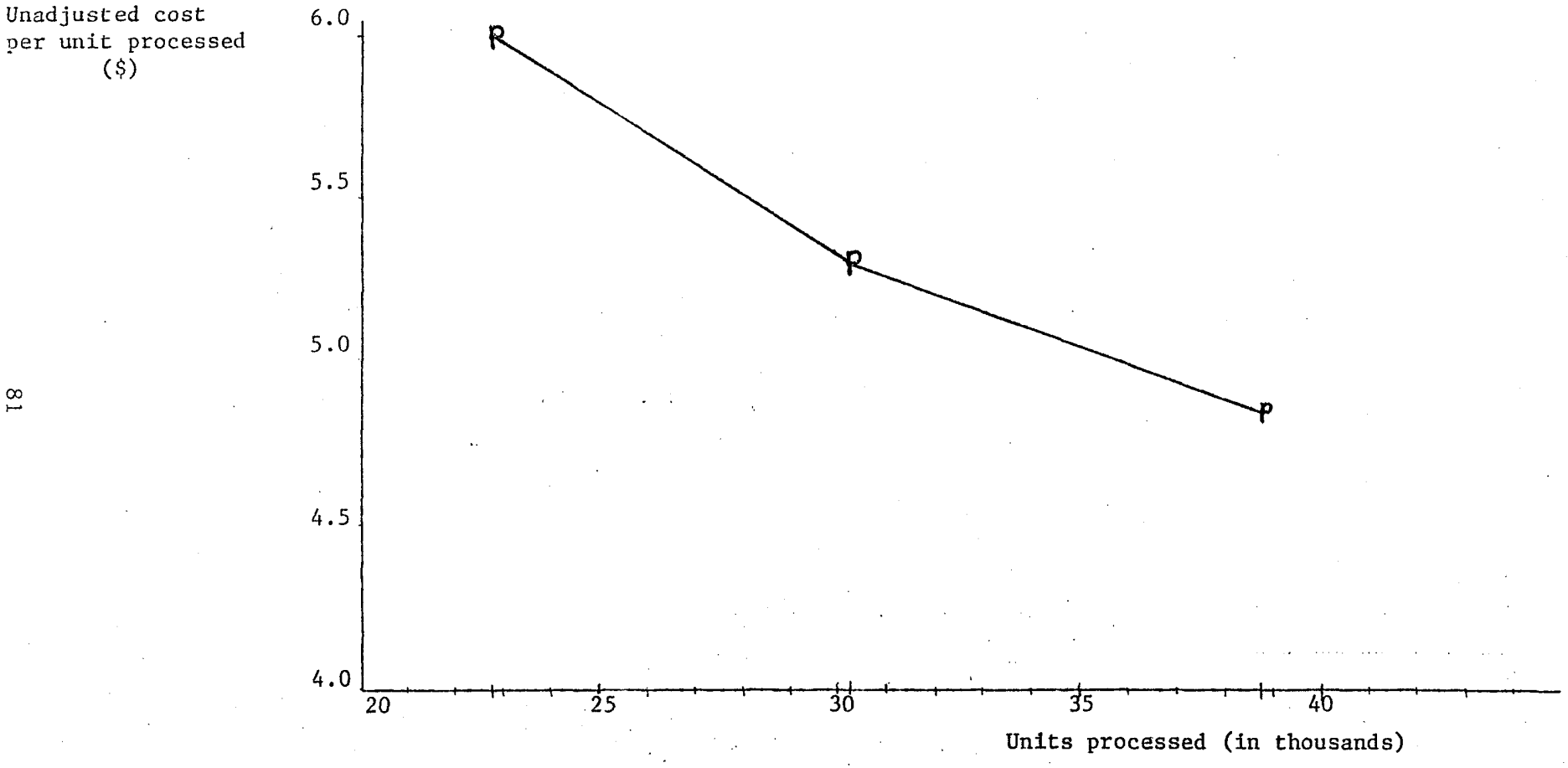


Figure 2.8. Unadjusted Processing Costs per Unit Processed vs. Units Processed [a]

[a] See Unit Definition Appendix

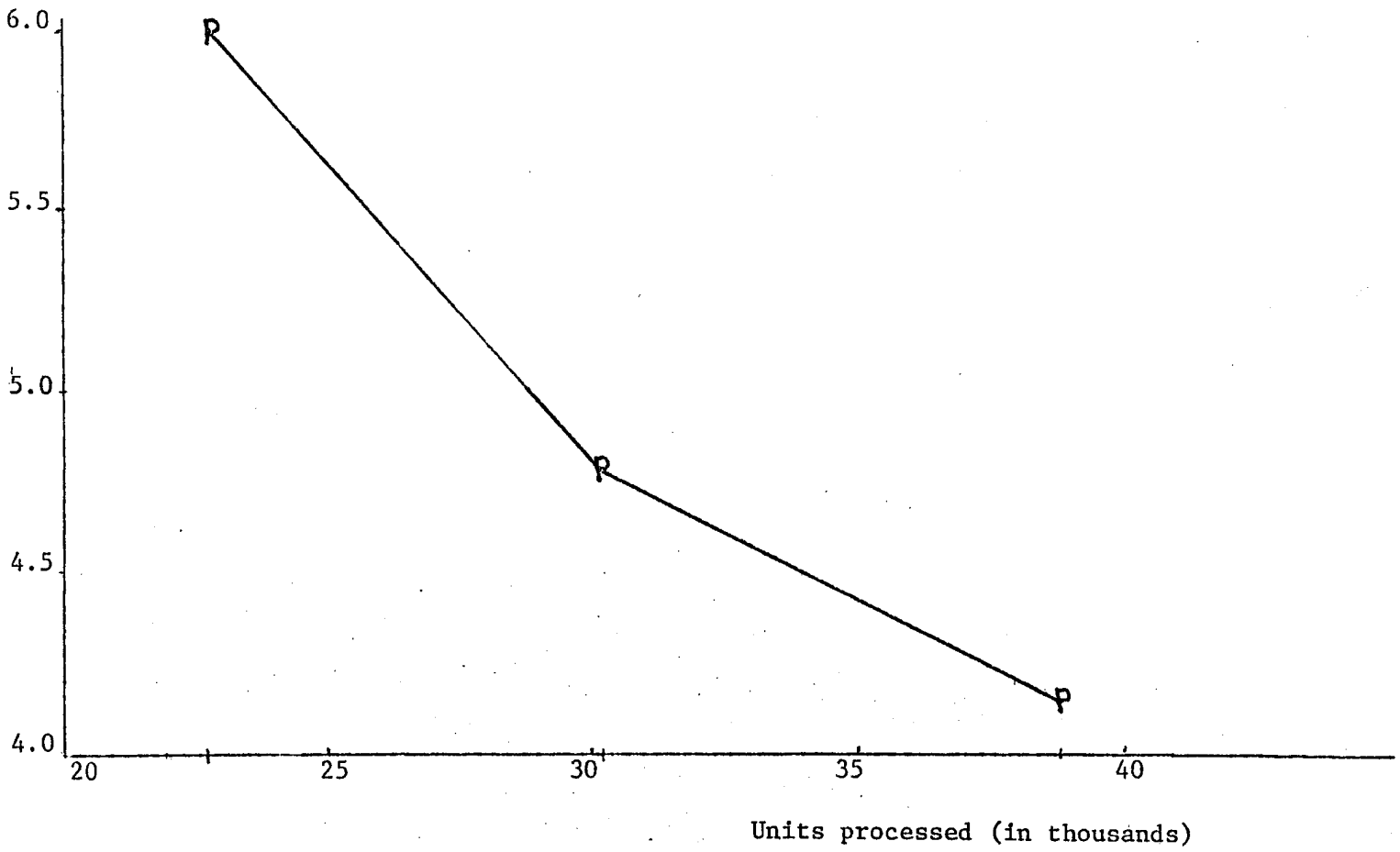


Figure 2.9. Consumer Price Index Adjusted Processing Cost per Unit Processed vs. Units Processed [a]

[a] See Unit Definitions Appendix

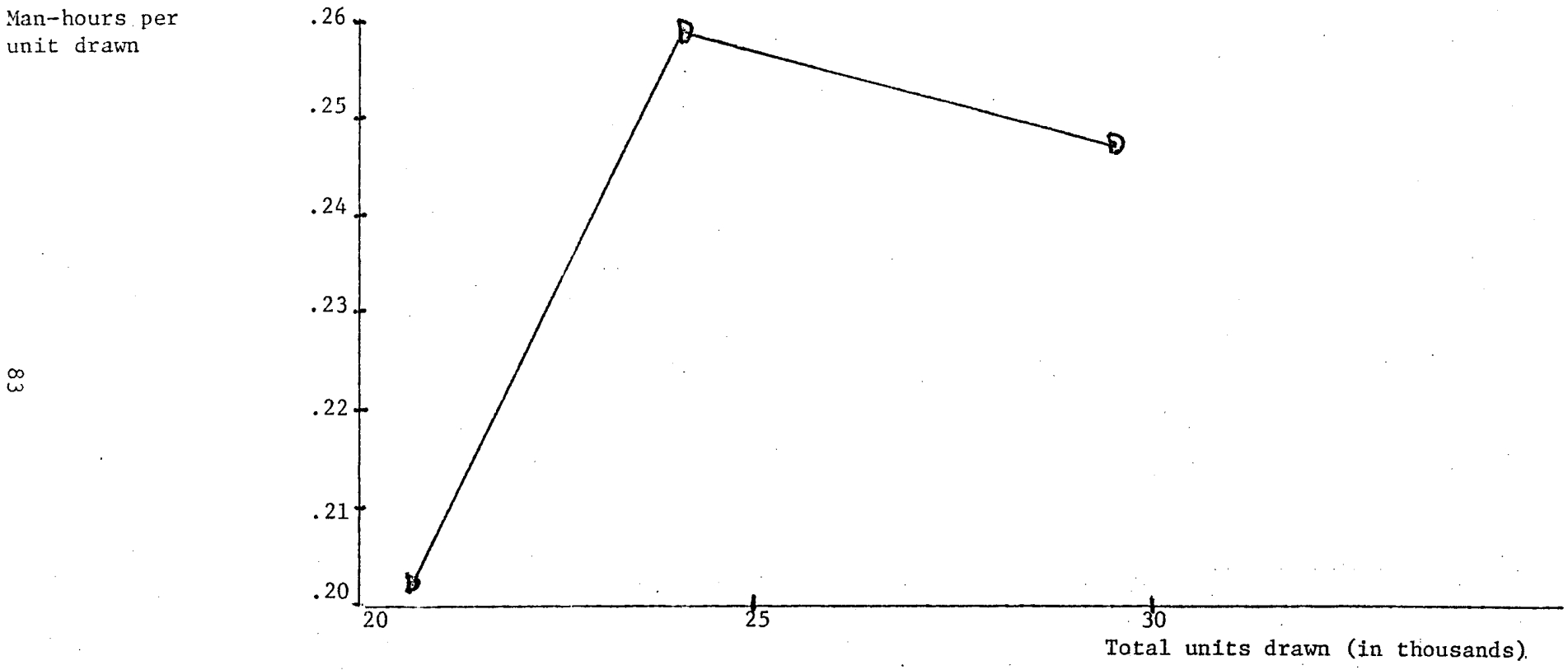


Figure 2.10. Donor Services Man-hours per Unit Drawn vs. Total Units Drawn [a]

[a] See Unit Definitions Appendix

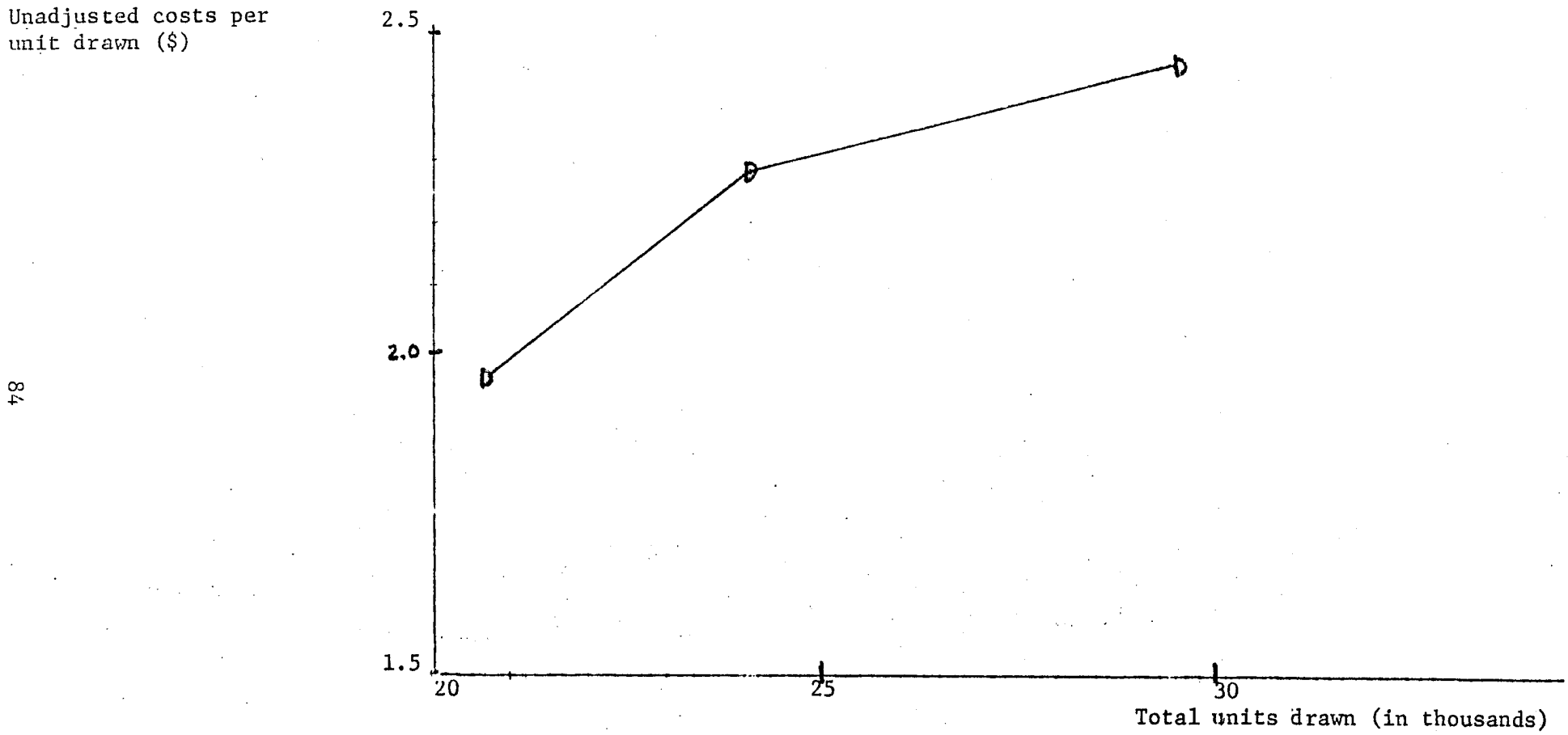


Figure 2.11. Unadjusted Donor Services Costs per Unit Drawn vs. Total Units Drawn [a]

[a] See Unit Definitions Appendix

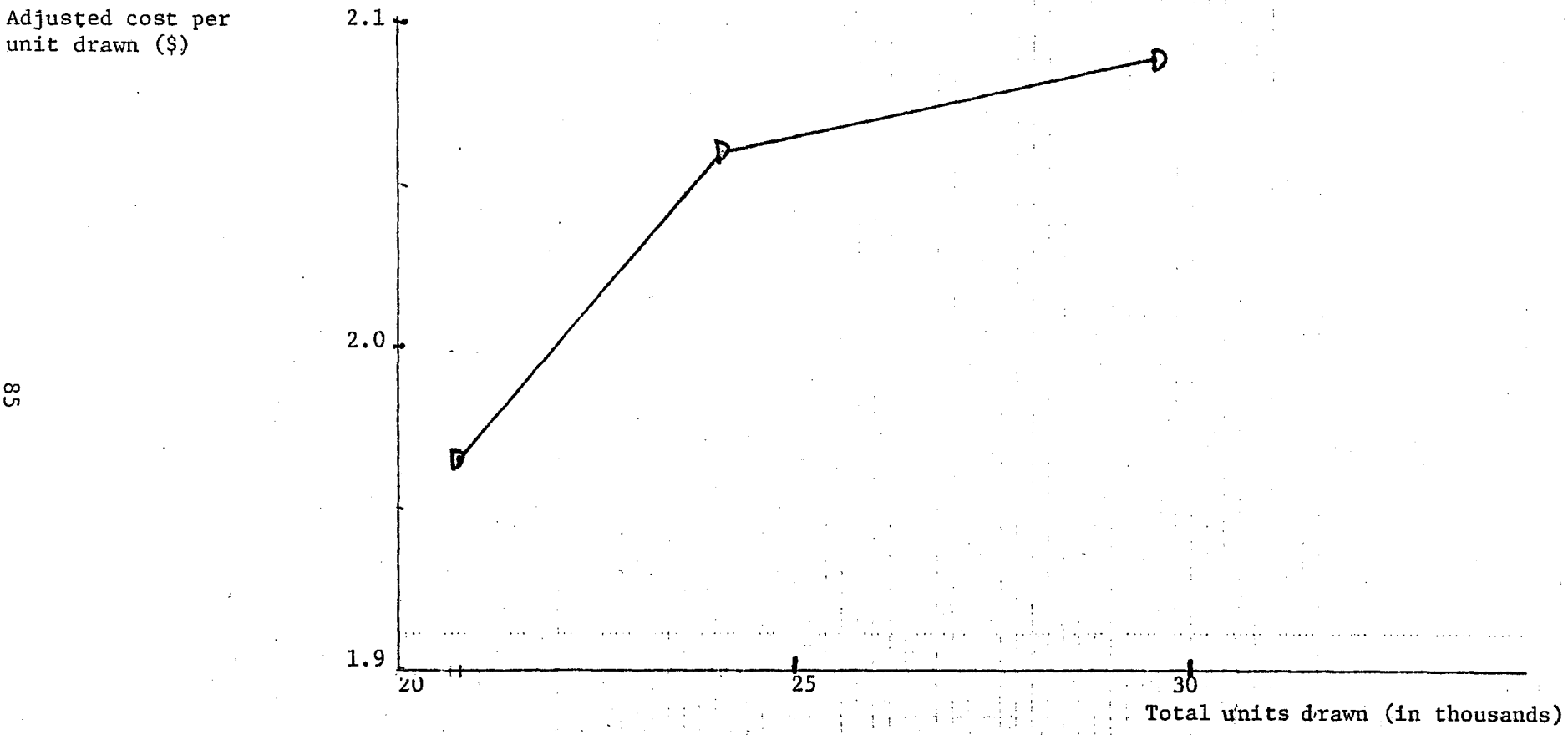


Figure 2.12. Consumer Price Index Adjusted Donor Service Costs per Unit Drawn vs. Total Units Drawn [a]

[a] See Unit Definition Appendix

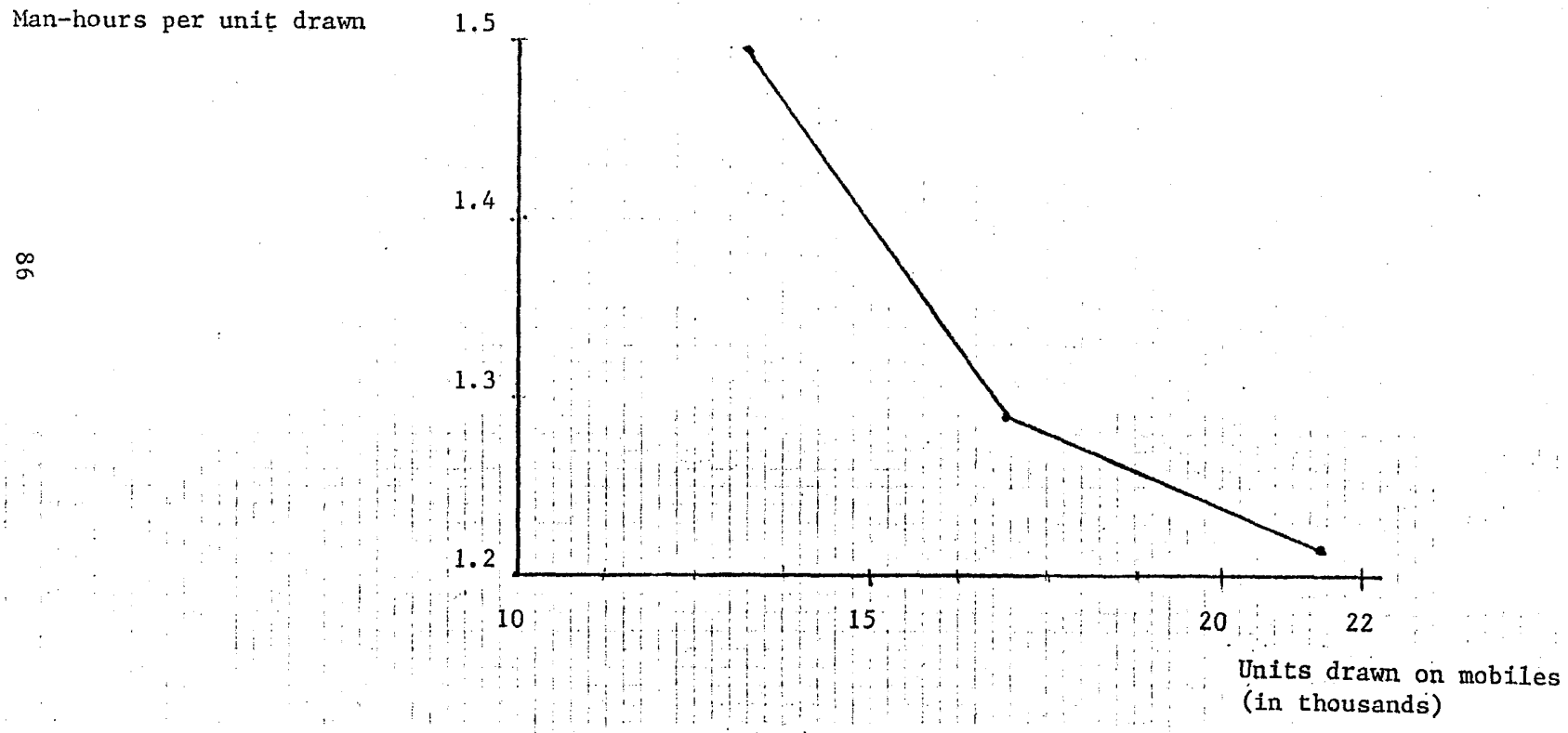


Figure 2.13. Mobile Phlebotomy Man-hours per Unit Drawn vs. Units Drawn on Mobiles [a]

[a] See Unit Definitions Appendix

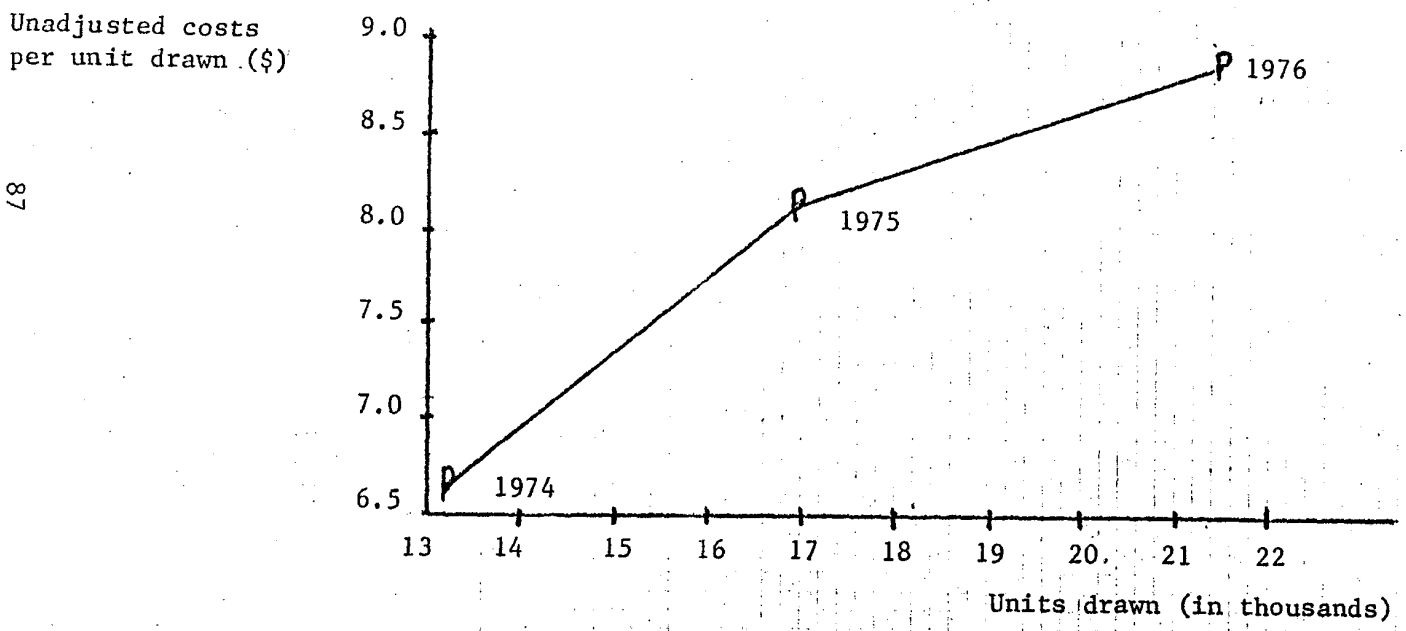


Figure 2. 14. Unadjusted Mobile Phlebotomy Costs per Unit Drawn vs. Units Drawn on Mobile [a]

[a] See Unit Definitions Appendix

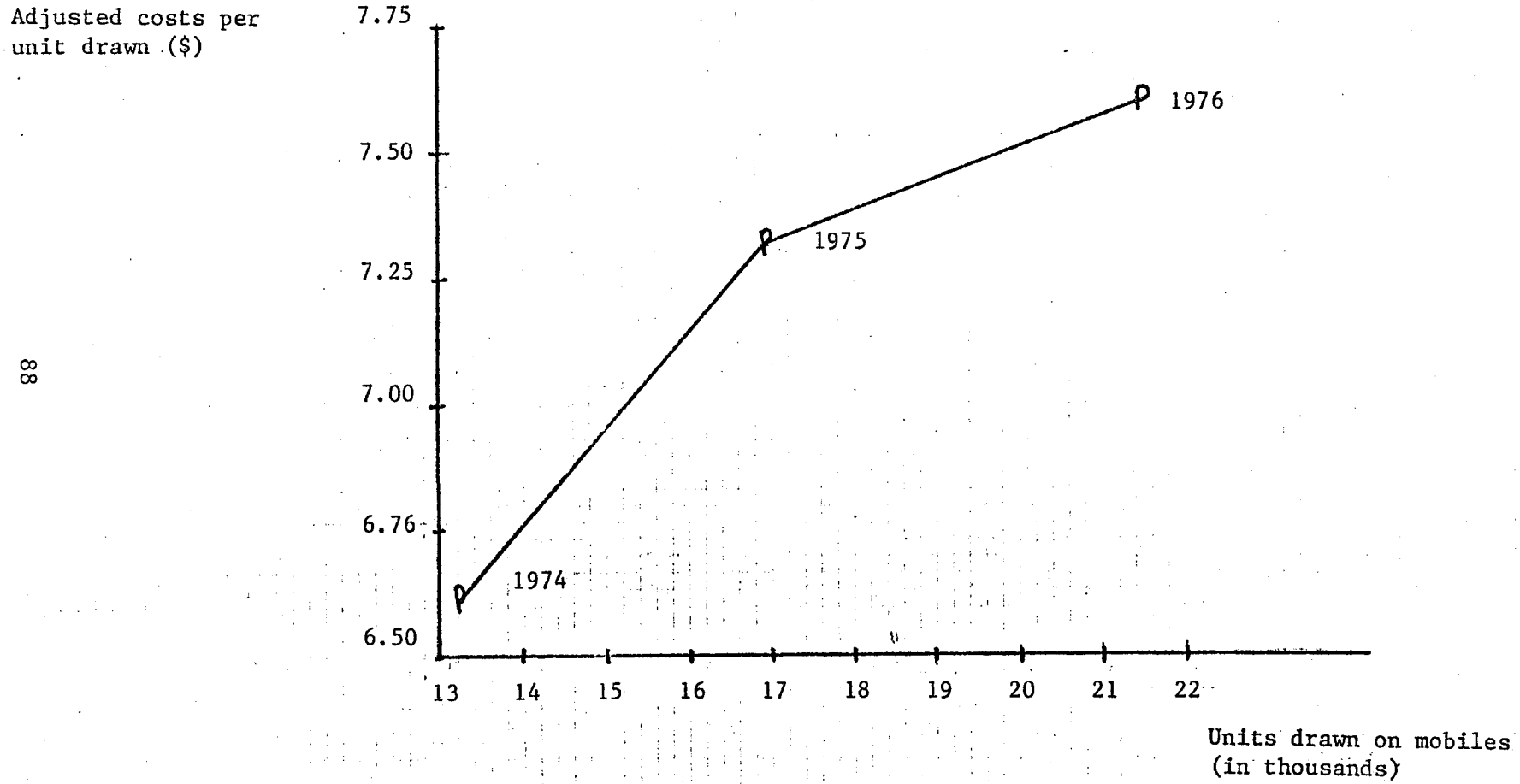


Figure 2.15. Consumer Price Index Adjusted Mobile Phlebotomy Costs per Unit Drawn vs. Units Drawn on Mobiles [a]

[a] See Unit Definitions Appendix

of phlebotomy on mobiles. Another somewhat important factor in the rising cost of blood bags is the increasing demand for blood components. As the component needs increase, more double and triple, rather than single, bags are required, and costs rise rapidly. (See table 2.5.)

Table 2.5. 1976 Blood Bag Prices[a]

	(Price per bag)
Single	$2.19
Double	4.38
Triple	6.57

[a] These prices are based on the volume used at CBS and participating hospitals

When the blood bag costs were adjusted to 1974 levels, there were economies of scale for the phlebotomy on mobiles. The cost per unit was $6.63 for 13,200 units and $6.38 for 21,400 units.

The foregoing comments concerning the cost of blood bags also apply to unusual costs observed for the drawing of blood at CBS itself. (See figures 2.17 and 2.18.) However, in this area - phlebotomy at the blood center - the labor hours per unit and also the costs per unit show a sharp rise from 1974 to 1975 and then a drop in 1976. (See figure 2.16). In fact, these costs and man hours exhibit unusual behavior because of the addition of a second phlebotomist in 1975. The chief administrator believed that the additional phlebotomist was needed to reduce the waiting time for donors at CBS. Actually, as the cost and the time of the additional phlebotomist were spread over an increased volume in 1976, center phlebotomy also showed economies of scale.

An important question is: "Have scale economies at CBS resulted in lower costs to the members than they would have incurred without CBS?" This question is not easy to answer. In general, the member hospitals did not maintain detailed cost and volume data for their operations before CBS was initiated, with the exception of the major hospital which did not join CBS initially but did so in 1975. Just after CBS was founded in 1972, this hospital conducted an extensive cost analysis of its operation. The cost for drawing and processing one unit of whole blood was just under $36. Because CBS was just starting and its volume was low, the hospital's analysis showed that blood purchased from CBS would cost about $44 per unit of whole blood. Cost figures for later years from the hospital are not available, but it is unlikely that the $36 per unit cost decreased, because of the severe inflation

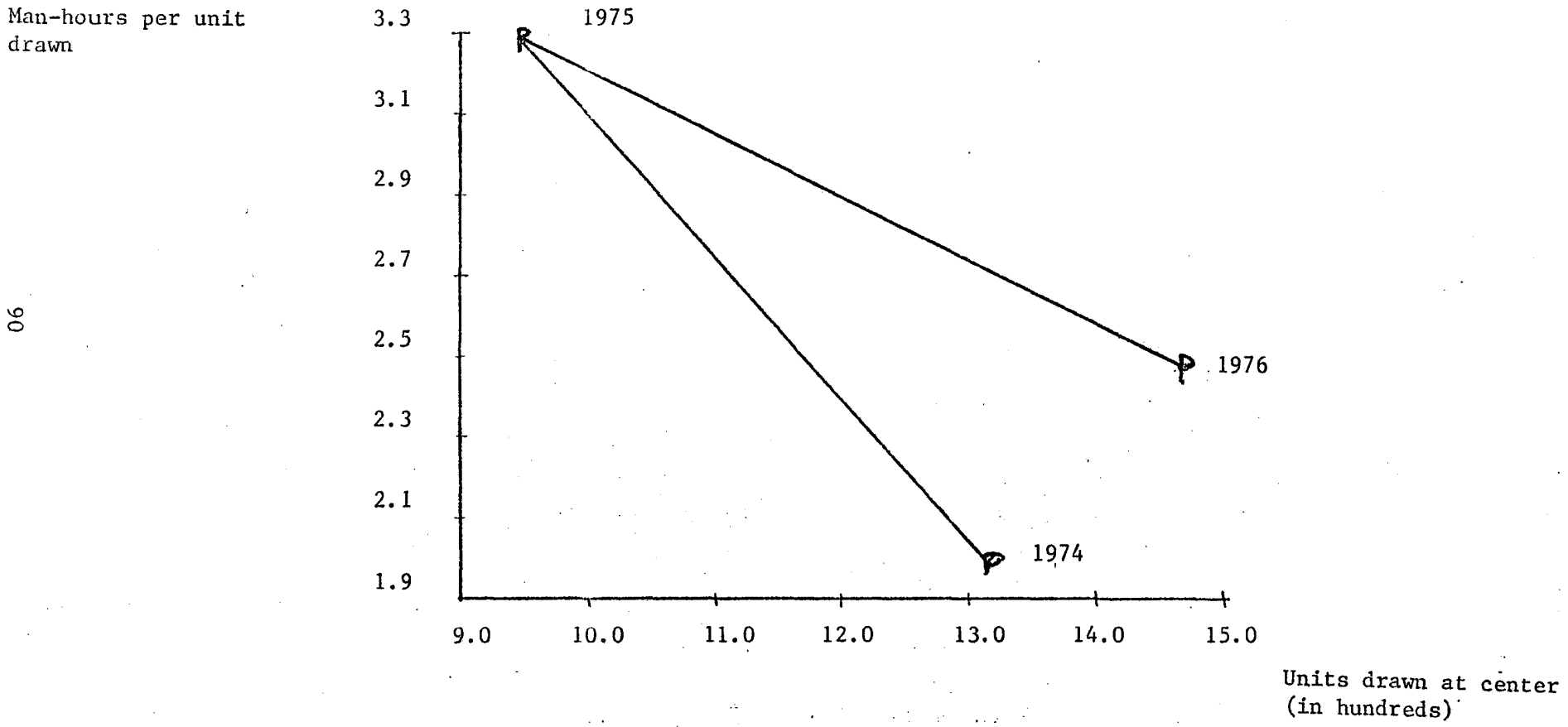


Figure 2.16: Center Phlebotomy Man-hours per Unit Drawn vs Units Drawn at Center [a]

[a] See Unit Definitions Appendix

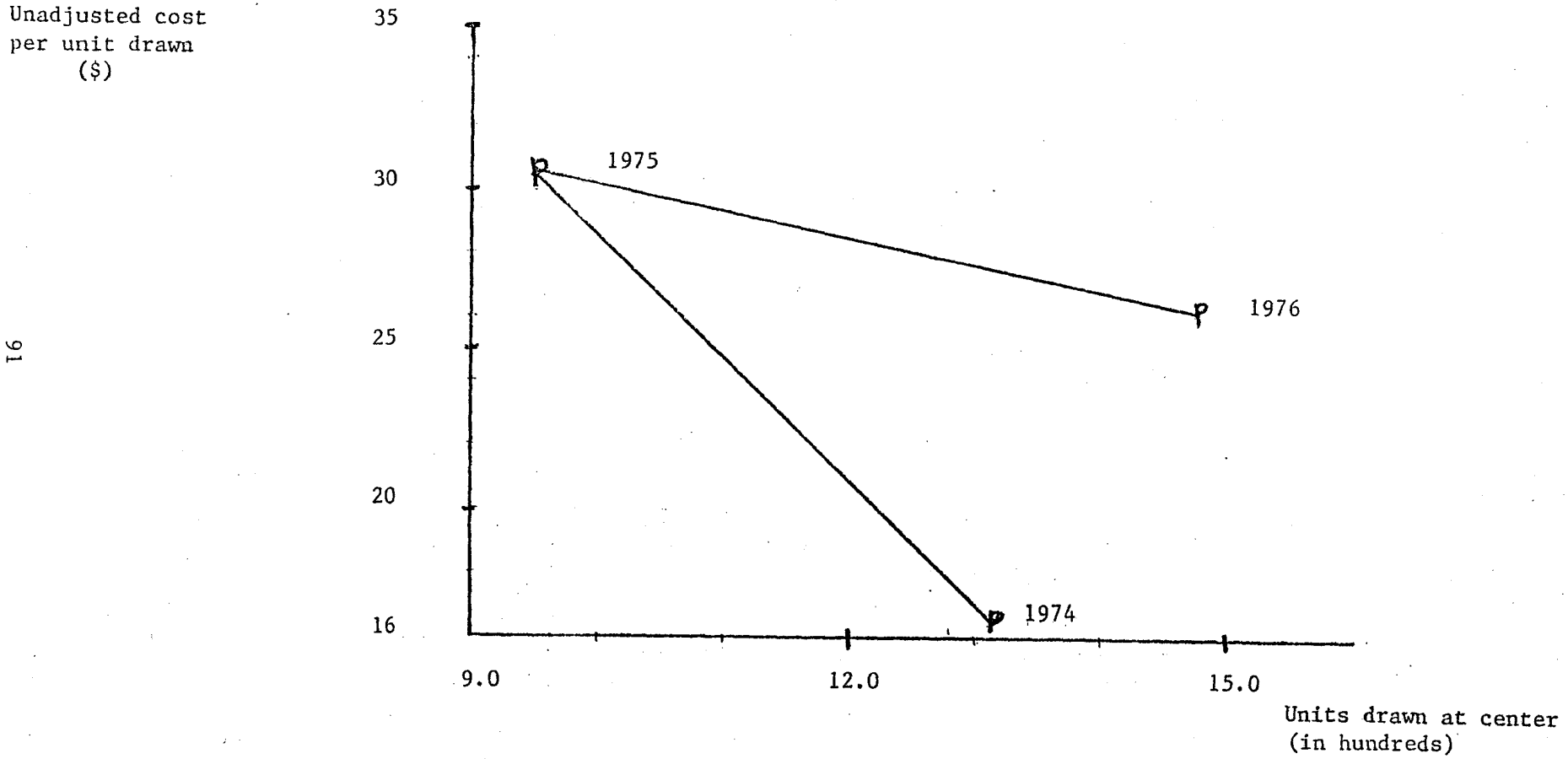


Figure 2.17. Unadjusted Center Phlebotomy Cost per Unit Drawn vs. Units Drawn at the Center [a]

[a] See Unit Definitions Appendix

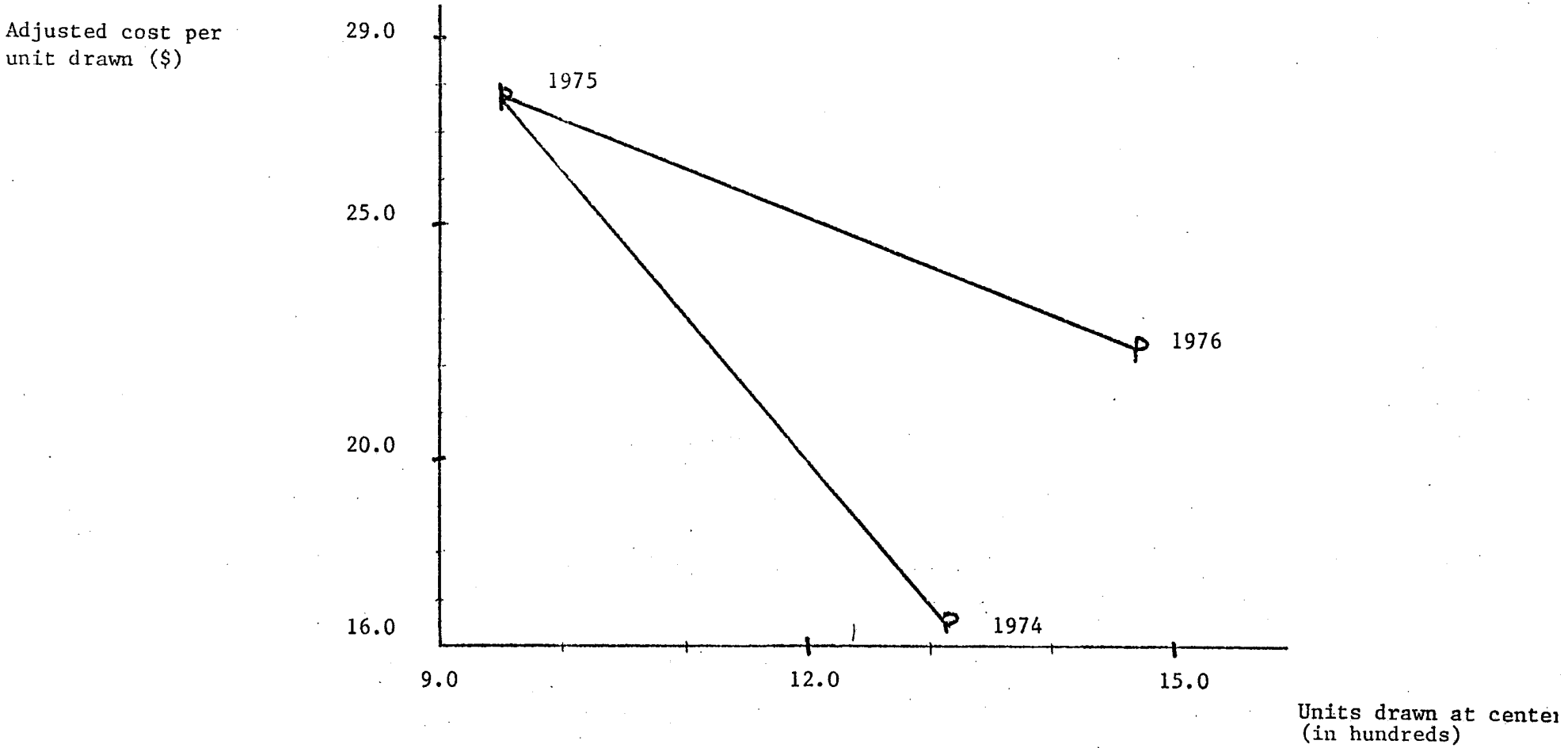


Figure 2.18. Consumer Price Index Adjusted Center Phlebotomy Cost per Unit Drawn vs. Units Drawn at Center [a]

[a] See Unit Definitions Appendix

of 1972 to 1976 and the use of more multiple blood bags. (It is true that the volume of blood and blood components used at the hospital has increased over this period. However, the volume is far below the volumes shown in the figures relating to CBS. It would therefore be unlikely that the hospital would have experienced any large economies of scale.) The present $36 per whole blood unit charged by CBS to its member hospitals is well within the cost range for a large hospital blood bank operating independently and very likely is considerably below the cost for a blood bank in a smaller hospital.

Another area of cost savings to the member hospitals is group purchasing of anti-sera, blood bags, and RIA test kits. A study conducted by CBS in 1975 showed that volume discounts produced actual savings of $26,585 for anti-sera and albumin, $13,345 for blood bags, and $2,700 for RIA test kits. In addition, CBS handled salvage plasma; however, this was a breakeven operation for CBS because the member hospitals received all of the profits from the sale of the salvage plasma, amounting to about $35,000. Thus the total 1975 real savings from group purchasing and salvage plasma to the participating hospitals was $77,000.

A last question of interest is: "How do the CBS costs compare with the costs experienced by other blood banks in the region?" Although not many data are readily available on the volume of blood used in the region, it was possible to obtain from a regional blood agency, information concerning the total number of transfusions made in a large number of hospitals in 1974. With the use of these transfusion data and 1974 Hospital Administrative Services (HAS) data on direct costs, it was possible to compute some direct costs per transfusion for the hospitals in different blood bank groupings. These figures are shown in table 2.6. Some comments concerning the table are necessary. The independents all maintain complete blood drawing and processing facilities. CBS itself does all of the processing for its members, although some of them maintain reasonably large drawing and processing capabilities. The member hospitals of Central Bank #2 do not draw or process blood. Thus for some of the hospitals the direct "salaries" per transfusion include costs of drawing and/or processing blood and for others they do not.

The purchase costs paid to the central banks and to supplementary suppliers appear in the column, "Other Direct Costs." It can be inferred from the closeness of these figures that in 1974 all central banks and supplementary suppliers probably charged about the same price for their units, with the exception of Central Bank #1.

Quality of Products and Services

Because virtually all of the blood drawn by CBS or received from other sources is from volunteer donors, there is little risk of hepatitis or other blood diseases. The drawing procedures followed by the phlebotomists meet all American Association of Blood Banks and Food and Drug Administration standards.

Table 2.6. 1974 Average Direct Costs per Transfusion[a] for Hospitals in Blood Bank Groups

Group[b]	Salaries per Transfusion	Other Direct Costs per Transfusion	Total Direct Costs per Transfusion
		(Dollars per Unit)	
Central Blood Services, Inc. (4 members)	$20.74	$44.54	$65.28
Central Bank #1 (3 members)	40.50	50.35	90.85
Central Bank #2 (3 members)	0	45.28	45.28
Independents (20 hospitals)	19.13	46.37	65.50

[a] Transfusions of whole blood and packed blood cells.

[b] The number of members shown is not the total number of members but only the number for which data were available from Hospital Administrative Services of the American Hospital Association.

Consequently almost all donors with potential or real problems are screened out prior to drawing. Of the total units drawn or received at CBS in 1975, only 24 had to be discarded for positive hepatitis test results. In the first five months of 1976 only seven units were discarded.

As was mentioned earlier, the staff of the major hospital that joined in 1975 had some early fears concerning quality and dependability. CBS experience from 1972 to 1975 clearly demonstrated that a shared blood bank organization could produce high quality blood and components when they were needed at the member hospitals.

The maintenance of high-quality standards also depends on well trained staff and good equipment. Because of its suburban location CBS has no trouble in attracting a high-quality staff. The equipment at CBS is modern and well maintained through a biomedical engineering service contract with the parent corporation.

Comprehensiveness

Because of the volume of operations, CBS is able to offer a range of products and services which an independent hospital blood bank or transfusion service may not find it economically feasible to provide. The blood products available include whole blood and such blood components as fresh frozen plasma, platelet concentrates, cyroprecipitate, packed red cells, frozen red cells, and anti-sera. The blood components are made at CBS, and the anti-sera are purchased in volume from commercial drug manufacturers.

Hematologists, immunohematologists, and pathologists who are part-time CBS staff members provide an additional level of expertise for the medical staffs of member hospitals. This expertise is needed because small to medium-sized hospitals cannot usually afford such specialists.

At the present time CBS is not large enough to fund a blood research staff, nor is it likely to be that large in the near future. However, there are medical schools in the metropolitan area which are conducting blood research programs. There is a need to make new knowledge concerning blood therapy and techniques available to the hospital physicians and technicians. CBS meets this need by holding quarterly meetings with the blood bank medical directors and separate quarterly meetings with the technicians on the staffs of member hospitals.

In the meetings for medical directors, the topics covered include such items as new innovations in technology, new component therapy, administrative aspects of physician ordering patterns, and blood bank management. In the meetings for the blood bank technicians some of the subjects covered by seminar speakers are new regulations and procedures, problem technology areas, new technologies, workshops on practice, and the impact of the technicians' work on the quality of patient care. In addition, participating hospitals with schools for medical technicians send their students to CBS for up to a week's training in blood bank medical technology.

Accessibility and Availability of Services

The blood center is open 24 hours a day, seven days a week, to respond to member needs. The consulting physicians are on call to handle difficult blood therapy questions.

Routine blood deliveries are made daily to each hospital. Second and third deliveries are frequently made in one day to fill emergency requests. On the average, 26 orders are filled each day for the 10 hospitals (which means each hospital receives an average of 2.6 orders per day). When an emergency request is received, the order is sent within 5 to 10 minutes by a CBS vehicle or, if none is available, by taxi.

Acceptance of Service

Some measures of the acceptance of CBS's services are the following: Most member hospitals use all of the CBS services, and the other members use most of the services. No hospital has dropped out of CBS, and one major hospital has been added as a member.

In the greater metropolitan area more and more independent hospitals have joined a central blood bank. Table 2.7 indicates some of the growth in shared blood banking in the area. This growth to some extent indicates the increased acceptability and need for such services.

Table 2.7. Number of Full-Service Member Hospitals in Central Blood Banks in the Metropolitan Area

Group	1974	1976
Central Blood Services, Inc.	9	11
Central Bank #1	8	20
Central Bank #2	6	9
Central Bank #3	0[a]	22
Central Bank #4	15	15

[a] This central bank was primarily a supplemental supplier in 1974 but has since taken on full responsibilities for its member hospitals.

Averaging of Supply-Demand Fluctuations

Some recent statistical studies[3] of a hospital's demand for blood and blood components show that the daily random fluctuations may be estimated by the use of certain probability distributions. Some of these studies also show that a central bank can take advantage of the fact that, except for large-scale emergencies, the demands are not likely to be high simultaneously at all hospitals. Hence it is possible to transfer blood from low-demand to high-demand hospitals on a daily basis and thus to average out the variation. Independent hospitals cannot do this averaging. Therefore they incur more shortages on some days and more outdating of 21-day-old blood on others.

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[3] Brodheim, E., and Prastacos, G. A General Model for Blood Usage in Hospital Blood Banks. Technical Report. New York: New York Blood Center and Greater New York Blood Program, 1976.
Deuermeyer, B.L. Multi-type production systems for multi-product inventory systems with applications to blood component management. Ph.D dissertation, Northwestern University, Evanston, Ill. 1976.
Pinson, S.D. A study of decision policies in blood bank inventory control: a computer simulation approach. MS dissertation, Northwestern University, Evanston, Ill. 1973.
Rabinowitz, M. Blood bank inventory policies: computer simulation. Health Services Research. 8:271, winter 1973.
Yen, H. Inventory management for a perishable product multi-echelon system Ph.D. dissertation, Northwestern University, Evanston, IL, 1975.

At CBS, because of the central inventory and the inventories at member hospitals, shortages that make necessary the postponement of surgery occur infrequently. Emergency shipments and/or transhipments can be made on short notice. Excessive inventories are not needed throughout the shared system so that less blood becomes outdated. As was mentioned previously, CBS's outdating is about 3.4 percent, whereas nationally outdating runs from 15 to 25 percent. (Before the large hospital joined CBS in 1975, the outdating there was 15 percent.)

CONSIDERATIONS FOR HEALTH PLANNERS

As a shared service, centralized blood banking provides many economic benefits for its members. These benefits include economies of scale and productivity increases at least up to a size of 40,000 to 50,000 units annually and quite possibly for much larger sizes. At some point, as the services grow in volume and comprehensiveness, more layers of administration and decentralization of authority among middle managers are needed; then there may possibly be some temporary diseconomies.

The advent of the "National Blood Policy" in 1974 focused attention on blood as a national resource. With this concept and with the growing demand for blood and blood components, there has been an increased awareness of the need for sharing blood services and an expansion of such sharing. In a 1974 study, shared blood banks were not one of the 17 most commonly shared services. However, in the region under study here, the growth of shared blood services in the two years from 1974 to 1976 was extensive. (See table 2.7.) Growth is expected to continue in this region and other regions.

The health planner should take an active role in the initiation of shared blood services. The economic and therapeutic benefits are great. The disadvantages, such as some loss of hospital blood bank autonomy, can be alleviated to a large extent by the maintenance of reasonably full, but low-volume capacity, services at each medium-sized to large hospital. Services which should be retained at the hospitals are phlebotomy and whole blood processing capabilities. Services which could be maintained at large hospitals would be pheresis donor drawings. In the main, however, the central bank should be responsible for recruiting donors and the drawing, processing, and inventory control of whole blood and packed cells.

From this study it would appear that the central bank should handle at least 40,000 units of blood and components annually to achieve a low-cost economy of scale operation. This study of CBS indicates that, when the operation is significantly smaller than 40,000 units annually, the cost per unit may possibly exceed the unit cost of a large independent hospital blood bank.

The economic variables and aspects that a health planner should consider in determining the potential for shared blood services are:

1. The demand for whole blood, packed red cells, and components in the geographic region. (In order to begin to realize <u>fully</u> the potential economies of scale and significant reductions in the fluctuations of

supply and demand, the sharing arrangement (SA) should handle at least 40,000 units annually.)

2. The capitalization equipment, personnel, and physical location required to handle the range of current services and the future growth and changing mix of components. (Some equipment and personnel may be available from the participating hospitals. However, the SA is likely to need large high-speed equipment, and the hospitals often must retain their medical technicians for laboratory and cross-matching activities. Capitalization requirements include a substantial amount of working capital because the early cash flow needs are large.)

3. The cost control and financial accounting procedures that will be used at the SA. (Because growth is an important factor, the economies of scale may not be noticed at first, owing to some overcapacity in phlebotomy, processing, transportation, and administration. However, tight management inspection must be maintained, or costs could easily dissipate any economies of scale.)

4. The efficiency, dedication, and personality of the administrator who will be in charge of the SA. (The administrator may be a physician who works part-time for the SA. He may facilitate the early cooperation needed among the hospital blood bank directors to initiate the SA. However, for the long run a full-time managerially trained administrator is needed.)

5. The purchasing of such items as blood bags, anti-sera, and RIA test kits. (Significant volume discounts can be realized for these items.)

The foregoing list of considerations relate to the economic impacts and their analyses, which are needed to evaluate the potential for and the implementation of shared blood services. In the previous four volumes[4], many noneconomic considerations for health planners were listed, and methodologies for evaluation were presented.

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[4] Health Services Research Center. Methodology for Health Planners to Evaluate Services Shared by Health Care Organizations. Four Volumes. Chicago: The Center, 1976.

Appendix

Unit Definitions

Weighted Units. This figure is an aggregate of all of the other unit figures below. It is calculated by taking the proportion of the total cost for CBS allocated to each department in CBS and multiplying by the number of units handled by that functional department.

Units Charged. This figure counts as one unit every whole blood unit or component unit that was sold or outdated in the system. This provides an appropriate unit to use in judging the performance of the transportation or administration staff.

Units Processed. This figure includes whole blood units processed plus components, where components were translated into whole blood equivalents according to the ratio of the time required to process a component to the time required to process a unit of whole blood.

Units Drawn on Mobiles. This is the number of units of whole blood that were drawn on mobile trips.

Units Drawn at Center. This is the actual number of units of whole blood that were drawn at CBS.

Total Units Drawn. This is all units of whole blood drawn in the system.

Case Study 3

CENTRALIZED LAUNDRY SERVICES IN A RURAL SETTING

Case Study 3

CENTRALIZED LAUNDRY SERVICES IN A RURAL SETTING

INTRODUCTION AND PURPOSE

The service described in this case study is a nonexclusive, symmetrical sharing arrangement for a supportive service. The study is an effort to assess the overall economic impact of a centralized laundry-linen facility located in a rural area and shared by a number of community hospitals.

There is a presumption that a laundry facility is characterized by economies of scale. This presumption has been followed by claims that savings are realized when hospitals abandon their own laundry facilities and share a centralized unit. Unfortunately, these claims have often not been substantiated; efforts to verify them on a state or national level have not been conclusive. As a result, it is not clear whether a centralized laundry unit leads to a reduction or containment of costs in the hospital industry.

This study attempted (1) to identify the most important factors which determine the economic outcome of sharing a centralized laundry unit; (2) to demonstrate whether, and to what extent, savings are realized through the sharing of a centralized laundry; and (3) to examine the allocation of the savings that may arise from the sharing of a laundry unit. For these attempts to succeed, the analysis of the economic impact of a centralized laundry facility needed to take into consideration the impact not only on the members of the sharing arrangement (SA) but also on the nonpartcipating hospitals and on the market where the unit operated.

SUMMARY OF PRINCIPAL FINDINGS FOR ECONOMIC IMPACT

1. The analysis of the centralized laundry facilities indicated that the economic performance can be considered very efficient and satisfactory. The administrators of the original six owner-member hospitals expressed their satisfaction with the services they received in terms of both the cost and the quality of laundry/linen processed. Five hospitals, in addition to the original six, have joined the centralized laundry and two more hospitals were under consideration as members at the time the study was made.

2. For an independent evaluation of the economic performance of the centralized unit, three approaches were taken. The first one consisted of comparing the <u>total costs</u> per pound of laundry/line processed by the centralized laundry with the costs determined in a feasibility study by a community hospital which was considering either upgrading its own laundry facility or joining the centralized unit. This comparison indicated that the total costs of laundry/linen per pound for the centralized unit were significantly lower than the costs for the community hospital (16 cents versus 20 cents per pound).

The second approach consisted of a comparison between the direct costs of laundry/linen per pound processed by the centralized unit and those of an aggregated group of hospitals operating their own laundry units. (Total costs were not available.) The results indicated that the costs per pound for the centralized unit were significantly lower than the costs for the aggregated group of hospitals.

The third approach compared the price per pound paid by community hospitals which utilized the services of commercial laundries with the total cost per pound for the centralized laundry. The hospitals using commercial laundries paid higher prices (19.30 cents and 17.00 cents) than the centralized unit charged or about the same price (16.00 cents) when the hospitals assumed the cost of linen.

3. Significant economies of scale were indicated by the analysis of the data concerning production costs and the costs of space utilized by the centralized unit and the same costs for hospitals with their own laundry facilities.

4. The cost of linen per pound of laundry processed appeared to be higher for the centralized unit than for hospitals with their own facilities.

5. The cost of transportation for the laundry ("soiled" and "clean") was another counterforce to the realized economies of a centralized unit. However, this cost appeared not to be very significant (around one cent per pound).

6. Intangible benefits appeared to have accrued to the members of the centralized laundry unit through additional services offered and the improvement in communication among the administrators concerning problems not associated with the laundry facility.

7. At least one member of the centralized laundry received direct, tangible benefits through the reallocation of space and the introduction of new services.

8. The efficiency and dedication of the administrative staff of the centralized laundry and its relationship with the member hospitals appeared to be important factors in the overall performance of this sharing arrangement.

9. No harmful effects to the industry, nonparticipating hospitals, and the labor market were noticed. If anything, the effects were positive. Indeed, many hospitals that originally were nonparticipants subsequently joined or desired to joint the laundry service.

10. The community at large could be considered the main benefactor from the operation of the centralized laundry facility because lower laundry/linen costs to the hospitals were reflected in lower billings and higher quality of services.

HISTORICAL BACKGROUND

The administrators of six county hospitals in a subregion of a state hospital association met frequently in 1967. Several of the hospitals were public ones, partly county supported but not controlled. These six hospitals represent one of the earliest instances of public general hospitals banding together for the corporate sharing of services. In 1968, an IRS tax-exempt 501(c)(3) corporation was formed to provide shared laundry and linen service to the six hospitals. The 501(c)(3) designation has not been challenged. The corporation is also exempt from ad valorem and other local taxes.

The initial capitalization for the venture was supplied by Hill-Burton funds, bonds, and individual donations. All six communities in which the original hospitals are located were willing to donate land to the corporation. The laundry facilities were finally built in a community which is the hub of the area and which has the lowest water rates. An individual donated 10 acres of land to the city, which then made the land available to the corporation.

The geographic area covered by the sharing arrangement is rural. The network includes hospitals ranging in size from fewer than 30 to 300 beds. The most distant hospital is about 120 miles from the corporate facility; only one hospital is located in the same community as the facility. The corporation is now the twelfth largest industry in a community with a population of nearly 20,000.

The corporate sharing arrangement (SA) currently provides laundry and linen service, purchasing and warehousing, the services of a dietitian, microfilming, drug packaging, management and biomedical engineering, and printing. Shared laundry and linen service, historically the first to be provided by the corporation, provides the substantive ground for determining the specific aspect of economic impacts under consideration here.

The initial group of six hospitals had a total of more than 900 beds. Five more hospitals have joined the service for a total of more than 1,100 beds. All the hospitals in the area now participate in the laundry. New membership could be gained only if the territory covered by the service were expanded. The laundry and linen facilities occupy 23,000 square feet of the total 39,000 available in the corporation. The plant usually operates one shift, five days a week, utilizing 90 to 95 percent of its capacity during that time. The laundry owns about 150 carts, in which it receives the dirty laundry. After the contents are weiged and emptied, the carts are steam-cleaned and disinfected. Then they are used for returning clean linen, which is heat sealed in plastic wrap, to the hospitals. The laundry owns two flat-bed trucks and a trailed and leases a tractor. Clean linen is delivered to the loading dock at each hospital in these vehicles.

Equipment includes 5 tumblers with a 400 pound capacity each, two smaller tumbers, two flatwork ironers, one cross folder, one regular folder, one sheet folder, and sundry other support equipment, such as an automatic supply system for detergent, bleach, and softener. There is a separate area for linen mending and for preparing surgical packs; overall, the space is reasonably organized for a rational work flow. All linen is owned by the corporation.

Economic Evaluation of the Centralized Laundry

For the evaluation of the economic performance of a centralized laundry facility it might be possible to compare the costs and quality of processing the laundry before sharing (inhouse laundry) and after sharing (through the centralized unit). Comparative and consistent data regarding the volume, quality and expenses of laundry arrangement would be needed. (The overall expenses after the sharing should include the cost of transporting "soiled" and "clean" laundry.) However, a before-and-after comparison might be difficult, as it would involve a period of time during which some important exogeneous factors, such as inflation, the cost of equipment, and changes in the prices of inputs (wage rates), could significantly affect the outcome.

The most important reason for not using the before-and-after comparison was that the data in the two periods were not consistent. In addition, the collection and verification of historical data are risky, as some of the participating hospitals may not have adequate records available.

For these reasons, the methodology that was followed for the evaluation of the economic performance of a centralized laundry facility consisted of a comparison of costs between the SA and two control groups of nonparticipating hospitals having characteristics similar to those of the members of the SA.

The first control group consisted of nonparticipating hospitals with their own laundry facilities. The second control group consisted of nonparticipating hospitals using the facilities of commerical laundries.

For the comparison of costs between the centralized unit and the two control groups two approaches were followed: The first approach compared the costs of the central unit and the costs of each control group taken as a whole. The second approach compared the costs of each member of the SA with the costs of a corresponding nonparticipating hospital. The first approach provided an overall assessment of differences in costs. The second approach demonstrated the origin of these differences, as well as whether there was a consistent downward trend (economies of scale) in average costs as the volume of laundry processed by a unit increases.

Criteria for Control Groups

There is a presumption that a laundry facility is characterized by economies of scale. This implies that the volume of laundry processed by a facility is a dominant variable as far as total and average costs are concerned. The volume of laundry processed by a hospital depends directly on the size of the hospital. Therefore, the size of each member of the SA utilizing the centralized laundry unit was used as a primary criterion for the selection of the hospitals in the control groups, although this is a proxy variable.

The second criterion used for the selection of the two control groups of nonparticipating hospitals was their location within the boundaries of the state where the SA is located.

The third and fourth criteria were imposed by the accessibility, availability, and uniformity of data sources. Only hospitals participating in the Hospital Administrative Services (HAS) program and reporting for at least 12 months were selected.

Finally, for Control Group I, hospitals with their own laundry facilities were selected, while for Control Group II, hospitals that buy services from commercial laundries were selected.

Other Impacts Arising From the SA

When the methodology for the economic performance of the centralized unit was established, the question arose: Are there any other consequences of sharing a laundry facility? In the analysis of the overall impact of sharing a laundry the following were examined: (1) the alternative uses of space and resources in general by member hospitals and/or potential members when they abandoned their own laundry facility; (2) the potential side benefits that might arise from the sharing of a laundry facility and the impact on nonparticipating hospitals; and (3) the pricing policy that the SA followed with regard to its members and nonmembers.

Data Sources--Limitations

During the site visit project staff members interviewed the administrators of the six hospitals that initiated the SA. The purpose of these interviews was to establish the motivations for the initiation of the SA, the implementation of the service, the degree of satisfaction with its current operations, and the policy regarding the future of the SA. The other part of the site visit consisted of collecting all available data relevant to the entire operation of the centralized laundry unit. The meaning, accuracy, and consistency of these data were checked with the assistance of the executive officer and the controller of the unit.

Complete data are available for the operation of the centralized laundry facility in terms of expenses, output, and balance sheets in a monthly form for the period of September 1973 to May 1976. These data, which were given to the project staff by the corporation during the site visit, cover in detail all major financial aspects of the processing of laundry and linen.

The major source of data for nonparticipating hospitals which maintained their own facilities or used the services of commercial laundries was the Hospital Administrative Services (HAS) program. The HAS program tries to maintain and enforce a certain set of guidelines for uniform, consistent, and accurate reporting. However, telephone calls were made to hospitals that were considered for the control groups to verify the accuracy and uniformity of the HAS data for the period of June 1975 through May 1976.

It should be noted that hospitals with their own laundry facilities report to the HAS program only the "direct expenses". These usually include wages and salaries, expenses for the supplies, and the number of man hours utilized in the processing of laundry. Not all hospitals include the expense for linen.

However, hospitals that buy the services of commercial laundries report as "direct expenses" the total price they pay for the processing of laundry. This price may or may not include the cost of linen but does represent the cost not only of wages, salaries, and supplies but also the cost of utilities, maintenance, and depreciation.

For this reason the comparison of costs per pound of laundry processed for the centralized unit and the nonparticipating hospitals with their own laundry units covered only wages and salaries and supplies. The comparison of costs for the central unit and for nonparticipating hospitals buying the services of a commercial laundry covered total costs per pound of processed laundry.

The "weight" of laundry is not uniform. It depends on whether the laundry is weighed before it is processed ("soiled") or after ("clean"). An estimate places the difference at from 5 to 15 percent, the "soiled" being heavier than the "clean." The weight of "clean" laundry can be higher if the degree of wetness increases.

Motivation, Implementation, and Performance of the SA as Viewed by the Administrator

The administrator of one of the largest hospitals appears to have been the one who suggested creating a centralized laundry facility to be shared by the other five hospitals in the area. After the initial contact and discussion, the administrators of the other five hospitals supported the idea.

The following factors appear to have motivated the six hospitals to participate in and form a SA for a centralized laundry unit:

1. Lack of capital funds to replace outmoded laundry equipment
2. The inadequacy of space for laundry and the need for an alternative use of the space
3. The availability of federal funds (Hill-Burton)
4. The expectation that the cost of a shared laundry would be lower than the cost of an inhouse laundry

The foregoing list shows that the motivation for the creation of a centralized laundry was economic, although the expectation of a reduction of each hospital's direct laundry costs was the least important factor. This should be expected because laundry costs are a small portion of the total budget of a hospital (less than 2 percent) and because hospitals do not face any major problems concerning reimbursement for laundry costs.

The laundry facility performs very well as far as the administrators of the six hospitals that own it are concerned. That the facility operates successfully in terms of costs, quality, and prompt service is shown by the fact that the SA has expanded its services to five additional hospitals. At the time of the study the facility was considering accepting two more hospitals with about 400 beds and approximately 1.5 million pounds of laundry a year. Furthermore, the SA has introduced a number of other services such as purchasing and drug packaging.

Two areas appear to create some minor problems for the SA. The first is the high cost and low productivity of specialized laundry services like surgical packages. The second is linen lost at the hospitals. However, the SA has undertaken a serious effort to minimize this problem.

Economic Performance of the Centralized Unit

Eleven community hospitals with an aggregate of more than 1,127 beds utilize the services of the centralized laundry facility. (See table 3.1.) However, laundry is only one of the services offered by this SA. The total assets of the SA amount to about $2,000,000, its net worth is more than $1,000,000. Approximately 40 percent of this net worth consists of contributions made by the six community hospitals which own the corporation. The other 60 percent is mainly a governmental contribution (Hill-Burton funds). The net worth covers the value of the assets utilized by the centralized laundry facility. The total annual budget of the SA exceeds $2,000,000, of which one-fourth is the share of laundry.

Table 3.1. Centralized Unit: Number of Hospitals and Pounds of Laundry Processed, by Bed Size, June 1975-May 1976

Bedsize	Number of Hospitals	Pounds of Laundry Processed
Under 50	6	78,990[a]
50-99	1	202,640
100-199	2	571,041[a]
200-299	2	785,455[a]
Total	11	3,494,260

[a] Mean.

Table 3.2. Centralized Unit: Total Expenses by Major Category, June 1975-May 1976

Expense Category	Amount	Percent Distribution
Wages and salaries	$198,459	36.40
Laundry supplies	39,152	7.18
Utilities	41,144	7.55
Maintenance	20,092	3.69
Depreciation and overhead	84,420	15.49
Linen	161,849	29.69
Total	$545,116	100.00

It is evident from table 3.2 that wages and salaries are the most important factor in total laundry expense. The second most important factor appears to be the expense for linen. It should be noted that the 15.49 percent for depreciation and overhead covers financial charges for the debt of less than 5 percent. (Depreciation charges amount to about 6 percent.)

The wage and salary expenses for this period increased significantly because of the new legal minimum wage rate ($2.30 per hour) that became effective Jan. 1, 1976. Table 3.3 shows the level of output and total salary and linen expenses for 1973 to 1976.

It is evident from table 3.3 that total expenses grew faster than output. As a result, the cost per pound increased from 12.33 cents in 1973-74 to 14.12 cents in 1975-76. The major contributors to this increase were the linen and salary expenses. Line 9 shows that the share of linen in total expenses increased significantly during this period. This increase in linen expenses resulted from a rise in the price of linen in addition to the loss of linen through theft and the improvement of the linen inventory.[1] It should be noted that the reported output of the centralized laundry unit for 1975-76 was 3,494,260 pounds. In October 1975 the facility started utilizing a new method for weighing the laundry processed, the so-called "calculated weight" which is an

[1] The expense for linen in this period is an overestimate, as the unit improved its linen inventory and covered an accumulated theft loss of linen.

Table 3.3. Selected Absolute Expenses per Pound of Laundry Processed and Their Share to Total, 1973-1976.

Item	FY 1975/76	FY 1974/75	FY 1973-74
	Pounds of processed laundry		
Output (pounds of processed laundry)	3,494,260	3,743,694	3,379,568
	Dollars		
Total expense	545,116	494,629[a]	416,668
Salary expense	198,459	177,265	146,607
Linen expense	161,849	125,802	99,294
	Cents per pound		
Total expense per pound	14.12	13.21	12.33
Salary expense per pound	5.14	4.74	4.34
Linen expense per pound	4.19	3.36	2.94
	Percentages		
Salary expense as percentage of total	36.4	35.8	35.2
Linen expense as percentage of total	29.7	25.4	23.8

[a] Total expenses for FY 1974/75 include the same percentage of overhead and depreciation as the expense for FY 1975/76.

average of the weight of "soiled" and "clean" laundry. As a result, the reported weight of laundry processed since October 1975 is about 14 percent lower. For consistency, the reported weight of 3,494,260 pounds for the fiscal year 1975-76 was adjusted to reflect the old method of weighing the processed laundry. This adjustment was made in order to identify the trends over time and was used only in Tables 3.3 and 3.4.

Table 3.4 shows the percentage of changes in total salaries and linen expenses as well as the corresponding changes per unit of output. It is clear from this table that the increase in the total cost per unit of output was significantly lower than the increase in linen and salary expenses.

Comparison of Centralized Laundry and Control Groups I and II

Two groups of hospitals were selected from the state in which the centralized laundry operates, with an effort made to match the bed size of the member hospitals. Control Group I consisted of hospitals with their own laundry facilities. Control Group II consisted of hospitals using the facilities of a commercial laundry.

Twelve hospitals were selected for Control Group I (matching the bed size of the member hospitals); only six were selected for Control Group II.

Table 3.5 presents the number of hospitals, the bed sizes and the annual pounds of laundry processed, by bed size, for the three groups: the centralized unit and Control Groups I and II.

Table 3.5 shows that the hospitals with their own laundries match well with the hospitals that use the centralized laundry, in terms of both individual bed size and total bed size. The match is less exact for pounds of laundry processed. The difference is significant for the two large hospitals and for the aggregate (total). This difference can be attributed to the following factors:

1. Differences in housekeeping practices and utilization of disposable linen between the matching hospitals
2. Differences in patient mix and length-of-stay (LOS)
3. Differences in the way the laundry is weighed (by volume, by calculation, by estimate)
4. Differences in the materials that make up the linen (cotton, synthetic)
5. Accuracy of reporting

It is obvious from table 3.5 that Control Group II is not very reliable. The basic reason is that in a rural area commercial laundries are not readily available, and/or hospitals are unwilling to use such facilities. Only six hospitals that used commercial laundries were identified. Consequently, the comparison of each hospital in this control group with the centralized unit in terms of average cost per unit of output was held to be the most appropriate analysis.

Table 3.4. Annual Percentage Change in Selected Absolute Expenses and Costs per Pound of Laundry Processed

Item	Percent Change	
	FY 1975-76	FY 1974-75
Total expense	10.2	18.7
Salary expense	12.0	20.9
Linen expense	28.7	26.7
Total expense per pound	6.9	7.1
Salary expense per pound	8.4	9.2
Linen expense per pound	24.7	14.3

Table 3.5. Number of Hospitals, Beds, and Pounds of Laundry Processed in the Centralized Unit, Control Group I, and Control Group II, June 1975-May 1976

Bed Size	Centralized Unit			Control Group I			Control Group II		
	No. of Hosps.	Mean Beds	Lbs. of Laundry	No. of Hosps.	Mean Beds	Lbs. of Laundry	No. of Hosps.	Mean Beds	Lbs. of Laundry
Under 50	6	36	78,190	1	41	80,153	4	40	78,301
50 - 99	1	85	202,640	2	90	352,883	NA	NA	NA
100 - 149	1	119	422,013	2	114	418,194	NA	NA	NA
150 - 199	1	191	720,070	3	181	830,701	NA	NA	NA
200 - 249	1	246	608,793	2	234	1,317,988	1	259	1,120,776
250 - 299	1	272	962,117	2	290	1,384,659	1	375	2,144,476
Total	11	1,172	3,494,260	12	1,149	4,670,119	6	1,039	4,276,385

NA = Not Available.

Table 3.6 shows the total direct expenses per pound broken down in terms of salaries, supplies, and linen expenses, by bed size, for Control Group I.

Table 3.6. Expenses per Pound of Laundry Processed for Control Group I by Bed Size, June 1975-May 1976

Expense Category	Bed Size					
	Under 50	50-100	100-150	150-200	200-250	250-300
Salary expense[a]	6.20	12.35	10.50	9.25	6.82	7.51
Supply expense[a]	13.94	1.99	2.10	2.39	8.74	2.21
Salary and supply expense[a]	20.14	14.34	12.60	11.64	15.56	9.72
Linen expense[a]	2.99	3.54	5.73	2.12	1.39	1.30
Total direct expense[a]	23.13	17.88	18.33	13.76	16.95	11.02
Pounds/man-hours	43.82	20.66	23.02	31.89	48.58	40.62
Hourly wage rate	$2.72	$2.55	$2.42	$2.95	$3.31	$3.05

[a] Cents per pound

Table 3.6 indicates that the total direct expenses per pound of laundry processed overall declined as the bed size increased. The same thing can be said in general for every item included in the total direct expenses. It can be argued that the differences in wage rates paid by these hospitals, although significant, cannot explain the differences in expenses per pound.

Table 3.7 displays the aggregate statistics of Control Group I and of the centralized laundry unit.

This table shows that the total direct expenses per pound of laundry processed by Control Group I were significantly greater than the expenses of the centralized unit. The only category in which the centralized unit had a larger expense was linen. It should be remembered that the value of 4.63 cents (linen expenses per pound) was an overestimate of the true expense for this item as it partly represented an increase in the inventory of linen that exceeded the current needs of this unit. For this reason, the overall difference in total direct expenses per pound should be considered a conservative estimate.

Table 3.7. Direct Expenses per Pound of Laundry Processed and Other Statistics for Control Group I and Centralized Laundry, June 1975-May 1976

Categories	Control Group I	Centralized Unit	Difference
Salary expenses[a]	8.28	5.68	+ 2.60
Supply expenses[a]	4.39	1.12	+ 3.27
Salary and supply expenses[a]	12.67	6.80	+ 5.87
Linen expenses[a]	2.12	4.63	- 2.51
Total direct expenses[a]	14.79	11.43	+ 3.36
Average wage rate	$ 2.92	$ 2.64	+$0.28
Pounds laundry man-hours	35.26	53.76	-18.50
Pounds of laundry processed	4,670,119	3,494,260	+1,175,859

[a] Cents per pound

The existence of economies of scale is demonstrated rather clearly by the difference in the number of pounds of laundry processed per man-hour. The centralized laundry processed almost 54 pounds per man-hour, while the average for the control group was about 35 pounds.

One way to put into perspective the impact of economies of scale when laundry facilities are centralized is to consider the difference in total direct expenses per pound between Control Group I and the central unit and to calculate the potential savings through sharing of the former. These savings amount to at least $150,000 per year (3.3 cents x 4670119).[2] This amount reflects only the potential savings in "direct" expenses rather than potential savings in total expenses. More specifically, these savings do not include potential savings from major inputs like utilities, maintenance, capital equipment, administration, and, perhaps most important of all, space.

[2] Alternatively, the potential savings amount to about 30 percent of the total direct expenses per pound (3.36/11.43=29.4%).

As was explained in the section on data limitations, the available hospital data do not provide information concerning the expenses of these inputs. For this reason a special effort was made to identify a hospital that was in the process of evaluating its own laundry operations.

Fortunately, a hospital located near the central unit was making a feasibility study of its laundry facility. This hospital, which has 150 beds, was faced with the problem of upgrading and/or replacing its laundry equipment at a cost of $200,000, plus the operational cost of processing its own laundry, or of joining the centralized unit. The hospital's total operational laundry cost was estimated to be around 20 cents per pound. This cost was significantly higher than the cost for the centralized unit, which was 15.60 cents per pound.

Control Group II (hospitals that used commercial laundries) consisted of only six hospitals. Four of these hospitals have fewer than 50 beds, while the other two have 259 and 375 beds respectively. The average expense per pound of laundry processed for the four small hospitals was 19.3 cents. (One of these hospitals did not report expenses for linen.) The hospital with 259 beds utilized a local commercial laundry and paid 16 cents per pound. This price did not include the cost of linen. The commercial laundry had agreed to assume the cost of maintaining the current inventory of linens in the future. It was not clear, though, whether the price of 16 cents per pound would remain constant when the commercial laundry incurred expenses for maintaining the inventory of linen.

Finally, the cost per pound of laundry processed for the hospital with 375 beds was 16.97 cents. It was not possible to find out whether this cost included the expense for linen.

It is evident that it was more expensive for community hospitals to use commercial laundries than to use the centralized laundry unit.

There is no available evidence as to the size of the commercial laundries utilized by the hospitals in Control Group II. Probably the hospitals were not the laundries' only customers.

Space, Equipment, Manpower

Once a community hospital decides to abandon its own laundry facility and use the services of a centralized laundry or those of a commercial one, consideration should be given to the resources that will be freed. These resources consist mainly of the space utilized by the laundry unit, the equipment, and the manpower. The administrator of one of the largest hospitals that participates in the centralized laundry stated that the need for space was one of the primary reasons he supported the idea of creating the SA. As a result of the elimination of its own laundry facility, this hospital was able to install a radiology unit, a television repair unit, and to increase its warehouse space. The minimum benefit is the equivalent of the cost of adding this space to the hospital if it had not eliminated the laundry unit. The maximum benefit is the equivalent of the revenue raised from the radiology unit, the cost saved by the television repair unit, and the value of the increased space in the warehouse unit. It is evident that the financial situation of the hospital as

a whole has been improved because the x-ray unit generates a net profit for the hospital but the laundry unit did not.

If a hospital closes its laundry facility, the hospital has to dispose of its equipment. The market value of the equipment, especially when it is operational, needs to be considered. In this case the equipment owned by the member hospitals was outmoded and basically not operational when they decided to form the centralized unit.

Eliminating the laundry facility means also that the hospital will have a surplus of manpower. If laundry employees are not released by the hospital but are added to other service departments, the salaries paid should be considered as part of the cost of the centralized unit. The employees of each hospital were absorbed by this centralized unit, retired, or resigned.

Improvement in Communications and Coordination in Other Services

One of the intangible benefits that accrued to the members of the SA was an improvement in communication and coordination in other services. The administrators of the six hospitals that own the SA meet frequently and discuss problems initially related to the operation of the centralized laundry. Because of these meetings and the contribution of the active and highly motivated director of the SA, the administrators agreed to expand the services offered by the SA. The services offered at the time of the study included purchasing and warehousing, microfilming, drug packaging, management engineering, printing, and the services of a dietitian. The realized savings from these added services cannot be considered as side benefits of the centralized laundry. However, the existence of the laundry has apparently contributed to the creation of these services.

Impact on Nonparticipants and the Market

There is no evidence that the centralized unit has exerted any negative influence on nonparticipating hospitals. Historically, the centralized unit had a positive impact on nonparticipating hospitals because it offered an alternative that had not previously existed in the market area. The utilization of the laundry services by five more hospitals (associate members of the SA) indicates that the alternative has benefited these hospitals. In addition, the fact that two more hospitals were considering joining the SA suggests that the value of the centralized laundry is recognized and well established.

The available evidence indicates that the centralized laundry has had no impact on the market in general for two reasons. One reason is the character of the location (rural); and the other is the lack of commercial laundry facilities willing to compete to provide hospital laundry service, a service that poses a number of problems commercial laundries find difficult to handle.

The Overall Economic Impact

The findings indicated that the economic performance of the centralized laundry was very efficient when compared to that of both control groups of hospitals. The direct expense per pound processed by the centralized laundry was signifi-

cantly lower than that of Control Group I, while its total expense per pound was lower than that of Control Group II. In addition, the total cost per pound processed by the centralized unit was significantly lower than that of a hospital with its own laundry facility, according to one feasibility study. To these results the following two qualifications can be added. First, the quality of cleaning in the central unit was excellent. (The percentage of returned clean laundry was less than 0.5 percent.) Second, the centralized unit used a "calculated weight," which is an average of the "soiled" and "clean" weight of linen processed. There is no available evidence to assess the impact of these two factors on Control Groups I and II directly. However, it appears that the large hospitals in Control Groups I and II (see table 3.5) processed an excessive quantity of laundry relative to the hospitals that used the facilities of the centralized unit. If this difference cannot be explained by differences in habits and patient mix, the expense per pound for Control Groups I and II was a conservative estimate of the true cost of processing the laundry.

An important factor has been purposely omitted from consideration thus far. This factor is the cost of transportation of the linen between member hospitals and the centralized unit. The SA owned two trucks and one trailer and leased a tractor. The laundry facility was not the sole user of the vehicles. The corporation did not allocate the total expense of transportation among the services that utilize it. One of the reasons was that the transportation cost was not very significant. Another is that all 11 hospitals utilized almost all services offered by the SA, and therefore it made no difference if the cost of transportation was allocated to all relevant services. If the total cost of transportation were allocated to the laundry service, the total expense of the laundry processed per pound would increase from 15.60 to 17.32 cents. However, a significant portion of the $60,000 should be allocated to the central warehousing service offered by the SA. Therefore, the expense of 17.32 cents per pound would be an overestimate of the true cost of laundry. If this factor and the true cost of linen, which has been estimated to be very close to 3 cents per pound, were taken into consideration, the overall cost of laundry processed by the centralized laundry facility would be less than 16 cents per pound.

This suggests that the hospitals which utilized the services of the centralized laundry have realized significant savings. To the direct savings from the operation of laundry should be added the indirect tangible and intangible net effects associated with the existence and operation of the centralized laundry. The indirect net effects are believed to be positive for this particular site.

Once it has been demonstrated that the centralized laundry unit has generated significant savings for the member hospitals, the following two questions arise: (1) How are these savings allocated among the members? (2) What is the impact on the community? To answer these questions one has to examine the tax status of the corporation and the pricing policy of the SA.

As was mentioned previously, the SA is recognized by the IRS as a tax-exempt 501(c)(3) corporation. This status allows the corporation to avoid taxation if it generates profits from its operations.

At the time of the study the SA charged $1.20 per bed per month to all its member hospitals for access to all of the services offered by it, including the centralized laundry. The price for the use of laundry facilities was uniform until October 1975, regardless of the status of a member (owner or associate). The price charged per pound for the period for July 1973 to September 1975 was 15 cents. In October 1975 the charge per pound was raised to 17 cents for the members who own the SA and to 18 cents for the associate members. This price discrimination can be considered as fair because of the difference in the amount of risk assumed by the owners and the associate members. The price paid by the member hospitals was not the cost of processing the laundry. The price structure allowed the centralized unit to generate a net profit which was allocated to the other services produced and offered by the SA. As long as all the members utilize the laundry and nonlaundry services of the SA, the true cost of processing the laundry is the cost of it and not the price the members pay. What they pay in excess of the cost of laundry per pound is returned to them through the nonlaundry services for which they pay a price that is lower than the cost.

As far as the community is concerned, the economic impact arising from the existence and operation of the centralized laundry can be considered beneficial for the following reasons: The hospital expenses are lower to the extent that the laundry expense is lower through the realized savings. The elimination of inhouse laundries made possible the introduction of new services at a reduced cost. Employees released by the hospitals began working for the SA. Finally, through the improvement in communications and coordination among the hospitals involved, more services were added to the SA that have evidently led to new realized savings.

CONSIDERATIONS FOR HEALTH PLANNERS

The variables that a planner should consider in making a decision to centralize laundry facilities are:

1. The physical conditions of the existing laundry facilities.
2. The alternative utilization of released resources.
3. The fact that the cost of linens in a centralized laundry appears to be significantly higher.
4. The cost of transportation.
5. The efficiency of the administrator in charge of the centralized unit.
6. The availability and willingness of commercial laundries to serve community hospitals.

Case Study 4

CENTRAL LAUNDRY IN AN URBAN HOSPITAL MARKET

Case Study 4

CENTRAL LAUNDRY IN AN URBAN HOSPITAL MARKET

INTRODUCTION AND PURPOSE

Some hospital activities such as laundry/linen can be operated with a variety of technological alternatives. The technology permits larger fixed investments in plant and equipment to achieve lower costs per unit of service, down to some limit where the complexity of administration and transportation precludes further gains in efficiency.

Potential cost reductions in laundry/linen may be sufficient to induce autonomous hospitals in a geographic region to support a shared service arrangement. Whether such an arrangement comes about and whether potential economies of scale are actually realized depends on several factors. The purpose of this study is to identify those factors and to clarify the role of economies of scale in shared service arrangements. The final economic issue is whether potential cost reductions in one activity, such as laundry, are seen or used by individual hospitals as a vehicle for expansion of activity and expenditure in other areas.

This case study of Sitefour Central Laundry (SCL) and the hospitals in its geographic area was made in July 1976. This site is a "mature," mostly urban, hospital market area--defined in terms of hospital beds and ancillary service per capita. By comparison with a rural site with larger unmet needs (Site 3), less conversion of cost savings in laundry into expansion in other areas was expected.

The data that were sought included the current cost per pound of SCL and of alternative laundry services. Historical data (particularly indirect and replacement costs) and other information, such as capital financing methods that led to initiation of SCL in 1970, the pricing of the service, and the relation of pricing rules to efficient operation of SCL, were sought as well.

SUMMARY OF PRINCIPAL FINDINGS FOR ECONOMIC IMPACT

1. SCL costs at the time of the study compared favorably with the prices quoted by commercial laundries, published estimates of inhouse laundry costs, and Hospital Administrative Services (HAS) tabulations of direct costs for inhouse laundries in the same state. Three administrators of hospitals participating in the SCL were somewhat skeptical about the extent of cost saving. In part their skepticism seemed to result from an underestimation of inhouse indirect and managerial costs. Replacement of linen losses had grown to be the most serious and unforeseen cost problem of SCL.

2. In the first two years the cost of central laundry operation was somewhat higher than the cost projected earlier by consultants. Volume was seriously overestimated by the original hospitals. Still, the cost in 1971 did compare favorably with that of commercial laundries and other central laundries.

3. Volume had expanded slightly beyond one-shift capacity owing to aggressive marketing efforts and the pricing structure.

4. SCL was reluctant to use the pricing structure to encourage efficiency: Linen losses had become a major cost and might be reduced by differential charges based on individual experience.

5. Individual hospital administrators did not view the SCL as a major source of intangible fringe benefits in the local industry. Their opinions tended to conflict with the record of initiation and development of other closely affiliated shared service operations which were organized in this area at later dates.

6. The central laundry had not been a means for cross subsidizing other activities of individual institutions (in sharp contrast to the findings at Site 3). The SCL was separately incorporated; a slight excess of revenue over expenses was used only for early debt amortization. Conversion of inhouse laundry facilities was not an occasion for expansion of employment and activities elsewhere in the hospitals.

7. If the IRS disallows tax-exempt status for SCL, the hospitals will not continue to have an opportunity for the gradual accumulation of equity in the facilities. This could result in some lessening of participation when the long-term contracts expire.

HISTORICAL BACKGROUND

The SCL is a separate corporation, part of a group of shared service corporations initiated as a result of planning by a local voluntary health council in 1966. The central laundry plant began operations in 1970, with 10 original members that signed 15-year contracts which were used as collateral for bank loans to finance construction.

The plant, which has 52,000 square feet of working area, was designed to handle an annual volume of 10.5 million pounds on a one-shift basis. The original workloads were overestimated, so that the first year the volume was about 8 million pounds. By 1972, because of marketing efforts, the volume had increased to 10 million pounds. The geographic area served has grown. At the time of the study, there were 15 participating hospitals and an annual volume of about 11 million pounds.

The total assets of the corporation exceeded $2,000,000 (in fiscal 1975-76); 85 per cent was the value of plant and equipment. These assets were financed by a mortgage loan that was assumed by the 10 original members of the SCL.

In the initial two years of SCL, average cost was about 13.5 cents per pound, considerably above the estimate of 6.6 cents per pound suggested by a feasibility study in 1966. With an adjustment made for inflation in the Wholesale Price Index, and linen expense included, the initial projection for 1970 might reasonably have been 11 cents per pound. The initial feasibility study documented the substantial replacement costs for old equipment at seven hospitals and estimated the average operating cost of inhouse laundries at about 133 percent of the rate for a central laundry.

ANALYSIS OF THE DATA

The annual total expenses of the SCL for the processing of laundry/linen in fiscal 1975-76 were more than $2,000,000. Costs of the central laundry by activity are presented in table 4.1. Several aspects of this budgetary experience are quite striking. For purposes of comparison with data reported by individual hospitals, the full inclusion of utilities was of obvious importance. Apparently the trends in fuel prices had a more severe effect on distribution than on utilities. Charges for replacement of linen losses rose to become the largest single cost item. Yet hospitals were reluctant to accept separate fees for linen loss by each hospital.

Between 1971 and 1976, total cost per pound of laundry rose at an average annual rate (compounded) of 8 percent, which was approximately equal to the rate of increase of hospital daily room rates nationally. Nearly half of this entire increase resulted from the rise in charges for linen replacement.

In an attempt to assess the economic performance of the SCL, its cost per pound of laundry/linen processed was compared with the following:

1. The direct cost per pound of laundry/linen of a group of hospitals having their own facilities and matching the characteristics of SCL's member hospitals.

2. The price charged by commercial laundry units serving community hospitals.

The direct cost for SCL, which was about 9½ cents per pound at the time of the study, compared favorably with the direct cost for hospitals in the same state which had complete inhouse facilities. Table 4.2 shows that 8 of 11 hospitals had direct costs more than one-third greater than the Sitefour costs. The largest hospital, with a bed size of 555, reported a direct cost of 8.4 cents.

Finally, table 4.3 presents the pounds of laundry and the price per pound for five community hospitals utilizing the facilities of commercial laundries.

Table 4.1. Central Laundry Costs per Pound of Soiled Linen

Item	1975-76[a]	Jan. 1976	Jan. 1972	Jan. 1971
		(In cents)		
Processing	4.70	4.31	3.12	3.03
Distribution	1.38[c]	1.38[c]	0.70	0.73
Utilities	3.33	3.14	2.10	2.11
Subtotal	9.41	8.83	5.92	5.87
Administration	2.81	2.64	1.75	1.23
Interest	1.07	1.00	1.39	1.63
Depreciation	1.11	1.06	1.12	1.67
Linen[b]	5.68	5.90	2.99	2.99
Total	20.08	19.43	13.17	13.39

[a] Through May 1976
[b] Revenue rather than expenses is presented because the purchase of replacement linen has greatly exceeded depreciation expense of original stock.
[c] Distribution expenses include an estimated amount of $20,000 that should be allocated to purchasing.

Table 4.2. Direct Laundry/Linen Expenses for 11 Hospitals With Complete Inhouse Facilities, in the Same State as Sitefour

Direct Cost per Pounds (Cents)	Bed Size			
	100-149	150-199	200-299	300 +
Under 9¢				2[a]
9-12	1			
12-15		1	1	1
15 +	1	1	2	1

[a] One hospital reported 8.9 cents for laundry and no linen expense.

Source: Hospital Administrative Services, 12 months through June 1976.

Table 4.3. Pounds of Laundry/Linen and Prices Paid by Community Hospitals Utilizing Commercial Laundries Located in Area Adjacent to That of Sitefour Central Laundry

Hospitals	Price per Pound	Pounds Utilized
A	23.00¢	1,499,045
B	25.00	182,666
C	28.80	1,163,922
D	29.30	3,505,098
E	35.00	118,045

Source: Hospital Administrative Services, 12 months through June 1976

As table 4.3 shows, total cost of SCL (about 20 cents) compared favorably with the cost of laundry for hospitals using commercial facilities. The closest commercial laundry specializing in services for hospital and health service institutions charged a rate 2 to 3 cents per pound higher.

One factor was excluded in the favorable comparison between SCL and the inhouse laundries. Some special items, less than 2 percent of a hospital's total weight for processing, are not suitable for bulk processing operations. Such items were still laundered at the individual hospitals, requiring space and personnel. One participating hospital in SCL spent 5.5 cents per pound on internal operations in addition to the SCL charges. This cost covered materials handling, storage, and disposables. The hospital spent a total of 11 cents per pound in 1970, before SCL was organized. The administrator is somewhat skeptical about the savings derived from SCL. The 1966 feasibility study recommended only a small capital expenditure for this particular hospital. By 1976 the 11 cent cost would have been inflated to about 17 cents (8 percent compounded). The administrator's opinion may therefore be justified. Ordinarily, the estimated indirect cost in 1970 would have seemed to be inadequate because no allowance was made for the 4,300 square feet of space. However, the opportunity cost of this space was probably not high because it was converted to marginal uses.

If the cost of $25 per square foot in 1970 was amortized over 30 years, this cost item would have added 2 to 3 cents per pound of laundry processed in 1970 and much more in 1976. Two other hospitals that closed their internal laundry facilities in 1970 have since undertaken or planned large capital spending programs for construction and modernization. Space for a laundry would have cost close to $50 per square foot and would have been one of the largest cost items.

The corporation did not attempt to generate a surplus cash flow in order to subsidize other activities. Also, it does not appear that the hospitals which eliminated most of their inhouse capacity were motivated by urgent space and manpower needs for expansion of other activities. Still, there seemed to be some considerable intangible benefits of the laundry arrangement by virtue of the growth of other cooperative ventures, such as a wage and salary survey, a credit and collections service, a blood center, and group purchasing.

SCL at the time of the study charged each hospital about 21 cents per pound of laundry processed. Revenues were slightly greater than operating costs in the last few years, so that a faster rate of amortizing the initial debt meant a build-up of equity for the original members. This extra inducement for the success of SCL may be weakened by a pending IRS decision to disallow tax-exempt status.

The three hospital administrators who were interviewed were somewhat skeptical about the cost savings they had gained through SCL. Each of them was quite happy to be relieved of the management "headaches" involved but was reluctant to interpret this as an equivalent reduction in management cost. On the basis of the data presented in table 4.3, and with a full accounting of indirect cost at replacement value, it is likely that the typical participating hospital is tangibly better off with the central laundry.

CONSIDERATIONS FOR HEALTH PLANNERS

In a mature hospital market area it seems unlikely that hospitals will see the initiation of a shared laundry as an opportunity to expand activities in other areas, either through retained profits or through conversion of inhouse space. The cost of replacing old equipment in individual hospitals is a major factor influencing the formation of a central laundry. Hospitals tend to maintain some internal capacity for laundering special items and may be reluctant to exert adequate control over linen losses.

The large amount of capital needed to build and operate a central laundry may force members to make long-term commitments so that bank loans can be obtained. Even though it is unlikely that the shared service organization will choose to legally enforce such commitments, the member hospitals tend to welcome management policies in the areas of pricing and marketing that assure satisfactory volume of production.

The taxation of shared laundries can substantially reduce their competitive advantage over commercial operations in a mature market area. Commercial laundries at present are charging a moderately higher price than central laundries but would not have the capacity to service a region in which most internal hospital laundries are closed.

Case Study 5

OBSTETRIC AND PEDIATRIC SERVICES

Case Study 5

OBSTETRIC AND PEDIATRIC SERVICES

INTRODUCTION AND PURPOSE

This study considers the consolidated medical pediatric program of a consortium of four hospitals and the consolidated obstetric services of two of those hospitals. The primary purpose of this study is to analyze the economic impact of these consolidations on the nonparticipating hospitals in the area. A secondary purpose is to evaluate the consolidations themselves, which must be understood before the impact on nonparticipants can be evaluated.

Both the process by which the consolidations were achieved and the performance of the programs were analyzed. For obstetrics, performance analysis focused on cost effects of consolidation on both participating and nonparticipating hospitals. For the medical pediatric program, because of the limited cost data, performance was evaluated through the reactions of participants in the program.

Consolidation of these particular services was motivated by reduced occupancy in the obstetric and pediatric wards of the consortium hospitals. The reduced occupancy resulted, in part, from the steadily declining birth rate and from the changing character of the neighborhoods served by the hospitals. High occupancy in these wards is necessary financially to ensure funds for long-range investments which improve patient care. High occupancy also improves the quality of care by attracting (1) an adequate number of interns, residents, and visiting staff members of high quality and (2) active teaching and research programs. Thus needs for both financial resources and a high quality of patient care have prompted hospitals to consolidate obstetric and pediatric departments.

Project staff members spent four days in June and one day in July at the site. Interviews were conducted with the administrators of the hospitals, with department chairmen, and with the executive director of the Consortium. Interviews were also conducted with administrators of four other hospitals that do not participate in the Consortium programs.

SUMMARY OF PRINCIPAL FINDINGS FOR ECONOMIC IMPACT

Pediatrics Consolidation

1. The consolidation of the medical pediatric departments of the four Consortium hospitals at the host hospital appears to have been successful because (1) the quality of care improved (expanded pediatric program, addition of neonatology unit) and (2) the utilization of existing and/or added facilities became more efficient. Efficiency improved because of

the elimination and/or reduction of excess capacity and the more productive use of the released resources. (The host hospital for the consolidated pediatric department closed its obstetric department. Some of the space and facilities were used for general medical and surgical purposes and for the neonatal unit all of which have significantly higher occupancy rates than the former obstetric department.)

2. The problems faced by the two Consortium hospitals in attracting and maintaining interns and residents of high quality were lessened because of the improvement of the facilities, the increased concentration of patients, and the establishment of a residency program.

3. The Consortium was successful in attracting a highly qualified neonatologist and in establishing a fellowship program in neonatology.

4. The impact of the consolidation on nonparticipating hospitals appears to have been positive but not too significant, with one exception. The exception was that a present member of the Consortium hospitals which did not participate initially was forced to do so by a low occupancy rate.

5. The overall impact on the medical staff was positive because of the improved quality of services and the total increase in patient utilization. However, some of the physicians at the hospitals that eliminated their medical pediatric department were, as would be expected, hurt by the consolidation because they had to practice at more than one hospital.

6. The consolidation of medical pediatrics and the arrangements that followed within the four Consortium hospitals appear to have benefited the community most of all. The benefit is both direct and indirect. The direct benefit arises from the improvement in the quality of care and the addition of new services. At the same time the better utilization of existing resources implies a containment in the costs associated with higher quality and more services. Most important of all, though is that the community benefited indirectly because there would have been a much higher cost for duplicated facilities and probably lower utilization rates if each hospital had tried to have its own pediatric unit and neonatal unit.

Obstetrics Consolidation

1. The consolidation of obstetric services resulted in an improvement in the quality of care and in lower total community costs.

2. Eliminating its obstetric department enabled one hospital to avoid a capital expenditure for renovation that would have increased patient costs by $9 to $15 per day and also ended a substantial financial drain at that hospital.

3. The consolidation improved the profitability of an already profitable obstetric department at the hospital hosting the consolidated program. The host hospital for the consolidated program received about 80 percent of the attending staff deliveries that would have been made at the other

hospital. The additional case load was accommodated in the existing facilities because the average postpartum stay was reduced. Direct costs in the obstetric department at the host hospital increased significantly however, because of an increased intensity of nursing services and the employment of additional obstetrical staff. The net cost effect is difficult to assess, but community costs undoubtedly were lowered by the consolidation.

4. Physicians at the hospital that eliminated its obstetric department were, as would be expected, hurt by the consolidation because they had to practice at more than one hospital and had fewer opportunities for referrals.

5. The quality of care was improved by the addition of a full-time chairman of the consolidated department of obstetrics and of an educational coordinator. The obstetric/gynecology residency program was upgraded from a three-year to a four-year program.

6. The nonparticipating Consortium hospitals benefited to a limited extent from the consolidation because of an increase in the number of deliveries in their obstetric departments.

7. The nonparticipating hospitals not in the Consortium also appear to have benefited to a limited extent from an increase in their case load owing to the consolidation.

HISTORICAL BACKGROUND OF THE CONSORTIUM

The consolidated programs involve four hospitals, labeled as A, B, C, and D, that have joined together to form a Consortium that is charged with promoting cooperative programs among its members. The hospitals are located in one area of a metropolitan district, with three in the city and one in an adjacent suburb. Hospital A, a Catholic institution with 558 beds, is housed in a facility constructed in 1939 and located in the city. In 1942 a non-Consortium hospital with a facility in the central city constructed a branch, Hospital D, within walking distance of Hospital A. Hospital D, which has 432 beds is now affiliated with two hospitals located in the central city. Hospital C with 402 beds, is located in an adjacent suburb only three miles from Hospital A. Approximately 54 percent of its patients come from the city.

In the early 1950s three new hospitals were constructed on the perimeter of the city in anticipation of the movement to the suburbs. The hospitals are identified as Hospitals B, E, and F. Hospital B is located in the western portion of the city, E to the north, and F to the southwest. Hospital B, with 619 beds, is located within a few blocks of Hospital A. Hospital E, with 675 beds, and Hospital F, with 595 beds, are full-service, high-quality hospitals located in attractive suburbs.

The neighborhood around Hospitals A, B, and D is changing because of the movement of city dwellers to the suburbs and an inflow of blacks to the neighborhood. The population is also becoming somewhat older. In response to this

demographic change, the hospitals have been looking to the western edge of the city for additional patients.

Table 5.1 presents the bed size, number of patient days, occupancy rate, and number of employees for the Consortium hospitals in 1975. Brief descriptions of the four Consortium hospitals are presented in the appendix. The hospitals differ in respect to both the activities conducted and the services provided. For example, Hospitals A and C have large emergency rooms and serve as trauma centers; Hospitals B and D have much smaller emergency services. Hospital B has much more extensive research activities than do the other hospitals.

The state in which the hospitals are located has a very active planning agency at the state level. State planners have played an important role in the development of the Consortium's consolidated program. The local planning agency is also active in terms of recommending and supporting the coordination and rational allocation of facilities within the metropolitan area. The planners have stated that there are approximately 200 excess beds in the metropolitan area. At the time of the study there was a moratorium on the construction of new beds, although a number of bed replacement programs were under way. A number of administrators and physicians at the consortium disagreed with the excess beds estimate and indicated that the estimate possibly was based on a lower average length of stay than presently existed.

The competitive position of the Consortium is suffering somewhat because of considerable competition from the hospitals located in the suburbs bordering the city. Primary competition seems to come from Hospitals E and F, with Hospital E being the one closest to the Consortium members.

Table 5.1. Characteristics of Consortium Hospitals, 1975[a]

Hospital	Beds	Patient Days	Occupancy	Number of Employees
A	558	185,392	91.0%	1,800
B	619	214,269	94.8	2,400
C	402	139,551	95.1	1,845
D	432	119,853	76.0	1,251

[a] Data for Hospitals C and D are for the period January 1 through December 31, 1975. Data for Hospitals A and B are for the period July 1, 1974 through June 30, 1975.

Source: Consortium Annual Report.

The hospitals in the Consortium are primarily reimbursed on a cost basis, although, for the three years ending in June 1976, Hospital C operated under an experimental prospective reimbursement program.

In the late 1960s the hospitals that now comprise the Consortium began discussing, along with other local hospitals, the possibility of cooperative efforts. The administrators of the hospitals believed that the greatest potential benefits from shared and consolidated programs would arise in the clinical area and began their activities in that area. This was atypical because most shared service arrangements involve administrative and support services, presumably because those services do not directly affect the prestige and quality of the participating institutions and do not have major repercussions for the medical staffs. The first shared program undertaken by the Consortium was the consolidation of the medical pediatric programs of the four hospitals. As a demonstration of the commitment of the institutions to cooperative programs, the Consortium was formally incorporated in June of 1972, with the administrator of Hospital A as its first president. The corporate office of the Consortium was established in March 1974. Shortly thereafter a full-time executive director was employed. The corporate office is located in the Hospital A facility. While each of the four hospitals is an active member of the Consortium, the individual hospitals maintain autonomy and are free to participate in individual programs to the extent they desire. The programs offered and the participation by the various hospitals at the time of the study were:

Program	Participants	Host Hospital	Status
Medical pediatrics	A,B,C,D**	A	implemented 1970
Pediatric residency	A,B,C,D	A	implemented 1970
Obstetric consolidation	A and C	C	implemented 1972
Neonatology (Level III)	A,B,C,D.	A	implemented 1975
Cardiovascular	A,B,C	B	implemented 1972
Plastic surgery residency	A,B,C	C	implemented*
Chronic renal dialysis and kidney transplantation	*	A	implemented*
Crisis intervention	A and B	B	implemented 1974
Orthopedic residency	*	*	*
Bioengineering	B and C	*	*
Pediatric psychiatry	*	A and B	to be implemented 1977

Program	Participants	Host Hospital	Status
Rehabilitation - adult	*	B	to be implemented 1976
- children	*	A	to be implemented 1976
Urology residency	A,B,C,D	all	implemented 1975

* Data not readily available.
** Hospital D will begin participating in FY 1977

All four of the Consortium hospitals are involved in the sharing of medical pediatric services, although surgical procedures for pediatric patients continue to be performed at all four hospitals. Hospital A has closed its obstetric unit, and the physicians at Hospital A have been accorded staff privileges at Hospital C. Both hospitals have continued to admit gynecology patients. For the obstetric consolidation there are thus two classes of nonparticipant hospitals: Nonparticipants within the Consortium and nonparticipants outside the Consortium. (The appendix contains selected obstetric data for all hospitals in this study.) For medical pediatric sharing, the nonparticipants are all outside the Consortium.

The financial arrangements and procedures for cost allocation among the participating hospitals vary considerably. For example, for some of the residency programs cost allocations are made on a "pass-through" basis. For others there is direct billing from one hospital to another for the services provided.

The role of the executive director is manifold. His duties relate both to the planning and maintenance of programs among the Consortium and to the interaction with the external environment of the hospitals. He coordinates, plans, convenes, and acts as court of high appeal, depending upon the circumstances. Recently the executive director was involved in the planning of a pediatric psychiatry program and in the solicitation of financial support from outside sources. A proposal was prepared and submitted to a foundation, and the foundation decided to fund the proposal. This program will create a single department of psychiatry for Hospitals A and B, staffed primarily by the psychiatrists at Hospital B. Forty new beds, expected to be constructed as part of Hospital A's bed replacement program, will be located adjacent to the medical pediatric beds. Besides doing coordinative and planning work, the executive director will be responsible for publicity and public relations for the program.

The Consortium maintains two types of budgets: (1) the corporate budget and (2) a professional services budget. The corporate budget essentially covers the out-of-pocket cost of maintaining the corporate office. Those costs include the salaries and fringe benefits for the executive director, his assitant, and their secretary and budgeted amounts for other expenses, such as office supplies, travel, insurance, fees for legal and accounting services, professissional

dues, and consultants' fees. The budget for 1976-77 was $133,000, with each of the Consortium hospitals responsible for 25 percent of the total. The corporate budget involves coordination and planning activities for all of the programs. Thus, it was not possible to determine the proportions of this cost that might be relevant to the consolidated obstetric and medical pediatric program. The neonatology budget for 1975 was $147,560. The cost was divided among the four hospitals according to their use of the service. The actual cash transactions were managed by Hospital A, where the neonatology unit is located.

HISTORICAL BACKGROUND OF THE PEDIATRIC CONSOLIDATION

An attempt will be made to describe the motivation for and the objectives of the medical pediatric consolidation as well as the problems that arose and the solutions that were found when the program was implemented. Utilization and expense data were employed in an effort to assess the impact of the consolidated medical pediatric program on the member hospitals, on nonparticipating hospitals in the area, and on the community.

The consolidation of medical pediatrics in the Consortium was first considered in the late 1960s. The objective was to improve the quality of patient care with due consideration for the cost. More specifically, the objective was to concentrate the patients into one unit instead of four so that interns, residents, and attending staff members of higher quality could be attracted and kept. At the same time it was hoped that the cost of care would be contained and/or improved through the realization of economies arising from a better utilization of available resources.

Table 5.2 indicates the bed size and occupancy rates, which ranged from 45 percent to 69 percent, in the pediatric departments of the Consortium hospitals in 1968. The data in this table suggest that there was an insufficient

Table 5.2 1968 Pediatrics Statistics for Consortium Hospitals

Hospital	Pediatric Beds	Occupancy
A	55	49-50%
B	23	69
C	37	50
D	35	45-50

Source: Report of Consultant, December 1968

concentration of patients in each of these departments to assure that well qualified interns, residents, visiting medical staff members and equipment were available to provide a high quality of pediatric care at a reasonable cost. The belief at the time was that such care could be achieved through the consolidation of the four independent programs.

The chief of pediatrics at Hospital A had a vision of an improved pediatric department. In the late 1960s he initiated work to bring about the consolidated program. A well known physician consultant was brought in to survey the facilities of the four hospitals and to make recommendations regarding the feasibility of a consolidated pediatric program. The survey was broadened to include a possible consolidation of the departments of obstetrics as well as of the departments of pediatrics.

The consultant recommended "that the staffs concerned with obstetric and pediatric patients be established as single obstetric and pediatric units with privileges for care of their obstetric and pediatric patients in any one of the hospitals caring for such patients." Specifically for pediatrics he recommended "that (Hospital A) and (Hospital B) be jointly established as the Pediatrics Center for prematures, infants, children, and adolescents, with equal privileges of the pediatric staffs and pediatric surgeons in both hospitals -- the older infants and children to be accommodated at (Hospital A) in a considerably expanded inpatient facility and in a greatly enlarged and well equipped outpatient facility . . . That (Hospital A's) and (Hospital B's) staff jointly supervise a premature unit which should preferably be established where the prematures are delivered in (Hospital B) and where a skilled neonatologist already is functioning . . . That operative procedures such as tonsillectomies, herniorraphies, uncompleted appendectomies, etc. in children should be transferred as soon as feasible . . . from (Hospital C) or (Hospital D) to the newly established Pediatric Center" (Hospitals A and B).

The recommendations were deliberately made broad so that the prospective participants could work out the details of the expected consolidated program and minimize the expressed conflicts of interest among the administrators, board of trustees, and related medical staffs. These recommendations were accepted in principle by all parties involved.

The implementation of the recommendations turned out to be more difficult and time consuming than expected. Only the medical pediatric program was consolidated. In 1970 a departnent of pediatrics of the four hospitals was established at Hospital A, with the chief of pediatrics of Hospital A as the head of the department. The consolidation of medical pediatrics was soon followed by a consolidation of the residency programs of Hospitals A,B,C, and D, with the new program centrally administered through the consolidated department. Initially three of the hospitals, A, B, and C, participated in the consolidated pediatric program, while Hospital D did not, primarily because of its affiliation with two other hospitals. In June 1976, Hospital D filed a certificate of need to close its medical pediatric program and join the Consortium program.

Even though it is difficult to determine the positions taken by the participating

hospitals (administrators, board of trustees, and related medical staffs) during the deliberations regarding the implementation of the recommendations, several facts remain clear. The initial positions are indicated in table 5.3.

Table 5.3 Initial Positions Taken with Regard to the Consolidation of Medical Pediatrics at Hospital A

Hospitals	Degree of Support			
	A	B	C	D
Administrators	Strong	Strong	Weak	Neutral
Pediatricians (medical)	Strong	Against	Weak	Neutral

A disagreement concerning the location of the pediatric center led to an impasse. The state planning agency became involved in the discussion and essentially forced the consolidation of the program. The agency recommended that the program, regardless of its location, should be considered as a Consortium program rather than as a program of any one individual hospital.

A major development in the pediatric program at the hospitals centered on the establishment of a neonatology unit. The location of the neonatal unit within the Consortium was a matter of great debate because considerable prestige was associated with the unit. One position was that the neonatal unit belonged with an obstetric department so that the newborns in need of intensive care could have it at that institution. Another position was that the neonatology unit belonged with a pediatric department. Some of the physicians believed the location was not crucial because patients could be transferred between hospitals with little difficulty and without detriment to the quality of care during the transfer.

The decision to place the neonatal unit at Hospital A was made after the consolidated Hospital A and Hospital C obstetric program was located at Hospital C. The state planning agency essentially told Hospital C that it could not locate a neontal unit within the institution at the location it preferred. Hospital C then essentially withdrew its active solicitation to have the neonatal unit located in its facility. There is some indication that Hospital B did not seek the neonatal unit too vigorously because of its wish to concentrate on other activities and services.

ANALYSIS OF THE DATA FOR PEDIATRICS CONSOLIDATION

For Hospital A the expansion of the pediatric department seems to have been beneficial to all parties involved. Presumably the hospital's prestige can

be considered to have been improved because of the consolidated program and also because of the level-three neonatology unit.

For Hospital B the immediate effects of the consolidated programs appeared to be slightly negative. The main impact of the consolidation was felt presumably only by the pediatricians who were forced to change their habits. However, the overall effect on the hospital was not significant because the unit was small and at the time not well supported. Indeed, there are some indications that the administration at Hospital B wanted to close the pediatric unit in order to reallocate resources to other services that might be provided by the hospital. For instance, some time after the medical pediatric department was eliminated, a cardiac surgery unit was established. The administrative staff of Hospital B seems to believe that the hospital will receive long-term benefits from its participation and cooperation in the consolidated programs.

Although staff privileges at Hospital A were extended to the medical pediatricians at the other Consortium hospitals, most of the physicians at Hospital B did not utilize these privileges. Most of the Hospital B medical staff at the time of the consolidation, perhaps 18 or 19 of the 22 attending physicians, sent patients to a downtown hospital specializing in pediatrics or to Hospital E. Most of the physicians were on the teaching staff of the downtown hospital. Three of the medical staff members sent their patients to Hospital A. At the time of the study the physicians who had joined the Hospital B staff since the consolidation were practicing at Hospital A, while the 18 or 19 physicians previously mentioned continued to practice at other hospitals. There was some indication that the pediatricians at Hospital B believed that the quality of care was somewhat better at the downtown hospital specializing in pediatrics. Also, some physicians indicated that they preferred to use Hospital E or the downtown specialty hospital because the house staff at Hospital A was foreign.

The medical pediatric staff members of Hospitals C and D utilize the medical pediatric facilities of Hospital A, although they also use the facilities of their own hospitals and those of Hospital E.

Table 5.4 shows selective statistics for the departments of pediatrics of Hospitals A,B,C, and D and for the period 1969 through 1974. The statistics for Hospital A indicate that the number of pediatric beds rose from 50 in 1969 to 58 in 1970 through 1974. In 1975, twelve more beds were added, in addition to the neonatal unit (seven beds). Even with the addition of these beds, the occupancy rate increased over the years. By 1974 the occupancy rate was more than 90 percent. These statistics indicate that the utilization of the pediatric facilities at Hospital A improved after the consolidation became effective.

Table 5.4 also indicates that the bed capacity of the pediatric departments of the other three hospitals declined significantly after the consolidation. From these data it appears that the decline in the number of patients treated by Hospitals B, C, and D followed the same pattern as the decline in their bed capacity. It is not strange, therefore, that Hospital D recently filed a certificate of need to eliminate its pediatric program.

Table 5.4. Selected Pediatric Statistics for the Four Consortium Hospitals, 1969-1975

Item	1969	1970	1971	1972	1973	1974	1975
				Hospital A			
Pediatric beds	50	58	58	58	58	58	70
Discharges	2,677	2,755	3,014	2,960	3,730	3,775	NA
Patient days	11,789	13,938	14,730	14,594	16,428	20,283	17,336[a]
Occupancy rate (percent)	65	66	70	69	78	96	82[b]
Length of stay	4.40	5.06	4.89	4.93	4.40	5.37	NA
				Hospital B			
Pediatric beds	23	19	12	12	12	12	12
Discharges	1,593	NA	NA	1,295	1,049	716	NA
Patient days	4,259	NA	NA	NA	NA	NA	1,598
Occupancy rate (percent)	51	NA	NA	NA	NA	NA	36
Length of stay	2.67	NA	NA	NA	NA	NA	NA

[a] July 1, 1974-June 30, 1975

[b] Based on 58 beds, not on 70 beds.

NA = Not Available.

Table 5.4. Selected Pediatric Statistics for the Four Consortium Hospitals, 1969-1975 (continued)

Item	1969	1970	1971	1972	1973	1974	1975
				Hospital C			
Pediatric beds	22	22	12	12	12	12	12
Discharges	1,372	1,180	NA	1,457	1,042	1,183	NA
Patient days	5,240	2,495	NA	3,287	4,213	5,201	1,962
Occupancy rate (percent)	65	31	NA	75	96	119	44
Length of stay	3.82	2.11	NA	2.26	4.04	4.40	NA
				Hospital D			
Pediatric beds	35	35	35	27	25	25	25
Discharges	NA	NA	NA	991	767	751	NA
Patient days	NA	5,312	5,537	4,594	NA	NA	3,133
Occupancy rate (percent)	NA	42	43	47	NA	NA	34
Length of stay	NA	NA	NA	4.64	NA	NA	NA

NA = Not Available

Two tentative conclusions emerge from the evaluation of these data. First, the improvement in the utilization of the facilities of Hospital A was not accidental, as the occupancy rates for the other hospitals all declined during the same time period. Second, the consolidated program at Hospital A received overall approval from most of the physicians at the other three hospitals.

To validate these tentative conclusions, a breakdown of the consolidated pediatric department utilization statistics in terms of surgical and medical pediatrics was attempted. Table 5.5 presents statistics for the pediatrics department for the period of July 1968 through June 1975.

The number of medical pediatric cases treated at Hospital A grew without interruption throughout the period, reaching a total of more than 2,200 cases in 1974-75, compared to about 900 cases in 1968-69 and 1969-70. The number of cases treated in surgical pediatrics declined to a total of fewer than 1,000 cases in 1974-75, compared with more than 1,700 cases in 1968-69. These data overwhelmingly support the conclusions previously drawn, as the trend in occupancy rates for surgical pediatrics of Hospital A, like that for the departments of pediatrics in Hospitals B, C, and D was down, while the trend in occupancy rates for medical pediatrics in Hospital A was up.

The impact of the consolidation of medical pediatrics on nonparticipating hospitals outside the four Consortium hospitals appears to have been positive but not very significant. Most of the physicians at Hospitals B, C, and D who did not support the consolidated program used the facilities of other hospitals before the consolidation took place. These physicians decided not to change their habits. Apparently they considered the new alternative (medical pediatric consolidation) and decided that the benefits were not sufficient to compensate them for the inconveniences they would have to suffer if they accepted the new service.

The neonatology unit in Hospital A utilizes some of the facilities and space released by the elimination of the obstetric department. This unit has had a 100 percent occupancy rate (sometimes even higher) since its beginning. It provides a high quality of care to high-risk newborns. A highly qualified neonatologist, who previously was with another city hospital, was named to head the unit and a neonatology fellowship program.

With the exception of Hospital A after consolidation, financial data for the pediatric departments of the four hospitals are not readily available. The basic reason is that these departments were small before and after the consolidation; their financial data were not kept in separate accounts. Hospital A has kept separate accounts since July 1971. Selected financial statistics for Hospital A are presented in Table 5.6.

It is evident from table 5.6 that total expenses as well as expenses per case increased significantly (about 47 percent) between 1973-74 and 1974-75 in comparison to the increases in the previous years (about 15 percent). This significant increase can be attributed mainly to the physical expansion program in the department of pediatrics and to the introduction of the neonatal unit.

Table 5.5. Selected Pediatric Statistics for Hospital A, July 1968 Through June 1975

Item	1968-69	1969-70	1970-71	1971-72	1972-73	1973-74	1974-75
Medical pediatrics							
Discharges	872	940	1,399	1,549	1,777	1,989	2,204
Patient days	5,492	5,338	7,848	9,534	10,220	11,341	12,480
Length of stay	6.30	5.68	5.61	6.15	5.75	5.70	5.66
Surgical pediatrics							
Discharges	1,762	1,812	1,583	1,461	1,311	1,181	995
Patient days	6,615	6,362	5,935	5,484	5,197	4,774	3,199
Length of stay	3.75	3.51	3.75	3.75	3.96	4.04	3.22

Table 5.6 Selected Pediatrics Financial Statistics for Hospital A, July 1971-June 1975

Item	1971-72	1972-73	1973-74	1974-75[a]
Total direct expenses	$ 373,331	$ 413,076	$ 486,962	$ 795,036
Total indirect expenses	562,041	668,683	774,773	1,060,677
Total expenses	935,372	1,081,759	1,261,735	1,855,713
Total revenue	1,069,328	1,140,567	1,296,435	1,743,836
Expense per case	310	350	398	580
Expense per day	62.26	70.17	78.30	107.04

[a] Expense and revenue data for this year include expense and revenues for the neonatal unit.

Although no attempt was made to evaluate the financial performance of the department of pediatrics of Hospital A, it appeared desirable to put their expenses per case and per day in perspective. Table 5.7 shows the expenses per case and per day for Hospital A, a nearby hospital which specializes in pediatrics, and a group of hospitals in the same geographic region.

Table 5.7 Expenses per Case and per Day for Pediatric Patients, 1971-1975

Item	1971-72	1972-73	1973-74	1974-75
		EXPENSES PER CASE		
Hospital A	$310	$350	$398	$ 580
Pediatric hospital[a]	911	923	856	944
Group hospitals[a]	794	877	954	1080
		EXPENSES PER DAY		
Hospital A	62.26	70.17	78.30	107.04
Pediatric hospital	149.35	159.12	167.83	181.49
Group hospitals[a]	102.47	112.26	123.13	136.36

[a] The data for the pediatric hospital and the group hospitals are for calendar years 1971, 1972, and 1973 and for January to September 1974.

It should be emphasized that the case mix of the hospitals included in Table 5.7 may not be and probably is not the same. For this reason a direct comparison of the expenses per case and/or per day might not be appropriate. However, if the data for the pediatric hospital and for the group of hospitals are utilized as an upper boundary of expenses per case and/or per day, it is obvious that the corresponding expenses of Hospital A are well within these bounds.

HISTORICAL BACKGROUND OF THE OBSTETRIC CONSOLIDATION

Early in the 1970s the obstetrical unit at Hospital A was judged to violate the state code. It was estimated that approximately $1.5 million would be required to bring the facility up to code. This provided a major impetus for the consolidation of obstetric services within the Consortium. It was natural to consider consolidation because at that time other obstetric services in the area were being consolidated.

In his 1970 report the consultant recommended "that the obstetric services be limited to (Hospital C) and (Hospital B) with cessation of the obstetric services at (Hospital A) and transferral of obstetric patients from (Hospital A) principally to (Hospital C). (Hospital D) could be brought into coordination in such manner as they saw fit and as seemed suitable to the other hospitals." He also reported that the 1970 obstetric occupancy rates at the four hospitals were

Hospital A	50%
Hospital B	88.6%
Hospital C	71-73%
Hospital D	50%

A short time later the state planning agency calculated the postpartum bed requirements for the group hospitals as well as for Hospital E. (See Table 5.8.) The calculations indicated substantial excess capacity at Hospitals A, B, D, and E.

Furthermore, the head of the state planning agency recommended that the obstetric department at Hospital A be closed and that patients be accommodated at Hospitals C, D and E.

However, table 5.8 shows that the amount of excess capacity depended greatly upon the occupancy rate and the average length of postpartum stay. In 1972 the average postpartum stay at Hospital C was 4.94 days and at Hospital A, 4.82 days (See Appendix, Table 5.A1). In addition, half of the Hospital A deliveries could be accommodated at Hospital C only if the average postpartum stay was four days. The other half could be accommodated at Hospital D only if the average postpartum stay was 4.0 or 4.5 days and if the occupancy rates at Hospital C dropped from the 1972 level of 84.5 percent.

Because of all of the parties involved, much discussion over several years centered on conjectures as to the flow of obstetric and gynecology patients

Table 5.8 Summary Analysis--Postpartum Bed Need, Group Hospitals (Based on 1970 Total Births).

Hospital	1970 Births	Postpartum Bed Need on Basis of Postpartum Stay 4.0 Days[a]	4.5 Days	5.0 Days	Licensed OB Beds	Surplus OB Beds For "Clean" GYN
A	2,610	42	46	50	70	9
B	3,411	52	58	63	53	--
C	2,801	44	49	53	60	10
D	2,646	42	46	51	67	10
E	4,600	68	75	82	79	14

[a] Minimum used in evaluating bed need for compliance with licensing requirements.

and physicians should Hospital A close its obstetric department. Eventually in 1972, because of the code problems and at the urging of the head of the state planning agency, it was decided that obstetrics would be eliminated at Hospital A. At that time Hospital A was short of medical-surgical beds, and the obstetric facilities could be used to alleviate that shortage.

The determination of the host hospital A cases was largely determined by religious convictions. Although the head of the state planning agency stated that the cases should go to Hospitals C and D, formal arrangements were made only with Hospital C, largely because it is also a Catholic hospital.

Prior to the obstetric consolidation, Hospital C had fifty obstetric beds plus ten swing obstetric/gynecology beds and a fiscal 1972 occupancy rate of 84.5 percent. The occupancy rate for the 70 bassinets was only 56 percent. However, the administration of Hospital C realized that the number of deliveries was declining and that the decreasing postpartum stay would lead to a lower occupancy rate in the obstetric department. In the long run, the administration of Hospital C faced three basic alternatives: (1) Substantially increase the number of deliveries at the hospital; (2) eliminate or reduce the obstetric services; or (3) support an underutilized department. The last alternative would be likely to involve high patient costs because of the declining case load and would result in an insufficient census to maintain a high quality department. The second alternative would run against the history of the hospital, which was originally founded as a "combined maternity hospital and infant home" and served only that function for 41 years. The chance to operate a consolidated service and to attract many of Hospital A's obstetric patients was opportune.

ANALYSIS OF THE DATA FOR OBSTETRICS CONSOLIDATION

As was mentioned previously, a primary incentive for the elimination of obstetric services at Hospital A was the capital expenditure required to bring the obstetric unit up to code. In addition, the financial situation at Hospital A was a contributing factor, with estimated losses of more than $140,000 (before allowances) in each of the years from 1969 through 1972, as indicated in Table 5.9. The estimated losses incurred in the delivery and labor rooms and in the obstetric department more than offset the estimated profit made on the nursery. These estimated losses should be compared with estimated obstetric profits of more than $440,000 in 1970 and in 1972 at Hospital C and an estimated obstetric profit of $283,053 in 1970, increasing to $439,516 in 1972, for Hospital B. From 1969 to 1972 Hospitals E and F earned an estimated total obstetric profit of more than $1,100,000 and more than $800,000, respectively. The estimates were based on both Hospital Administrative Services (HAS) and hospital data and were calculated by taking actual revenue for each department and subtracting expenses.[1] Because of these estimates, the profit figures should be judged with caution. The data presented in Table 5.10 indicate that the estimated losses incurred in Hospital A can be explained by the fact that Hospital A had lower revenue and higher direct costs per obstetric patient day than the other hospitals. These lower revenues and higher direct costs resulted in large part from the low occupancy rate.

By 1972 the occupancy rate in Hospital A was 54 percent, while the occupancy rates for Hospital B and C were approximately 85 percent, as indicated in Table 5.10. The occupancy rate of 85 percent for Hospital C was considerably higher than the rate (65 percent) in 1969 because of a reduction of six obstetric beds and an increase of 15.7 percent in patient days even though deliveries increased by only 8.2 percent. As indicated in table 5.10, the average adult length of stay in the obstetric departments of Hospitals A, B, and C was substantially greater than the average for the national sample, the average for the state, and the average for hospitals with more than 40 obstetric beds, although the differences were not statistically significant at the customary levels.

The revenue per patient day for Hospital A was lower than that for Hospitals B, C, D, E, and F. This may have resulted in part from the fact that welfare deliveries that were primarily paid for on a Medicaid formula. (See table 5.10.[2]) The low revenue combined with high costs resulted in substantial losses on the obstetric services. With the projected decline in the birth rate the profit outlook was certainly not favorable. In addition, Hospital A was also faced with an estimated expenditure of $1.5 million to bring its facilities up to code.

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1 Actual departmental expenses were used when available. Missing data were estimated from real data at comparable hospitals.

2 An effort was made to determine the causes of the high costs at Hospital A. The analysis of direct and indirect costs for 1969 to 1972 did not show any clear trends or significant causal factors.

Table 5.9. Total Obstetric Department Net Profit (Loss)[a]
(Includes Obstetrics, Nursery, and Labor and Delivery Rooms)

Hospital	1969	1970	1971	1972	1973	1974	1975
A	$(214,985)	$(164,409)	$(143,698)	$(181,696)	b	-	-
B[c]	NA	283,053	328,602	439,516	$509,635	$532,278	$1,343,356
C	NA	440,777	NA	472,366	516,510	145,057	831,691
D[d] [e]	NA	(163,288)	51,615	5,473	NA	NA	NA
E[c]	181,476	122,245	510,665	325,895	941,894	1,032,731	1,313,878
F[c] [f]	126,463	94,794	405,912	208,403	363,216	423,678	581,579

[a] After indirect costs were allocated.

[b] Department closed October 1972.

[c] Indirect costs allocated using the allocation rates for Hospital C.

[d] Calendar year.

[e] Net profit is estimated using the obstetrics nursing cost per patient day for Hospital A.

[f] Obstetrical nursing revenue was estimated using the rate of revenue to direct cost for Hospital E.

NA=Not Available.

Table 5.10. Obstetric Department Gross Revenue and Total Costs per Patient Day, 1969-1975

Hospital	Item	1969	1970	1971	1972	1973	1974	1975
A	Revenue	$75.51	$91.52	$114.63	$128.03	[a]	-	-
	Total costs	89.80	102.86	117.37	143.08	[a]	-	-
B	Revenue	NA	NA	145.71	173.79	$182.69	$189.97	$234.15
	Total costs	NA	NA	126.38	145.50	149.12	146.25	149.70
C	Revenue	NA	140.65	NA	147.31	173.46	174.78	234.97
	Total costs	NA	111.66	NA	116.74	142.39	166.10	183.33
D	Revenue	87.41	100.18	122.80	143.58	199.31	193.06	220.93
	Total costs	100.63	110.09	118.66	143.15	167.69	164.44	198.43
E	Revenue	100.81	109.38	120.99	137.28	172.00	197.48	247.36
	Total costs	92.28	103.28	98.83	121.91	128.31	147.95	181.17
F	Revenue	88.63	93.60	122.42	129.33	147.81	159.59	176.34
	Total costs	82.18	89.12	103.08	118.55	126.78	135.77	146.42

[a] Department closed October 1972.

NA = Not Available

In summary, because of the low occupancy rate, the high cost, the low revenue, and the required capital outlay for renovation, elimination of obstetric services at Hospital A was economically necessary unless additional obstetric patients could be attracted to the hospital.

As was indicated previously, Hospital C could not accommodate half of Hospital A's deliveries with its current 50 obstetric beds plus ten swing beds if it maintained the same average postpartum stay. Hospital C either had to increase the number of beds dedicated to obstetrics or had to reduce the average length of stay. Because the overall occupancy rate for Hospital C in 1972 was 97 percent, new construction would likely have been required to provide additional beds. Instead, Hospital C reduced its average postpartum stay from 4.94 days in 1972 to 3.95 days in 1973 and to 4.3 days in 1974 and 1975. These figures are based on 50 obstetric beds, so the average stay is underestimated to the extent that swing beds were used and their use not reported. The important fact is that Hospital C was able to accommodate most of the Hospital A attending staffs obstetric patients without any additional allocation of fixed resources or capital.

In 1972, before the consolidation, Hospital C had a direct cost per obstetric patient day of $58.68, which was substantially lower than the cost for Hospitals A, B, and E and about the same as the cost for Hospital F. (See appendix, table 5.A1.) The direct cost per obstetric admission was less than that for Hospitals A and B but was greater than that for Hospitals E and F because of Hospital C's greater length of stay. The revenue per obstetric patient day and per discharge was greater than that at Hospitals A, D, E, and F. Hospital C was earning a substantial profit, estimated at $440,000 in 1972. In summary, prior to the consolidation, Hospital C apparently had a profitable and efficient obstetric department, although the average postpartum stay was high.

In responding to the increased number of deliveries, Hospital C substantially increased the number of nursing hours per obstetric patient day and per obstetric discharge. This increase in the intensity of nursing care is not surprising because a patient would require fewer nursing services on the last day than on the earlier days of her stay and the last day or half day was eliminated at the time of the consolidation. Part of the increased intensity may have resulted from the additional intensive care facilities for newborns. The increased intensity of nursing services was reflected in the nursing salaries per obstetric patient day, which increased from $51.60 in 1972 to $62.70 in 1973 and $77.82 in 1975.

These increases at Hospital C occurred in the delivery and labor room, nursery, and obstetrical units. Table 5.11 indicates that, from 1972 to 1975, the number of nursing hours per delivery increased from 16.28 to 18.28, but the other hospitals had similar increases. The increase in delivery and labor room salaries per delivery for Hospital C was $25.70 between 1972 and 1975. (See table 5.12.) Hospital E incurred a large cost increase primarily because of a greater increase in the wage rate, while Hospitals B and F had similar increases, primarily because of lower increases in wage rates.

Table 5.11. Delivery and Labor Room Nursing Hours per Delivery

Hospital	1969	1970	1971	1972	1973	1974	1975
A	19.33	20.74	20.82	25.74	a	-	-
B	NA	NA	16.60	20.82	24.79	22.98	21.55
C	NA	12.58	NA	16.28	15.80	17.18	18.28
D[b]	16.08	18.62	19.00	20.69	20.70	20.97[c]	NA
E	11.53	12.17	10.37	14.82	14.73	18.06	16.30
F	8.97	8.98	9.89	10.35	13.53	12.30	12.83

a Department closed October 1972.

b Calendar year.

c Based on data for 11 months.

NA = Not Available .

Table 5.12. Delivery and Labor Room Nursing Salaries per Delivery

Hospital	1969	1970	1971	1972	1973	1974	1975
A	$77.27	$92.32	$92.69	$125.22	a	-	-
	(3.97) [b]	(4.41)	(4.43)	(4.83)	-	-	-
B	NA	NA	70.78	95.50	$107.07	$105.58	$109.08
	NA	(4.18)	(4.26)	(4.59)	(4.32)	(4.59)	(5.06)
C	NA	71.34	NA	82.78	85.11	92.96	108.48
	NA	(5.67)	NA	(5.08)	(5.39)	(5.41)	(5.94)
D	59.03	76.64	82.23	93.58	107.09	117.12	NA
	(3.67)	(4.12)	(4.33)	(4.52)	(5.17)	(5.58)	NA
E	42.69	47.28	50.71	71.91	73.71	87.19	100.49
	(3.70)	(3.88)	(4.89)	(4.85)	(5.00)	(4.83)	(6.16)
F	34.30	37.70	44.81	52.02	62.54	61.33	71.85
	(3.85)	(4.20)	(4.53)	(5.03)	(4.62)	(4.99)	(5.60)

a Department closed October 1972.

b The hourly wage rate is reported in parentheses throughout this table.

NA = Not Available.

The largest increase in the intensity of nursing services was in the nursery, where the nursing hours per newborn patient day increased from 5.18 in 1972 to 6.47 in 1974. (See table 5.13.) This increase was about the same as for Hospital E but was substantially greater than that for Hospitals B and F. The newborn average length of stay was 5.61 days in 1972, 5.11 days in 1973, 4.88 days in 1974, and 4.76 days in 1975. From 1972 to 1974 the average length of stay for newborns was reduced more than the average postpartum stay, and the intensity of nursing services was increased substantially.

The total direct cost per obstetric patient day for Hospital C increased from $58.68 in 1972 to $94.50 in 1975. Even though the data for the other hospitals were not directly comparable, because of apparently different procedures for assigning other direct expenses to the obstetric department, this increase was not likely to be any less than that incurred by other hospitals. The increase was probably the result of the increase in the intensity of nursing services in Hospital C that offset the economies realized from the increased case load.

Much of the observed increase in obstetrical direct cost resulted from wage rate increases, which are likely to be beyond the control of a hospital. For example, the wage rate for nurses in the delivery and labor rooms increased from $5.06 per hour in 1972 to $5.94 per hour in 1975 at Hospital C, as indicated in table 5.12. Other hospitals experienced similar increases. Table 5.14 presents the average wage rate for obstetrical, nursery, and delivery and labor room nurses and indicates that between 1972 and 1974 wage rates increased at a very slow rate, probably because of wage and price controls. In 1975 the average wage rate increased substantially for Hospitals C, E, and F, resulting in higher obstetric costs. The wage rate for Hospital B remained essentially unchanged over this period, which contributed to the stability in the salaries per obstetric patient day figure. The wage rate increase from 1972 to 1975 for Hospital C was $0.89 per hour, while for E the increase was $1.20 per hour and for F the increase was $0.72 per hour. Hospital C apparently did not experience an unusual rate of increase in wage rates.

The use of patient day costs for Hospital C is somewhat misleading because the consolidation resulted in a substantially lower average postpartum stay, which held down the rate of increase in cost per discharge. For example, the direct cost per obstetric discharge increased by 41.1 percent from 1972 to 1975, while the direct cost per obstetric patient day increased by 61 percent during the same period. Table 5.15 indicates that the direct cost per admission decreased slightly from 1972 to 1973 but then increased substantially in both 1974 and 1975. The increase in 1974 resulted from an increase in the intensity of nursing services and an increase in the average postpartum stay, although, as was previously indicated, the average stay for 1973 may be underestimated. The increase in 1975 resulted from a decrease in discharges, an increase in nursing intensity, and an increase in wage rates. The cost increase for Hospital C during the post-consolidation period was greater than that for Hospitals B, E, and F. Although the direct cost per obstetric patient was greater for Hospital E than for Hospital C, Hospital E reduced its average postpartum stay by more than Hospital C did. By 1975 the direct cost per discharge for Hospital C was greater than the corresponding figure for the other three hospitals and was $96.63 greater than the figure for Hospital

Table 5.13. Nursing Hours in Nursery per Newborn Patient Day

Hospital	1969	1970	1971	1972	1973	1974	1975
A	3.88	4.27	4.30	5.61	[a]	-	-
B	NA	NA	4.12	4.62	4.83	4.74	4.51
C	NA	5.20	NA	5.18	5.50	6.09	6.47
D[b]	NA	6.75	5.98	6.78	6.01	6.95[c]	NA
E	4.43	5.29	5.46	6.43	6.65	7.53	7.78
F	4.21	3.68	3.60	3.95	4.13	4.07	4.48

a Department closed October 1972.

b Calendar year.

c Based on data for 11 months.

NA = Not Available.

Table 5.14. Average Hourly Wage Rates for Nursing Staff

Hospital	1972	1973	1974	1975
A	$4.65	a	-	-
B	4.43	$4.28	$4.43	$4.42
C	4.55	4.88	4.89	5.44
D	NA	NA	NA	NA
E	4.36	4.77	4.59	5.56
F	4.65	4.48	4.75	5.37

a Department closed October 1972.

NA = Not Available

Table 5.15. Direct Cost per Obstetrics Admission

Hospital	1969	1970	1971	1972	1973	1974	1975
A	$207.32	$242.53	$268.86	$345.08	a	-	-
B	NA	NA	290.65	333.02	$341.14	$342.25	$332.81
C[b]	NA	277.85	NA	289.86	288.89	369.40	408.90
D	NA	NA	NA	NA	NA	NA	NA
E	190.33	218.84	219.09	280.06	322.36	347.36	382.33
F	161.93	172.34	199.86	240.69	251.34	267.42	312.27

a Department closed October 1972.

b Per discharge.

NA = Not Available

F, which has had consistently lower direct costs per admission that the other hospitals. Hospital B was able to avoid a cost increase from 1972 to 1975 by increasing the number of admissions, patient days, and deliveries. Hospital C thus experienced a somewhat greater increase in direct costs per discharge than did the other hospitals over the postconsolidation period.

The revenue per obstetric patient day data reported in Table 5.10 indicate that Hospital C increased its average charge rate by 59.5 percent from 1972 to 1975, while Hospitals D and E had similar increases. Both Hospitals B and F had smaller percentage increases. The total obstetric profit for Hospital C was $440,000 in 1972 and somewhat more than $500,000 in 1973 and 1974. In 1975 the profit jumped to $1,340,000, primarily because of a 34.4 percent increase in charges per patient day. This profit pattern may have resulted from wage and price controls or from the prospective reimbursement program in which Hospital C participated. The consolidation clearly appears to have strengthened the profit situation of Hospital C.

To assess the cost effects of the obstetric consolidation, it is necessary to consider the costs that would have been incurred in Hospitals A and C had the consolidation not taken place. As an estimate of the cost savings in 1973, it can be assumed that the obstetric direct cost per patient day at Hospital A would have increased to $75 because of the declining occupancy rate. The renovation costs of approximately $15 per patient day would have raised the cost to $90, which is approximately $17 more than the cost at Hospital C. Most of the savings is a result of the avoidance of the capital expenditure that would have been required to bring the facility up to code.

If the average postpartum stay at Hospital C would have been reduced even if the consolidation had not taken place, this benefit cannot be ascribed to the consolidation. The increased intensity of nursing services at Hospital C after the consolidation appears to have resulted in greater cost increases than at the other hospitals considered in this study, so Hospital C did not realize increasing returns to scale in the direct costs of obstetric care. Because no additional facilities were required as a result of the consolidation, it is reasonable to assume that indirect costs were not substantially affected by the consolidation. Unfortunately, overhead allocation rates for each year were not available to permit further investigation of this point.

The real benefits of the consolidation were thus the avoidance of renovation costs, the elimination of losses at Hospital A, and an increase in the case load at Hospital C without a substantial increase in fixed and allocated costs. These benefits occurred in conjunction with a somewhat greater increase in direct costs than might have occurred had there been no consolidation. The revenue data in Table 5.10 indicate that the net benefits were passed on to patients during 1973 and 1974, but the large increase in charges in 1975 indicates that the benefits were retained by Hospital C thereafter.

Physicians' Acceptance of And Participation in the Consolidation

During the Jan. 18, 1972, meeting involving representatives of Hospitals A and C, the associate administrator of Hospital A stated that "prior to any commitment, the doctors involved should be the architects of any change or

consolidation proposed. To that end it was decided that a joint staff meeting be held to discuss any and all changes proposed." The fact that this meeting was not held indicates that the decision makers were primarily the administrators of the hospitals and that the physicians, although included, did not seem to have played a decision-making role.

Interviews with administrators and physicians indicate that the physicians at Hospital A, particularly the gynecologists, were not satisfied by the consolidation. Even though Hospital C offered staff privileges to all the obstetricians at Hospital A, Hospital C did not want to accept additional gynecology cases because of its very high occupancy rate. Also, Hospital A did not want to lose its gynecology cases. Hospital A physicians were thus forced to practice obstetrics in one hospital and gynecology in another.

The administration of Hospital A has done everything it can for the gynecologists on the staff. They are given favored treatment in terms of the location of their beds, and they are given first access to operating rooms so that they have very minor delays in admitting patients. There are generally **longer** delays for admitting cases at Hospital C. There are considerable difficulties for the physicians who continue to practice at Hospital A because they do not get referrals from other doctors. It is now more difficult to attract new physicians to the gynecology department at Hospital A. In total, physician acceptance has been what would have been expected. Those physicians who were hurt by the consolidation do not view it favorably. Most physicians would agree that a consolidation was economically necessary, but the Hospital A physicians would have preferred Hospital A to have been the host hospital.

Data are available from the city hospital Council on the obstetric admissions by attending staff physicians for 1972 to 1974. From these data the names of the 1972 attending staff obstetricians of Hospital A were selected, and their cases were tabulated by hospital location for 1972, 1973, and 1974. With the use of the percentage of their 1972 cases at Hospitals A, B, C, and D, it is possible to estimate the number of their 1973 and 1974 obstetric cases at Hospitals B, C, and D that would have gone to Hospital A had it not closed its obstetric department and the number that would have gone to Hospitals B, C, and D anyway. These estimates are given in table 5.16.

Table 5.16 Estimated Disposition of Obstetrical Admissions of Former Hospital A Attending Staff Obstetricians After Consolidation for Calendar Years 1973 and 1974

	Hospital					
Number of Cases	B	C	D	E	F	Other
1973	97	1,213	48	NA	194	NA
1974	111	989	95	NA	176	NA

NA = Not Available.

The conclusion that may be drawn from this analysis is that most of the case load of the attending staff at Hospital A was transferred to Hospital C, although Hospitals B, D, and F did receive some of the cases. It is also likely that some cases were transferred to Hospital E.

The house staff (residents) of Hospital A formerly made a number of deliveries. It is relatively easy for attending staff physicians to transfer their cases to the hospital of their choice, but the disposition of the house staff deliveries is difficult to control. Most of such deliveries are likely to be made in hospitals in the county rather than in Hospital C in the adjacent county. Hospitals B and D did benefit somewhat by obtaining some of the house staff deliveries because of their location in the same county as Hospital A, their proximity to Hospital A, and their "full-service" obstetric departments. It is also likely that some of the house staff deliveries are made in other city hospitals.

Finally, the consolidation did result in improvements in the quality of care. A full-time chairman of obstetrics was hired at Hospital C. An educational Coordinator was also employed. The residency training programs of Hospitals A and C were consolidated at Hospital C, and that program has been raised from a three-year to a four-year obstetric/gynecology residency program. The residents take part of their training at Hospital A.

CONSIDERATIONS FOR HEALTH PLANNERS

A consolidation of medical/clinical services is a very difficult and delicate process from the initiation through the final implementation stages. The reason is that strong pecuniary and nonpecuniary interests of institutions, administrators, and medical staff are at stake. The consolidation of a service affects in various degrees these interests. For this reason, therefore, some of the principal parties involved should have strong (economic) motivations in order to set in motion a process that will lead to consolidation. For a successful consolidation of a service, however, a mechanism that compensates the principal parties that are affected negatively should be established and implemented.

Because a consolidated program is a voluntary arrangement among institutions and the role of a health planner is an advisory one, the following appear to be the important factors that should be considered.

1. Administrators, trustees, and/or physicians should realize and believe that a consolidated program for a particular medical/clinical service is the right solution for the problems facing the service.

2. The basic problem faced by a service should be one of excess capacity/underutilization, lack of sufficient concentration, maldistribution or lack of distribution, so that the elimination, expansion, addition, or reallocation of the facilities through the consolidated program will correct it.

3. The overall support of the participating institutions and their

corresponding members associated with the particular service is required for a successful consolidated program.

4. Planners should recognize the strong self-interests of the participating institutions and their corresponding members associated with the service and should not disregard those interests.

5. Mechanisms that identify the consequences of the consolidation for all relevant participants and mechanisms that compensate the "losers" should be established.

6. The direct involvement of planners in the final round of discussions and negotiations during the initiation and implementation process might become necessary. For this reason planners should try to be informed about the potential problems during this time and be ready to participate.

7. The consolidation of a medical/clinical service does not necessarily imply a reduction in the cost of this service per unit of output.

8. A reduction in the total expenses for the service through the elimination of duplicated facilities and reduced excess capacity should be expected.

9. An increased utilization of the remaining services should be expected.

10. Improvement in the quality and/or comprehensiveness of services should be expected, although a reduction in the geographic accessibility might be noticed.

Appendix

Selected Obstetrics Data by Year for Study Hospitals and for State and National Hospital Averages

Table. 5.A1 presents background information for the obstetric departments of Hospitals A to F and state and national samples for the preconsolidation period (1967 to 1972). Except for Hospitals A and D, the group and perimeter hospitals had higher occupancy rates than the hospitals in the state and national groups. The average length of stay and the direct costs for Hospitals A to E were substantially greater than those for the state and national groups. The revenue per patient day and per admission for the Consortium and perimeter hospitals were substantially greater than the revenue for the state and national groups.

Table 5.A1. Selected Obstetrics Data by Year[a]

Year	Group Hospitals				Perimeter Hospitals		National		
	A	B	C	D[b]	E	F	State	All	More than 40 OB Beds
					Number of Beds				
1969	68	NA	56[c]	57	65	66	24 (19.5)[d]	23 (15.4)	54 (20.4)
1970	68	NA	57[c]	57	65	66	26 (19.2)	22 (15.5)	55 (21.0)
1971	68	51	NA	57	64	66	25 (19.0)	22 (14.7)	53 (17.2)
1972	68	51	50[c]	57	65	66	25 (19.2)	22 (15.0)	54 (18.8)
					Occupancy (Percent)				
1969	66.4	NA	65.3	75.8	89.6	81.3	56.6 (19.3)	53.0 (20.2)	65.5 (15.3)
1970	66.0	NA	73.1	79.2	92.9	87.7	58.7 (20.3)	55.0 (21.9)	68.3 (16.0)
1971	65.5	91.3	NA	71.4	99.2	87.1	58.2 (21.1)	55.6 (21.0)	71.9 (15.9)
1972	54.0	83.9	84.5	60.6	89.4	80.3	54.1 (20.1)	51.4 (19.6)	66.4 (14.4)

[a] The data are from July 1 to June 30, that is, 1969 data represent July 1, 1968 to June 30, 1969.
[b] Calendar year
[c] Does not include 10 swing OB/GYN beds.
[d] Standard deviations are reported in parentheses.
NA=Not Available.

Table 5.A1. Selected Obstetrics Data by Year[a] (continued)

Year	Group Hospitals			Perimeter Hospitals			National		
	A	B	C	D [b]	E	F	State	All	More than 40 OB Beds
					Average Length of Stay				
1969	4.813	NA	NA	5.282	4.449	4.089	4.252 (.564)[c]	3.944 (.836)	4.401 (.750)
1970	4.852	4.277	4.977 [b]	4.791	4.272	3.980	4.335 (.569)	3.877 (.768)	4.269 (.708)
1971	4.657	4.502	NA	4.692	4.482	4.018	4.200 (.531)	3.816 (.745)	4.222 (.731)
1972	4.823	4.529	4.940	NA	4.655	4.178	4.188 (.558)	3.785 (.760)	4.235 (.741)
					Direct Cost Per OB Patient Day (Dollars)				
1969	42.48	NA	NA	NA	42.78	39.60	37.18 (8.72)	41.48 (13.76)	41.27 (9.69)
1970	49.99	70.57	55.83 [b]	NA	51.23	43.30	41.37 (11.12)	44.68 (14.85)	46.53 (11.41)
1971	57.34	64.56	NA	NA	48.89	49.74	46.81 (12.30)	48.15 (17.09)	49.23 (11.39)
1972	69.62	73.52	58.68	NA	60.16	57.61	55.19 (13.12)	54.65 (20.25)	57.62 (14.23)

[a] The data are from July 1 to June 30; that is, 1969 data represent July 1, 1968 to June 30, 1969.
[b] Calendar year.
[c] Standard deviations are reported in parentheses.
NA=Not Available.

Table 5.A1. Selected Obstetrics Data by Year[a] (continued)

Year	Group Hospitals			Perimeter Hospitals			National		
	A	B	C	D[b]	E	F	State	All	More than 40 OB Beds
				Direct Cost Per OB Admission (Dollars)					
1969	207.32	NA	NA	NA	190.34	161.93	158.50 (44.01)[c]	160.88 (52.88)	179.88 (46.05)
1970	242.53	NA	277.85[b]	NA	218.84	172.34	179.45 (53.40)	170.98 (57.77)	196.97 (52.88)
1971	268.86	290.65	NA	NA	219.09	199.86	196.61 (56.52)	181.70 (65.93)	205.86 (52.43)
1972	345.08	333.02	289.86	NA	280.06	240.69	232.08 (69.99)	205.38 (80.19)	242.23 (69.53)
				Revenue Per OB Patient Day (Dollars)					
1969	75.51	NA	NA	87.41	100.81	88.63[d]	59.19 (21.26)	59.01 (24.67)	68.11 (26.52)
1970	91.52	NA	140.65[b]	100.18	109.38	93.60[d]	70.14 (20.51)	66.72 (25.82)	79.38 (29.87)
1971	114.63	145.71	NA	122.80	120.99	122.42[d]	82.50 (24.06)	76.47 (44.21)	88.53 (33.11)
1972	128.03	173.79	147.31	143.58	137.28	129.33[d]	95.16 (31.23)	84.01 (36.10)	100.97 (33.45)

[a] The data are from July 1 to June 30, that is, 1969 data represent July 1, 1968 to June 30, 1969.
[b] Calendar year.
[c] Standard deviations are reported in parentheses.
[d] Hospital F did not report obstetrics nursing revenue, so the obstetrics nursing revenue as a percentage of obstetrics direct cost for Hospital E was used to estimate obstetrics nursing revenue for Hospital F.
NA = Not Available.

Table 5.A1. Selected Obstetrics Data By Year (Continued)

Year	Group Hospitals			Perimeter Hospitals			National		
	A	B	C	D[b]	E	F	State	All	More than 40 OB Beds
				Revenue Per OB Admission (Dollars)					
1969	363.42	NA	NA	461.74	448.57	369.96[c]	255.41 (105.96)[d]	229.42 (96.51)	295.46 (115.02)
1970	444.01	NA	699.98[b]	480.01	467.24	374.93[c]	307.00 (106.99)	256.09 (103.51)	332.28 (122.71)
1971	533.81	655.96	NA	576.22	542.20	494.47[c]	349.12 (119.94)	291.26 (218.53)	368.90 (155.78)
1972	617.48	787.18	727.65	NA	639.00	541.83[c]	402.49 (157.12)	317.11 (155.89)	421.74 (153.11)
				Nursing Hours Per OB Patient Day					
1969	11.03	NA	NA	NA	10.51	9.74	10.63 (2.45)	12.98 (4.50)	11.73 (2.86)
1970	11.32	NA	11.19	NA	11.62	9.53	10.28 (2.47)	12.72 (4.44)	11.92 (3.00)
1971	11.68	11.87	NA	NA	10.46	10.13	11.03[e] (2.96)	12.64 (4.19)	11.78 (2.75)
1972	13.71	13.32	11.34	NA	13.07	10.95	12.55 (3.24)	13.50 (4.43)	12.94 (3.00)

[a] The data are from July 1 to June 30; that is, 1969 data represent July 1, 1968 to June 30, 1969.
[b] Calendar year.
[c] Hospital F did not report obstetrics nursing revenue, so the obstetrics nursing revenue as a percentage of obstetrics direct cost for Hospital E was used to estimate obstetrics nursing revenue for Hospital F.
[d] Standard deviations are reported in parentheses.
[e] Excludes one value of 37.81.
NA=Not Available.

Case Study 6

GRAPHICS, INC.

Case Study 6

GRAPHICS, INC.

INTRODUCTION AND PURPOSE

This case study is a further examination of a site visited for an earlier report on shared services.[1] The corporation studied represents a nonexclusive, symmetrical sharing arrangement (SA), providing administrative services. If the geographic area covered by an SA is large or if the administrative and transportation costs are substantial, the potential savings from economies of scale may be outweighed by increases in other expenses. This case study examined a shared printshop operation (Graphics, Inc.). The geographic area covered by the SA is an entire state with more than 200 hospitals. Distances are large, and transportation costs could be expected to be a potentially significant factor in the cost of printed materials for the hospitals. In addition, salaries and/or commissions for field representatives or regional sales/marketing agents could be expected to raise administrative costs.

SUMMARY OF PRINCIPAL FINDINGS FOR ECONOMIC IMPACT

1. A typical major hospital with 500 beds routinely uses 400 or more different printed forms and in addition each year prints several documents for public relations.

2. Substantial economies of scale are possible in the printing process. As an indication of their magnitude, a run of 5,000 copies of one type of form costs $30 per 1,000, a run of 20,000 costs $23.50 per 1,000, and a run of 100,000 costs $17.50 per 1,000.

3. Potential economies of scale are not easily realized. Suboptimal runs are frequently ordered from Graphics, Inc.

4. "Reruns," that is, using the same plates as for a previous order, which would reduce costs, account for less than half of the orders to Graphics, Inc.

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[1] Health Services Research Center. Methodologies for Health Planners to Evaluate Services Shared by Health Care Organizations. Four volumes. Chicago: The Center, 1976. Volume 2, Case Study 4, p. 49.

5. Machines at Graphics, Inc. are usually operated for only one shift.

6. Transportation costs are not a significant factor in the pricing or marketing of the printing services of Graphics, Inc.

7. A major marketing effort in the remoter areas of the state would increase administrative costs for Graphics, Inc. without resulting in significant scale economies.

8. A shared printing service at the very least maintains a competitive posture compared to commercial printers by virtue of income and ad valorem tax exemptions, avoidance of sales commissions, and profit margins.

HISTORICAL BACKGROUND

The service here referred to as Graphics, Inc. is a division within a free-standing, hospital-owned shared service organization. The organization is incorporated and holds an IRS 501(e) tax exemption. In addition, it was recently granted an exemption from state property and real estate taxes by the state supreme court after about three years of litigation. All not-for-profit hospitals are eligible for membership in the organization; more than 50 have joined since 1970. The SA is located in the largest SMSA of the state. That SMSA also contains at least three SAs, providing different services, and three integrated multihospital systems. Several large commercial printers are located in the area.

A major hospital, with more than 500 beds, can be expected to use more than 400 different forms in its operation. For some of these forms, the expected usage is one per admitted patient; for other forms usage may be substantially greater. In addition, most hospitals also produce a sizable amount of public relations material to be printed, such as patient brochures and house organs.

The capability of Graphics, Inc. is comparable to that of a large commercial printer. It can produce a wide array of flatwork, as well as a full range of snap-out forms. There is a "rapid-copy" service for items that are ordered in quantities of less than 1,000. The print shop is unionized. The Graphics, Inc. division has 23 full-time equivalent employees. The presses usually operate one shift, with occasional overtime. The budget for Graphics, Inc. is more than $900,000, with a majority of the business stemming from the hospitals within the SMSA.

In the early years of Graphics, Inc., when a written printing agreement was needed for a bank line of credit, a core of six major hospitals tended to have their printing needs (at least routine flatwork) supplied by Graphics, Inc. This was before Graphics purchased equipment for producing snap-out forms. Some successful efforts were also made at that time to develop some standardization of forms.

Recently the hospitals have become fully accustomed to Graphics and tend to forget that it is a shared arrangement. Agreements are no longer needed by the bank, which views Graphics as a capable printer in the area. The tendency of the hospitals is to request estimates or bids from several printers in the area for a significant part of their printed needs. Bids were requested for about 500 out of 4,132 orders in 1975 (usually the high dollar volume items). Graphics is thus forced to stay competitive.

Another development has been the actual reduction of standardized forms. Many hospitals now want some modification of a form also used by other hospitals or changes in their own forms from one order to the next.

A key function of Graphics, Inc. is to develop estimates for potential orders. This process is described in some detail because it highlights the complex nature of a print shop. The final cost of an order is heavily influenced by the number of units ordered. For some machines, it is uneconomical to run just a few copies. The larger the run, the cheaper the unit price, up to the production capacity limitation of the particular press. The final cost is also influenced by the complexity of the production process needed. Each "job" requires that a plate be made, unless a plate is available from a previous order and no changes are needed. Many jobs require several plates. The cost of such a plate may range from about $15 to $100. If several plates and different colors are needed, extra "setup" and "wash-up" time is needed. For a small job, these times may account for about 20 percent of the final cost of the job. Reducing this percentage yields economies. Making estimates or bids for a job requires intimate knowledge of setup times and and frequencies, machine production capabilities, and the costs associated with them and with paper stock prices. Table 6.1 illustrates the intricacies both of estimating costs, and of the printing process.

From the hospital's perspective, it is in its best interest to order as large a number of copies as possible, with the least number of changes from previous orders. Some hospitals tend to order what they believe to be a year's supply to reduce unit costs, but these supplies must be warehoused. If the hospital has excess warehouse space, forms may be stored relatively cheaply. However, purchase of a large number of forms reduces inventory turnover and ties up significant working capital. For instance, a large 500-bed hospital may spend up to $300,000 for printed forms, brochures, and other materials in one year. Because Graphics, Inc. is a not-for-profit operation and its original charter requires the SA to promote the well being of its members, the hospitals do receive sound advice as an additional benefit. An estimator for Graphics may price an order on the basis of several potential quantities and discuss with the hospital's purchasing agent the tradeoffs in warehousing versus production costs to the hospital.

No corporate data exist to show for what percentage of bids Graphics, Inc., rather than a commercial printer, receives the contracts. Interviews indicated that Graphics receives a large percentage of those jobs for which it bids. The hospitals are increasingly being made aware of costs; allegedly this is a major reason for requiring bids even for smaller orders. That Graphics is competitive is proved by its annual dollar volume of business and by the fact that routine orders require an average turnaround of 45 working days (with

Table 6.1. Chargeable Printing Operations, by Functional Areas

Composition	Preparatory	Press Work	Bindery
Proofing	Camera	Washup-color	Cutting
Copy preparation	Stripping	Mixing inks (color match)	Cutting apart
Typesetting	Silvers-color key	Make ready	Flat trimming
Consultation	Consultation	Press run	Book trimming
Layout and design	Filing	Work and turn dry time	Pad trimming
Headline composition	Miscellaneous	Hold press for customer	Folder
Customer changes		Miscellaneous	Drilling/slotting
Keylining			Stitching
Proofreading			Round cornering
Photo retouching			Speed klect
Photography			Collating
Miscellaneous			Punching
			Spiral punch
			Spiral bind
			Shrink wrap
			Job 703 inspect 705 count
			Hand fold
			Gather--hand
			Gather--saddle
			Inserting
			Remarry
			Padding
			Band
			Wrap
			Miscellaneous handwork
			Delivery

flatwork requiring only 15 working days and multiple copy snap-out forms requiring up to six weeks). In the near future, Graphics expects to hire one full-time estimator; at the time of the study two management level employees devoted a significant part of their time to this key function.

For all of its years of existence except the year ending June 1975, during which there was a five week strike, Graphics generated an end of year net gain. This excess of income over expenses is allocated within eight and a half months to the hospitals in the ratio of their dollar volume of business. Because the margin is small and the number of users large, this is a significant marketing enticement only for the largest hospitals. These, however, are the ones most likely to award a job on the basis of a competitive bid. Graphics does have a marketing edge in that it can help a hospital with the actual form design and with inventory control. Graphics has an art department

that understands the substantive medical and administrative contents of the forms. This is thought to improve the quality of the forms. The few tasks that Graphics cannot perform in house are farmed out. For instance, Graphics can manufacture pads of flatwork (that is, tablets of single sheet forms), but it cannot do stitch binding. However, there is very little call for such work.

The hospitals outside of the main SMSA in the state do not generate a large volume of business. However, their needs are real and at times acute. A field representative from Graphics is welcome, and he generally obtains orders for all the hospital's current print needs. The orders may be quite small, with few margins for economies. Thus the cost of the field representative, who is usually a department manager or even the division manager of Graphics, may not be recovered. No sales commission is given to these representatives.

ANALYSIS OF THE DATA

Table 6.2 shows the distribution of sales to member hospitals of the SA. Four large participants account for more than half of annual dollar sales; Hospital Systems A and B are each multihospital systems, with a common warehouse for each system. It is estimated that System B uses Graphics for about 50 percent of its printing needs, so that it is clear that the major metropolitan hospitals are the predominant locations for potential as well as current sales.

The warehouse for system A is part of a significant group purchasing program through which supplies are distributed to other smaller hospitals outside the metropolitan area. The hospitals in the system have achieved some standardization of routine printed forms. The number of items held in inventory for 11 hospitals is now 346, compared to more than 500 originally for only three hospitals. Stock of printed forms turns over every six months; other supplies turn over every 45 days. As a result, the inventory of printed forms is $60,000 out of a total $300,000, while their annual share of total transactions is much less.

The quantities used of particular forms are more or less closely tied to the number of hospital admissions. With a mean stay of seven days and a 90 percent occupancy rate, a single hospital of 500 beds will use annually about 23,500 admission forms, which have seven parts and are the most complex single routine form. Graphics estimates that the optimal run of these forms is 75,000, at a cost of $50 per 1,000. This is obviously more than a single hospital can expect to use before changes in the form are required. One 500-bed hospital has its inventory managed by Graphics; a full year's supply of admission forms is produced in one run. The typical run of admission forms, however, is only 10,000, at a cost of $120 per 1,000. On this small run, 15 percent of the cost is for time spent in "setup" by the press operators, a cost which must be incurred by each hospital wanting slight variations in a form.

Table 6.2. Total Printing Sales to Client Hospitals, 1975-76

Hospital	Bed Size	Volume of Sales	Dollars/Bed
		Metropolitan Area	
A (3-hospital system)	1,064	$160,221	$150
B (2-hospital system)	801	218,825	273
C	736	94,557	128
D	273	77,576	284
E	153	39,804	260
F	130	27,303	210
G	129	49,846	386
H	107	63,205	590
I	75	9,507	126
J	48	46,124	960
All others (11)	3,551	37,948	10
		Outstate	
K	105	6,447	61
L	104	4,835	46
M	100	6,046	60
N	67	3,780	56
O	65	5,738	88
P	40	3,184	79
Q	39	5,060	129
R	35	3,684	105
All others (11)	1,167	23,782	20
		Nonmembers (Introductory work)	
		56,388	
	Total	$943,860	

Other important multi-part forms are used in quantities up to five times as large as quantities for the admission form--for example, x-ray reports, laboratory reports, and doctor's orders. A large hospital may use about 150,000 two-part "doctor's orders" forms each year. A run of 5,000 of these forms recently cost $30 per 1,000; a run of 20,000 cost $23.50 per 1,000; a run of 100,000 cost $17.50 per 1,000. These differences clearly exceed the interest cost of carrying larger inventories unless warehouse space is unusually expensive. Further potential economies are possible when several hospitals agree to use the same form, when orders are planned with long lead times, and when the print shop has enough volume to run a second shift.

Potential economies of scale in printing are not automatically realized by Graphics, Inc. Several factors contribute to or frustrate the realization of savings. In a typical production week, about 400,000 total impressions may be made on the regular presses. In addition, 200,000 impressions may be made for snap-out forms and 40,000 impressions for the "rapid-copy" service. There may be 20 jobs with total impressions of fewer than 1,000, 27 jobs with total impressions between 1,000 and 2,000, and 14 jobs with more than 5,000 impressions.

Three mulihospital systems are clients of Graphics; each has achieved meaningful standardization within its group. However, even the change of one plate to print a hospital's name is a nontrivial setup cost. Furthermore, the large hospitals have drifted away from standardization and large runs with long lead time. A 500-bed hospital uses about 25,000 copies of the seven-part admission form in one year. The optimal run is about 75,000, at a cost of $50 per 1,000. The typical run, however, is only about 10,000, at a cost of $120 per 1,000.

Small changes that are nonetheless important to the hospital are frequently desired. Graphics filled 4,132 orders in 1975. Of these, 1,769 were reruns without changes, 708 were reruns with changes in the forms, and 1,655 were new orders. Even a single-page form often uses two or three plates, costing $75 to $100 each. The overall situation, however, is that Graphics at the time of the study was surviving and expanding volume in a vigorous, well developed, competitive industry.

Graphics, Inc. has not used aggressive marketing tactics to build volume in standardized forms. The low marketing budget is one competitive advantage Graphics has that makes possible its low price bids to the major buyers. Hospital System A continues to solicit bids on about 35 percent of all printed forms (75 percent of dollar volume). Graphics wins 85 percent of these bids. The shared printing service cannot afford to jeopardize its price competitiveness in a well developed local printing industry. One consequence of this policy is that Graphics attempts to bid every job at accurate cost rather than to make "package deals" for orders consisting of several jobs. A recent confidential bid comparison between Graphics and commercial printers was obtained. It was clear from those data that the private printers were not pricing each job to reflect economies of scale. Therefore, Graphics, Inc. won an order involving six different jobs because one of the jobs was so large that the more accurate bid of Graphics was lower than the commercial printers' bids. Even though Graphics' pricing policy does not harm with the major accounts, the policy does prevent use of a marketing tool with new accounts because the SA will not price a job below cost as an enticement.

Marketing and service cost is a significant growth limitation at Graphics. Nearly 90 percent of the long-term capital assets of the association is equipment used in the Graphics division. Hospitals may become members by purchasing one share of common stock for $1. They may or may not choose to become regular customers of Graphics, Inc. In the past, participation in Graphics required a commitment contract. The contracts have never been legally enforced. They are obviously not needed to secure the small bank loan. Retained net income cannot be allocated on the basis of equity share because this would be an unfair windfall to the small hospitals. Therefore, retained income is allocated each year according to share of sales.

The overall implication of the capital structure is that the large hospitals are predictably reluctant to endorse a costly marketing effort. Their desires carry great weight owing to the absence of long-term commitments.

For fiscal year 1976, about $22,000 net income in the printing division is expected to be allocated to the participants. As in previous years, this will represent about a 10 percent "dividend" on stockholders' equity (at the beginning of the year). The savings can be, at present, almost equally attributed to lower marketing cost, tax exemptions, and the absorption of commercial profits. When it is considered that Graphics typically must win competitive bids for large orders, it is reasonable to assume also that a hospital pays lower prices to outside printers because of the competitive pressure exerted by Graphics.

CONSIDERATIONS FOR HEALTH PLANNERS

1. Administrative costs do increase when the geographic territory increases. There may be a need for a field representative, whose costs may not be fully covered by the proportionately small amount of extra business he generates.

2. Transportation costs, here as in Case Study 3, do not appear significantly to affect the final cost of the service; these costs neither encourage nor inhibit marketing strategy and resulting potentials of scale economies.

3. Standardization is a key element in achieving economies of scale. In print shops, it may be extremely difficult to persuade hospitals to use identical or similar forms. Each form may have to contain the logo or letterhead of the hospital, and the actual users of the form may insist on a specific layout or content that differs from that of other hospitals' forms.

4. Over time, an SA may be viewed as a provider of services no different from any other provider. The ideology of sharing may then not be a determining factor for usage. The SA would be viewed like a commercial venture by the users, but it would retain some competitive advantages:

    a. It would be tax exempt
    b. It would be nonprofit

c. No commissions would have to be paid to salesmen. Commercial printers usually pay their field representatives ten percent of the dollars in sales they obtain. In this case study, the SAs not having to pay commissions resulted in about $100,000 cost avoidance.

5. From the present case study, it is not clear that a print shop should be a high priority item for sharing. The return on investment, if a new plant had to be built and capitalized, might not be as high as for some other services shared. This relates to the problem of achieving standardization.

6. Cost avoidance by hospitals joining a shared printing arrangement may be limited. A large hospital having an inhouse print shop may have only one employee running one often ancient and paid-for press in a small space. The total annual expense may be less than $20,000 per year. If the hospital abolishes this inhouse service, deadlines for rush orders may not be met by commercial sources, and small orders may have to be paid for on a "per job" basis.

7. Availability of a service is a key item. In this case study, the SA had many commercial competitors. This, and Graphics' entry into the arena, ensured reasonable prices for printing services. In the absence of such availability, a shared printing operation would have a greater impact on reducing costs.