APPLICATION OF THE MATERIALS MANAGEMENT CONCEPT
TO THE HOSPITAL PURCHASING
ORGANIZATION

DISSERTATION

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Hospitals have increasingly come under close public scrutiny in the last several years because of the constantly escalating price of health care in the United States. It has been estimated that approximately 30 per cent of a typical hospital's operational budget is devoted to purchasing consumables plus the cost of materials support.

The purpose of this study is to examine and compare materials management practices of selected individual hospitals in Texas Health Services Area 5 in order to determine the extent and manner in which they utilize the materials management concept. In addition, the investigation focuses on determining if there are any relationships between the variables of type of ownership, size and the extent to which the study hospitals utilize the materials management concept.

The primary data for the study were obtained from personal interview with the top materials management executives or their representatives in a sample of 30 hospitals in the study area. The interviews were conducted during the months of April, May, and June, 1980. The sample was drawn from a population of 90 hospitals in the 19 county area.
Each hospital was described as an individual case, and then descriptive cross comparisons were made by classifications of hospitals according to bed size and type of ownership. In addition, a materials management numerical score was tabulated based upon a rating guide which was formulated to include the major phases of materials management. A descriptive statistical analysis was accomplished utilizing a computer program from the total sample population as well as by type of ownership and size categories.

Based upon the information received in interviews with the top materials management executives, a wide variation in the use of materials management practices was noted. Expressed in terms of the numerical score developed for each hospital, the overall range varied from a low of 7 points to a high of 47 points. The overall mean of the scores of the total study population was 28.8. A further examination of these scores revealed a relationship between hospital size and the degree to which the materials management concept is utilized.

The conclusions of this study were based upon five exploratory questions which relate to the following topic areas: competence of the top materials management executives; functions performed by materials management organizations; types of materials management operational systems used; and evaluation of materials management effectiveness.
Relative to the competence of the top materials management executive, it was determined that a wide variation exists relative to the profile characteristics studied. Overall, it was determined that the younger top materials management executives are more receptive to the materials management concept. Fifty per cent of the sample hospitals were judged to use a materials management type structure. There does not appear to be a relationship between organizational size and the number of materials management functions performed. In addition, there is a wide difference in the use of the types of inventory control systems and materials distribution systems.

Very little substantive input regarding the effectiveness of their materials management function is provided to the Chief Executive Officers of the study hospitals. Even though it was found that 50 per cent of the hospitals utilize indices to monitor performance, several of the hospitals use only a minimal number of indicators. From the responses of the top materials management executives, it is obvious that there is only a limited degree of formalized reporting to top management.

Based upon the study of the materials management concept and its current usage, as well as upon findings and conclusions derived through primary data obtained from the sample hospitals, some general recommendations are presented
for consideration by top materials management executives
and chief executive officers of hospitals.
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CHAPTER I

INTRODUCTION

Hospitals have increasingly come under close public scrutiny because of the constantly escalating price of health care in the United States. William K. Kenning has observed that the total cost of purchasing consumables plus the cost of materials support amounts to approximately 30 per cent of a typical hospital's operation budget. Further, if the time spent by the "user" department personnel on supply activities and other direct expenses is included, at least one-third of the budgeted operating expenses in a hospital are related to the materials system (1, p. 84).

A well publicized General Accounting Office study indicates that purchasing and materials management techniques in many hospitals can be vastly improved by applying modern materials management methods (2, p. 1). Ester Kuntz believes that hospitals will be able to avoid further government regulations only by taking the initiative in cutting costs through better purchasing methods (3, p. 56). The materials management concept is offered as a major approach which is available to hospitals as a means for solving many of the problems relating to the acquisition and flow of materials throughout the institution.
The materials management concept is a general model of how the activities related to the flow of materials into, through, and out of an organization are organized. Compared with such functional organizational units as accounting, engineering, personnel, etc., it is not characterized by relatively distinct and clear boundaries.

Materials management is basically a group of interrelated activities which can be and often are treated as discrete functional units. Further, it is an organizational concept that provides for more efficient planning, coordination, and control of all materials activities occurring prior to the actual use of materials. The concept provides for an organizational arrangement whereby various functions related to the acquisition, movement, and disposal of all materials used in a structure are grouped under one central authority (4, p. 15). In addition, it recognizes the interdependency of all these functions and provides an umbrella under which the requisite planning, coordination, and control can be obtained to the long term benefit of the organization. This brief introduction to the materials management concept is expanded in Chapter II, as are related concepts such as systems theory and the contingency approach to management.

The health care industry has not embraced the materials management concept to the same extent that the business sector has incorporated it into its structure. Considering
the background of environmental pressures which are being exerted upon the health care industry, it appears that there should be sufficient impetus for hospitals to adopt the materials management concept in order to realize sizeable cost savings. However, the literature does not indicate that this is the case. It appears that many hospitals have retained old, ineffective materials organizational structures in which purchasing authority is diffused throughout the organization instead of being centralized under one materials management executive.

This study was concerned with performing an in-depth analysis of hospital materials management practices within the Texas Health Services Area 5. The results of this study could provide valuable information to hospital chief executive officers as well as governmental agencies charged with the responsibility of increasing the efficiency of health care institutions. A review of the literature does not indicate that a dissertation study of this nature has been done. Also, an off line computer search related to Hospital Materials Management was accomplished through Bibliographic Retrieval Services, Inc., and no dissertations on this specific subject area were found.

Nature of the Problem

The nature of the problem centers on the fact that hospitals seem to be holding onto outdated organizational
forms and practices relating to the purchasing function even though modern materials management organizational structures and procedures have been tried, tested, and found to be highly successful.

Dean S. Ammer, a national authority on materials management practices in hospitals, has done an exhaustive study of hospitals' materials management procedures across the nation and has published his findings in a report entitled, Hospital Materials Management: Neglect and Inefficiency Promote High Costs of Care. The conclusions of this study resulted in a list of recommendations made by Ammer in which he states that

... hospitals could do a much better job of materials management ... without making any changes in existing regulations, resources, and environment. In a majority of hospitals, worthwhile gains can be made simply if the administrator wills them. This quick and easy route to improved performance does not, by any means, lead to the ultimate in materials management. But, in the average hospital, substantial excess cost can be peeled away painlessly and easily (5, p. 107).

Ammer (5, pp. 108-109) makes the following three proposals which each hospital may put into force in order to reduce costs:

I. Assess the materials management staff. Every hospital should have at least one executive who genuinely understands the principles of purchasing and inventory management. In smaller hospitals, this person may be an assistant administrator who has other duties.
II. Centralize materials management authority and responsibility. A single executive, accountable directly to the administrator or his assistant should have at least policy enforcement responsibility for all phases of materials management. This state of affairs, it should be noted, does not now exist, even in a minority of hospitals which have executives with the title of materials management, or its equivalent.

III. Set specific materials management goals and objectives. The conventional department operating expense budget is presently the only control that is commonly applied to any materials management activity. Badly needed are controls more directly related to performance which measure inventory turnover, stockouts, purchase price changes, and materials handling costs. These measures are remarkably easy to develop and can work almost immediately to spur performance.

From Ammer's basic findings relating to the utilization of the materials management in hospitals, the following is a listing of problems relating to the application of this concept:

1. There is a wide range in the competency of the top purchasing executives among various hospitals.

2. Materials management functions are being performed in a highly dispersed manner throughout the hospital organizational structure.
3. The organizational and physical technology is available to implement the materials management concept, but few hospitals have maximized the concept's potential advantages.

4. There is limited use of various operational control systems such as inventory control, materials handling exchange carts, etc., in many hospitals.

5. There is an absence of good documentation and enforceable policies and procedures within the materials management organization.

6. There is the absence of the widespread introduction of computerized information systems in the materials management system which would lead to greater managerial control.

7. There is the lack of certain purchasing strategies such as group purchasing in order to reduce materials costs.

8. Such cost reduction techniques as product evaluation and standardization committees are not being utilized to the extent necessary.

The above-mentioned list highlights a few of the materials management problem areas which are thought to exist in hospitals. By more extensively utilizing the materials management concept, hospitals could alleviate, if not totally eliminate many of these problems in the materials management area which could in turn help to control the
spiraling costs of health care. By properly controlling the materials flow through the institution, hospital management could then, in turn, better manage this sphere of hospital operations.

Purpose of the Study

The purpose of this study is to examine and compare materials management practices of selected individual hospitals in Texas Health Services Area 5 in order to determine the extent and manner in which they utilize the materials management concept. In addition, the study will focus on determining whether there are any relationships between ownership and size variables, and the extent to which the hospital utilizes the materials management concept.

Exploratory Questions

Certain exploratory questions were used to guide this research activity and aid in analyzing the results of this study. These exploratory questions are as follows:

1. What is the basic competence of the materials managers in the study hospitals as measured on the basis of certain profile characteristics of materials managers, generally?

2. How is the materials management function organized and performed in the sample hospitals?

3. Are the various operational control systems such as inventory control and materials handling adequate for
proper control of the materials flow through the institution? What is their nature and the form that they take?

4. Does top management periodically evaluate the efficiency of the materials management function, i.e., efficiency as measured in terms of such indices as inventory per bed, inventory turnover rate, etc.?

5. What relationships, if any, exist among the variables of hospital size and type of ownership, and the extent to which the materials management concept is utilized by the study hospitals?

Methodology

A thorough survey of the literature was the basis for identifying materials management concepts and techniques which were used for formulating an integrated approach to the study. From the identification of these concepts and techniques, a model was developed and an interview questionnaire formulated to determine the extent to which the materials management concept was used in the study hospitals.

Thirty study hospitals were randomly sampled from the nineteen county Texas Health Service Area 5. After the sample hospitals were selected, personal interviews were conducted with the materials management executive or his representative in each of the study institutions utilizing the interview questionnaire previously developed.
From the data collected from each study hospital, a case study was developed utilizing a standard format which included the major topics areas. Next, descriptive cross-comparisons were made in terms of independent variables such as size and type of ownership and dependent variables such as materials management organizational structure, type of inventory control system, and materials handling and distribution system employed.

Finally, from the data collected, a rating guide was formulated to include the major phases of materials management. A composite score was then developed for each of the study hospitals. These materials management scores were analyzed from a descriptive standpoint in terms of their mean, range, etc. A more complete description of the methodology is found in Chapter III.

Limitations of the Study

This study was limited to acute general and specialty hospitals in the nineteen-county Texas Health System Agency 5. A list of these hospitals is presented in Appendix A.

Only selected elements related to the functional processes of the materials management concept were investigated. These elements include materials management organizational structure, inventory control system used, material handling and distribution system used, materials management performance indicators used, and others found in individual hospitals.
A related limitation of this study was the imprecise rating score that was developed for each of the study hospitals. The interview questions utilized were limited in scope as indicators of usage of the materials management concept. In addition, weights were assigned arbitrarily to the various questions. In view of these limitations, it must be understood that the rating guide did not reveal small differences between the study hospitals. It is felt that in spite of these limitations, the basic ideas underlying the formulation of the rating guide are sound, and it serves as a fairly reliable instrument to measure the materials management developmental level.

Another limitation to the study relates to the data acquisition method utilized. In any study which uses the personal interview as the method for data collection, the investigator must recognize certain inherent weaknesses and attempt to minimize their effects on the data he obtains. Data obtained may be incomplete or may be distorted by the interviewee. Likewise, the interviewer may misinterpret the information given, or he may bias the answer he receives simply by the manner in which he phrases the question. Often, it is difficult to distinguish between fact and opinions which are proffered by the interviewee. An attempt was made to minimize this problem by developing an interview guide format which utilized standard terminology which was familiar to most materials management executives.
Plan of Study

Chapter I has contained an introduction to the study along with background information relating to the hospital and the external and internal forces which are currently affecting its operation. In addition, the following topics are explored: the specific nature of the problem; the purpose of the study; exploratory questions to be addressed in the study; the methodology used; and some limitations to the study.

Chapter II is devoted to a review of the literature from which the materials management criteria are developed.

Next, in Chapter III, individual case studies are presented for each of the study hospitals. In Chapter IV, the materials management of the study hospital are compared and analyzed in order to determine if any significant relationships exist between the variables studied as well as possibly identifying any patterns which might emerge. Chapter V, the final chapter is used to summarize, draw conclusions, and make any appropriate recommendations based on the study.
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CHAPTER II
MATERIALS MANAGEMENT AS A HOSPITAL
OPERATIONAL CONCEPT

The term "materials management" has traditionally been related only to business operational applications. Materials management as an operational concept is concerned basically with the efficient flow of materials into, through, and out of an organization. This efficient flow is related to the procurement cycle, the internal distribution system, as well as other systems designed to control the various aspects of materials movement through the organization. Henning (1, p. 82) observes that materials management is a relatively new concept in the health care industry. Even though materials management was applied on a large scale by the military as early as World War II, the majority of hospitals, even today, apply it only on a very limited scale.

The Materials Management Concept

Vance Goubeau, vice-president of materials of Radio Corporation of America, states that the emergence of materials management can be traced back to the 1920's when in certain industries the purchasing department was given responsibility for the store's activity (2, p. 7). However,
it was not until World War II that serious attention was focused on materials management. The aircraft industry, faced with the serious problem of producing and assembling thousands of parts and purchased components, turned to a materials management approach in order to coordinate systematized methods for providing fast and efficient production of aircraft and related products. A 1944 study of the wartime aircraft industry indicates the central role of materials management by stating that

... the problem of materials management contributes one of the most important and timely of all those confronting the airframe industry today (3, p. 3).

After World War II, the trend of separating the purchasing function from the production department continued. William P. Stillwell (4, p. 24) observes that following World War II studies point out that approximately 70 per cent of the industrial firms had purchasing report either to the Chief Executive Officer or some other member of top management. This trend continued in an even more pronounced way as demonstrated by the fact that approximately 90 to 95 per cent of purchasing managers of industrial firms report to top management. It has been only within the last half of the twentieth century that materials management has emerged as a separate activity in the hospital setting.

Ammer states that in earlier years materials management was slow to emerge in hospitals not only because of ignorance
but also because of the lack of existence of materials to manage. Now, in fact, materials management has developed as a process that is second in economic impact only to personnel costs (5, p. 5). Henning has noted several technological advances that have influenced hospital materials management methods. In the late 1950's, hospitals shifted attention from the management of groups of hand-processed reusables to the management of the purchases, storage, distribution, and disposal of volumes of consumables. The second technological advance mentioned by Henning which has influenced hospital materials management is the computerization of inventory control procedures. Another computer usage in the materials management area has been automatic telephone ordering systems, which connect thousands of hospitals with primary suppliers (1, p. 82).

Henning also points out several purchasing methods which have recently evolved. In 1963, the Carborundum Company publicly described its system method of contracting with "high performance" vendors who are capable of quick and complete service that was designed to reduce the need to build up inventory and spend purchasing time for the vagaries of ordinary services. This has been called the "prime vendor" concept in the health care industry. In addition, as hospitals have expanded the sharing of their services, group purchasing projects have increased. With an increasing emphasis on cost, many hospitals are now examining
"total" systems cost rather than looking at product costs only (1, p. 83).

Fearon (6, pp. 10-11) delineates ten functions which, when integrated, become a materials management structure. He asserts that all of these functions must be performed by an organization that has an input of materials. These ten functions are as follows:

1. Materials planning and control
2. Purchasing
3. Procurement and Materials Management research
4. Inventory control
5. Traffic
6. Receiving
7. Incoming quality control
8. Stores
9. Materials handling and movement
10. Scrap and surplus disposal

These functions in larger institutions may be treated organizationally as separate activities. However, in the small to medium sized institutions, several of these functions may be combined to form the organizational unit. The materials management concept provides the theoretical framework for tying these various functions into an integrated, coordinated structure. Such terms as "integrated" and coordinated" indicate strongly that the materials management concept has its origins in systems theory.

The systems concept provides the theoretical basis for the materials management type structure. Johnson, Kast, and Rosensweig state that systems management

... involves the application of systems theory to managing organizational systems and subsystems.
It can refer to management of a particular function or to projects or programs within a large organization. An important point is that systems theory is a vital ingredient in the managerial process. It involves recognizing a general model of input—transformation—output with identifiable flows of materials, energy, and information. It also emphasizes the interrelationships among subsystems as well as the suprasystem to which a function, project, or organization belongs (7, p. 9).

With the systems perspective in mind, the materials management structure may be viewed as a multi-unit system within the suprastructure of the overall organization. In addition, it may also be viewed as an input—transformation—output model in that its primary function is to procure (input) materials from the external environment, store them prior to delivery, and transport them to the point of use at the proper time, and then dispose of them when their utility has been exhausted. The systems concept emphasizes the fact that the materials structure must be integrated within the organizational suprastructure and this implies that the necessary information and materials flow must occur for the integration to take place. Further, there must be a goal-orientation of the materials management structure which must be tied to the overall goal of the suprastructure. As previously stated, the materials management system has identifiable subsystems or subfunctions such as purchasing, stores, traffic, etc., which must be integrated for optimal performance.
Although systems theory provides a theoretical framework for the materials management concept, it must be realized that individual organizational differences must be taken into account when applying it to specific organizational situations. The contingency approach to management provides additional theoretical information which is useful in considering the application of the materials management concept to different organizational settings.

Carlisle believes that contingency theory, as well as systems theory, attempts to avoid simple descriptive analysis and focuses on the relationships of organizations and situations. He further observes that the identification of the systems involved in organizations and their management as well as understanding the primary variables and multivariate relationships among them is the key to understanding how organizations function. On one hand, systems theory provides the theoretical emphasis on the whole, parts, and relationships and on the other, contingency theory puts this theory to use by identifying specific parts (variables) and their attributes that are significant in managing organizations (people, tasks, structures, technology, etc.) and relating these to the need for particular concepts and techniques (8, p. 106).

The contingency approach provides the theoretical rationale for investigating possible internal and external organizational variables which may influence just how a
particular organization adapts the materials management concept. Robert Ballot implies a contingency approach to the study of the materials management concept when he states that the organization of the materials subfunctions in a manufacturing organization will depend on the relative importance of each subfunction for any company. Individual companies have successfully organized for materials management in many different structures and no one structure can be recommended as best without detailed study of that company (9, p. 67).

Ballot further asserts that every organization has its own definition of the activities that comprise the materials management system. No two industries or organizations are alike, and even separate divisions in the same company are often organized along different lines. Consequently, the type of industry, the complexity of its product and processes, and other factors must be considered in tailoring a program for an individual company. The activities and priorities of established disciplines such as marketing, industrial engineering, and quality control vary from business to business. It is therefore reasonable to assume that a function such as materials management should have somewhat unique situational activities and priorities (9, p. 24). To carry this thought a step further to the study at hand, it is reasonable to assume that hospitals also have situational differences and priorities that
influence the extent and manner to which the materials management concept is utilized. There are, however, some basic differences between manufacturing and hospital organizations in their use of the materials management concept.

Hospital Materials Management

Ammer states that in a manufacturing organization, the materials management responsibility temporarily ends when purchased material is converted into some product. At this point in the process, manufacturing is responsible for the basic conversion process. After the conversion process, materials management takes over again when the product becomes part of the finished goods inventory, and its role may take over again when the product becomes part of the finished goods inventory and may continue until delivery is made to the customer (5, p. 8).

In a service organization, such as a hospital, where there is no tangible end product, materials management responsibility normally ends when the product is delivered to the using department. The purchasing department does the actual buying while the general stores area normally accepts delivery from suppliers, maintains inventory, and delivers materials as required to users. In hospitals a third materials management activity, commonly identified as "central supply," exists because some purchases require processing before they can be used or reused. Thus,
hospital materials management is responsible for having materials on hand "ready to use" rather than simply as procured.

This "ready to use" concept also explains why hospital materials managers are also responsible for activities that would not otherwise be regarded as part of the materials management organization. For example, if a hospital has its own laundry or printshop, the activities are normally placed under the materials manager. Purchased paper is "ready to use" only after it has been printed, and the same analogy can be applied to linens and uniforms processed in the laundry. Both of these activities are substitutes for purchases (5, p. 9).

Harold Fearon believes that the materials management concept is applicable to any organization in which a continuous, efficient flow of materials, parts, and/or supplies is necessary to accomplish the overall goals of that organization. He further states that the concept can be applied appropriately in all types of organizations—hospitals, educational institutions, governmental agencies, railroads, insurance companies and utilities (6, p. 8).

Even though each of these organizations produces a service rather than a "hard" product, they are vitally dependent upon an effective and efficient supply of materials and supplies to support their operations. The materials management functions must all be performed
whether they are under an integrated system or not. The materials management concept provides the means for organizing a coordinated system for the materials flow through the system.

Hospital Materials Management
Organizational Structure

What is the best hospital materials management organizational structure? Several writers have proposed the "ideal" or "typical" organizational design. In Figure 1 Ammer proposes what he considers to be the conventional organizational arrangement for a materials management structure.

Ammer notes, however, that materials managers are extending their role to include all transport, messenger, and mail service within the hospital. He states that the structure embraces all functions concerned with the purchase, movement, and storage of materials as well as the two "manufacturing" activities: the laundry and the print shop (5, p. 10).

Fearon substantially agrees with Ammer regarding what the "typical" materials management structure should be. Fearon proposes the structure as indicated in Figure 2. There are some differences which may be noted. The functions which are added by Fearon are as follows: materials planning and control, inventory control, procurement
research, incoming transportation, receiving, incoming
quality control, and scrap and surplus disposal (6, p. 9).

What are the main reasons for the variance between
these two "typical" organizational structures? Evidently
the difference may be accounted for by the fact that in
Ammer's organizational structure the purchasing function
would include as subfunctions the activities of scrap and
surplus disposal, inventory control, procurement, research,

![Materials Management Structure](image)

Fig. 1--Materials Management Structure

Source: Dean S. Ammer, Hospital Materials Management:
Neglect and Inefficiency Promote High Costs of Care, Bureau
of Business and Economic Research, Northeastern University,

e tc., that Fearon included as separate functions. Another
explanation for the differences may be that Ammer's struc-
ture is based on empirical research, whereas Fearon's model
is one that is based on a nominal statement of what the
functions "ought" to be. Because of size economies involved,
certain of the functions found in the structures above might
be combined with some other activity. For example, more than
likely the scrap and surplus disposal function might even be
Fig. 2--Materials Management Structure

the responsibility of some department outside the materials management department.

Housley's materials management model presents the functions as being related in an orderly manner. He divides materials management into four functional categories of supervisor, supply, process and distribution. He maintains that this categorization of functions covers the range of materials from acquisition to disposition. Unless the Materials Manager understands this relationship, the more effective he or she can be in the short or long run (10, p. 13).

In order to implement the materials management concept Housley states that the following approaches are considered to be essential:

1. Centralized Purchasing
2. Inventory Reduction Programs
3. Amalgamation of the Supply, Process, and Distribution Function
4. Product Equipment Standardization
5. Electronic Purchase Data Transmission Systems
6. Prime Supplier Procurement
7. Group Purchasing and Shared Services
8. Stockless Purchasing

(10, p. 13)

Housley places the responsibility for operationalizing these elements into objective statements directly on the Materials Manager.

The functions that have similar characteristics of Supply, Process, and Distribution should be under the supervision of the Materials Manager. It has been proved that
the following areas can relate together very effectively and harmoniously: Centralized Purchasing; Central Stores; Supply, Process and Delivery; Receiving; Copying; Pharmacy; Linen Processing, Supply, and Distribution; and Property Management. Housley does not, however, recommend that the following functions which are frequently included under the materials management structure as appropriate: Housekeeping, Trash Collection, Laundry, Morgue, Patient Escort Service, and Data Processing (10, p. 14).

As previously stated, Housley has indicated that after an administrative understanding of the Materials Management Concept has been reached, then appropriate achievable objectives should be set by the individual responsible for the person responsible for managing materials. He offers the following objective as a "model set":

1. To manage and control the flow of supplies and equipment from acquisition to disposition.

2. To apply management methods to the supply, process, and distribution of products and equipment, i.e., value analysis, cost analysis, and product utilization studies.

3. To centralize all purchasing functions for control and cost effectiveness.

4. To provide the mechanism whereby an atmosphere will prevail to ensure an improved level of patient care through product standardization and evaluation with emphasis on the quality of care and the containment of costs.
5. To provide for unified supply, process, and distribution of goods and services under the same area and supervision.

6. Reduction of cost by inventories to cost effective minimums.

7. To keep administration, department heads, and other appropriate parties informed and abreast of changes in equipment, products and supply methods.

8. To meet or exceed all the requirements of the Prudent Buyer Concept.

9. To control the amounts of unofficial inventory (that which has been expensed and dispensed) by quarterly physical inventories and stockless purchasing.

10. To relieve nursing and other departments of all supply functions—inventory, requisitioning, recording, delivery, and processing of supplies and equipment.

11. To provide all consumer departments with the total supply system—always having the right supply at the right time in the right quantities.

12. To purchase all supplies and equipment prudently with consideration for cost, service and quality.

13. Improved vendor relations through centralized contacts and sales representative orientations to the hospital Materials Management philosophy.

14. To reduce and contain all direct and indirect operating costs of the total material function.
15. Establishment of an effective property management (assets management) program (10, p. 15).

After the objectives have been determined then plans should be developed in order to carry them out. These objectives and the plans developed for carrying them out should be part of and directly related to the hospitalwide strategic planning process. The next question which arises is to whom the top purchasing executive should report.

Housley believes that to be effective the top purchasing executive should be in at least a middle management position and report directly to top management or administration (10, p. 13). Ammer reports that if the top purchasing executive has the title of Materials Manager then they are more likely to report to an assistant administrator or administrator than the purchasing manager who often reports to the controller if there is no materials manager. He further states that it is also not uncommon for the purchasing manager or materials manager to report to a director of administrative services if the hospital has one. This position typically encompasses all hospital departments except those involved directly in patient care (11, p. 8).

A Hospital Purchasing Manager report raises the point that the hospital is probably the only organization in our society where there are three "legitimate" purchasing organizations: the pharmacy, food services and the purchasing department itself. The report goes on to indicate that
in a few organizations these three buying organizations are being merged. As the results of this merger, responsibility for all purchasing, processing, inventory management, and distribution centers on a single executive—an assistant administrator for materials management who is identified on the organizational chart in Figure 4. The question raised by the report is whether this is the materials management organization of the future (12, p. 13).

This report cites five advantages for this type of organization which are as follows:

1. The hospital's purchasing power is maximized. One single executive has the responsibility for all buying as well as negotiating long term contracts.

2. The "buck" cannot be passed on inventory management. One executive is responsible for all hospital inventory—in theory up to the point where the inventory is actually consumed.

3. Operating costs can be reduced. It is possible to introduce maximum economics of scale into the supply process. These efficiencies come not only from better systems management and optimum computer programming but also through better utilization of manpower.

4. Paths of professional development are more clearly defined. There is a delineated career path through the materials management organization up to the rank of administrator. This integrated organization also has more depth than any of its parts which would otherwise stand alone.

5. The top materials manager participates in top management decisions. The overall materials management function would have size enough so that its views can be heard at the second level of the hospital's organization (12, p. 13).

It would seem that this "modern" materials management structure would provide a better means for solving materials
Fig. 3--Materials Management Organization of the Future

problems from a total organizational viewpoint rather than from the perspective of any one of the individual functions comprising the concept. In addition, this structure provides a logical approach for achieving control over the materials flow in hospitals. Since there are many organizational configurations which are described as materials management type structures, is there one which is most appropriate for hospitals?

Ammer apparently believes that the appropriate materials management type structure is the one which makes it possible to eliminate duplication of inefficiencies in materials acquisitions and handling. What is the main criteria for evaluating whether a structure is based upon the materials management concept? Ammer states the following relating to this question:

The dividing line between a purchasing manager and a materials manager is not well defined but is is probably crossed when central supply, purchasing, and stores are joined under a materials manager (11, p. 4).

When the organizational arrangement is utilized, it is possible to eliminate duplication of inefficiencies in materials acquisitions and handling. Ammer mentions the example of when central supply and purchasing are not organizationally combined, then frequently purchasing acquires materials and these materials are then "temporarily" stored not only in purchasing but also in central supply which also has distribution responsibility for
these materials. Thus, not only are these somewhat duplicate inventories, but there is also a duplication in the distribution function. The following section will more specifically address the problem relating to a centralized purchasing structure.

Centralized Purchasing

For the materials management concept to be realized, a strong centralized purchasing system must be established in the organization. Without this strong central influence, purchasing authority will be dispersed throughout the organization. Management needs to be cognizant of the cost and adverse effect that decentralized purchasing causes.

Pauley states that there are two views regarding centralized purchasing; they are as follows:

1. The technical departments (users) view favoring decentralized purchasing.

2. The business and economical view favoring centralized purchasing.

The technical view is based on the logic inherent in the following statement:

If I know what I need, I know best how to buy it. After all, it's me or my department who is the user and, as such, is accountable for results (13, p. 4).

This technical view is the prevalent argument particularly if the hospital does not have an efficient purchasing
department which has been officially charged with the responsibility and commensurate authority to carry out a centralized materials management program.

By utilizing the business view of centralization the hospital is in a better position to stay on top of the purchasing function. The centralized materials management function, in total, provides an easier means for management to make improvements and to make corrections if something goes wrong. The following is a listing of the major benefits relating to utilizing the business view of centralization:

1. It provides an easier means for management to make improvements and to make corrections if something goes wrong.
2. Necessary in-service to maintain purchasing proficiency can best be accomplished.
3. It provides an easier means to determine and measure performance.
4. It provides, on a continuous basis, the necessary checks and balances that will result in favorable reviews and audits, both external and internal.
5. It provides a means for better determining the extent of compliance with the prudent buyer's principle (12, p. 18).

Another strong argument favoring the business view is the fact that by taking the purchasing duties away from the
user departments, it relieves them of the function and allows them more time to perform their departmental functions.

Unless a materials management program maintains a high degree of centralized purchasing control, it will never succeed to any great extent. One of the best tools for providing this centralized control is the use of a strong inventory control system.

Inventory Control System

One major control device that an effective materials management program must utilize is a strong inventory system. Aljian defines inventory control as that activity that is charged with the responsibility of

... ensuring enough but not too much supply on hand of all the materials and supplies of the proper quality essential to the business (14, 1-27).

Stafford states that as hospitals become more and more materials-intensive, the natural tendency is for inventories of disposal syringes, disposal linens, and disposable trays, tubes and kits to be expanded rapidly. The proliferation of hospital materials therefore increases the requirement for a greater emphasis on inventory control for hospital management. Stafford lists the following as additional reasons for management to emphasize inventory control:

1. To prevent inventory stockouts.
2. Auditors require evidence of inventory control in order to accurately evaluate the hospital's internal control system.

3. To provide a means for pinpointing losses and obsolescence.

4. To minimize costs involved in holding inventories, which averages 24 per cent of the actual cost of inventory (15, p. 99).

The inventory control method, like other types of controls, lends itself to the systems approach. Stafford mentions that there are four widely used inventory control systems. The four methods for inventory control are the two-bin system, the traveling requisition system, the cardex manual system, and the computer inventory system. The next few sections will describe these systems more extensively.

**Two-Bin System**

The two-bin system of inventory control is used for slow-moving items which are purchased infrequently. In the two-bin system, a card is prepared which includes the vendor's name, the manufacturer's name, when it was last purchased, the quantity purchased, and the price paid. This card is placed on the shelf with a quantity of the item which is sufficient to cover the computed lead time required to order the item and replenish inventory. This backup quantity is then isolated from the rest of the stock
and is used only when the primary stock is exhausted. At this point, the stock clerk takes the card that is with the reserve stock and forwards it to the purchasing clerk. Finally, the stock clerk then proceeds to issue the reserve stock, and the purchasing department proceeds to order a new supply of the item (15, p. 99).

**Traveling Requisition System**

The traveling requisition system is a form of inventory control that may be used for all classes and types of inventory. Briefly stated, the system relies on a card that travels back and forth between the storeroom, the purchasing department, and the receiving department. This card is kept on the shelf next to the item and contains information that the purchasing clerk needs to know when ordering new supplies.

The purchasing clerk knows when to pull the card for reordering purposes by the reorder point for the item which is clearly displayed on the card in issue units. When the on-hand balance of the item is at the reorder point, as determined by visual inspection, the stock clerk pulls the card from the shelf and forwards it to the purchasing department. When the purchasing department clerk has placed the order, the card is then sent to the receiving department where the receipt is recorded on the card next to the corresponding order information. Finally, the card is sent back to the stock clerk with the new stock of the item (15, p. 100).
Cardex Manual System

The cardex manual system, which has been used for at least fifty years, may also be applied to any category of items. A posting clerk is required to add received merchandise to a current on-hand balance and subtract from the balance as items are issued by the stock clerk. The net figure represents the balance of inventory on hand.

If the cardex system is designed properly, a posting clerk is available to record purchases (receipts) and issues of each item on a routine basis. Notice of receipts may be handled by way of a copy of the stores requisition which was used by the stock to fill the supply order. If pricing the requisition is part of the posting clerk's responsibility, the additional information, such as price, may be required. A copy of the purchasing order from the purchasing clerk is usually the document used to communicate the purchase price to the posting clerk (15, p. 100).

Computer Inventory System

The computer inventory system is frequently based on the same rules of operation as a cardex system. The main difference is that a posting clerk is no longer required since the computer performs all posting. Another important difference is that the computer system will much more efficiently prepare many special reports which are often too cumbersome a task to undertake with a cardex system.
The most frequently used input document for issues is the stores requisition, just as it is with the cardex system. The input document for receipts is a copy of the receiving document. Unlike the cardex system, purchase orders are automatically generated by the computer based upon issues sufficient to reach the reorder point. Under the cardex system, purchase orders are generated manually by the purchasing clerk when the posting clerk indicates that the balance on hand has reached a prescribed reorder level (15, p. 101).

Comparison of Methods

Which system is the best? Stafford has identified three criteria which may be utilized for evaluating which system is the preferable one. The three criteria are reorder frequency, cost of operating, and availability of special reports. The following is a discussion of these three criteria in terms of the various inventory control system options (15, pp. 100-101).

Reorder frequency.—Reorder frequency refers to the number of times an item is reordered over a given time period. Figuring the optimum frequency requires information on item cost, holding cost, reorder cost, and volume of usage. With the three manual systems calculating reorder is difficult and cumbersome. The cardex and traveling requisition systems track all of the necessary data,
but the computation still must be done manually. Because of this, the tendency is to do the necessary figuring only occasionally and possibly not at all. The reorder history is not always available with the two-bin system and the reorder frequency is very seldom computed. The computer system tracks all of the necessary data and the order frequency is simple, fast, and automatic.

Cost of operating.—Stafford states that the cost of operating the various systems are difficult to compare in actual dollar values, but some conclusions can be drawn. The costs used to compare the systems are actual costs of personnel time, materials costs, and purchased service costs.

The two-bin system offers the lowest operating costs because the only real costs are the cost of the purchasing information card and the cost of the employee's time in filling out the card. The operating cost of the traveling requisition system is greater than that of the two-bin system only to the extent that it requires more time to post purchasing and receiving information.

The cardex and computer systems are very nearly equal in operating cost. The cost of operating the cardex related mainly to the clerical time necessary for posting. Computer system costs are associated with computer time, program costs, and paper costs. Stafford believes that based on his
experience the computer service cost for a given number of inventory items are about the same as the cost of the clerical time that is needed to track the same items.

In summary, there is some question as to the cost-effectiveness of one system versus the other. The implication of this disagreement regarding the cost-effectiveness of one inventory central system over the others is apparently related to the particular situational variables associated with the specific hospital.

Availability of special reports.—Without a doubt, the computer system is far superior to any of the others in producing special reports on vendor performance, ABC analysis (an organized method of concentrating managerial time on high-value items), inventory turnover and obsolescence, department utilization, and a host of other subjects. The time required to produce these manually would be very great as compared to the computer system. A computer can generate almost any useful inventory management report cheaply and easily. If the materials manager requires detailed and extensive reports he should place a high value on the computer system.

The two-bin and traveling requisitions systems yield much less information than the cardex system. The computer system, on the other hand yields much more information than the cardex system. If the systems are compared on the basis
of the potential for human error as well as the quantity of information, a good computer system would rank higher than the other three systems. In addition, the computer system tracks the actual inventory costs of issue and the value of inventory balance on hand as inventory balances better than any of the other three systems.

In summary, Stafford (15, p. 101) believes that no one system stands out as a system of choice for all hospitals. Each materials manager must determine which of the criteria is most essential to his or her operation and compare the various systems in terms of those criteria most appropriate for the particular materials management organization. Closely linked to inventory control is the method a hospital may choose for distributing the materials to the user departments.

Materials Handling and Distribution

Housley states that getting the right supply to the right place at the right time in the right quantity is a tremendous task to perform even under the most ideal conditions. This distribution process may be hampered by such things as differing supply needs, a variety of systems that must connect at or about the same time, traffic patterns, and structural barriers within the hospital. In addition, there may be three or more integrated distribution alternatives before the ultimate disposition of the supply as indicated in Figure 4 (16, p. 103).
Materials handling and movement may be defined as those activities involved in moving materials from their point of receipt or storage to the point of usage (6, p. 11). There are basically three ways or methods of distribution for supplies: individual requisition, PAR, and exchange cart. The following three sections will investigate these three approaches in depth.

**Individual Requisition**

Individual requisitions are the basis of the traditional distribution system. A supervisor or his/her designee orders something when it is needed. Under this arrangement, someone in the user area has the responsibility for maintaining an adequate level of supplies, for making out a requisition for all needed items, and for physically taking the requisition to central stores for processing. Central stores or general stores will then fill the order and deliver the requested items on a supply cart to the destination. This entire process may be repeated at regular intervals several times a week by the user departments (16, p. 103).

The basic advantage of this distribution method is its simplicity; there are, however, numerous disadvantages. This type of system of individual requisitions creates two semi-independent inventories. One of these is in General Stores, Central Supply, or both; the other is dispersed
throughout the institution in the various using depart-
ments. The former is "official" in that it is recorded
in that it exists in the physical sense but it is not
carried as a hospital asset. The materials manager
basically has direct control over only the general stores
and central supply inventories; the user department main-
tains inventory control over its own supplies. Inventory
control is made very difficult because it is difficult for
him to do much more than just guess what is already on hand
in various departments. Because of these various pockets
of inventory throughout the system there are wide shifts
in demand from the user departments. These erratic shifts
in demand are basically the result of changing user inven-
tory levels rather than actual usage of materials (17,
p. 4).

Another disadvantage of the system is that it is
time-consuming for the user departments. Nursing and
other departmental personnel must take time from their busy
schedules to handle supply chores, and the salaries of
these individuals are generally higher than those usually
involved in the supply process. In addition, the entire
burden of supply forecasting is placed on the user person-
nel (18, p. 104). In essence, this method is "user" con-
trolled as opposed to materials management controlled.
PAR Level Transfer System

A PAR level transfer system functions like an exchange cart system without wheels. The "cart" consists of shelf space in the user area that is assigned a specific quota of supplies by materials management. A quota for each supply item is established, and this quota is maintained by central supply or general stores. A worker from Central Supply or General Stores generally makes the rounds of all the user areas at frequent intervals. A large transfer cart is used to replenish all the stock back to "PAR" levels.

Housley states that the major advantage of this system over the individual requisition method is that nursing and other departmental personnel are not involved on a daily basis with supply duties. The major disadvantage is that the replenishment process is very slow because it is performed in departments where fluctuations in use are the rule rather than the exception and this makes it necessary for the restocking clerk to return to stores several times to restock his/her supplies (16, p. 105).

At least in theory the materials manager takes over the user inventory when the exchange cart or PAR level transfer system is used. The inventory that is on the floor is treated as "belonging" to materials management until the department actually uses it.
**Exchange Cart System**

Hospitals have been experimenting with and developing the exchange cart system for the past ten years. Each exchange cart has a fixed quota of material and materials management knows exactly how much inventory is on the floor at the time the cart is exchanged. More specifically, the exchange cart works as follows:

1. Supplies at each major stocking location are removed from fixed shelving and loaded on carts. Levels are set for each supply item sufficient to meet demand between supply intervals.

2. For each cart at the point of use there is another cart in progress. While supplies are drawn from one, the other is loaded in the supply dispatch center to the present quantity. At predetermined intervals, the newly loaded cart is wheeled to the point of use and the depleted cart is returned. After this, the cycle is then repeated.

3. Usage may be monitored on a work-sheet which accompanies each cart. Disbursements of items placed on the carts are recorded on the work-sheet. Then disbursements can be recapped periodically to facilitate departmental costing and to control inventory levels on the cart.

4. Charge tickets or charge labels may be preattached to patient charge items prior to loading them on the cart. When such items are drawn from the cart, the labels or tickets are placed with the patient charge recovery (18, p. 1).
Officially, then, the exchange cart takes away all inventory management responsibility from the user. In a well-run system, inventory levels are always lower than they could ever be with individual requisitioning, since the materials manager is able to respond immediately to actual usage from what amounts to a single inventory (19, p. 5). Other advantages of an exchange cart system are the following: it provides a reliable supply inventory for the user departments; it eliminates many peaks and valleys in demand flow; it reduces the overall inventory levels in the user areas; and it provides for excellent control of patient charges.

In summary, the total supply cart exchange system serves five integral functions: forecasting, distribution, supply, control, and patient charge accountability. Housley states that the most important one is forecasting. Because of the fact that a supply shortage may be anticipated twenty-four hours in advance of the time the item is needed, the materials manager has adequate time to prepare and take the necessary steps to procure or substitute for an item (18, p. 105).

**Implementation Problems**

What often occurs when materials management initiates an exchange cart of PAR system is that the user department becomes dependent on materials management system for their
supply requirements. If the user obeys the rules inherent in either a PAR or exchange cart system, he relinquishes all discretionary stockpiling and is completely unprotected if the system fails (19, p. 5).

One of the major factors regarding which of the two distribution systems of PAR and exchange cart is preferable is related to the floor space available for storage on the user unit. In addition, many stores areas in older hospitals do not have space for the reserve cart that is needed for each one that is on the floor in exchange cart systems. To summarize, the PAR system is probably more practical than the exchange cart method for the older hospital—especially multi-story facilities in major institutions while the exchange cart is definitely superior in newer hospitals (19, p. 6).

In conclusion, Housley states that distribution is an integral part of the supply process and that a product or supply has little value until it is in the hands of those who can use it. The traditional "reverse distribution process," in which the user departmental personnel go down to central or general stores to pick up needed supplies is a costly, inefficient use of manpower. Again, the situation variables associated with each hospital must be considered when deciding which type of distribution system should be chosen. In order to ascertain the effectiveness
of such control systems, performance indicators should be developed for the total materials management area.

Materials Management Effectiveness

In order for top management to monitor the performance of lower divisions, objectives must be specifically defined by each organizational unit. From these objectives, performance indicators should be developed in order to monitor materials management effectiveness. These organizational units objectives should be linked to the overall planning system of the hospital. From a departmental standpoint, the planning process should be used as a conceptual basis for developing these standards. This process begins with an evaluation of the existing situation. This step should be based upon facts about the department's internal operations, utilization trends, and trends in materials management which will affect operations (19, p. 4).

What objectives are appropriate for the materials management activity? The answer is any basic recurring goal which is agreed upon by both the manager and his subordinate. In the case of the materials manager, he and his subordinate should decide upon which factors in the materials management area are important from the standpoint of effectiveness. Several mentioned as important factors are the following:

1. Low purchasing prices
2. High inventory turnover
3. Quality adequate to meet clinical standards
4. Superior service to users of materials
5. Low departmental operating costs
6. Professional development (20, p. 7).

On at least an annual basis, the manager and his subordinate should try to establish a program that works to achieve these objectives. What should the nature of these objectives be?

Stadnik states that success or effectiveness in materials management is often difficult to identify. By way of contrast to materials management activities, other hospital departments are frequently monitored in terms of man-hours per unit of service (i.e., meals, pounds of laundry, patient-day, etc.). Materials management activity measurements are more difficult to specify. One could choose man-hours per purchase order, but that indicator can easily be made to look better by generating more orders, each of less value, for the same dollar volume of purchase (21, p. 4). The difficulties with these measures is that they are measures of activities and not necessarily a measure of effectiveness.

A Hospital Purchasing Management (HPM) article, "Reports to Management" identifies an objective means for developing an objective relating to prices paid for supplies that may be monitored from year to year. This price index may provide a convenient frame of reference and measures average performance by hospitals in pursuit of a goal such
as, "lower purchase price." This index may provide a baseline for setting such goals as "to maintain the price level to an increase of not more than 5 per cent within the next year" (20, p. 7). Indices such as this objective may be developed for inventory turnover as well as other materials management areas. The next section examines a specific tactic that the materials manager may utilize to reach its price objective.

Group Purchasing

Group purchasing is a definite approach that hospitals may utilize in order to contain costs of their supplies. Group purchasing may be defined as that activity related to . . . the collective action involving more than one institution in the buying process (22, p. 5). This collective purchasing action usually involves several hospitals, but may extend beyond the hospitals. For example, a municipal buying organization that services all city-owned facilities may be classified as a legitimate purchasing group. Also, the investor-owned hospital chains engage in a form of group buying even though only corporately-owned hospitals are allowed membership in the group.

Usually, however, group purchasing is a voluntary association of hospitals that are linked together by geographical or religious ties. From a legal standpoint the group is almost always formed on a non-profit basis.
and is governed by directors which are appointed from the member hospitals. The purchasing group may operate autonomously or may be part of an overall shared-service organization (22, p. 6).

The hospitals which hold membership in these groups normally may pick and choose among several negotiated group contracts. For example, if the member hospital has a better price which has been previously negotiated, it may choose not to participate in this contract. In addition, some hospitals belong to several groups and they may pick and choose which group contract would be most beneficial to the organization; therefore, there is competition among different purchasing groups.

Group purchasing strength is based upon the fact that there is a definite committed volume from the member hospitals which may be offered for price concessions. Experience indicates that rarely does a hospital buy everything it could through the purchasing group to which it belongs. Another weakness is the fact that the materials manager of the hospital is usually not willing to commit himself in advance to a group contract prior to the bidding process. Therefore, these problems dilute the negotiating posture of most purchasing groups. HPM reports that some groups are stronger than others. For example, corporately-owned hospitals are steadily increasing the strength of their centralized purchasing programs (22, p. 7). Another means
for strengthening the materials management system in hospitals is to develop an automated management information system.

Materials Management Computerized Information System

For any system or subsystem to function effectively, feedback systems must be developed that provide for information to flow to the necessary decision-making points. The materials management system must have an information flow network which provides the materials manager with the requisite information for decision-making. The computer has provided the means for developing automated information systems which may definitely assist the materials manager in the decision-making process.

Fearon and Moore conducted a study in fifteen profit-making firms' materials management organizations located across the United States. These fifteen organizations were selected on the basis of their being on the leading edge of computer application in purchasing. Each of the firms used computer technology to automate data handling in most large-volume, repetitive situations, thereby improving accuracy and timeliness. It was found that most applications are in the operating system area since it involves mainly the rapid and accurate manipulation and feedback of repetitive data. Also, it was discovered that the
computer was also used to a much lesser degree to generate management-reporting systems (23, p. 30).

In terms of its use in the decision-making process in purchasing, it was found that only a third of these firms had developed programs to assist them in this area. Computer-based systems which utilized analytical techniques such as simulation or modeling were extremely rare but those few which had used this approach found that it allowed them to expand materials management-influence beyond its traditional boundaries and enhanced greater objectivity in the decision-making process.

Although this study was done in the manufacturing industries, it is thought that some of the conclusions of the study may have relevance to the research. In view of this fact the following is a listing of the appropriate conclusions:

1. Purchasing was one of the last functional areas to make use of the computer.

2. The majority of firms received economic savings in the form of manpower reductions.

3. Immeasurable benefits received include (a) improved response time, (b) greater usability of supplies, expenditures, and pricing, (c) relieving buyers of routine activities, allowing them more time for forward planning.
4. The knowledge base of personnel in purchasing must be expanded substantially if there is to be a major breakthrough in computer usage in purchasing.

5. Before top management will be willing to provide the resources required to expand computer assistance, a method of measuring purchasing's contribution to company goals needs to be developed.

6. Purchasing is behind other functional areas in its use of the potential of the computer.

7. The primary reason for purchasing lagging behind other functional areas is that the necessary types and numbers of personnel who are aggressive in utilizing the latest tools to aid in decision-making have not been present in the purchasing organization (23, p. 39).

These conclusions may provide some basic guidelines examining the state of development of materials management automated information systems.

The literature indicates that the main usage of automated information systems in hospital materials management departments is for inventory control systems. Ammer states that among hospitals that use computers, most of the clerical effort involved in making out charge slips is eliminated. He believes that while manual inventory methods are still dominant in American hospitals, it is only a matter of time before EDP becomes universal. The potential advantages outweigh, he says, its disadvantages even in the smallest
hospital which, with time sharing, need not invest in expensive equipment. Ammer further believes that minimal technical and programming skills are required in the hospital as long as the computer is used for the routine paperwork that is pretty much common to all hospitals. Ammer lists as major barriers to universal adoption of EDP the resistance to change and a reluctance to go through a period of transition in changing from manual methods to an automated method (20, p. 38).

Jeffrey Stadnik has indicated that computerized inventory systems have, in some cases, been at least an indirect cause of the more serious problem of letting these become substitutes for complete materials management. He says that some hospitals have directed attention toward "inventory control" of general stores items to the exclusion of controlling other purchased items which are stored in the user areas. The remainder of the materials purchased either go directly to specific users or into inventories other than general stores and are neglected in the "magic aura" of the computerized general stores inventory reports (24, p. 14). Another valuable method that is a means for increasing control in the materials management is the formation and proper functioning of a Standardization and Product Evaluation Committee.
Product Evaluation and Standardization Committee

Product evaluation and standardization is a concept whereby the materials manager may eliminate the duplication of items that perform the same function. Pauley states that while it is essential that every hospital have a properly structured purchasing function, it will not be totally cost effective unless a Product Evaluation-Standardization-Value Analysis Team is a viable part of that function (25, p. 2). Pauley defines Product Evaluation as a technique that is used to ensure that money is well spent when it's for the right item to perform a defined function and is obtained in an auditable manner at the right price. The product's function is defined by answering the question of what, why, when, where and who. What is the purpose of the material or piece of equipment? Why is the shape, size, color, brand, grade, etc., of the material being used? When should it be used and when is it no longer needed? Where does the product's value lie? Who uses it?

On the other hand, standardization is the concept of eliminating the duplication of items which perform the same function. This concept does not necessarily mean that the hospital will select and use only one brand. What it does mean is that the hospital narrows down the list of specific products to a number of "acceptable" brands. Pauley says that hospitals must have products "ruled in" to meet the brand specifications, not ruled out so that only one brand
or private label is selected (25, p. 2). Value analysis will be specifically discussed in the next section even though it is actually a part of the Product Evaluation Standardization Process. Most hospitals create a formal committee in order to perform the Product Evaluation/Standardization function.

Housley lists the following as what should be the objectives of an effective product standardization program:

1. To provide the mechanism whereby an atmosphere will prevail to insure an improved level of patient care through product evaluation with emphasis on the quality of care and the containment of costs;

2. To evaluate the voluminous and continuous flow of new and unproved products;

3. To reduce the expense of educating and training of personnel to many and varied products and techniques through standardization;

4. To keep Administration and Department heads informed and abreast of changes in equipment and products;

5. To assist department heads in understanding mutual problems in reference to supplies and equipment; and

6. To minimize the quantities of inventory by reducing the variety of products (26, p. 10).

The above list of objectives showed the guidelines which govern the actions of a Product Standardization Committee which should be established with top-level administrative support.

Because of the various interest groups which must be served in the hospital, representation must be multi-disciplinary. There must be a conscientious attempt to
demonstrate to the medical staff that their interests are to be considered. Housley states that the very aspect of not including the medical staff may be the reason most standardization committees are not successful. In addition, since the majority of items will be of a nursing nature, the Nursing Department should be well represented. Other potential members of the committee are: the materials manager, the purchasing agent, the chief engineer, the chief laboratory technician, the director of housekeeping, a member of administration, and a member from the finance and accounting department (28, p. 11). In summary, it is thought that because of the diversity of various interests throughout the hospital, each institution should carefully consider the committee membership needs based upon a careful evaluation of these particular departments and the products to be evaluated. There are some specific guidelines that should be considered regarding how the committee is conducted.

First, as is true of all effective committee operations, a specific agenda should be sent in advance by the chairman to all members for regularly scheduled meetings. The role of the recording secretary is important because a log of all items presented along with decisions reached should be carefully documented. Barretti maintains that any interested group or individual should be able to request that an item be placed on the agenda by following a well-defined procedure.
This openness creates a participative environment and prevents the committee from being regarded as a small, closed process that imposes its ideas on the departments of the hospital (27, p. 9). Another means for creating an environment of openness is the use of an appeal process.

If a department or other interest group is not satisfied with a decision of the committee an appeals process should be available. The dissenting party should request that the item be reconsidered by being placed on the agenda for further discussion or presentation. If the committee again upholds its previous decision, provisions should be available for a one-time appeal to the chief executive officer or his designee. This appeals process strengthens the committee by providing a means for resolving differences by an objective third party and helps strengthen the committee by dispelling the notion that the committee is an arbitrary body (27, p. 9).

In conclusion, the Standardization/Product Evaluation Committee has a significant role to play, in balancing patient care, operational needs, and cost considerations. The materials manager should be the impetus behind this process because of the fact that unless there is some forum for making these product decisions based upon some means for gain consensus, then his or her job will indeed be extremely difficult. A specific methodology named value
analysis is an excellent technique for assisting the Product/Standardization Committee make its decisions.

Value Analysis

Pauley defines value analysis as the process of systematically determining the nature of material and equipment specifications and end-use requirements to ensure that performance, ultimate cost and availability of supply are in proper balance. He further states that value analysis is the "bridge" between "what" to buy and "how" to buy it (25, p. 2).

Pauley believes that there are ten value tests which have been used for years by industry and that they are equally applicable to hospitals and should be used by the Standardization Committee in performing its functions relating to product evaluation. The following is a listing of these tests:

1. Does the use of the item contribute value? (The Committee will be able to identify purchases that do not provide value.)

2. Does the item need all of its features? (The Committee will be surprised to learn how some products are used and in many situations paying for features that simply are not needed.)

3. Is the cost of the item proportionate to its usefulness? (This test will be able to identify dozens
of cases where a lower cost item will do the same job as well or better.

4. Is there anything better for the intended use? (Value analysis does not necessarily result in the purchase of the lowest priced item, but that which performs the defined function more efficiently and economically.)

5. Can an item be made by a lower cost method? (The test is used by manufacturers, but the hospital can apply it to its manufacturing type operations such as: Central Supply, Maintenance Shops, Laundry, and Food Preparations.)

6. Can a standard item be found that will be usable? (This incorporates standardization as part of the Committee's efforts.)

7. Is the item made on proper tooling, considering the quantities used? (This test is also used by manufacturers, but the Committee's version of this test would be to relate equipment needs to present and future demands.)

8. Do material, reasonable labor, overhead, and profit reasonably equal the item's cost? (The hospital buys hundreds of items where this would identify intrinsic opportunities for cost reduction, since prices paid are often many times any reasonable estimate of cost.)

9. Will another dependable supplier provide it for less? (Constantly seeking out dependable suppliers is economically advantageous. Being alert to the best source for the products at the right price is of daily concern to
the purchasing professional and the Committed can be of
tremendous value to Materials Management in this regard.)

10. Is anyone buying the item for less? (Suppliers
can legally charge whatever the traffic will bear. Prices
actually paid are directly related to price consciousness
and the manner in which purchasing is practiced by the
hospital (25, pp. 2, 19).

By systematically applying the previously listed value
analysis tests as guidelines for action in the purchasing
area as well as the Standardization Committee, their effec-
tiveness will be greatly enhanced.

Summary

Today's hospital must take all measures possible in
order to contain costs and maximize the most efficient use
of resources. Chapter II has explored the fundamental
management methods applicable to the hospital materials' 
activities.

This chapter defines materials management as:

The management of materials and people in
all departments performing materials functions
within an integrated system to efficiently support
quality patient care using no more than necessary
of the hospitals limited resources: dollars, 
people, and space (1, p. 82).

The components of the materials management concept have been
presented as being applicable to the hospital setting and
as being capable of increasing the efficient use of its
resources. Chapter III illustrates the summary points of
interviews with the top purchasing (materials management)\(^1\) executives of the thirty hospitals in the study population.

\(^1\)Throughout this report, the terms "purchasing" and "materials management" are considered synonymous and are used interchangeably because this reflects an industry-wide usage of these terms.
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CHAPTER III

MATERIALS MANAGEMENT PRACTICES IN
INDIVIDUAL AREA HOSPITALS

This exploratory and descriptive study was based on data obtained from a sample of hospitals in the nineteen-county Texas Health Systems Area 5. A survey of the literature was the basis for identifying materials management concepts and techniques which were used in formulating an integrated approach to the study. From the identification of these concepts and techniques, a model was developed and interview questions were formulated to determine the extent to which it was used in the study hospitals. Then, practices followed in a sampling of hospitals were determined through the use of personal interviews with the top materials management executive of the study hospitals. These interviews were conducted during the months of April, May, and June, 1980.

Research Design

This study was limited to selected hospitals in the nineteen counties with comprise Texas Health Service Area 5. The nineteen counties which comprise Texas HSA 5 are as follows:
Only Type I hospitals were included in the research population. The category of Type I hospitals is a classification used by the Texas Hospital Association and includes hospitals that are institutions, both general and special, which care primarily for acute diseases and conditions where patients stay a comparatively short time (6, p. V). Appendix A is a listing of the total of ninety Type I hospitals which are located in Texas Health Service Area 5, along with the hospital's size, ownership, and type of services offered. This list was taken from the 1978-1979 edition of the Texas Hospital Association publication entitled Hospitals and Health Related Institutions, a publication which identifies all hospitals (both members and non-members of THA) in the state of Texas licensed by the Hospital Licensing and Certification Division, Texas Department of Health, and the Texas Department of Mental Health and Mental Retardation; federal and state hospitals; and related institutions which hold institutional membership in the Texas Hospital Association.
Hospitals were selected from a broad range of ownership and size categories in order to determine if these variables are associated with the utilization of materials management practices. The size of hospitals was measured in number of beds an institution was licensed to operate and were grouped in the following size categories:

- 1 - 100 Beds
- 101 - 200 Beds
- 201 - up Beds

Three categories of ownership were used to classify the hospitals; these ownership categories and their subtypes are as follows:

**Voluntary**
- Church
- Non-profit, Non-church

**Governmental**
- City
- City-County
- Hospital Authority
- Hospital District

**Proprietary**
- Association
- Corporation
- Individual
- Partnership

An analysis of the population of Type I hospitals in Texas HSA 5 reveals a distribution pattern as indicated in Table I.

The sample size for this study was determined by the formula $n = \frac{N}{1 + Ne^2}$ where $n$ = sample size (hospitals), $N = \ldots$
population size, and \( e = \) precision factor (Yamane, p. 549). The level of confidence of the sample was 95% with precision factor of ± 15 per cent.

### TABLE I

OWNERSHIP AND SIZE OF TYPE I HOSPITALS IN TEXAS HEALTH SYSTEMS AREA 5

<table>
<thead>
<tr>
<th>Size</th>
<th>Voluntary</th>
<th>Governmental</th>
<th>Proprietary</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-100 Beds</td>
<td>6</td>
<td>10</td>
<td>29</td>
<td>45</td>
</tr>
<tr>
<td>101-200 Beds</td>
<td>12</td>
<td>6</td>
<td>9</td>
<td>27</td>
</tr>
<tr>
<td>201-up Beds</td>
<td>10</td>
<td>5</td>
<td>3</td>
<td>18</td>
</tr>
<tr>
<td>Total</td>
<td>28</td>
<td>21</td>
<td>41</td>
<td>90</td>
</tr>
</tbody>
</table>

A modified random sample was used to select the study hospitals because of the necessity to limit the number of study hospitals to permit data collection by means of personal interviews. The personal interview technique was used because this method was thought to be essential in gathering large amounts of information in depth in order to determine the study hospital's use of the material management concept (1, p. 549). If the above-mentioned formula had been used for determining the sample size required for each segment under study, the complete population of ninety would have to be included in the interview process, thus making
the study prohibitive in respect to the large amount of time required as well as the considerable economic investment. Since no statistical inferences were to be drawn, it was thought that the modified sample method is appropriate.

In order to prevent as much bias in the selection process as possible, each of the ninety study hospitals was assigned a number and a table of random digits was used to select the sample. When a maximum of three hospitals were selected for each size and ownership category, then if additional hospitals were subsequently selected in the filled category, they were not used again until each segment had a total of at least three study hospitals. Although this method is not truly random, it was thought that it is relative bias-free.

This study was designed on the assumption that hospitals exhibit varying degrees of materials management development. An Interview Questionnaire (see Appendix B) was formulated as the instrument to gather data relating to the materials management practices in the study hospitals. The criteria used in the Interview Questionnaire were based upon these functional processes which comprise the materials management concept.

Primary data for the study were drawn from the following sources:
1. A pilot study was conducted in order to test criteria developed and to further refine the instrument.

2. A case study of the materials management practices in each hospital was conducted through interviews with the materials management executive, or his designee.

The case studies attempted to identify existing materials management practices and related concepts of organizational structure, inventory control, materials handling and distribution, centralized purchasing concept, and others.

After data were obtained through the interviews, they were described, analyzed, and evaluated as follows:

1. Each hospital study was written up as a separate case, following a standard format containing selected categories of information.

2. Descriptive cross-comparisons were then made in terms of independent variables, such as size and type of ownership, and dependent variables such as materials management organizational structure, type of inventory control system, and materials handling and distribution system employed.

3. Also, from the data collected, a rating guide was formulated to include the major phases of materials management (see Appendix C). A numerical value was assigned to each of the questions which are considered to be important
measures of individual activities. While each question deals with only one phase of a particular activity, the total of the numerical values assigned to all questions provides a theoretical measure of the hospital's materials management program. This composite score may be thought of as a measure of utilization of the materials management process or activities and is not necessarily indicative of the effectiveness of the activities involved. Its value in this study lies merely in facilitating internal comparisons.

4. The materials management scores which were tabulated for each of the study hospitals were analyzed from a descriptive standpoint using the Statistical Package for the Social Sciences (SPSS) at the Louisiana State University Computer Center. The SPSS Condescriptive Statistical program which calculates descriptive statistical tests such as mean, variance, range, etc., was used to examine the thirty scores from an overall standpoint as well as by type of ownership and size categories. A further discussion of the analysis and results obtained is found in Chapters IV and V. Next, the format used to organize the case studies is explained, followed by the case studies of the thirty individual study hospitals. Each study follows a format consisting of twelve major classifications.
Interview Format

The following is an outline and explanation of the interview format used to record and compare information acquired from discussions with the top purchasing executives of the study hospitals. Prior to the interview outline, each hospital is assigned a general code composed of two letters and a number in order to classify each into the appropriate study grouping. For the three general major ownership categories, the following codes are used: G for governmental, V for voluntary, and P for proprietary. The second letter in the code denotes the size category within the particular ownership group; the size category symbols are as follows: S for hospitals below 101 beds, M for hospitals from 101 to 200 beds, and L for hospitals 201 beds and up. The number assigned after the two previously explained letters indicate the the number of the sample hospital in the study group category. Thus, GS₃ is the code for the third 100 bed or less sized governmental sample hospital.

I. Institutional Characteristics.--This information, coupled with the previously described general code, further identifies the hospital in regards to the type of service rendered by the facility, a more specific indication of the ownership category, and an indication of the licensure and accreditation status of each hospital.
The type of service categories to be found among the sample hospitals are as follows:

- General
- Pediatric
- General Osteopathic
- Psychiatric

The following is a listing of the Classification Codes used to further describe specific accreditational and licensure characteristics:

0 - Licensed by the Texas Department of Health
1 - Registered by the American Hospital Association
2 - Member Institution of the Texas Hospital Association
3 - Member Institution of the American Hospital Association
4 - Fully or Provisionally Accredited by the Joint Commission on Accreditation of Hospitals
5 - Accredited by the American Osteopathic Association

II. Top Purchasing Executive Profile.--The second section of the outline records background information on each top purchasing executive interviewed. The first item of information requested is the educational level of the top purchasing executive described in terms of whether the individual is degreed or non-degreed, and whether a certificate is held. Next, each interviewee is requested to indicate the number of years experience that he/she has in the materials management area. The experience category ranges used are as follows:

- Less than 2 years
- 2-5 years
- 5-15 years
- 15 years up
The next element in the profile determines the top purchasing executive's age category. The age category ranges used are as follows:

- Less than 35 years
- 35-50 years
- Over 50 years

Next, the salary range for each top purchasing executive is determined. The salary range categories are as follows:

- Less than $12,000
- $12,000-$15,999
- $16,000-$19,999
- $20,000-$25,000
- Greater than $25,000

Finally, the interviewee is asked if he or she holds membership in any professional materials management organization. The following is a listing of the options under this question:

- National Association of Purchasing Management
- National Association of Hospital Purchasing Management
- International Materials Management Society (Health Care Section)
- None
- Other

III. Organizational Structure.—In this section, the top purchasing executive is requested to indicate his or her title as well as the title of the person to whom he or she reports. Next, the interviewee is requested to list the functions which are the responsibility of the materials and purchasing manager.

IV. Inventory Control System.—Next, the top purchasing executive is requested to describe the type of inventory
control system used in the study hospital. The type of inventory control system is classified as to whether it is Cardex, Computerized, or Visual. Next, an inquiry is made to determine if ABC analysis and Economic Order Quantity theory are used. Finally, it is ascertained whether a perpetual inventory system is used.

V. Materials Handling and Distribution.--This topic of discussion is focused upon the nature of the materials handling and distribution system. The main types are PAR, Exchange Cart, and Requisition. Further, the type is determined for not only Nursing Service but also the other user areas because oftentimes the same type is not used in both areas.

VI. Centralized Purchasing.--The sixth section ascertains the relative degree of centralized purchasing by determining first if all hospital purchase orders are written by the materials manager and, if not, the exceptions are noted. Additionally, it is ascertained if certain commodity groups are purchased by either the user departments or by the materials management function. It is noted whether the materials management department has at least a minimal role or no role in the materials management of the commodity group classifications.

VII. Use of Indices to Control Materials Management Effectiveness.--Each top purchasing executive is questioned
as to the specific type of performance indicators which are used to monitor the materials management organizational effectiveness; if specific indices are used, these are listed in this section. Also, each interviewee is asked if he/she uses an index to track changes in cost. It is also ascertained whether periodic reports are routinely submitted to Administration and also whether follow-up action is required if such reports are, in fact, requested.

VIII. Group Purchasing.--This section deals with the question of whether the hospital is a member of a purchasing group. Also, the top purchasing executive is asked if he or she foresees more or less involvement in group purchasing. Also, the specific type of purchasing group the hospital holds membership in is determined if it is indeed a member.

IX. Materials Management Computerized Information System.--The nature of the computerized information system, of any, is investigated in this section. First, it is determined if the hospital does have an automated materials management information system. Next, the top purchasing executive is asked if he believes that the computer should be used to a greater extent in his materials management organization. It is also ascertained whether an automated order entry system is used.

X. Product Evaluation/Standardization.--In this section is is determined whether or not the hospital has a
functioning Product Evaluation/Standardization Committee. Also, it is determined what role, if any, the top purchasing executive has on the committee. Finally, the top purchasing executive is asked to rate the effectiveness of this committee in terms of the following classifications: Very Effective, Fair, Needs Improvement, and Poor.

XI. Value Analysis.—This section determines whether or not Value Analysis is used as a technique for evaluation of various products that are presently stocked or are under consideration to be stocked.

XII. Narrative.—The final section of the outline is included to allow for any unusual or significant comments made by the top purchasing executive regarding the materials management concept and its particular application at their hospital. This unstructured part of the interview provided some of the more interesting and informative ideas in this study process.

Individual Practices in Sample Hospitals

The following outlines summarize the data taken from the interviews with thirty top purchasing executives of the sample hospitals.
I. Institutional Characteristics
   Service- General
   Ownership- Hospital Authority
   Classification Codes- 0, 1, 2

II. Top Materials Management Executive Profile
   Education- Non-degreed
   Experience- 15 yrs. up
   Age- Over 50
   Present Salary- 12,000- 15,999
   Membership in Professional Organization(s)- None

III. Organizational Structure of Materials Management System
   Top Materials Management Executive- Central Supply Supervisor
   Reports to- Director of Nursing
   Functions Performed- Purchasing
                        Distribution
                        Inventory Control
                        Receiving
                        Central Supply

IV. Inventory Control System
   Type- Visual
   ABC Analysis Used- No
   EOQ Theory Used- No
   Perpetual Inventory Used- No
V. **Materials Handling and Distribution**

Nursing Service - Requisition

Other Major Departments - Requisition

VI. **Centralized Purchasing**

P.O.'s Issed by Purchasing/Materials Office - No

Role of Purchasing/Materials Management in Acquisition of Principal Types of Goods:

- No Role: Dietary, Business Office, Housekeeping, Linen,
- Laboratory, Maintenance, Pharmacy, Radiology
- Minimal to Maximum Role: Medical-Surgical

VII. **Use of Indices to Control Materials Management Effectiveness**

Indices to Monitor Performance - None

Index Used to Track Changes in Cost - No

Periodic Reports Submitted to Administration - No

Follow-up Action Required by Administration - No

VIII. **Group Purchasing**

Membership in Which Group(s) - None

Foresee More/Less Group Purchasing - N/A

IX. **Purchasing/Materials Management Computerized Information System**

Utilize Computerized Information System - No

Should Computer Have More Use - Yes

Utilize Automated Entry System - No
X. **Product/Standardization Committee**

Established: No

Role of Materials Manager - N/A

Effectiveness of Committee - N/A

XI. **Value Analysis**

Utilize Value Analysis - No

XII. **Narrative**

This hospital is very decentralized; in fact, there is not a person with the title of Purchasing Agent. Each department does its own purchasing, inventory control and storing. In this specific hospital, a consultant which had been retained by the board was also interviewed with regard to the Materials Management function in the subject hospital. He has been retained to develop various new operational systems throughout the hospital. It is quite apparent that the consultant has met with a great deal of resistance in the hospital. It appears that the department heads certainly do not want to change the present method of purchasing.

There are no purchase orders issued and each department controls its own stock in what could be a general stores area. As the result, there is a great deal of duplication of stock among all areas.
The Central Supply Supervisor purchases all of the medical-surgical supplies for the hospital and a haphazard requisition system is used to request the needed items. It is apparent that the Materials Management system is very underdeveloped at this hospital.

Hospital-GS_2

I. **Institutional Characteristics**
   
   Service- General
   
   Ownership- Hospital Authority
   
   Classification Codes- 0, 1, 2, 3

II. **Top Materials Management Executive Profile**
   
   Education- Non-degreed
   
   Experience- 2-5 yrs.
   
   Age- Less than 35
   
   Present Salary- Less than 12,000
   
   Member in Professional Organization(s)- None

III. **Organizational Structure of Materials Management System**
   
   Top Materials Management Executive- Purchasing Agent
   
   Reports to- Administrator
   
   Functions Performed- Purchasing
   Inventory Control
   Receiving
   General Stores
   Distribution
IV. Inventory Control System
   Type- Visual
   ABC Analysis Used- No
   EOQ Theory Used- No
   Perpetual Inventory Used- No

V. Materials Handling and Distribution
   Type at Nursing Stations- PAR
   Specific Type by Other Major Departments- Requisition

VI. Centralized Purchasing
   P.O.'s Issued by Purchasing/Materials Office- No
   Exceptions: Dietary and Pharmacy
   Role of Purchasing/Materials Management in Acquisition of Principal Types of Goods
   No Role: Dietary and Pharmacy
   Minimal to Major Role: Business Office, Housekeeping, Linen, Medical-Surgical, Laboratory, Maintenance, Radiology.

VII. Use of Indices to Control Materials Management Effectiveness
   Indices to Monitor Performance- None
   Index Used to Track Changes in Cost- No
   Periodic Reports Submitted to Administration- No
   Follow-up Action Required by Administration- No

VIII. Group Purchasing
   Membership Which Group(s)- Regional Group
   Foresee More/Less Group Purchasing- More
IX. **Purchasing/Materials Management Computerized Information System**

Utilize Computerized Information System - No
Should Computer Have More Use - Yes
Utilize Automated Entry System - No

X. **Product/Standardization Committee**

Established - Yes
Role of Materials Manager - Member
Effectiveness of Committee - Fair

XI. **Value Analysis**

Utilize Value Analysis - No

XII. **Narrative**

This hospital uses the visual method for controlling the stock levels in General Stores. Central Supply handles basically sterilization activities and is not involved in the functions of purchasing, distribution and inventory control. However, Central Supply is an activity supervised by Nursing Service but this functional relationship does not appear to detract from the effectiveness of the Materials Management department.

In addition to interviewing the Purchasing Agent, a conversation with the Administrator revealed that he was not particularly satisfied with the Purchasing
function. He stated that the hospital contemplated affiliation with a Management group and felt that the group could offer some real potential advantages in developing a strong materials management program. The hospital has just joined a shared purchasing group and the Administrator and Purchasing Agent stated that they were expecting real savings from this affiliation.

Overall, there is a rather low level of utilization of the Materials Management concept, but the Administrator and Purchasing Agent are striving to increase the effectiveness and efficiency of the materials management system.

Hospital-GS₃

I. Institutional Characteristics

Service- General
Ownership- Hospital Authority
Classification Codes- 0, 1, 2

II. Top Materials Management Executive Profile

Education- Non-degreed
Experience- 2- 5 yrs.
Age- Over 50
Present Salary- Less than 12,000
Membership in Professional Organization(s)- None
III. Organizational Structure of Materials Management System

Top Materials Management Executive- Purchasing Agent
Reports to- Director of Nursing
Functions Performed- Purchasing
Distribution
Inventory Control
Receiving
General Stores
Central Supply
Housekeeping

IV. Inventory Control System

Type- Cardex
ABC Analysis Used- No
EOQ Theory Used- No
Perpetual Inventory Used- No

V. Materials Handling and Distribution

Nursing Service- Requisition
Other Major Departments- Requisition

VI. Centralized Purchasing

P.O.'s Issued by Purchasing/Materials Office- Yes

Role of Purchasing/Materials Management in Acquisition of Principal Types of Goods

No Role: Laboratory, Radiology, Dietary, Pharmacy

Minimal to Maximum Role: Housekeeping, Linen, Maintenance, Medical-Surgical.

VII. Use of Indices to Control Materials Management

Indices to Monitor Performance-
Monthly inventory kept by Business Office and budgeting is done from this document.

Index Used to Track Changes in Cost- No
Periodic Reports Submitted to Administration- Yes
Follow-up Action Required by Administration- Yes

VIII. **Group Purchasing**

Membership in Which Group(s)- Management Contract Group
Foresee More/Less Group Purchasing- More

IX. **Purchasing/Materials Management Computerized Information System**

Utilize Computerized Information System- No
Should Computer Have More Use- Don't Know
Utilize Automated Entry System- No

X. **Product/Standardization Committee**

Established- No
Role of Materials Manager- N/A
Effectiveness of Committee- N/A

XI. **Value Analysis**

Utilize Value Analysis- No

XII. **Narrative**

The purchasing function at this very small hospital has just been centralized. The Purchasing Agent also performs these other functions: housekeeping
supervisor, and occasionally works in surgery. She states that approximately 50 per cent of her time is devoted to the materials management function. General stores is used to store only those items which the nursing units do not have room to keep. The hospital is presently enlarging the storage area in order to centralize the inventory even further. Each user department is responsible for its own inventory control. This hospital is affiliated with a non-profit medical center which provides it management services. The purchasing agent purchases a large amount of supplies from the medical center with which it is affiliated. Purchase orders are used for all acquisitions except from the medical center.

It is estimated that from 80 to 90 per cent of supplies are procured from the medical center. The Purchasing Agent states that their affiliation with the medical center has not produced that many changes in the materials management function at the hospital; she says that the Director of Materials Management at the larger hospital has been to their hospital only a couple of times and he made very few suggestions regarding any changes in operation.
The major problem that was mentioned is the lack of proper storage space to accommodate the inventory levels required. The Purchasing Agent is not familiar enough with computer applications to the material management function to comment as to whether she feels that they should utilize it more. The Business Office is responsible for the reconciliation of charge slips with supply issues.

Hospital-GM

I. Institutional Characteristics

Service- General
Ownership- County
Classification Codes- 0, 1, 2, 3, 4

II. Top Materials Management Executive Profile

Education- Non-degreed
Experience- 5-15 yrs.
Age- Over 50
Present Salary- Less than 12,000
Membership in Professional Organization(s)- None

III. Organizational Structure of Materials Management System

Top Materials Management Executive- Purchasing Agent
Reports to- Administrator
IV. Inventory Control System

Type- Cardex

ABC Analysis Used- No

Economic Order Quantity (EOQ) Theory Used- Modified

Perpetual Inventory Used- Yes

V. Materials Handling and Distribution

Nursing Service- Requisition

By Other Major Departments- Requisition

VI. Centralized Purchasing

P.O.'s Issued from Purchasing/Materials Office- No

Role of Purchasing/Materials Management in Acquisition of Principal Types of Goods

No Role: Dietary, Maintenance

Minimal to Major Role: Business Office, Housekeeping, Laboratory, Medical/Surgical, Pharmacy, Radiology

VII. Use of Indices to Control Materials Management Effectiveness

Indices to Monitor Performance- None

Index Used to Track Changes in Cost- No

Periodic Reports Submitted to Administration- None

Follow-up Action Required by Administration- N/A
VIII. Group Purchasing

Membership in Which Group(s)- Yes, Metro Group
Foresee More/Less Group Purchasing- More

IX. Purchasing/Materials Management Computerized Information System

Utilize Computerized Information System- No
Should Computer Have More Use- Yes
Utilize Automated Entry System- Just Started, Yes

X. Product/Standardization Committee

Established: Yes, Just Formed
Role of Materials Manager- Member
Effectiveness of Committee- Fair

XI. Value Analysis

Utilize Value Analysis- Yes, within framework of Product Evaluation Committee

XII. Narrative

This hospital maintains a highly controlled cardex inventory system. The Purchasing Agent has a bookkeeping background and maintains a very organized materials management system. The materials management system is moderately centralized. Purchase orders are issued from the Purchasing Department for Laboratory, Housekeeping, as well as certain items for maintenance and radiology. Pharmacy and Maintenance order supplies using their own purchase
order numbers. However, the dietary department does not utilize P.O. numbers. The Administrator, from time to time, issues purchase orders for certain equipment but he does send a copy to the Purchasing Department. There are no indices used to monitor the effectiveness of the Purchasing Department but the Purchasing Agent acknowledges the need for developing them.

With regard to Group purchasing, there is a definite commitment to buying all items possible that are offered through the local metropolitan shared service organization. The Purchasing Agent states that there is too much user control with regard to the purchasing function; too often the desires of the user department override good materials management practice. The Purchasing Agent expressed the hope that the newly formed Product Evaluation Committee of which she is a member will facilitate better coordination and cooperation between the Purchasing Department and the user departments.

Although a computer inventory control system is not used, the Purchasing Agent felt that such a system would be very useful in managing the Purchasing Department. Also, it is anticipated that an automated entry system will be used with a Prime Vendor
in the near future. There is no input from the Purchasing Department to the overall hospital planning process. The Purchasing Agent feels that the Central Supply and General Stores functions should be integrated under one department not only to prevent inventory duplication but also to bring about better coordination between the departments. Overall, the Materials Management Department has been developed to a moderate degree at this hospital.

Hospital-GM₂

I. Institutional Characteristics
   Service- General
   Ownership- County
   Classification Codes- 0, 1, 2, 3, 4

II. Top Materials Management Executive Profile
   Education- Non-degreed
   Experience- 15 yrs. up
   Age- Over 50
   Present Salary- 16,000-19,999
   Membership in Professional Organization(s)- THA, Society of Hospital Purchasing Managers

III. Organizational Structure of Materials Management
   Top Materials Management Executive- Director of Purchasing
   Reports to- Assistant Administrator
Functions Performed:
- Purchasing
- Distribution
- Inventory Control
- Receiving
- General Stores
- Central Supply
- Surplus/Scrap Disposal
- Printshop
- Laundry

IV. Inventory Control System
Type: Cardex
ABC Analysis Used: No
EOQ Theory Used: No
Perpetual Inventory Used: Yes

V. Materials Handling and Distribution
Nursing Service: PAR
Other Major Departments: Requisition

VI. Centralized Purchasing
P.O.'s Issued by Purchasing/Materials Office: Yes

Role of Purchasing/Materials Management in Acquisition of Principal Types of Goods
No Role: Dietary and Pharmacy
Minimal to Major Role: Housekeeping, Linen, Laboratory, Maintenance, Medical/Surgical, Radiology.

VII. Use of Indices to Control Materials Management Effectiveness
Indices to Monitor Performance: None Used
Index Used to Track Changes in Cost: No
Periodic Reports Submitted to Administration- No
Follow-up Action Required by Administration- No

VIII. Group Purchasing

Membership in Which Group(s)- No membership
Foresee More/Less Group Purchasing- Not interested in joining

IX. Purchasing/Materials Management Computerized Information System

Utilize Computerized Information System- No
Should Computer Have More Use- Yes
Utilize Automated Entry System- No

X. Product/Standardization Committee

Established- Yes
Role of Materials Manager- Member
Effectiveness of Committee- Fair

XI. Value Analysis

Utilize Value Analysis- No

XII. Narrative

This county hospital is headed by a Purchasing Agent who has just recently taken over as the top purchasing executive. He has previously served in the materials management department of a much larger hospital and completely understands the materials management concept. The materials management structure is relatively advanced for this size hospital.
For example, the Director of Purchasing is responsible for not only the traditional areas of Purchasing, Distribution, Inventory Control, and General Store, but also Central Supply, Laundry, Printshop, and Photography.

From a structural standpoint, the Materials Management Department is very well developed. The Director of Purchasing states that he wants to utilize a computerized information system for his department and lists this as one of his goals to be accomplished. He does not believe that there is an adequate system for monitoring patient-chargeable items. The main Central Supply function is for sterilization activities only; most of the chargeable and non-chargeable supplies are distributed through General Stores.

The Director of Purchasing has analyzed purchasing groups in the area and has decided not to join at this time mainly because of what is considered to be the prohibitive cost of membership. He does, however, anticipate that the hospital will join in the future. Also, he has currently been involved in long-range planning with the other department heads; therefore, the Purchasing Department does have an input into the institutional long-range planning process.
One of the major projects that the Director of Purchasing is involved in is as a member of the Product Evaluation Committee; this committee has just been created and the Director of Purchasing is very enthusiastic about the possible accomplishments that may be achieved. The committee is presently going through the Storeroom Catalog in order to standardize as many products as possible. Overall, from an organizational standpoint, the materials management structure is quite advanced; however, there appears to be a lack of strong control systems for inventory, patient charges, and indices to monitor materials management effectiveness.

Hospital-GM₃

I. Institutional Characteristics

Service- General
Ownership- Hospital Authority
Classification Codes- 0, 1, 2, 3, 4

II. Top Materials Management Executive Profile

Education- PhG- Pharmacy Degree
Experience- 2- 5 yrs.
Age- Over 50
Present Salary- 20,000- 25,000
Membership in Professional Organization(s)- None
III. Organizational Structure of Materials Management System

Top Materials Management Executive- Director of Purchasing

Reports to- Administrator

Functions Performed- Purchasing Distribution Inventory Control Receiving General Stores

IV. Inventory Control System

Type- Visual

ABC Analysis Used- No

EOQ Theory Used- No

Perpetual Inventory Used- No

V. Materials Handling and Distribution

Nursing Service- Exchange Cart (Chargeable Items)

PAR- Non-chargeable

Other Major Departments- Requisition

VI. Centralized Purchasing

P.O.'s Issued by Purchasing/Materials Office- No

Role of Purchasing/Materials Management in Acquisition of Principal Types of Goods

No Role: Dietary, Pharmacy, Maintenance

Minimal to Major Role: Business Office, Housekeeping, Laboratory, Medical-Supply, Radiology

VII. Use of Indices to Control Materials Management Effectiveness

Indices to Monitor Performance- None
Index Used to Track Changes in Cost- No
Periodic Reports Submitted to Administration- No
Follow-up Action Required by Administration- N/A

VIII. Group Purchasing
Membership in Which Group(s)- Local Metro
Foresee More/Less Group Purchasing- More

IX. Purchasing/Materials Management Computerized Information System
Utilize Computerized Information System- No
Should Computer Have More Use- Not familiar enough to comment
Utilize Automated Entry System- No

X. Product/Standardization Committee
Established- Yes
Role of Materials Manager- Member
Effectiveness of Committee- Fair

XI. Value Analysis
Utilize Value Analysis- No

XII. Narrative
The Purchasing Agent is a pharmacist who has taken over the materials management function; he was not entirely familiar with the materials management concept as distinct from "purchasing." He views these two terms as synonymous in nature. In terms of computerization of the materials management
function, he feels that he does not have enough specialized knowledge about the area to state whether he should utilize a computerized information system to a greater extent. One major area that he mentioned was the fact that Central Supply is organizationally under Nursing Service and a number of problems in terms of control result from the arrangement. Very few performance indicators are used, but plans are under way to institute the use of them. Approximately forty-five days of inventory is kept in stock.

Two specific objectives that the Purchasing Agent mentioned were as follows: to lower inventory per bed and to institute better control over lost charge. The level of inventory control sophistication is low because of the relatively minor degree of precision in accounting for the inventory. However, the distribution system is quite advanced because of the exchange cart which is in use. This exchange cart is in existence basically because the new building which was just recently occupied was designed to accommodate the relatively sophisticated exchange cart system. In terms of centralization other than Medical/Surgical supplies, the only materials management involvement in the purchase
of supplies in other departments is in the area of physically controlling stocks.

Hospital- GL

I. Institutional Characteristics

Service- General

Ownership- Hospital Authority

Classification Codes- 0, 1, 2, 3, 4

II. Top Materials Management Executive Profile

Education- Non-degreed

Experience- 5-15 yrs.

Age- Less than 35

Present Salary- 16,000-19,999

Membership in Professional Organization(s)- THA- Texas Society of Hospital Purchasing Managers

III. Organizational Structure of Materials Management System

Top Materials Management Executive- Director of Purchasing

Reports to- Associate Administrator

Functions Performed- Purchasing
Inventory Control
Receiving
General Stores
Distribution
Scrap & Surplus Disposal
Printshop

IV. Inventory Control System

Type- Cardex
ABC Analysis Used - Yes
EOQ Theory Used - Yes
Perpetual Inventory Used - Yes

V. Materials Handling and Distribution
Nursing Services - Requisition
Other Major Departments - Requisition

VI. Centralized Purchasing
P.O.'s Issued by Purchasing/Materials Office - No

Role of Purchasing/Materials Management in Acquisition of Principal Types of Goods
No Role: Dietary, Maintenance, Pharmacy

Minimal to Major Role: Business Office, Housekeeping, Linen, Laboratory, Medical/Surgical, Radiology.

VII. Use of Indices to Control Materials Management Effectiveness
Indices to Monitor Performance - Yes

Inventory Turnover Rate
Purchase Cost/P.O. Issued
Dollar Volume of Inventory
Price/Volume Report

Index Used to Track Changes in Cost - No

Periodic Reports Submitted to Administration - Yes
Follow-up Action Required by Administration - No

VIII. Group Purchasing
Membership in Which Group(s) - Yes, Local Metro

Foresees More/Less Group Purchasing - More
IX. Purchasing/Materials Management Computerized Information System

Utilize Computerized Information System- No
Should Computer Have More Use- Yes
Utilize Automated Entry System- No

X. Product/Standardization Committee

Established- No
Role of Materials Manager- N/A
Effectiveness of Committee- N/A

XI. Value Analysis

Utilize Value Analysis- No

XII. Narrative

This Director of Purchasing is cognizant of the meaning of the materials management concept but admits that her hospital does not utilize it to any great degree. She believed that the materials management concept is the wave of the future specifically in the way in which the Purchasing function is organized. She does not feel that her Administrator is sold on the concept and that she does not have the necessary supports to initiate a materials management type organization. In addition she does not feel that her Administrator understands the concept and all of its ramifications. Also, she believes that she is understaffed to the
point where additional materials management functions cannot be assumed.

One of the major problems which was pointed out by a national consulting firm which performed a hospital-wide management audit is that the purchasing function should be much more centralized; however, this finding was given a low priority for accomplishment related to other factors, so it will probably be delayed until later. A computerized inventory control system has not been implemented but the Director of Purchasing states that there are current plans for doing so in the near future.

In spite of the fact that there is no computerized information system in use, the following indices are periodically calculated: inventory turnover rate, purchase cost per purchase order issued, dollar volume of inventory and price and volume reports. The Director of Purchasing commented that it takes quite a few man-hours to make these manual calculations and that if they were computerized it would save much time. The Director of Purchasing acknowledges the need for a Product Evaluation committee but does not feel that she has adequate staffing to provide the proper guidance for information of such a committee.
I. Institutional Characteristics

Service- General
Ownership- Hospital District
Classification Codes- 0, 1, 2, 3, 4

II. Top Materials Management Executive Profile

Education- Non-degreed
Experience- 5- 15 yrs.
Age- 35- 50
Present Salary- 20,000- 25,000
Membership in Professional Organization(s)- THA-Texas Society of Hospital Purchasing Managers

III. Organizational Structure of Materials Management System

Top Materials Management Executive- Director of Purchasing
Reports to- Associate Administrator
Functions Performed- Purchasing
Inventory Control
Receiving
General Stores
Distribution
Scrap/Surplus Disposal
Printshop
Copying

IV. Inventory Control System

Type- Computerized
ABC Analysis Used- No
EOQ Theory Used - No
Perpetual Inventory Used - Yes

V. **Materials Handling and Distribution**
Nursing Service - Exchange Cart
By Other Major Departments - Requisition

VI. **Centralized Purchasing**
P.O.'s Issued by Purchasing/Materials Office - Yes
Role of Purchasing/Materials Management in Acquisition of Principal Types of Goods
No Role: None
Minimal to Major Role: Dietary, Housekeeping, Linen, Laboratory, Maintenance, Medical/Surgical, Pharmacy, Radiology, Business Office

VII. **Use of Indices to Control Materials Management Effectiveness**
Indices to Monitor Performance -

- Inventory turnover rate
- Purchase cost per $1000 of procurement
- Purchase cost per P.O. issued
- Dollar volume of inventory
- Price/Volume report

Index Used to Track Changes in Cost - Yes
Periodic Reports Submitted to Administration - Yes
Follow-up Action Required by Administration - Yes

VIII. **Group Purchasing**
Membership in Which Group(s) - None
Foresee More/Less Group Purchasing - N/A
IX. Purchasing/Materials Management Computerized Information System

Utilize Computerized Information System- No
Should Computer Have More Use- Yes
Utilize Automated Entry System- No

X. Product/Standardization Committee

Established: Yes
Role of Materials Manager- Member
Effectiveness of Committee- Very Effective

XI. Value Analysis

Utilize Value Analysis- Yes

XII. Narrative

Because of the size and political environments of this hospital, most of the operating procedures and policies for the Materials Management function are very rigid. Ninety-three to ninety-four percent of all products purchased are done so on a contract basis. For example, the guidelines for purchasing are as follows: items or groups of items costing under $500 are subject to telephone quotations; items from $500 to $2,000 must be formally bid on a written quotation basis. Any item or group of items greater than $2,000 must be formally bid with a formal, public bid opening
required. The Purchasing Agent of this hospital is highly motivated and extremely competent.

In addition to the General Store inventory being automated, the Pharmacy Department is in the process of putting their inventory on computer. The Purchasing Agent has held several training sessions on materials management for the Texas Hospital Association.

The main problem area, as pointed out by the Purchasing Agent, is the fact that Central Supply has not been organizationally placed under a materials management type structure. She states that control is lost when supplies are transferred to Central Supply. Administration, she states, is aware of this problem and believes that Central Supply and Purchasing will be placed in the same organization whenever the present Central Supply supervisor retires. A unique aspect to the Purchasing function is the manner in which orders are placed.

Only one purchase order number is placed with each contract vendor and each time an order is placed for an item or contract, a release form is issued to accounting noting the original purchase order number. This innovative system drastically reduces
the number of purchase orders issued on an annual basis. With the exception of the problem related to Central Supply, the Purchasing Department appears to be well centralized with respect to the purchase of most items in the hospital; in fact, in all instances Purchasing selects the suppliers for all areas because of the strict bid requirements of the institution.

In terms of a computerized information, the hospital is in the process of developing an in-house overall information system which will include the materials management function. The Product Evaluation Committee is judged to be very effective by the Purchasing Agent; she states that the physician and non-physician members of the committee do an outstanding job of making hard decisions about products and standardizing all items which are purchased.

Hospital-GL3

I. Institutional Characteristics
Service- General
Ownership- Hospital Authority
Classification Codes- 0, 1, 2, 3, 4

II. Top Materials Management Executive Profile
Education- Non-degreed
Experience - 5-15 yrs.
Age - 35-50
Present Salary - 20,000-25,000
Membership in Professional Organization(s) - None

III. Organizational Structure of Materials Management System

Top Materials Management Executive - Purchasing Agent
Reports to - Vice President
Functions Performed - Purchasing, Distribution, Inventory Control, Receiving, General Stores, Surplus/Scrap Disposal, Property Management, Copying

IV. Inventory Control System

Type - Computerized
ABC Analysis Used - No
EOQ Theory Used - Yes
Perpetual Inventory Used - Yes

V. Materials Handling and Distribution

Nursing Service - PAR
By Other Major Departments - PAR and Requisition

VI. Centralized Purchasing

P.O.'s Issued by Purchasing/Materials Office - Yes
Role of Purchasing/Materials Management in Acquisition of Principal Types of Goods
   No Role - Maintenance and Pharmacy
Minimal to Maximum Role: Dietary, Housekeeping, Linen, Laboratory, Medical/Surgical, Radiology, Business Office

VII. Use of Indices to Control Materials Management Effectiveness

Indices to Monitor Performance -

- Inventory per bed
- Purchasing cost per P.O. issued
- Dollar volume of inventory

Index Used to Track Changes in Cost - Yes
Periodic Reports Submitted to Administration - Yes
Follow-up Action Required by Administration - Yes

VIII. Group Purchasing

Membership in Which Group(s) - Yes, Local Metro group
Foresee More/Less Group Purchasing - Less

IX. Purchasing/Materials Management Computerized Information System

Utilize Computerized Information System - Yes
Should Computer Have More Use - Yes
Utilize Automated Entry System - Yes

X. Product/Standardization Committee

Established - Yes
Role of Materials Manager - Chairperson
Effectiveness of Committee - Fair

XI. Value Analysis

Utilize Value Analysis - No
XII. Narrative

Because of the rapid growth that this hospital is experiencing, the Purchasing/General Stores has been moved to a leased warehouse/office building approximately two miles from the hospital itself; trucks are used to transport the supplies from the warehouse facilities to the main unit. The Purchasing Agent does not indicate that there are any great problems related to the logistical situation. Even with the separated warehousing facilities, the Purchasing Agent states that they are able to operate with less than 30 days of stock. A par level transfer system is utilized to stock the Nursing Stations, Emergency Room, Surgery, Respiratory Therapy, Intensive Care Unit, and Anesthesia; a requisition system is utilized for other user areas.

Purchase orders are issued for buying in all areas of the hospital, but maintenance and pharmacy performs the materials management function for their respective departments. Purchasing is involved in the dietary department to the extent that it determines inventory department and controls the physical stock; this is a departure from the lack of any involvement in this area by other hospitals visited.
The indices used to monitor materials management effectiveness are inventory per bed, purchase cost per purchase order issued, and dollar value of inventory. Also, an index has been developed to track changes in the cost of the major commodity classifications. Management does require that a report be submitted to monitor the performance of the purchasing function and follow-up action is required with respect to variance from stated objectives in the materials management area. The Purchasing Agent is not completely sold on the group purchasing concept with regards to the local metropolitan association; the Purchasing Agent states that he foresees his hospital purchasing less through these groups.

The Purchasing Agent is chairman of the hospital Product Standardization Committee which evaluates only medical-surgical supplies. The Purchasing Agent believes that the computer is a valuable asset for control purposes in materials management and feels that it should be used to a greater extent. The Purchasing Agent believes that the main problem with the in-house computer system is that the user does not have adequate control over the input of data to the system and he, therefore, does not have complete confidence in the information generated.
The Purchasing Agent also believes that Central Supply should become part of the materials/purchasing function.

I. Institutional Characteristics

Service- General
Ownership- Hospital Authority
Classification Codes- 0, 1, 2, 3, 4

II. Top Purchasing Executive Profile

Education- M.S. in Materials Management
Experience- 2-5 yrs.
Age- Less than 35
Present Salary- 20,000-25,000

Membership in Professional Organization(s)- NAPM, NAPHM, THA, Texas Society of Hospital Purchasing Managers

III. Organizational Structure of Materials Management System

Top Materials Managers Executive- Director of Materials Management

Reports to- Administrator

Functions Performed- Purchasing, Inventory Control, Receiving, General Stores, Distribution, Central Supply, Scrap/Surplus Disposal, Printshop, Transport, Messenger, & Mail Service, Copying, Property Management
IV. Inventory Control System

Type- Cardex

ABC Analysis Used- Yes

EOQ Theory Used- Yes

Perpetual Inventory Used- Yes

V. Materials Handling and Distribution

Nursing Service- Exchange Cart

By Other Major Departments- PAR

VI. Centralized Purchasing

All P.O.'s Issued by Purchasing/Materials Office- No

Role of Purchasing/Materials Management in Acquisition of Principal Types of Goods

No Role: None

Minimal to Major Role: Laboratory, Maintenance, Medical/Surgical, Pharmacy, Radiology, Business Office

VII. Use of Indices to Control Materials Management Effectiveness

Indices to Monitor Performance-

Inventory per bed
Inventory turnover rate
Purchasing cost per P.O. issued
Dollar value of inventory
Price/Volume report

Index Used to Track Changes in Cost- Yes

Periodic Reports Submitted to Administration- Yes

Follow-up Action Required by Administration- Yes
VIII. Group Purchasing

Membership in Which Group(s)- Yes, Local Metro Group and National Cooperative Group

Foresee More/Less Group Purchasing- More

IX. Purchasing/Materials Management Computerized Information System

Utilize Computerized Information System- No
Should Computer Have More Use- Yes
Utilize Automated Entry System- No

X. Product/Standardization Committee

Established- Yes
Role of Materials Manager- Chairperson
Effectiveness of Committee- Fair

XI. Value Analysis

Utilize Value Analysis- No

XII. Narrative

This institution's materials management department is headed by a top purchasing executive who is very highly qualified. His educational background could hardly be better; he has received a Master of Science degree in materials management. In addition, he also has several years' experience working in the Central Supply Department of a very large hospital prior to his experience as a materials manager. The Materials Manager is fully cognizant of the meaning and
implications of the materials management concept and is striving to adopt it to the fullest extent possible at his hospital.

There are plans to put the manual inventory control system on the in-house computer within the next few months. He states that when this is done, he will be more able to accurately track inventory levels as well as be more able to monitor the overall effectiveness of the materials management system. In other words, the automated system will allow him to have many more reports which could not previously be economically produced manually.

In regard to written policies and procedures, the materials management department is in the process of revising and formulating them for their accreditation purposes. In summary, this hospital has adopted the materials management concept to a relatively high degree.

Hospital-VS1

I. Institutional Characteristics

Service- General
Ownership- Church
Classification Codes- 0, 1
II. Top Materials Management Executive Profile

Education- Non-degreed

Experience- 2- 5 yrs.

Age- Less than 35

Present Salary- Less than 12,000/yr.

Membership in Professional Organization(s)- None

III. Organizational Structure of Materials Management

Top Materials Management Executive- Purchasing Clerk

Reports to- Business Manager

Functions Performed- Purchasing
                        Distribution
                        Inventory Control
                        Receiving
                        General Stores

IV. Inventory Control System

Type- Visual

ABC Analysis Used- No

EOQ Theory Used- No

Perpetual Inventory Used- No

V. Materials Handling and Distribution

Nursing Service- Exchange Cart

By Other Major Departments- Requisition

VI. Centralized Purchasing

P.O.'s Issued by Purchasing/Materials Office- No

Role of Purchasing/Materials Management in Acquisition of Principal Types of Goods
No Role- Laboratory, Maintenance, Dietary

Minimal to Major Role: Housekeeping, Linen, Medical/Surgical, Supplies, Pharmacy, Radiology, Business Office

VII. Use of Indices to Control Materials Management Effectiveness

Indices to Monitor Performance- None
Index Used to Track Changes in Cost- No
Periodic Reports Submitted to Administration- No
Follow-up Action Required by Administration- None

VIII. Group Purchasing

Membership in Which Group(s)- None
Foresee More/Less Group Purchasing- N/A

IX. Purchasing/Materials Management Computerized Information System

Utilize Computerized Information System- No
Should Computer Have More Use- Not known
Utilize Automated Entry System- No

X. Product/Standardization Committee

Established- No
Role of Materials Manager- N/A
Effectiveness of Committee- N/A

XI. Value Analysis

Utilize Value Analysis- No
XII. Narrative

This small hospital has recently become a satellite of a larger medical center located approximately sixty miles away and has just moved into a new facility. The major impact of this move on the materials management function has been the change to an exchange cart system on the Nursing units; all other areas are on a requisition system of supplies distribution. Purchasing is done basically by the purchasing clerk who forwards all completed purchase orders to the Administrator for her review. Purchase Orders are not written for all areas. For example, Maintenance does not write purchase orders for their acquisitions. The Purchasing clerk reports to the Business Manager who is responsible for management review of charges to ensure the proper mark-up.

There seems to be little effect on the materials management function by the medical center with whom they are affiliated. All purchases are made independently of the medical center with no items bought through the storeroom of the parent hospital. There is no computerized information system and no product evaluation committee. In summary, the materials management function is very decentralized from the main hospital with apparently little effect exercised
upon this satellite hospital and a relatively unsophisticated materials management system.

Hospital-VS$_2$

I. Institutional Characteristics

Service- Pediatric
Ownership- Non-Profit, Non-Church
Classification Codes- 0, 1, 2, 4

II. Top Materials Management Executive Profile

Education- B.S.
Experience- 2- 5 yrs.
Age- 35- 50
Present Salary- 20,000- 25,000

III. Organizational Structure of Materials Management System

Top Materials Management Executive-Assistant Administrator

Reports to- Administrator

Functions Performed- Purchasing
Distribution
Inventory Control
Receiving
General Stores
Central Supply
Scrap/Surplus Disposal
Printshop
Transport, Messenger, Mail Service
Property Management
Copying
IV. **Inventory Control System**

Type- Cardex

ABC Analysis Used- No

EOQ Theory Used- No

Perpetual Inventory Used- Yes

V. **Materials Handling and Distribution**

Nursing Service- Requisition

By Other Major Departments- Requisition

VI. **Centralized Purchasing**

P.O.'s Issued by Purchasing/Materials Office- Yes

Role of Purchasing/Materials Management in Acquisition of Principal Types of Goods

No Role- Dietary, Pharmacy, and Laboratory

Minimal to Major Role: Housekeeping, Linen, Maintenance, Medical-Surgical Supply, Radiology, Business Office

VII. **Use of Indices to Control Materials Management Effectiveness**

Indices to Monitor Performance- None

Index Used to Track Changes in Cost- No

Periodic Reports Submitted to Administration- No

Follow-up Action Required by Administration- N/A

VIII. **Group Purchasing**

Membership in Which Group(s)- Yes, Regional Group

Foresee More/Less Group Purchasing- Less
IX. **Purchasing/Materials Management Computerized Information System**

Utilize Computerized Information System- No
Should Computer Have More Use- Yes
Utilize Automated Entry System- No

X. **Product/Standardization Committee**

Established- Yes
Role of Materials Manager- Chairperson
Effectiveness of Committee- Very Effective

XI. **Value Analysis**

Utilize Value Analysis- No

XII. **Narrative**

This specialty children's hospital is an interesting study from two perspectives. First, it is interesting from a purchasing standpoint in that the products which are procured are non-standard sizes and therefore makes it impossible to utilize the same bid process which could be used under normal circumstances because of the specialty nature of the hospital. An example of this is that because of the small size of pediatric patients, catheter trays are not normally assembled which have a small catheter and accessories in them; this lack of similarity in supply requirements would make it difficult to standardize products and therefore
would decrease group purchasing effectiveness to a certain degree.

Another interesting aspect of this hospital is the fact that the hospital is merging with another children's hospital in the city. The purchasing function was one of the initial functions which is being merged. The manner in which this function is being merged is that the Purchasing Agent at the hospital where the interview was taking place has assumed an Assistant Administrator's position over purchasing, and the purchasing agent at the other hospital actually functions as Purchasing Agent for both facilities. Presently Administration, Respiratory Therapy, and purchasing are merged with all functions eventually to be merged.

A manual cardex system is utilized to control the inventory with future plans to develop a program for inventory control for use on the in-house computer system. Also, there were future plans to replace the presently used requisition system with an exchange cart system. Purchasing is fairly well integrated with all purchasing orders written from the Purchasing Agent's office. There does not appear to be a great deal of interest in group purchasing with the interviewee stating that he
expects there to be less involvement in group purchasing. An interesting fact is that the children's hospital has an agreement with a large hospital nearby under which they may purchase any supplies with a 5 per cent markup. This allows the hospital to take advantage of the larger hospital's purchasing power.

Hospital-VS

I. **Institutional Characteristics**
   Service- General
   Ownership- Non-Profit, Non-Church
   Classification Codes- 0, 1, 2, 3, 4

II. **Top Materials Management Executive Profile**
   Education- Certified Surgical Technologist
   Experience- 2- 5 yrs.
   Age- 35- 50
   Present Salary- 16,000- 19,999
   Membership in Professional Organization(s)- None

III. **Organizational Structure of Materials Management System**
   Top Materials Management Executive- Director of Materials Management
   Reports to- Administrator
Functions Performed- Purchasing
Distribution
Inventory Control
Receiving
General Stores
Central Supply
Pharmacy

IV. Inventory Control System
Type- Cardex
ABC Analysis Used- No
EOQ Theory Used- No
Perpetual Inventory Used- Yes

V. Materials Handling and Distribution
Nursing Service- Requisition
By Other Major Departments- Requisition

VI. Centralized Purchasing
P.O.'s Issued by Purchasing/Materials Office- Yes
Role of Purchasing/Materials Management in Acquisition of Principal Types of Goods
No Role- Dietary
Minimal to Major Role: Housekeeping, Linen, Laboratory, Maintenance, Medical/Surgical, Pharmacy, Radiology, Business Office

VII. Use of Indices to Control Materials Management Effectiveness
Indices to Monitor Performance- None
Index Used to Track Changes in Cost- No
Periodic Reports Submitted to Administration- Yes
Follow-up Action Required by Administration- No
VIII. **Group Purchasing**

Membership in Which Group(s) - None
Foresee More/Less Group Purchasing - N/A

IX. **Purchasing/Materials Management Computerized Information System**

Utilize Computerized Information System - No
Should Computer Have More Use - Yes
Utilize Automated Entry System - No

X. **Product/Standardization Committee**

Established - No
Role of Materials Manager - N/A
Effectiveness of Committee - N/A

XI. **Value Analysis**

Utilize Value Analysis - No

XII. **Narrative**

This top purchasing executive has functioned in several functional areas of Nursing Service such as Emergency Room Supervisor, Operating Room Supervisor, and Central Supply Buyer prior to assuming her present title of Director of Materials Management. A materials management structure is utilized at this hospital. However, it appears that because the materials manager has been involved in these Nursing Service functional areas during her career,
she does not appear to have the broad perspective required for a materials management organization at this time; she does acknowledge this and is aware that this broad perspective must be developed.

All departmental purchase orders are written in the Director of Materials Management's office and the purchasing functions which have been decentralized throughout the past are currently being centralized under the Director of Materials Management; in fact, a General Stores storage area has recently been organized under the Materials Manager. Also, there is an interest for initiating a computerized inventory control system at some future time. Also, plans are underway to form a Product Evaluation Committee to be headed by the Director of Materials Management.

Materials Management has the responsibility for monitoring whether there are lost charges that may have occurred in the patient charge system. There is minimal use of quantitative techniques that could be used to monitor the performance of the materials management organization. There are plans to investigate whether it would be beneficial to join a local metropolitan purchasing group. Overall, it appears that there is a strong attempt to
implement the materials management concept to the
greatest extent possible.

Hospital-VM₁

I. Institutional Characteristics

Service- General
Ownership- Non-Profit, Non-Church
Classification Codes- 0, 1, 2

II. Top Materials Management Executive Profile

Education- Associate Degree (2 yrs.)
Experience- 5- 15
Age- Less than 35
Present Salary- 16,000- 19,999
Membership in Professional Organization(s)- THA,
Society for Hospital Purchasing Management

III. Organizational Structure of Materials Management System

Top Materials Management Executive- Director of Purchasing
Reports to- Administrator
Functions Performed- Purchasing
Distribution
Inventory Control
Receiving
General Stores
Surplus/Scrap Disposal
Property Management

IV. Inventory Control System

Type- Cardex
ABC Analysis Used- Yes
EOQ Theory Used- Yes
Perpetual Inventory Used- Yes

V. Materials Handling and Distribution
Nursing Service- Pt. Chargeable Items- Exchange Cart
Non-Pt. Chargeable- PAR
By Other Major Departments- Requisition

VI. Centralized Purchasing
P.O.'s Issued by Purchasing/Materials Office- Yes
Role of Purchasing/Materials Management in Acquisition of Principal Types of Goods
No Role- Dietary, Maintenance, Laboratory, Pharmacy
Minimal to Major Role: Medical/Surgical Supply, X-Ray, Linen, Business Office

VII. Use of Indices to Control Materials Management Effectiveness
Indices to Monitor Performance-
- Inventory per bed
- Inventory turnover rate
- Dollar volume of inventory
Index Used to Track Changes in Cost- Yes
Periodic Reports Submitted to Administration- Yes
Follow-up Action Required by Administration- Yes

VIII. Group Purchasing
Membership in Which Group(s)- Management Contract group
Foresee More/Less Group Purchasing- N/A
IX. Purchasing/Materials Management Computerized Information System

Utilize Computerized Information System - No
Should Computer Have More Use - Yes
Utilize Automated Entry System - Yes

X. Product/Standardization Committee

Established - No
Role of Materials Manager - N/A
Effectiveness of Committee - N/A

XI. Value Analysis

Utilize Value Analysis - Yes

XII. Narrative

This proprietary hospital is headed by a top purchasing executive who has a good understanding of the materials management concept. A manual cardex system exists for inventory control; the materials manager feels that the cardex system should be computerized for greater efficiency. Several important indices such as inventory per bed are monitored on a continuing basis by the top purchasing executive. In addition, a monthly report is submitted to the Administrator and follow-up action is requested when required. There is currently no Product Evaluation Committee but the top purchasing executive hopes to establish one in the near future because he sees a
definite need for one. Central Supply is charged with the responsibility for reconciling charges with issues and it is thought that there is less than 1 per cent lost charges.

The major goals that the top purchasing executive had established for his department are as follows: consolidate the inventory from various user areas, establish a "peel and stick" system to account for lost charges, extend the exchange carts system to the Emergency Room and Surgery.

The major problem areas are perceived to be the lack of a product evaluation committee and the lack of adequate authority to do an effective job of directing the materials management department. The top purchasing agent believes that General Stores and Central Supply should be integrated under one department head because of a duplication of stock in each department as well as a duplication of employees. The top purchasing agent, in general, feels that he did not have the proper amount of administrative support to do the best job possible.

Hospital-VM$_2$

I. Institutional Characteristics
Service- General Osteopathic
Ownership- Non-Profit, Non-Church
Classification Codes- 0, 1, 2, 5, 6

II. Top Materials Management Executive Profile
Education- Diploma, R. N.
Experience- Less than 2 yrs.
Age- Over 50
Present Salary- Less than 12,000
Membership in Professional Organization(s)- TEA-Texas Society of Hospital Purchasing Managers.

III. Organizational Structure of Materials Management System
Top Materials Management Executive- Purchasing Agent
Reports to- Administrator
Functions Performed- Purchasing
  Inventory Control
  Receiving
  General Stores
  Distribution
  Central Supply
  Printshop

IV. Inventory Control System
Type- Visual
ABC Analysis Used- No
EOQ Theory Used- No
Perpetual Inventory Used- No

V. Materials Handling and Distribution
Nursing Stations- PAR
By Other Major Departments- Requisition
VI. Centralized Purchasing

P.O.'s Issued by Purchasing/Materials Office- No

Role of Purchasing/Materials Management in Acquisition of Principal Types of Goods

No Role- Dietary, Housekeeping, Laboratory, Maintenance, Pharmacy, X-ray

Minimal to Major Role: Business Office, Linen, Surgical Supplies

VII. Use of Indices to Control Materials Management Effectiveness

Indices to Monitor Performance- Inventory per bed

Index Used to Track Changes in Cost- No

Periodic Reports Submitted to Administration- No

Follow-up Action Required by Administration- No

VIII. Group Purchasing

Membership in Which Group(s)- Yes, Metro Purchasing Group

Foresee More/Less Group Purchasing- More

IX. Purchasing/Materials Management Computerized Information System

Utilize Computerized Information System- No

Should Computer Have More Use- Yes

Utilize Automated Entry System- No

X. Product/Standardization Committee

Established- No

Role of Materials Manager- N/A

Effectiveness of Committee- N/A
XI. **Value Analysis**

Utilize Value Analysis- No

XII. **Narrative**

This osteopathic hospital has a rather low level of materials management development. The purchasing agent has less than two years' experience and is striving to develop her materials management skills. She admits that she has less than adequate knowledge of quantitative analytical skills. The basic problem areas from an institutional materials management standpoint which she lists are: lack of proper amount of storage area, fluctuation in patient census which makes it difficult to keep the proper amount of stock on hand, the amount of paperwork required, a true departmental costing system, and no written guidelines from administration.

The purchasing agent is "sold" on the utilization of a computerized inventory control system, but admits that she is not really familiar with the problems related to its application. The physical facility is quite old but she states that there are plans for a new hospital to be built in the future. The inventory control system used is basically a visual method of observing stock levels and there are no plans for future development of
a better control system. A user controlled requisition system is utilized to distribute the stock to all areas of the hospital except for the Nursing Stations. The nursing stations are serviced by a PAR level transfer system.

In summary this hospital utilizes a very decentralized purchasing system for all products except for medical and surgical supplies. Certain commonly-used products are requisitioned by all user departments from General Stores. The only index used to monitor materials management effectiveness is inventory per bed. It was obvious that the Purchasing Agent is neither familiar with the use of performance indicators nor aware of their value in the monitoring of the materials management system. The hospital has no formal Product Evaluation Committee and her statement regarding product standardization was that "if a doctor wants it, he gets it."

Hospital-VM3

I. Institutional Characteristics

Service- General Osteopathic
Ownership- Non-Profit, Non-Church
Classification Codes- 0, 1, 2, 5, 6
II. Top Materials Management Executive Profits

Education- B.A. degree

Experience- 5-15 yrs.

Age- Less than 35

Present Salary- 16,000-19,999

Membership in Professional Organization(s)- THA-Texas Hospital Purchasing Managers

III. Organizational Structure of Materials Management System

Top Materials Management Executive- Purchasing Agent

Reports to- Administrator

Functions Performed- Purchasing
Inventory Control
Receiving
General Stores
Distribution
Central Supply
Scrap/Surplus Disposal
Printshop

IV. Inventory Control System

Type- Cardex

ABC Analysis Used- No

EOQ Theory Used- No

Perpetual Inventory Used- Yes

V. Materials Handling and Distribution

Nursing Service- Exchange Cart, PAR, Requisition

By Other Major Departments- Requisition
VI. Centralized Purchasing

P.O.'s Issued by Purchasing/Materials Office- No

Role of Purchasing/Materials Management in Acquisition of Principal Types of Goods

No Role- Pharmacy and Maintenance

Minimal to Major Role: Dietary, Business Office, Housekeeping, Linen, Laboratory, Medical/Surgical, Radiology.

VII. Use of Indices to Control Materials Management Effectiveness

Indices to Monitor Performance-

Inventory per bed
Inventory turnover rate
Dollar volume of inventory

Index Used to Track Changes in Cost- Yes

Periodic Reports Submitted to Administration- Yes

Follow-up Action Required by Administration- No

VIII. Group Purchasing

Membership in Which Group(s)- Yes, Metro Purchasing Group

Foresee More/Less Group Purchasing- More

IX. Purchasing/Materials Management Computerized Information System

Utilize Computerized Information System- No

Should Computer Have More Use- No

Utilize Automated Entry System- No

X. Product/Standardization Committee

Established- No
XI. **Value Analysis**

Utilize Value Analysis - No

XII. **Narrative**

The Purchasing Agent at this osteopathic hospital has a very sophisticated view of the materials management concept. The Purchasing Agent stresses the importance of top administrative support. She states that the previous administration did not provide the necessary support but that the current one understands what is required for an effectively managed purchasing function. She states, for example, that the present administrator backs her up whenever the problem of brand preference comes up. Therefore, she is able to shift many of the purchasing decisions from the user department to the purchasing department because of this administrative support.

She believes that one of her functions is to educate the user departments regarding the benefits of a strong centralized purchasing department by explaining that centralization relieves the user departments of the materials management functions and allows them more time to devote to actual departmental activities.
An interesting observation relating to the title of the top purchasing executive is that the structure of the purchasing organization which includes central supply would imply a materials manager designation; however, the purchasing agent's title is used.

The purchasing agent states that basically a user generated requisition system is used to distribute supplies but that they are currently converting all departments to a PAR level transfer system based on each departmental expenditure. The Purchasing function is fairly well centralized with only the Pharmacy and Maintenance Departments doing their own purchasing of supplies. The indices used to monitor materials management effectiveness are inventory per bed, inventory turnover rate, and a dollar volume of inventory.

Periodic reports are submitted to administration but follow-up action is not required. A computerized information system is planned for the future. The Purchasing Agent expressed interest in the use of an optical scanner to charge supplies to the individual patient and the user departments. This system would entail scanning a bar code which would be placed on all chargeable and non-chargeable
items issued to the user departments as well as patients. She thought this system would reduce cost charges to a very minimum.

The major problem areas mentioned are training of Central Supply technicians, the orientation of user department heads regarding the value of centralized purchasing and the number of lost charges. Because of administrative support the Purchasing Agent believes that she has a greater degree of flexibility in purchasing supplies for user departments.

Hospital-VM

I. Institutional Characteristics
Service- General
Ownership- Non-Profit, Non-Church
Classification Codes- 0, 1, 2, 3, 4

II. Top Materials Management Executive Profile
Education- Non-degreed
Experience- 5- 15 yrs.
Age- Over 50
Present Salary- 12,000- 15,000
Membership in Professional Organization(s)- None

III. Organizational Structure of Materials Management System
Title of Top Materials Management Executive- Director of Purchasing
Reports to- Assistant Administrator

Functions Performed-
- Purchasing
- Distribution
- Inventory Control
- Receiving
- General Stores

IV. Inventory Control System

Type- Traveling Requisition and Computerized

ABC Analysis Used- Yes

EOQ Theory Used- Yes

Perpetual Inventory Used- Yes

V. Materials Handling and Distribution

Nursing Service- Exchange Cart and Requisition

By Other Major Departments- Requisition

VI. Centralized Purchasing

P.O.'s Issued by Purchasing/Materials Office- No

Role of Purchasing/Materials Management in Acquisition of Principal Types of Goods

- No Role- Dietary, Linen, Laboratory, Maintenance, Pharmacy, X-ray

- Minimal to Major Role: Housekeeping, Medical/Surgical Supplies, Business Office

VII. Use of Indices to Control Materials Management Effectiveness

Indices to Monitor Performance-

- Inventory Turnover Rate
- Purchase Cost of P.O. Issued
- Dollar Volume of Inventory

Index Used to Track Changes in Cost- No
Periodic Reports Submitted to Administration- Yes
Follow-up Action Required by Administration- Yes

VIII. **Group Purchasing**

Membership in Which Group(s)- Local Metro Purchasing Group

Foresee More/Less Group Purchasing- More

IX. **Purchasing/Materials Management Computerized Information System**

Utilize Computerized Information System- Yes
Should Computer Have More Use- Yes
Utilize Automated Entry System- No

X. **Product/Standardization Committee**

Established- No
Role of Materials Manager- N/A
Effectiveness of Committee- N/A

XI. **Value Analysis**

Utilize Value Analysis- No

XII. **Narrative**

The Director of Purchasing lists as her major problem area the lack of centralized purchasing. The Purchasing Department has no materials management role in the following areas: Dietary, Business Office Supplies, Laundry, Laboratory, Maintenance, Pharmacy, and Radiology. For a hospital this size,
it is unusual to have purchasing this decentralized. In contrast to this major problem area, there appears to be a very good computerized information system in existence which provides the following indices to control materials management effectiveness: Inventory turnover rate, purchase cost per Purchase Order issued, and the dollar volume of inventory. Periodic reports are required by Administration and the top purchasing executive's immediate supervisor demands follow-up action when deviation from numerically stated objectives is experienced.

Lost charges is also mentioned as a problem area and the Director of Purchasing is exploring the possibility of utilizing a label transfer system on patient chargeable items. An exchange cart system is utilized for all Nursing Stations with PAR levels established and preprinted on a standardized form; these carts are filled in General Stores and exchanged on each station three times a week. All other areas in the hospital are on a requisition system where the user department establishes their own stock levels. There is no formalized Product Evaluation Committee; the function was handled on an informal basis through the Director of Purchasing.
I. Institutional Characteristics
Service- General
Ownership- Non-Profit, Non-Church
Classification Codes- 0, 1, 2, 3, 4

II. Top Materials Management Executive Profile
Education- Non-degreed
Experience- 15 yrs. up
Age- Over 50
Present Salary- 20,000- 25,000
Membership in Professional Organization(s)- THA- Texas Society of HPM

III. Organizational Structure of Materials Management System
Top Materials Management Executive- Purchasing Agent
Reports to- Administrator
Functions Performed- Purchasing
Distribution
Inventory Control
Receiving
General Stores
Printshop
Property Management

IV. Inventory Control System
Type- Cardex
ABC Analysis Used- Yes
EOQ Theory Used- Yes
Perpetual Inventory Used- Yes
V. **Materials Handling and Distribution**

Nursing Stations- PAR

By Other Major Departments- Requisition

VI. **Centralized Purchasing**

P.O.'s Issued by Purchasing/Materials Office- Yes

Role of Purchasing/Materials Management in Acquisition of Principal Types of Goods

No Role- Dietary, Pharmacy

Minimal to Major Role: Housekeeping, Linen, Laboratory, Maintenance, Medical/Surgical Supplies, X-ray, Business Office

VII. **Use of Indices to Control Materials Management Effectiveness**

Indices to Monitor Performance- None

Index Used to Track Changes in Cost- No

Periodic Reports Submitted to Administration- No

Follow-up Action Required by Administration- No

VIII. **Group Purchasing**

Membership in Which Group(s)- Yes, Local Metro Group

Foresee More/Less Group Purchasing- Same

IX. **Purchasing/Materials Management Computerized Information System**

Utilize Computerized Information System- No

Should Computer Have More Use- Uncertain

Utilize Automated Entry System- No
X. **Product/Standardization Committee**

Established- No

Role of Materials Manager- N/A

Effectiveness of Committee- N/A

XI. **Value Analysis**

Utilize Value Analysis- No

XII. **Narrative**

The Purchasing Agent for this facility has had more experience in hospital purchasing than any top purchasing executive visited and believes that a more informal rather than formal materials management system works best for him. For example, he prefers to introduce new products on an informal basis to the user department rather than have them introduced through a product evaluation committee. He also believes that he can achieve his materials management goals "through the back door" by informally relating to user department heads. A cardex system with minimum and maximum inventory levels is utilized with apparently satisfactory results. The Purchasing Agent states that he is not interested in changing the inventory from the manual to an automated system. A PAR level transfer system is used for the Nursing Units with all other departments ordering by requisition.
No formal reporting system was used to appraise higher management of the performance of the materials management functions. The Purchasing Agent periodically coordinates with the Administrator regarding the materials management function. The Purchasing Agent, although very active in a purchasing group, is not completely sold on the concept because he is not certain that group purchasing is economically beneficial for the institution. A major problem mentioned by the Purchasing Agent is the lack of adequate space for stock; the problem will be rectified within the next thirty months or so because of an expansion program which is underway.

Hospital-VL

I. Institutional Characteristics
   Service- General
   Ownership- Church
   Classification Codes- 0, 1, 2, 3, 4

II. Top Materials Management Executive Profile
   Education- Non-degreed
   Experience- 15 yrs. up
   Age- Over 50
   Present Salary- 20,000- 25,000
Membership in Professional Organization(s)- THA
Texas Society of HPM

III. Organizational Structure of Materials Management System

Title of Top Materials Management Executive- Director of Materials Management

Reports to- Administrator

Functions Performed- Purchasing
Distribution
Inventory Control
Receiving
General Stores
Central Supply
Surplus/Scrap Disposal
Printshop
Transport, Messenger,
Mail Service
Copying

IV. Inventory Control System

Type- Traveling Requisition and Cardex

ABC Analysis Used- No

EOQ Theory Used- Yes

Perpetual Inventory Used- Yes

V. Materials Handling and Distribution

Nursing Service- Requisition

By Other Major Departments- Requisition

VI. Centralized Purchasing

P.O.'s Issued by Purchasing/Materials Office- Yes

Role of Purchasing/Materials Management in Acquisition of Principal types of Goods

No Role- Dietary, Housekeeping, Maintenance, Pharmacy
Minimal to Major Role: Linen, Medical/Surgical Supplies, Laboratory, X-ray, Business Office

VII. Use of Indices to Control Materials Management Effectiveness

Indices to Monitor Performance - Dollar Volume of Inventory

Index Used to Track Changes in Cost - No

Periodic Reports Submitted to Administration - No

Follow-up Action Required by Administration - No

VIII. Group Purchasing

Membership in Which Group(s) - Local Metro Group

Foresee More/Less Group Purchasing - More

IX. Purchasing/Materials Management Computerized Information System

Utilize Computerized Information System - No

Should Computer Have More Use - Yes

Utilize Automated Entry System - No

X. Product/Standardization Committee

Established - Yes

Role of Materials Manager - Not a member

Effectiveness of Committee - Needs Improvement

XI. Value Analysis

Utilize Value Analysis - No

XII. Narrative

The materials management organization includes Central Supply along with General Stores and
therefore has a modern structure. This organization has a Purchasing Agent as well as a Materials Manager. A cardex and traveling requisition system is used for inventory control with perpetual inventory records kept for most items. Materials handling and distribution is by requisition for all user areas but the hospital plans to go to an exchange cart system within the year; a pilot program using the exchange cart system on a nursing unit is being tested. A major problem listed is the lack of a centralized materials management program throughout the hospital; the materials management department exercises no materials management role for dietary, housekeeping, maintenance, and pharmacy. This degree of decentralized materials management is unusual for a hospital of this size.

Also, the lack of a computerized information system is also unusual. The materials manager indicates that the purchasing/materials department should use a computerized information system to a greater extent. The hospital did not have a Product Evaluation committee until just recently. The materials manager states that she did not believe that she would be able to resolve questions of brand preference
and standardization in the best overall interest of the hospital.

There does not appear to be any major upper level administrative involvement in the materials management area in view of the fact that periodic reports to administration are not required. The only index which is calculated on a regular basis is the dollar value of inventory.

Hospital-VL

I. Institutional Characteristics

Service- General
Ownership- Church
Classification- 0, 1, 2, 3, 4

II. Top Materials Management Executive Profile

Education- B.S., R.N.
Experience- 5- 15 yrs.
Age- 35- 50
Present Salary- 25,000- Up
Membership in Professional Organization(s)- NAPM
THA- Texas Society of HPM

III. Organizational Structure of Materials Management System

Top Materials Management Executive- Director of Materials Management
Reports to: Vice-President
Functions Performed—Purchasing
Inventory Control
Receiving
General Stores
Distribution
Central Supply
Scrap/Surplus Disposal
Laundry
Printshop
Transport, Messenger, and Mail Service
Copying
Property Management

IV. Inventory Control System
Type—Computerized Inventory Control
ABC Analysis Used—Yes
EOQ Theory Used—Yes
Perpetual Inventory Used—Yes

V. Materials Handling and Distribution
Nursing Service—Exchange Cart, PAR, Requisition
Other Major Departments—Requisition

VI. Centralized Purchasing
P.O.'s Issued by Purchasing/Materials Office—No
Role of Purchasing/Materials Management in Acquisition of Principal Types of Goods
No Role—Maintenance, Pharmacy
Minimal to Major: Dietary, Business Office, Housekeeping, Linen, Laboratory, Medical/Surgical Supplies, X-ray

VII. Use of Indices to Control Materials Management Effectiveness
Indices to Monitor Performance—
Inventory per bed
Inventory turnover rate
Purchasing cost per $1,000 of procurement
Purchase cost per P.O. issued
Dollar volume of inventory
Price/Volume report
Volumes by vendor and user area

Index Used to Track Changes in Cost- No
Periodic Reports Submitted to Administration- Yes
Follow-up Action Required by Administration- Yes

VIII. Group Purchasing

Membership in Which Group(s)- Local Metro Group and National Group
Foresee More/Less Group Purchasing- More

IX. Purchasing/Materials Management Computerized Information System

Utilize Computerized Information System- Yes
Should Computer Have More Use- Yes
Utilize Automated Entry System- Yes

X. Product/Standardization Committee

Established- Yes
Role of Materials Manager- Chairman
Effectiveness of Committee- Very Effective

XI. Value Analysis

Utilize Value Analysis- Yes

XII. Narrative

The basic philosophy of the materials manager at this large hospital is that the department should
have a service orientation to the user department. Also, the materials manager believes that for the materials management concept to succeed there should be strong top administrative support.

He lists as his major problem areas as waste management and the housekeeping department. Only one prime vendor is used and the major reason given for this is the fact that he believes that it is the only way to comply with the Prudent Buyer rule of the Social Security Administration. This is also his reason for participating in the local metropolitan group purchasing program. A computerized inventory system is utilized to control stock levels. Numerous indices are used to monitor materials management performance and periodic reports are submitted to administration for upper management review.

The Materials Manager is Chairman of the Product Evaluation Committee and he judges the work of the committee to be very effective. Another major problem area mentioned by the materials manager is the logistical problem of servicing the six satellites that the hospital owns. He states that he has to constantly adjust the materials management
system to deal with the increased responsibilities added with more hospitals to supply.

There are plans to develop departmental inventory levels and reorder points that will be established for all areas which requisition supplies from the Central Supply and General Storeroom. Floor stocks are periodically checked for stockpiling, obsolescence and waste. Purchase orders are written for all hospital acquisitions; however, the dietary, pharmacy, and maintenance departments are authorized to issue their own purchase orders.

Hospital PS

I. Institutional Characteristics
Service- General
Ownership- Partnership
Classification Codes- 0, 1, 2, 3, 4

II. Top Materials Management Executive Profile
Education- Diploma, R.N.
Experience- 5- 15 yrs.
Age- 35- 50
Present Salary- 12,000- 15,999
Membership in Professional Organization(s)- No

III. Organizational Structure of Materials Management System
Top Materials Management Executive- Purchasing Agent
Reports to- Associate Administrator

Functions Performed- Purchasing
Distribution
Inventory Control
Receiving
General Stores
Central Supply
Pharmacy

IV. Inventory Control System

Type- Visual

ABC Analysis Used- No

EOQ Theory Used- No

Perpetual Inventory Used- Yes

V. Materials Handling and Distribution

Nursing Service- Requisition

By Other Major Departments- Requisition

VI. Centralized Purchasing

P.O.'s Issued by Purchasing/Materials Office- No

Role of Purchasing/Materials Management in Acquisition of Principal Types of Goods

No Role- Dietary, Housekeeping, Laboratory, Maintenance, X-ray

Minimal to Major: Medical/Surgical Supplies, Pharmacy, Business Office

VII. Use of Indices to Control Materials Management Effectiveness

Indices to Monitor Performance- None

Index Used to Track Changes in Cost- No
Periodic Reports Submitted to Administration- No
Follow-up Action Required by Administration- No

VIII. Group Purchasing
Membership in Which Group(s)-Yes, Local Metro Group
Foresee More/Less Group Purchasing- Less

IX. Purchasing/Materials Management Computerized Information System
Utilize Computerized Information System- No
Should Computer Have More Use- No
Utilize Automated Entry System- No

X. Product/Standardization Committee
Established- Yes
Role of Materials Manager- None
Effectiveness of Committee- Very Effective

XI. Value Analysis
Utilize Value Analysis- No

XII. Narrative
The Purchasing Agent has been an employee at this institution for approximately 15 years and is basically a R.N. who became Central Supply Supervisor and the Purchasing Agent. Interestingly, the Pharmacy is under the Purchasing Agent/Central Supply Supervisor. The hospital is converting to a Unit Dose method of distributing drugs. Purchase
orders are not used and Purchasing in general is very decentralized with such departments as Dietary, Housekeeping, Maintenance, and X-ray doing their own purchasing and inventory control.

The Purchasing Agent made an interesting comment with regard to utilization of performance indicators in tracking the purchasing department's effectiveness; she stated: "I don't believe in giving them any information unless they request it." The Purchasing Agent does not wish to utilize automated inventory control procedure because she believes that she can effectively control the stock levels by utilizing the visual method.

An interesting observation was made concerning the Standardization Committee relative to the fact that the Purchasing Agent rated the effectiveness of the committee very high. She states that the effectiveness is rated very high because the committee is doctor-dominated by the physicians who own the hospital. Only physicians are on the committee and what they say goes as far as which supplies and equipment to purchase. Because of this fact, this hospital is very well equipped.
Hospital-PS_2

I. Institutional Characteristics
Service- Psychiatric
Ownership- Corporation
Classification Codes- 8, 1, 2, 4

II. Top Materials Management Executive Profile
Education- Non-degreed
Experience- 5- 15 yrs.
Age- Over 50
Present Salary- 12,000- 15,999
Membership in Professional Organization(s)- None

III. Organizational Structure of Materials Management System
Title of Top Materials Management Executive- Accountant
Reports to- Administrator
Functions Performed- Purchasing
Receiving
Property Management
Copying

IV. Inventory Control System
Type- Visual at decentralized locations
ABC Analysis Used- No
EOQ Theory Used- No
Perpetual Inventory Used- No
V. **Materials Handling and Distribution**

Nursing Stations- Most orders are delivered directly to Nursing Unit

By Other Major Departments- Most orders are delivered directly to the department unit

VI. **Centralized Purchasing**

P.O.'s Issued by Purchasing/Materials Office- No

Role of Purchasing/Materials Management in Acquisition of Principal Types of Goods

VII. **Use of Indices to Control Materials Management Effectiveness**

Indices to Monitor Performance- None Used.

Index Used to Track Changes in Cost- None

Periodic Reports Submitted to Administration- No

Follow-up Action Required by Administration- N/A

VIII. **Group Purchasing**

Membership in Which Group(s)- None

Foresee More/Less Group Purchasing- N/A

IX. **Purchasing/Materials Management Computerized Information System**

Utilize Computerized Information System- No

Should Computer Have More Use- No

Utilize Automated Entry System- No

X. **Product/Standardization Committee**

Established- No
Role of Materials Manager- N/A
Effectiveness of Committee- N/A

XI. Value Analysis
Utilize Value Analysis- No

XII. Narrative
This is a very small psychiatric hospital which does not have a Purchasing or Materials manager. The purchasing function is handled by the Accountant who states that approximately one hour a day is devoted to the function. Purchasing, inventory control, and receiving are accomplished at the user level. There is no central supply or general stores area where inventory is centralized. The order is placed and received directly at the user level.

Generally speaking, the ward clerk places the order with the vendor; also, the nursing units generate the required charge slips. The signed receiving copies are brought to the Accountant for proper verification of receipt. The ward clerk, who does most of the ordering and receiving, works approximately half-time on the Nursing Unit and the remainder of her time in the Accountant's office; this permits better control of the procurement process. Although the materials management
system is relatively unsophisticated, there seems to be adequate control over purchasing, receiving, and inventory. It appears that due to the small size of the facility, it is easier to be aware of the various activities of materials management that require monitoring.

Hospital-PS3

I. Institutional Characteristics
Service- General
Ownership- Corporation
Classification Codes- 0, 1, 2, 4

II. Top Materials Management Executive Profile
Education- M.S.
Experience- 2-5 yrs.
Age- Less than 35
Present Salary- 20,000-25,000
Membership in Professional Organization(s)- None

III. Organizational Structure of Materials Management System
Top Materials Management Executive- Assistant Administrator
Reports to- Administrator
Functions Performed- Purchasing, Distribution, Inventory Control, Receiving, General Stores
IV. **Inventory Control System**

Type- Cardex

ABC Analysis Used- No

EOQ Theory Used- No

Perpetual Inventory Used- Yes

V. **Materials Handling and Distribution**

Nursing Stations- Exchange Cart

Other Major Departments- Requisition

VI. **Centralized Purchasing**

P.O.'s Issued by Purchasing/Materials Office- Yes

Role of Purchasing/Materials Management in Acquisition of Principal Types of Goods

No Role- Dietary, Housekeeping, Maintenance, Pharmacy

Minimal to Major Role: Linen, Laboratory, Medical/Surgical Supplies, Radiology, Business Office

VII. **Use of Indices to Control Materials Management Effectiveness**

Indices to Monitor Performance- None Used

Index Used to Track Changes in Cost- No

Periodic Reports Submitted to Administration- No

Follow-up Action Required by Administration- N/A
VIII. Group Purchasing

Membership in Which Group(s) - Local Metro Group
Foresee More/Less Group Purchasing - More

IX. Purchasing/Materials Management Computerized Information System

Utilize Computerized Information System - No
Should Computer Have More Use - Yes
Utilize Automated Entry System - No

X. Product/Standardization Committee

Established - No
Role of Materials Manager - N/A
Effectiveness of Committee - N/A

XI. Value Analysis

Utilize Value Analysis - No

XII. Narrative

The top purchasing executive at this hospital has the title of Assistant Administrator. In addition to Purchasing he has other hospital administrative functions. The major problem mentioned was the overall control. He does not believe that the materials management department has adequate authority to deal with such issues as brand selection; physicians as well as nursing service exercise too much control in this area. Another problem area
mentioned is the low level of the expertise of personnel in the materials management area. For example, he would like to institute a computerized inventory control system but feels that the personnel who work in Purchasing would be so resistant to this change that it might not be worth the effort to do so.

There is a low degree of centralization of the materials management function at this hospital. Dietary, Housekeeping, Maintenance, and Pharmacy do their own purchasing; however, all purchase orders are issued and written by the Purchasing Department. There is not a Product Evaluation Committee, but the top materials management executive believes that problems relating to new products are handled adequately in an informal way through his office. For example, if a salesperson desires to introduce a user department to a new product then the top purchasing executive will "screen" the product and then coordinate the introduction of the product to the necessary department head.

The top materials management executive believes there are possibly some problems with lost charges but is not entirely sure because he did not have an adequate information system to give him the hard
facts for determining it. Overall, the Assistant Administrator judges his materials management systems somewhat "antiquated" and he lacks the authority and means to update the system.

Hospital-PS₄

I. Institutional Characteristics

Service- General
Ownership- Corporation
Classification Codes- 0, 1, 2, 3, 4

II. Top Materials Management Executive Profile

Education- 2 yrs. College
Experience- 2-5 yrs.
Age- Less than 35
Present Salary- Less than 12,000
Membership in Professional Organization(s)- THA- Texas Society of Hospital Purchasing Managers

III. Organizational Structure of Materials Management System

Top Materials Management Executive- Central Service Supervisor
Reports to- Administrator
Functions Performed- Purchasing Distribution
Inventory Control
Receiving
General Stores
Central Supply
Property Management
IV. **Inventory Control System**

Type- Cardex

ABC Analysis Used- No

EOQ Theory Used- No

Perpetual Inventory Used- No

V. **Materials Handling and Distribution**

Nursing Service- Requisition

By Other Major Departments- Requisition

VI. **Centralized Purchasing**

P.O.'s Issued by Purchasing/Materials Office- Yes

Role of Purchasing/Materials Management in Acquisition of Principal Types of Goods

No Role- Dietary, Linen, Pharmacy, X-ray

Minimal to Major Role: Housekeeping, Maintenance, Laboratory, Medical/Surgical Supplies, Business Office

VII. **Use of Indices to Control Materials Management Effectiveness**

Indices to Monitor Performance- None

Index Used to Track Changes in Cost- No

Periodic Reports Submitted to Administration- No

(Prepares reports on occasion for Administrator)

Follow-up Action Required by Administration- N/A

VIII. **Group Purchasing**

Membership in Which Group(s)- Yes, Regional Group

Foresee More/Less Group Purchasing- More
IX. Purchasing/Materials Management Computerized Information System

Utilize Computerized Information System- No
Should Computer Have More Use- Yes
Utilize Automated Entry System- No

X. Product/Standardization Committee

Established- No
Role of Materials Manager- N/A
Effectiveness of Committee- N/A

XI. Value Analysis

Utilize Value Analysis- No

XII. Narrative

The top purchasing executive at this hospital is titled central supply supervisor. Interestingly, the central supply supervisor reports to the Administrator rather than the Director of Nursing which is more common when the Central Supply Supervisor is the Purchasing Agent. Although the title indicates that the only items stocked would be medical/surgical, this is not the case. In addition to medical/surgical supplies, items for housekeeping and maintenance are also stocked. The purchasing department exercises no role in the acquisition of products for Dietary, Linen, Pharmacy, and Radiology. The top purchasing executive does
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some statistical reporting when requested by the Administrator but does not routinely monitor certain indices to evaluate the department's effectiveness.

There is no Product Evaluation Committee in existence; the evaluation of new products is done on an informal basis between the Central Supply supervisor and the user department heads.

One of the main problems listed by the Central Supply supervisor is the lack of a proper amount of staffing for the purchasing function. Another problem area mentioned is the lack of cooperation from the user departments; she believes that the physicians and user departments have too much control over the purchasing function. The last major problem area mentioned is the lack of an adequate amount of space for inventory storage; the inventory for Central Supply is stored in three different areas which makes control somewhat more difficult. Overall, this hospital's materials management system is decentralized with several departments performing their own materials management functions.

Hospital-PM1

I. Institutional Characteristics

Service- General
Ownership - Partnership
Classification Codes - 0, 1, 2, 4

II. Top Materials Management Executive Profile
Education - Non-degreed
Experience - 5 - 15 yrs.
Age - Less than 35
Present Salary - 20,000 - 25,000
Membership in Professional Organization(s) - THA - Texas Society of Hospital Purchasing Managers

III. Organizational Structure of Materials Management System
Top Materials Management Executive - Materials Manager
Reports to - Administrator
Functions Performed - Purchasing, Distribution, Inventory Control, Receiving, General Stores, Central Supply, Surplus/Scrap Disposal, Property Management

IV. Inventory Control System
Type - Cardex
ABC Analysis Used - No
EOQ Theory Used - No
Perpetual Inventory Used - Yes

V. Materials Handling and Distribution
Nursing Service - PAR
By Other Major Departments - PAR
VI. Centralized Purchasing

P.O.'s Issued by Purchasing/Materials Office- Yes

Role of Purchasing/Materials Management in Acquisition of Principal Types of Goods

No Role- Pharmacy

Minimal to Major Role: Dietary, Housekeeping, Linen, Laboratory, Maintenance, Radiology, Medical/Surgical, Business Office

VII. Use of Indices to Control Materials Management Effectiveness

Indices to Monitor Performance-

Inventory turnover rate
Inventory per available bed
Inventory per occupied bed

Index Used to Track Changes in Cost- No

Periodic Reports Submitted to Administration- Yes

Follow-up Action Required by Administration- Yes

VIII. Group Purchasing

Membership in Which Group(s)- Yes (Only management contract group)

Foresee More/Less Group Purchasing- N/A

Other Benefits than Price- N/A

IX. Purchasing/Materials Management Computerized Information System

Utilize Computerized Information System- No

Should Computer Have More Use- Yes

Utilize Automated Entry System- Yes
X. **Product/Standardization Committee**

Established- No

Role of Materials Manager- N/A

Effectiveness of Committee- N/A

XI. **Value Analysis**

Utilize Value Analysis- No

XII. **Narrative**

This materials management department has very strong leadership at the top. The hospital is managed by a management contract group and the materials manager, because of her expertise in the Materials Management area, consults with other hospitals within the group. There is strong emphasis on tight control of stock levels. In fact, she made an interesting comment with respect to the amount of storage area available. She does not want surplus storage area because if there is available storage area, then she believes that inventory levels will be increased to fill the area. With regard to tracking price change, she is not too concerned about this area because of the large number of items on contract which reduce the number of price changes which occur during the life of contract. This materials manager has developed a very good system for accounting for patient chargeable
items. She has named it the "tag-it" system and has implemented it in several of the management group's hospitals.

Although the hospital utilizes a PAR transfer system, the materials manager believes that the exchange cart system is the best method. An exchange cart system is not used at this hospital because there is not enough room on the units to accommodate the carts. A manual cardex inventory control system is used but the materials manager does feel that an automated system would be beneficial. The materials manager states that she does not believe that a Product Evaluation Committee is necessary at her hospital because of the good rapport which exists between the user departments and the materials manager.

A function that this materials manager performs which is normally not included within most purchasing departments is the processing of accounts payable invoices. Normally this function is accomplished within the accounting department of the Business Office. She stated that a comparative analysis of prices revealed that no economic advantage would occur by joining the local metro-shared purchasing group.
I. Institutional Characteristics

Service- General
Ownership- Corporation
Classification Codes- 0, 1, 2, 3, 4

II. Top Materials Management Executive Profile

Education- Non-degreed
Experience- 5- 15 yrs.
Age- 35- 50
Present Salary- 20,000- 25,000
Membership in Professional Organization(s)- IMMS

III. Organizational Structure of Materials Management System

Top Materials Management Executive- Materials Manager
Reports to- Administrator
Functions Performed- Purchasing, Distribution, Inventory Control, Receiving, General Stores

IV. Inventory Control System

Type- Cardex
ABC Analysis Used- No
EOQ Theory Used- Modified
Perpetual Inventory Used- Yes
V. Materials Handling and Distribution

Nursing Service—Dual System—PAR and Exchange Cart
By Other Major Departments—Requisition

VI. Centralized Purchasing

P.O.'s Issued by Purchasing/Materials Office—No
No Role—Pharmacy

Minimal to Major Role: Dietary, Housekeeping, Linen, Laboratory, Maintenance, Medical/Surgical, Radiology, Business Office

VII. Use of Indices to Control Materials Management Effectiveness

Indices to Monitor Performance—

Activity Reports such as workload reports, number of P.O.'s issued, number of requisitions, comparison of workload, etc.

Index Used to Track Changes in Cost—No
Periodic Reports Submitted to Administration—No
Follow-up Action Required by Administration—N/A

VIII. Group Purchasing

Membership in Which Group(s)—Metropolitan Group
Foresee More/Less Group Purchasing—More

IX. Purchasing/Materials Management Computerized Information System

Utilize Computerized Information System—No
Should Computer Have More Use- Yes
Utilize Automated Entry System- No

X. **Product/Standardization Committee**
   Established- Yes
   Role of Materials Manager- Chairperson
   Effectiveness of Committee- Fair

XI. **Value Analysis**
   Utilize Value Analysis- No

XII. **Narrative**

The Purchasing Agent has been at this hospital for only a short time. He was a materials manager in a Northeastern state and indicates that he was truly a "materials manager" at his previous job but that this is not the case at this institution. He said that the previous Purchasing Agent at this hospital was no more than an "order taker" and that the use of the materials management concept is apparently much more prevalent in the Northeastern states than this region of the country.

He believes that his major goal at this hospital is to develop a program to implement the concept at this facility. He questioned whether the Administrator had a firm idea of the meaning of the materials management concept but felt that the Chief
Executive Officer would support its implementation. The Purchasing Agent states that his corporate headquarters has national contracts, but that they do not force the various member hospitals to buy under these contracts. They merely request that they purchase under these contracts whenever possible. This is an example of the "decentralized" type control utilized by the corporation.

The distribution system is dual in nature with chargeable items being issued by Central Supply via exchange cart and non-chargeable items being issued by General Stores via the requisition method. The Purchasing Agent states that one of his major priorities is to consolidate both chargeable and non-chargeable items into a General Stores area and utilize an Exchange cart system to distribute them to the user areas. Other major problem areas that the Purchasing Agent mentioned are: lack of adequate storage area, stock-outs, the proper rapport with nursing service and maintenance of an adequate inventory.

Hospital-PM3

I. Institutional Characteristics

Service- General Osteopathic
Ownership- Corporation
Classification Codes- 0, 1, 2, 4

II. **Top Materials Management Executive Profile**

   Education- Non-degreed
   Experience- Less than 2 yrs.
   Age- Less than 35
   Present Salary- Less than 12,000
   Membership in Professional Organization(s)- None

III. **Organizational Structure of Materials Management System**

   Top Materials Management- Central Supply Supervisor
   Reports to- Nursing Director
   Functions Performed- Purchasing
                           Distribution
                           Inventory Control
                           Receiving
                           General Stores
                           Central Supply

IV. **Inventory Control System**

   Type- Visual
   ABC Analysis Used- No
   EOQ Theory Used- No
   Perpetual Inventory Used- No

V. **Materials Handling and Distribution**

   Nursing Stations- PAR
   By Other Major Departments- Requisition
VI. Centralized Purchasing

P.O.'s Issued by Purchasing/Materials Office- No

Role of Purchasing/Materials Management in Acquisition of Principal Types of Goods

No Role- Dietary, Business Office, Laboratory Maintenance, Pharmacy, X-ray, Respiratory Therapy

Minimal to Major Role: Housekeeping, Medical/Surgical, Laundry

VII. Use of Indices to Control Materials Management Effectiveness

Indices to Monitor Performance- Inventory Turnover Rate, Purchase Cost per Purchase Order Issued

Index Used to Track Changes in Cost- No

Periodic Reports Submitted to Administration- No

Follow-up Action Required by Administration- No

VIII. Group Purchasing

Membership in Which Group(s)- Metropolitan Group

Foresee More/Less Group Purchasing- Less

IX. Purchasing/Materials Management Computerized Information System

Utilize Computerized Information System- No

Should Computer Have More Use- No

Utilize Automated Entry System- No

X. Product/Standardization Committee

Established- Yes

Role of Materials Manager- No Role

Effectiveness of Committee- Fair
XI. Value Analysis

Utilize Value Analysis - No

XII. Narrative

Overall, the materials management concept has not developed to a great extent at this hospital as shown, demonstrated by the fact that Pharmacy, Dietary, Maintenance, Laboratory, X-ray, Respiratory Therapy, and the Business Office are allowed to issue their own purchase orders. This is an excellent example of a hospital where the purchasing function is widely dispersed throughout the organization and the user performs the various materials management functions at the department level. Basically, the only centralized purchasing that is done occurs in Nursing Service whereby the Central Supply supervisor purchases materials for Nursing Service.

There does appear to be adequate control over medical/surgical supplies in that the Central Supply supervisor (Purchasing Agent) does utilize a PAR level transfer system and does occasionally check floor stocks for stockpiling, obsolescence, and waste. However, even with the PAR level transfer system in use, it appears that the user controls their own inventory levels. There is very little interest in utilizing a computerized information system in
purchasing. Even though they are members of the local metropolitan purchasing group, they are minimally involved and indicate that they foresee purchasing less through the group.

The central supply supervisor is not familiar with the materials management concept and her only background is in central supply; she therefore would not be very familiar with the material requirements of other departments.

**Hospital-PL**

I. **Institutional Characteristics**
   
   Service- General
   
   Ownership- Corporation
   
   Classification Codes- 0, 1, 2, 4

II. **Top Materials Management Executive Profile**
   
   Education- Non-degreed
   
   Experience- 15 yrs. up
   
   Age- 35- 50 yrs.
   
   Present Salary- 16,000- 19,999

   Membership in Professional Organization(s)- NAHPM THA- Texas Society of Hospital Purchasing Managers

III. **Organizational Structure of Materials Management System**
   
   Top Materials Management Executive- Materials Manager
Reports to- Controller

Functions Performed- Purchasing
Inventory Control
Distribution
Scrap/Surplus Disposal
Property Management
General Stores

IV. Inventory Control System
Type- Computerized
ABC Analysis Used- Yes
EOQ Theory Used- Yes
Perpetual Inventory Used- Yes

V. Materials Handling and Distribution
Nursing Service- Exchange Cart and PAR
By Other Major Departments- Requisition

VI. Centralized Purchasing
P.O.'s Issued by Purchasing/Materials Office- No
Role of Purchasing/Materials Management in Acquisition of Principal Types of Goods
No Role- Laboratory and Pharmacy
Minimal to Major Role: Dietary, Business Office, Housekeeping, Linen, Maintenance, Medical/Surgical, Radiology

VII. Use of Indices to Control Materials Management Effectiveness
Indices to Monitor Performance-
Purchasing cost/$1000 of procurement
Inventory per bed
Inventory turnover rate
Purchasing cost per P.O. issued
Dollar volume of inventory
Price/Volume report

Index Used to Track Changes in Cost - Yes
Periodic Reports Submitted to Administration - Yes
Follow-up Action Required by Administration - Yes

VIII. Group Purchasing

Membership in Which Group(s) - Corporate buying program and local Metro buying group

Foresee More/Less Group Purchasing - Less

IX. Purchasing/Materials Management Computerized Information System

Utilize Computerized Information System - Yes
Should Computer Have More Use - Yes
Utilize Automated Entry System - Yes

X. Product/Standardization Committee

Established - Yes
Role of Materials Manager - Chairperson
Effectiveness of Committee - Fair

XI. Value Analysis

Utilize Value Analysis - Yes

XII. Narrative

This proprietary hospital is owned by one of the major hospital chains which is noted for its highly centralized operation. This centralization is demonstrated in materials management by the fact
that rigid goals and standards are set by the corporate office located in another state. A very sophisticated centralized computerized information system is used to monitor the activities of the material management function in an on-going manner. If there are any deviations from standard stock levels, then the materials management department is questioned as to the reason for the deviation.

The materials management department must live within the corporately derived standards and the materials manager must operate rigidly by a set of procedures developed by the corporate office. For example, the hospital purchases items that are on a national contract and no items may be purchased outside the corporate national contracts (even at a lower price) except for very extenuating circumstances. In addition, no new products may be added to the storeroom unless they are justified before the Product Evaluation Committee utilizing a twelve step criterion method.

The Materials Manager judges the effectiveness of the Product Evaluation Committee as fair. The Materials Manager states that his major problem area is control over inventory during the time the department is closed and also the fact that
supplies that are lost and unaccounted for from the carts which are delivered to the Nursing Stations. The emphasis of the hospital on control of inventory was accentuated by the fact that the materials manager reports to the controller rather than the Administrator or Assistant Administrator which was the usual case in other hospitals visited.

Another unique fact is that a separate unit, called patient chargeable items, is controlled and distributed properly. The Materials Manager believes that the materials management function should be centralized to a greater extent; the materials manager exercises no control in the purchase of pharmaceutical and laboratory supplies.

Hospital-PL_2

I. Institutional Characteristics
Service- General
Ownership- Corporation
Classification Codes- 0, 1, 2, 4

II. Top Materials Management Executive Profile
Education- Non-degreed
Experience- 5-15 yrs.
Age- Less than 35
Present Salary- 20,000-25,000
Membership in Professional Organization(s) - IMMS
THA - Texas Society of Hospital Purchasing Managers

III. Organizational Structure of Materials Management System

Top Materials Management Executive - Materials Manager

Reports to - Assistant Administrator

Functions Performed - Purchasing, Distribution, Inventory Control, Receiving, General Stores, Central Supply, Surplus/Scrap Disposal, Property Management, Copying

IV. Inventory Control System

Type - Computerized

ABC Analysis Used - Yes

EOQ Theory Used - No

Perpetual Inventory Used - No

V. Materials Handling and Distribution

Nursing Service - PAR

By Other Major Departments - Requisition

VI. Centralized Purchasing

P.O.'s Issued by Purchasing/Materials Office - No

Role of Purchasing/Materials Management in Acquisition of Principal Types of Goods

No Role - Dietary and Pharmacy
Minimal to Major Role: Housekeeping, Linen, Laboratory, Maintenance, Medical/Surgical Supplies, X-ray, Business Office

VII. **Use of Indices to Control Materials Management Effectiveness**

Indices to Monitor Performance-

- Inventory per bed
- Inventory turnover rate
- Dollar volume of inventory
- Price/volume report

Index Used to Track Changes in Cost- Yes

Periodic Reports Submitted to Administration- Yes

Follow-up Action Required by Administration- Yes

VIII. **Group Purchasing**

Membership in Which Group(s)- Corporate buying group

Foresee More/Less Group Purchasing- Same

IX. **Purchasing/Materials Management Computerized Information System**

Utilize Computerized Information System- Yes

Should Computer Have More Use- No

Utilize Automated Entry System- Yes

X. **Product/Standardization Committee**

Established- Yes

Role of Materials Manager- Chairperson

Effectiveness of Committee- Fair

XI. **Value Analysis**

Utilize Value Analysis- Yes
XII. Narrative

This hospital is an affiliate of a major multi-unit chain. The Materials Manager seems highly qualified for his position as Materials Manager. Although non-degreed, he plans to start work on his degree very soon. In addition to working for another hospital proprietary group, he has served as the Inventory Control Specialist on the corporate level prior to becoming a Materials Manager. In discussing his future, he contemplated doing some consulting work at some point in the future.

An interesting observation is that the Materials Manager did not feel that they needed to have their inventory control function automated; he states that he would prefer to have an extra worker in lieu of utilizing the automated inventory control or possibly the acquisition of a small in-house computer would be more desirable than the time-sharing system in use. He believes the turn-around time required to receive the inventory updating is too long for maximum benefit.

A very impressive patient charge system is used at the nursing stations. Each unit nurse is required to specifically account for charges that were not made for items issued through General Stores. A
The major problem area mentioned is the lack of adequate storage space. A label transfer system is used for patient charges.

The Materials Manager states that approximately 95 per cent of items purchased are on contract. The Materials Manager is Chairman of the Products Evaluation Committee but rated its effectiveness as only fair and expressed the opinion that the committee's work was mainly a "whitewash."

Hospital-PL3

I. Institutional Characteristics

Service- General
Ownership- Corporation
Classification Codes- 0, 1, 2, 3, 4

II. Top Materials Management Executive Profile

Education- Non-degreed
Experience- 5-15 yrs.
Age- 35-50 yrs.
Present Salary- 20,000-25,000

Membership in Professional Organization(s)- THA- Texas Society of Hospital Purchasing Management

III. Organization Structure of Materials Management System

Top Materials Management Executive- Materials Manager
Reports to- Controller

Functions Performed- Purchasing
Distribution
Inventory Control
Receiving
General Stores
Surplus/Scrap Disposal
Printshop
Property Management
Copying

IV. Inventory Control System
Type- Traveling Requisition and Cardex
ABC Analysis Used- Yes
EOQ Theory Used- Yes
Perpetual Inventory Used- No

V. Materials Handling and Distribution
Nursing Stations- Exchange Cart
By Other Major Departments- Requisition

VI. Centralized Purchasing
P.O.'s Issued by Purchasing/Materials Office- No

Role of Purchasing/Materials Management in Acquisition of Principal Types of Goods
No Role- Dietary, Pharmacy
Minimal to Major Role: Housekeeping, Linen, Laboratory, Maintenance, Medical/Surgical Supplies, X-ray, Business Office

VII. Use of Indices to Control Materials Management
Indices to Monitor Performance- Inventory per bed
Index Used to Track Changes in Cost- Yes
Periodic Reports Submitted to Administration- Yes
Follow-up Action Required by Administration- Yes

VIII. Group Purchasing
Membership in Which Group(s)- Corporate Buying Group
Foresee More/Less Group Purchasing- More

IX. Purchasing/Materials Management Computerized Information System
Utilize Computerized Information System- No
Should Computer Have More Use- Yes
Utilize Automated Entry System- Yes

X. Product/Standardization Committee
Established- No
Role of Materials Manager- N/A
Effectiveness of Committee- N/A

XI. Value Analysis
Utilize Value Analysis- Yes

XII. Narrative
This proprietary hospital is part of a multi-unit chain which is renowned for its excellence. The Materials Manager has worked in two previous health care institutions and states that this particular chain has the best materials management system that he has utilized. The hospital uses American Hospital Supply's ASAP System, which is a prime-vendor
automated order-entry system. The Materials Manager stated that his predecessor had not been able to institute the Exchange Cart System but that he has been able to successfully implement the system. He thought the successful implementation resulted primarily from the development of a pre-listed sheet of entries and par levels that were compiled by the user department. By involving them in the change process, the exchange cart system was successfully implemented.

In addition, he is looking forward to implementing a computerized inventory control system but stated that the corporation did not anticipate implementing this system for about five years. He indicates that it would be very helpful in his work. The computerized system would be very helpful because of the large number of items (approximately 1700) stocked in General Stores. Central Sterile Supply is a very small department because all that is done is actual sterilization activities with no distribution or inventory control activities completed. The major problem area mentioned was the large amount of paperwork required by upper management; he stated that approximately four to five days a month were required just to do the paperwork.
The policy of centralized purchasing is explicitly stated in the following statement to all vendors who call on the hospital: "Purchasing is centralized under the Materials Management Department with the exception of pharmaceutical and dietary food products." The materials manager stated that the department is expected to formally formulate goals and present them to Administration.

Summary

In this chapter, materials management practices followed in each of the thirty hospitals have been presented in individual case studies. The sample size was based upon a population of ninety acute care hospitals in the nineteen county North Central Texas area. The top purchasing executive or his representative was interviewed following a standard format. Sections I and II of each outline contained information about the particular hospital and a profit of the top purchasing executive. Sections III through XI contained certain information concerning the material management activities and policies of the hospitals. Section XII provided a deviation from the structural format used in the first eleven sections of the outline, and allowed the interviewees an opportunity to provide appropriate information taken from their experiences.
In Chapter IV, practices in the individual hospitals will be classified, compared and organized by bed size, type of ownership, and other variables.
CHAPTER BIBLIOGRAPHY

CHAPTER IV

COMPARATIVE ANALYSIS OF MATERIALS MANAGEMENT PRACTICES

In Chapter III, individual materials management practices in the thirty study hospitals were presented as case studies. In this chapter, selected materials management practices are compared according to groupings based upon hospital size and ownership classifications as well as an overall comparison. Table II is a summary of the distribution pattern of hospitals by groupings that are to be compared.

<table>
<thead>
<tr>
<th>Size</th>
<th>Voluntary</th>
<th>Governmental</th>
<th>Proprietary</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-100 Beds</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>101-200 Beds</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>201-up Beds</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>Total</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>30</td>
</tr>
</tbody>
</table>
Finally, an overall tabulation of practices followed by all of the thirty hospitals as a group will be accomplished to make comparisons and note any significant patterns which might exist. Also, a comparison of the materials management scores will be accomplished using a descriptive statistical method.

**Practices in Governmental Hospitals, 1-100 Beds**

Three hospitals fall within this category as shown in Table III.

**Organizational Structure**

In none of these hospitals does the top purchasing executive have the title of materials manager. Two of them are titled Purchasing Agent and the other is titled Central Supply Supervisor. Two of the top purchasing executives report to the Director of Nursing and the other to the Administrator. This would possibly seem to indicate that the previously described "technical" emphasis exists in GS\(_1\) and GS\(_3\) whereas the "economic" emphasis exists in GS\(_2\). Using Ammer's definition of a materials management organization existing when the Purchasing, Central Supply, and General Store are integrated, GS\(_1\) is the only one out the three which fits this criterion. It seems that the distinction between Central Supply and General Stores is nebulous in some cases. Apparently, as in the case of GS\(_1\), the General Stores function has not been organized to take care
of supplies for the user departments other than Nursing Service. For example, in GS₁, there is a centralized location where each user department has an area to store his/her supplies. The Central Supply Supervisor in GS₁ does stock some items used by departments other than Nursing Service; however, this occurs only when the department head requests it and is, therefore, not a standard operating procedure.

**Inventory Control System**

Of the three hospitals only GS₃ has an inventory control system which is considered adequate from a materials management perspective. GS₁ and GS₂ utilize a visual method for ascertaining stock levels and does not provide for an adequate method for controlling stock levels. The cardex system, if strictly maintained does provide for a better method of control. None of the hospitals use any type of quantitative technique to control the proper stock levels or to determine the reorder point. Also, none of the hospitals utilize a perpetual inventory.

**Distribution System**

These three hospitals exhibit a rather unsophisticated distribution system. GS₂ displays the most centrally controlled system by using a PAR level approach which allows for decreased user control. The least complex of the three is GS₁, where most non-nursing service supplies are delivered
<table>
<thead>
<tr>
<th>Hospital</th>
<th>Organizational Structure</th>
<th>Inventory Control System</th>
<th>Distribution</th>
<th>Indices Used and Information System</th>
</tr>
</thead>
<tbody>
<tr>
<td>GS1</td>
<td>Central Supply Supervisor</td>
<td>Type: Visual</td>
<td>Nursing Service: Requisition</td>
<td>Indices Used: None</td>
</tr>
<tr>
<td></td>
<td>Reports to: Director of Nursing</td>
<td>ABC Used: No</td>
<td>Other Departments: Received Directly from Vendor</td>
<td>Use Computer: No</td>
</tr>
<tr>
<td></td>
<td>Functions: Purchasing</td>
<td>EQQ Used: No</td>
<td></td>
<td>Use Automated Entry: No</td>
</tr>
<tr>
<td></td>
<td>Receiving</td>
<td>Perpetual: No</td>
<td></td>
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*Materials Management
to the user department directly rather than being stored by Purchasing in General Stores prior to distribution.

Indices Used and Information System

No formal indices are used by any of the hospitals in this category. There is apparently no attempt by any of these hospitals' top purchasing executives or their immediate supervisors to develop indices to monitor materials management effectiveness.

The use of any sort of computerized information system is non-existent. Furthermore, there are no existing plans to develop such a system. No automated entry system is used by any of the three hospitals. Only the top purchasing executive of GS\textsubscript{3}, a very small hospital, has some reservations about using a computerized information system in the materials management area.

Practices in Governmental Hospitals, 101-200 Beds

Three hospitals fall within this category as shown in Table IV.

Organizational Structure

In this group, only the top Purchasing executive of GM\textsubscript{1} reports directly to the Administrator; however, the top Purchasing executive of GM\textsubscript{2} indicates that in most cases he has a direct line to the Administrator even though he formally reports to the Assistant Administrator. GM\textsubscript{2}
is the only hospital of the three which utilize Ammer's material management model by having the Central Supply Supervisor report to the Purchasing Agent. In GM₁ the Central Supply function is under the direction of the Pharmacists; the organizational alignment would appear to present the same problems as in the case of Central Supply reporting to Nursing Service. Interestingly, the top Purchasing executive in GM₃ has the title of Assistant Administrator but does not have the Central Supply function; however, the top Purchasing executive in GM₁ has the title of Director of Purchasing but does have the Central Supply function as well as a number of other materials management related functions. This comparison points out the fact that the title of the top purchasing agent is not always an indicator of the functions actually performed.

**Inventory Control System**

In comparing the three inventory control systems GM₃ has the least sophisticated system from a control standpoint; GM₃ utilizes a visual method for ascertaining inventory control levels. The use of ABC analysis is absent in each hospital. GM₁ utilizes a modified EOQ method in that maximum and minimum levels are calculated for each stock item in General Stores with the reorder point of the minimum being used to stock approximately a thirty days' supply. Neither GM₂ nor GM₃ uses EOQ theory in any manner. The three top purchasing executives
unanimously indicated that their inventory control system did not extend to the user level. No attempt was apparently made to control stock levels at the user levels.

**Distribution System**

$\text{GM}_1$ utilizes an individual requisition method of distributing medical-surgical supplies whereas $\text{GM}_2$ and $\text{GM}_3$ utilize basically a PAR and exchange cart method respectively. However, $\text{GM}_2$ does not use a "pure" PAR system exclusively because individual requisitions are utilized to a certain degree in the distribution of medical-surgical supplies. $\text{GM}_3$ uses an exchange cart system exclusively to distribute medical-surgical supplies to Nursing Stations; these carts are filled and exchanged every twenty-four hours by Central Supply. This exchange cart system was initiated when the newly opened hospital was occupied.

In all three hospitals both surgical and non-surgical supplies are distributed to all non-nursing service departments by the individual requisition method.

**Indices Used and Information System**

The use of performance indicators is absent in each of the hospitals in this category. Also none of the hospitals utilizes any method of computer application. None of the orders placed by any of the sample hospitals is computer-assisted. However, $\text{GM}_1$ does indicate that they are planning to use an automated entry system to a prime
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*Materials Management*
### TABLE IV--Continued

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</table>

*Materials Management*
vendor within the next few months. All top purchasing executives indicate that they believe that the computer should be used to a much greater extent although the top purchasing executive of GM₃ states that he is not familiar enough with computer application to comment intelligently on the subject.

Practices in Governmental Hospitals, 201-Up Beds

Four hospitals fall within this category as shown in Table V.

Organizational Structure

GL₄ is the only hospital which has its top purchasing executive titled Materials Manager; the other three hospital's top purchasing executives are titled either Director of Purchasing or Purchasing Agent. Predictably, the organizational structure of GL₄ contains all of those functions including both Central Supply and General Store, which are generally associated with the materials management concept. The top purchasing executive of GH₄ is educationally the best qualified of all interviewed and his complete understanding of the materials concept along with a cooperative administrative staff creates probably the most effective structure studies. Each of the top purchasing executives reported to an administrative staff member who is lower in rank than the Chief Executive Officer; this is what would be
expected based upon the increased size of this category of hospital.

**Inventory Control System**

One half of these hospitals utilize a computerized inventory system and the other half use a manual cardex system. GL\(_2\) probably has the most controlled inventory management system for the supplies managed in the General Stores location. However, the Director of purchasing indicates that this tight control is diminished when the supplies are transferred to the Central Supply department because of the distribution system from that point forward. She believes that this weakness in the system points to the efficacy of utilizing a materials management structure which would include Purchasing, Central Supply, and General Stores in the same organizational line. In GL\(_2\) she believes that when the present Central Supply supervisor retires that the material management concept will be more closely followed. ABC analysis is utilized only by GL\(_4\) which is possibly predictable from the standpoint of the educational level of the Top Purchasing Executive. EOQ theory is used by 50 per cent of the sample hospitals and each of the four hospitals indicates that a perpetual inventory is maintained for all supplies in the General Store area. In only one hospital, GL\(_3\), is the physical inventory extended to the user department.
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*M*Materials Management
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*Materials Management
**Distribution System**

Three out of the four hospitals use either a PAR or Exchange method of distribution. The hospital that does not, GL₁, uses the requisition method of distribution.

For distribution of medical-surgical and other classifications of supplies to non-nursing areas of the hospital, all health care facilities use the requisition method of distribution.

**Indices Used and Information System**

All hospitals in this category use various indices to monitor the performance of the materials management system. The most commonly used performance indicators among the four hospitals studied are Inventory Turnover Rate and Dollar Volume of Inventory. In addition, each hospital periodically submits routine performance reports to administration. The administrative supervisor of each top purchasing executive except GL₁ required follow-up action based upon the reports submitted. GL₁ is the only hospital which does not use an automated entry system for placing orders. GL₁ and GL₄ do not use a computerized information system to any degree. However, both top purchasing executives of these hospitals indicate that they plan to institute some degree of automation in the near future. In fact, the GL₄ Materials Manager indicates that the necessary computer tape drive units have been ordered
for the in-house unit and as soon as they arrive, the inventory will be automated. Each top purchasing executive indicates that the computer should be utilized to the greatest extent possible.

Practices in Voluntary Hospitals, 1-100 Beds

Three hospitals fall within this category as shown in Table VI.

Organizational Structure

The wide variance in the title of the top purchasing official in this group of hospitals is from Purchasing Clerk to Assistant Administrator; the third hospital, VS₃, has the top Purchasing executive with the title of Director of Materials Management. VS₂ and VS₃ hospitals' top purchasing executives report to the Administrator and the third top purchasing executive reports to the Business Manager. VS₂ and VS₃ have integrated several functions, including Purchasing, General Stores, and the Storeroom, into the Materials Management Structure. The VS₂ top purchasing executive with the title Assistant Administrator initially commenced his work at this hospital as Purchasing Agent, and then his role was expanded to include the "typical" materials management functions.

Inventory Control System

VS₁ utilizes a visual inventory control system whereby the stock clerk periodically walks through the storeroom
<table>
<thead>
<tr>
<th>Hospital</th>
<th>Organizational Structure</th>
<th>Inventory Control System</th>
<th>Distribution</th>
<th>Indices Used and Information System</th>
</tr>
</thead>
<tbody>
<tr>
<td>VS₁</td>
<td>Top M- M* Executive: Purchasing Clerk</td>
<td>Type: Visual</td>
<td>Nursing Service: Exchange Cart</td>
<td>Indices Used: None</td>
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<tr>
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<td>Reports to: Business Manager</td>
<td>ABC Used: No</td>
<td>Other Departments: Requisition</td>
<td>Use Computer: No</td>
</tr>
<tr>
<td></td>
<td>Functions: Purchasing</td>
<td>EOQ Used: No</td>
<td></td>
<td>Use Automated Entry: No</td>
</tr>
<tr>
<td></td>
<td>Distribution</td>
<td>Perpetual: No</td>
<td></td>
<td>Feel Greater Use: Unknown</td>
</tr>
<tr>
<td></td>
<td>Inventory Control</td>
<td>Extend to User: Yes</td>
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<td></td>
<td>Receiving</td>
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<td>General Stores</td>
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<td>VS₂</td>
<td>Top M-M Executive: Assistant Administrator</td>
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<td>Reports to: Administrator</td>
<td>ABC Used: No</td>
<td>Other Departments: Requisition</td>
<td>Use Computer: No</td>
</tr>
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<td>Functions: Purchasing</td>
<td>EOQ Used: No</td>
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<td>Use Automated Entry: No</td>
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<td>Distribution</td>
<td>Perpetual: Yes</td>
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<td>Feel Greater Use: Yes</td>
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<td>Inventory Control</td>
<td>Extend to User: No</td>
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<td>Receiving</td>
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<td>Central Supply</td>
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<td></td>
<td>Scrap/ Surplus Disposal</td>
<td></td>
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<td>Printshop</td>
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*M: Materials Management
<table>
<thead>
<tr>
<th>Hospital</th>
<th>Organizational Structure</th>
<th>Inventory Control System</th>
<th>Distribution</th>
<th>Indices Used and Information System</th>
</tr>
</thead>
<tbody>
<tr>
<td>VS₃</td>
<td>Top M-M* Executive:</td>
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<td>Director of Materials</td>
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<td>Other Departments: Requisition</td>
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</tr>
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<td>Management</td>
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<td>Reports to: Administrator</td>
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<td>Functions:</td>
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<td>Purchasing</td>
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<td>Distribution</td>
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</tbody>
</table>

*Materials Management
and notes those items of stock which need to be ordered; the list is then used by the top purchasing executive to place orders for the needed supplies. A cardex system is used by both VS$_2$ and VS$_3$. Neither ABC analysis nor EOQ theory is used by any of the hospitals in this category. Both VS$_2$ and VS$_3$ indicate that they keep a perpetual inventory for the storeroom stock. Only VS$_1$ indicates that when a physical inventory is taken that it extends to the user department levels.

**Distribution System**

VS$_1$, the smallest hospital in this category, indicates that it uses an Exchange Cart system for distributing its medical-surgical supplies to the various Nursing Stations. Perhaps this method is used by this hospital because it has a very new facility which was designed to accommodate an exchange cart system. The other two hospitals, VS$_2$ and VS$_3$ use the requisition method of distribution. For areas other than Nursing Service, all distribution is done by means of requisition.

**Indices Used and Information System**

No indices are used to monitor materials management performance. None of the three hospitals uses a computerized information system or an automated order entry system. Hospital VS$_2$ and VS$_3$ indicate a greater need for computer application in various phases of materials management.
Practices in Voluntary Hospitals, 101-200 Beds

Four hospitals fall within this category as shown in Table VII.

Organizational Structure

In each of these sample hospitals some form of the title Purchasing Agent is used; it is interesting that none of the hospitals uses the materials manager title. However, two hospitals, VM\textsubscript{2} and VM\textsubscript{3} both have materials management-type structures in that Purchasing, Central Supply, and General Stores are all functionally integrated. Also, of possible noteworthiness is the fact that both VM\textsubscript{2} and VM\textsubscript{3} are osteopathic hospitals. The top purchasing executive in VM\textsubscript{3} indicates that the only differences that she has observed in terms of materials management practices is the fact that the accreditation standards in osteopathic hospitals are less stringent than those in alleopathic hospitals. She indicates the only area of possible significance for this is in Central Supply rules and procedures. In all cases but one and that is VM\textsubscript{4}, the top purchasing agent reports to the Chief Executive Officer of the hospital.

Inventory Control System

The three basic types of inventory control systems may be observed among the four hospitals in this category; these three types are visual in VM\textsubscript{2}, Cardex in VM\textsubscript{1} and VM\textsubscript{3}, and computerized in VM\textsubscript{4}. It may be concluded from this
<table>
<thead>
<tr>
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<th>Distribution</th>
<th>Indices Used and Information System</th>
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*M=Materials Management
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<th>Hospital</th>
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<th>Inventory Control System</th>
<th>Distribution</th>
<th>Indices Used and Information System</th>
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<td>VM₃</td>
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<td>and Requisition</td>
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<td>Other Departments:</td>
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<td>Requisition</td>
<td>Feel Greater Use: No</td>
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<td>Distribution</td>
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<td>VM₄</td>
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<td>and Requisition</td>
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<td>Requisition</td>
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<tr>
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<td>Distribution</td>
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<td>Inventory Control</td>
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<tr>
<td></td>
<td>General Stores</td>
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</tr>
</tbody>
</table>

*Materials Management
that good inventory accountability probably exists in hospitals \( VM_1, VM_3, \) and \( VM_4 \), with the poorest accountability existing in \( VM_2 \). Better use of quantitative techniques for inventory control is found in hospitals \( VM_1 \) and \( VM_2 \), where ABC analysis and EOQ theory techniques are used, whereas neither of these techniques are used in \( VM_2 \) and \( VM_3 \). The top purchasing executives in \( VM_1 \), \( VM_3 \), and \( VM_4 \) indicate that a perpetual inventory is maintained for most, if not all stock items. In all sample hospitals but \( VM_3 \), the annual or semi-annual physical inventory is extended to the individual user departments.

**Distribution System**

Among these sample hospitals there is a strong indication that a centralized distribution system exists due to the fact that each of the sample hospitals has some form of PAR or Exchange Cart in use. An interesting variation of the straight Exchange Cart system is found in \( VM_1 \) where the patient-chargeable supplies are distributed via the exchange cart method and the non-patient-chargeable items are distributed on a PAR basis only to the nursing units. In \( VM_3 \), all major types of distribution systems are used to distribute medical-surgical supplies to the nursing units. As found in the distribution of medical-surgical supplies to all other non-nursing areas
of the other study hospitals, the requisition method is used.

**Indices Used and Information System**

Indices are used, at least to a moderate degree by each hospital in this category. The $VM_2$ top purchasing executive indicates that performance indicators are used only to a very moderate degree to monitor materials management performance. Also $VM_2$ is the only hospital out of the group which is not required to submit periodic reports to administration. Only $VM_4$ uses a computerized information system. However, each of the remaining hospitals except $VM_3$ indicates that they feel that greater use of the computer should initiated. $VM_1$ is the only hospital which utilizes an automated order entry system.

**Practices in Voluntary Hospitals, 201-Up Beds**

Three hospitals fall within this category as shown in Table VIII.

**Organizational Structure**

The top purchasing executive for $VL_1$ is the only one in this group without the materials manager title. He is also the only one who does not have responsibility for the "typical" materials management structure which normally includes Central Supply which is integrated with Purchasing and General Stores. Surprisingly, the top Purchasing executives for $VL_1$, and $VL_2$ report directly to the Chief Executive
officer; this is atypical in that hospitals that are as large as these which normally report to second line administrative managers such as the top purchasing executive for VL\textsubscript{3} who reports to a vice-president. As is apparent in this category, the larger the hospital, the greater the number of functions supervised which are theoretically related to the materials management concept. For example, the top purchasing executive for VL\textsubscript{2} and VL\textsubscript{3} are responsible for ten and eleven "traditional" materials management functions, respectively, whereas the top purchasing executive for VL\textsubscript{1} has responsibility for only five functions.

**Inventory Control System**

One would expect each of these large-sized hospitals to utilize a computerized inventory; however, this is not the case. Only VL\textsubscript{3} uses an automated inventory control system. The other two hospitals, VL\textsubscript{1} and VL\textsubscript{2} utilize a manual cardex system. EOQ theory is used, at least to a minimal degree, by all three subject hospitals with VL\textsubscript{1} and VL\textsubscript{2} indicating that they used a modified form of EOQ modeling. ABC analysis is used only by VL\textsubscript{3}. Each hospital indicates that a perpetual inventory is maintained for accountability of stock. Only VL\textsubscript{3} extended the physical inventory to the user department stock.
Distribution System

There is no clear indication for a standard method for distributing medical-surgical supplies to nursing service. For example, VL₁ uses a PAR method for distribution, VL₂ uses a requisition method for distribution, and VL₃ uses Requisition, PAR and Exchange Cart methods for distribution. However, for distribution of medical-surgical and other commodities to non-nursing units, the requisition method for distribution is used by all hospitals in this category.

Indices Used and Information System

No indices are used by VL₁ to monitor materials management performance: the top purchasing executive indicates that he is more comfortable monitoring effectiveness in a more informal way as well as informally reporting on materials management activities to the Chief Executive Officer on a non-periodic basis. Only VL₃ uses a Computerized information system. The top purchasing executive of VL₂ indicates a strong desire to implement a computerized inventory system for the materials management area and states that it is one of the priority goals that she has. Only VL₃ utilizes an automated order entry system which is tied in with the hospital's prime vendor arrangement. Within this group two extremes in computer utilization and information system may be observed. For example, VL₁
### TABLE VIII
Materials Management Practices Followed by Individual Voluntary Hospitals, 201-Up Beds

<table>
<thead>
<tr>
<th>Hospital</th>
<th>Organizational Structure</th>
<th>Inventory Control System</th>
<th>Distribution</th>
<th>Indices Used and Information System</th>
</tr>
</thead>
<tbody>
<tr>
<td>VL₁</td>
<td>Top M-M* Executive:</td>
<td>Type: Cardex</td>
<td>Nursing Service:</td>
<td>Indices Used:</td>
</tr>
<tr>
<td></td>
<td>Reports to: Administrator</td>
<td>ABC Used: No</td>
<td>PAR</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>Functions:</td>
<td>EOQ Used: Modified</td>
<td>Other Departments:</td>
<td>Use Computer: No</td>
</tr>
<tr>
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<td>Purchasing</td>
<td>Perpetual: Yes</td>
<td>Requisition</td>
<td>Use Automated Entry: No</td>
</tr>
<tr>
<td></td>
<td>Distribution</td>
<td>Extend to User: No</td>
<td></td>
<td>Feel Greater Use: Uncertain</td>
</tr>
<tr>
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<td>Inventory Control</td>
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<td>General Stores</td>
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*Materials Management
<table>
<thead>
<tr>
<th>Hospital</th>
<th>Organizational Structure</th>
<th>Inventory Control System</th>
<th>Distribution</th>
<th>Indices Used and Information System</th>
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</thead>
<tbody>
<tr>
<td>VL3</td>
<td>Top M-M* Executive:</td>
<td>Type: Computerized</td>
<td>Nursing Service:</td>
<td>Indices Used:</td>
</tr>
<tr>
<td></td>
<td>Director of Materials</td>
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<td>Exchange Cart, FAR, and Requisition</td>
<td>Use Computer: Yes</td>
</tr>
<tr>
<td></td>
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<td>EOQ Used: Yes</td>
<td>Other Departments: Requisition</td>
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<td></td>
<td>Reports to:</td>
<td>Perpetual: Yes</td>
<td></td>
<td>Feel Greater Use: Yes</td>
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<td></td>
<td>Vice President</td>
<td>Extended to User: Yes</td>
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<td>Functions:</td>
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<td>Scrap/ Surplus Disposal</td>
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<td>Laundry</td>
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</tbody>
</table>

*Materials Management
utilizes no performance indicators and no computerization of any functions, whereas VL\textsubscript{3} utilizes not less than seven different performance indicators as well as using a very sophisticated computerized information system. There appears to be a relationship between the degree of computerization of materials management functions and the sophistication of the information system used by the materials management functions.

Practices in Proprietary Hospitals, 1-100 Beds

Four hospitals fall within this category as shown in Table IX.

Organizational Structure

There is a wide variety of titles for the top purchasing executives in this group. For example in PS\textsubscript{2}, which is a psychiatric hospital, the Accountant is the top purchasing executive who devotes approximately 10 per cent of her time to the materials management function. In PS\textsubscript{4}, the Central Supply Supervisor is the designated top purchasing executive; interestingly, the PS\textsubscript{4} Central Supply Supervisor reports to the Administrator rather than the Director of Nursing as is usually the case. PS\textsubscript{2} is the only hospital which does not have the "typical" materials management structure. In a hospital as small as PS\textsubscript{2} (below 50 beds), it is questionable, perhaps, whether the various functions should be as centralized as would be required by a "typical"
materials management structure which would include the integration of Purchasing, General Stores, and Central Supply. In a psychiatric hospital of this size, it may also be questionable as to whether the Central Supply function would be necessary in any case.

**Inventory Control System**

Because of the proprietary nature of the hospitals in this category, one would think that a strong inventory control system would exist in most of these hospitals. This, however is not the case. Only half of the hospitals in this category have fairly strong inventory control systems. PS1 and PS2 both utilize a visually-based inventory control system with PS2 even decentralizing this function to the user department. PS3 and PS4 both utilize a manual cardex system which is a stronger system than PS1 and PS2. No quantitative analytical techniques such as ABC analysis or EOQ theory are used in inventory control among any of the hospitals in this grouping. Perpetual inventories are maintained by PS1 and PS3 with PS2 and PS4 stating that this type of inventory accounting method is not used. In no cases did the physical inventory extend beyond the storeroom to the user areas.

**Distribution System**

Three out of the four hospitals utilize the requisition method of distribution; PS3 is the only sample that
uses an exchange cart system. In terms of the other non-nursing user areas of the hospital, all hospitals use the requisition method of distribution. Overall, then, there has been little apparent effort to centralize the user stock levels by instituting the more controlled PAR and Exchange Cart methods of physical distribution of supplies.

Indices Used and Information Systems

There appears to be the least degree in the use of performance indicators among members of this group as compared to other groups studied. None of the sample hospitals utilize the computer in any manner within the materials management area. The PS3 top purchasing executive does indicate that he would like to automate his inventory control function but that he is reluctant to do so because of the resistance to change of the inventory control clerks he has in Purchasing. There does not appear to be any perceived need by top administration to monitor the effectiveness of the materials management area.

Practices in Proprietary Hospitals, 101-200 Beds

Three hospitals fall within this category as shown in Table X.

Organizational Structure

Two top purchasing executives out of three have the title of materials manager. The two top purchasing executives of PM1 and PM2 report directly to the administrator.
<table>
<thead>
<tr>
<th>Hospital</th>
<th>Organizational Structure</th>
<th>Inventory Control System</th>
<th>Distribution</th>
<th>Indices Used and Information System</th>
</tr>
</thead>
<tbody>
<tr>
<td>PS1</td>
<td>Top M-M* Executive: Purchasing Agent Reports to: Associate Administrator Functions: Purchasing, Distribution, Inventory Control, Receiving, General Stores, Central Supply, Pharmacy</td>
<td>Type: Visual ABC Used: No EOQ Used: No Perpetual: Yes Extend to User: No</td>
<td>Nursing Service: Requisition Other Departments: Requisition</td>
<td>Indices Used: None Use Computer: No Use Automated Entry: No Feel Greater Use: No</td>
</tr>
<tr>
<td>PS2</td>
<td>Top M-M Executive: Accountant Reports to: Administrator Functions: Purchasing, Receiving, Property Management, Copying</td>
<td>Type: Visual, each User Department ABC Used: No EOQ Used: No Perpetual: No Extend to User: No</td>
<td>Nursing Service: Requisition Other Departments: Directly to User Department from Vendor</td>
<td>Indices Used: None Use Computer: No Use Automated Entry: No Feel Greater Use: No</td>
</tr>
</tbody>
</table>

*Materials Management
<table>
<thead>
<tr>
<th>Hospital</th>
<th>Organizational Structure</th>
<th>Inventory Control System</th>
<th>Distribution</th>
<th>Indices Used and Information System</th>
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</thead>
<tbody>
<tr>
<td>PS₃</td>
<td>Top M-M* Executive</td>
<td>Type: Cardex</td>
<td>Nursing Service: Exchange Cart</td>
<td>Indices Used: None</td>
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<tr>
<td></td>
<td>Assistant Administrator</td>
<td>ABC Used: No</td>
<td>Other Departments: Requisition</td>
<td>Use Computer: No</td>
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<td>Reports to:</td>
<td>EOQ Used: No</td>
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<td>Use Automated Entry: No</td>
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<td></td>
<td>Administrator</td>
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<td></td>
<td>Feel Greater Use: Yes</td>
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<td></td>
<td>Functions:</td>
<td>Extend to User: No</td>
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<td>Purchasing</td>
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<td>Inventory Control</td>
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<td>Copying</td>
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</tr>
<tr>
<td>PS₄</td>
<td>Top M-M Executive:</td>
<td>Type: Cardex</td>
<td>Nursing Service: Requisition</td>
<td>Indices Used: None</td>
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<td>C.S. Supervisor</td>
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<td>Other Departments: Requisition</td>
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<td></td>
<td>Reports to:</td>
<td>EOQ Used: No</td>
<td></td>
<td>Use Automated Entry: No</td>
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<tr>
<td></td>
<td>Administrator</td>
<td>Perpetual: No</td>
<td></td>
<td>Feel Greater Use: Yes</td>
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<tr>
<td></td>
<td>Functions:</td>
<td>Extend to User: No</td>
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<td>Distribution</td>
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<td>General Stores</td>
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<td>Central Supply</td>
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<td></td>
<td>Property Management</td>
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</tbody>
</table>

*Materials Management
The top purchasing executive of PM₃ is titled Central Supply Supervisor and reports to the Nursing Director instead of the Administrator. The top purchasing executive of PM₂ has recently moved to the hospital from a hospital in the Northeastern United States. In this region of the United States, he states, hospitals have not applied the materials management concept to the degree that the hospitals in the Northeastern United States have. He comments that one of the major problems that he has is the fact that Nursing Service is responsible for the Central Supply function and that this is an organizational structure problem because of the following reasons: it increases the amount of inventory that is carried because of duplication of supplies stocked both in the General Storeroom and Central Supply; also, he feels that there are additional employees who could be eliminated if Central Supply and General Stores were integrated under the Materials Manager; finally, there would be better coordination between Central Supply and General Stores should they be under the same manager.

The PM₃ top purchasing executive has just taken over the function of Central Supply supervisor and is not at all familiar with the materials management concept. Again, a wide spectrum of organization structures is observed ranging from those which utilize a "typical" materials management structure to those which are very underdeveloped.
Inventory Control System

The inventory control system utilized by hospitals in this category vary from visual to manually maintained cardex systems. There is a wide variety in the degree of effectiveness among those who utilized this type of inventory control system. For example, PM\(^1\) maintains a very high degree of accuracy with regard to the accounting for inventory levels not only in the storeroom but also at the user departmental levels. Other hospitals who state that they maintain a cardex system may not have this degree of inventory control. As in any system used, the degree of effectiveness is directly related to the competence of the individuals responsible for maintenance of the system. The accuracy level could not be observed in most of the individual case studies. Only PM\(^2\) utilizes any type of quantitative techniques for inventory control, and the top purchasing executive indicates that a modified type of EOQ is utilized. PM\(^1\) and PM\(^2\) both utilize a perpetual inventory control system and extend the method of taking physical inventory to the user department.

Distribution System

Each hospital in this category maintains either a PAR or Exchange Cart system and this indicates that as a group, materials function maintains excellent control over the distribution of medical-surgical supplies to nursing service
# Table X

**Materials Management Practices Followed by Individual Proprietary Hospitals, 101-200 Beds**

<table>
<thead>
<tr>
<th>Hospital</th>
<th>Organizational Structure</th>
<th>Inventory Control System</th>
<th>Distribution</th>
<th>Indices Used and Information System</th>
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<tbody>
<tr>
<td>PM1</td>
<td>Top M-M* Executive:</td>
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<td>Indices Used:</td>
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<td></td>
<td>Materials Manager</td>
<td>Type: Cardex</td>
<td>Nursing Service:</td>
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</tr>
<tr>
<td></td>
<td>Reports to: Administrator</td>
<td>ABC Used: No</td>
<td>PAR</td>
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<tr>
<td></td>
<td>Functions:</td>
<td>EOQ Used: No</td>
<td>Other Departments:</td>
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</tr>
<tr>
<td></td>
<td>Purchasing</td>
<td>Perpetual: Yes</td>
<td>PAR</td>
<td>Use Automated Entry: No</td>
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<tr>
<td></td>
<td>Distribution</td>
<td>Extend to User: Yes</td>
<td></td>
<td>Feel Greater Use: Yes</td>
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<tr>
<td></td>
<td>Inventory Control</td>
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<td>Receiving</td>
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<td></td>
<td>General Stores</td>
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<td>Central Supply</td>
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<td></td>
<td>Surplus/Scrap Disposal</td>
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<tr>
<td>PM2</td>
<td>Top M-M Executive:</td>
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<td></td>
<td>Materials Manager</td>
<td>ABC Used: No</td>
<td>Exchange Cart and</td>
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<td>Reports to: Administrator</td>
<td>EOQ Used: Modified</td>
<td>Requisition</td>
<td>Use Automated Entry: No</td>
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<td></td>
<td>Functions:</td>
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<td>Other Departments:</td>
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<tr>
<td></td>
<td>Purchasing</td>
<td>Extend to User: Yes</td>
<td>Requisition</td>
<td>Feel Greater Use: Yes</td>
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<td></td>
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<td>Receiving</td>
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<tr>
<td></td>
<td>General Stores</td>
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</table>

*Materials Management*
<table>
<thead>
<tr>
<th>Hospital</th>
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<th>Inventory Control System</th>
<th>Distribution</th>
<th>Indices Used and Information System</th>
</tr>
</thead>
<tbody>
<tr>
<td>FM3</td>
<td>Top M-M* Executive Central Supply Supervisor Reports to: Nursing Director Functions: Purchasing Inventory Control Receiving General Stores Distribution Central Supply</td>
<td>Type: Visual ABC Used: No EOQ Used: No Perpetual: No Extend to User: No</td>
<td>Nursing Service: PAR Other Departments: Requisition</td>
<td>Indices Used: Yes Use Computer: No Use Automated Entry: No Feel Greater Use: No</td>
</tr>
</tbody>
</table>

*MATERIALS MANAGEMENT
PM₁ is one of the few hospitals which maintains a PAR system for non-medical/surgical supplies which are distributed to non-nursing service units.

**Indices Used and Information Systems**

Indices to monitor materials management effectiveness are utilized by each sample hospital in this category. However, it is noted that some of the indicators which are used are related not to performance per se but to certain activity measures. For example, PM₂ indicates that such activity measures as work load reports, number of purchase orders issued, number of requisitions received, etc., are generated for reporting purposes. The major problem with these types of measurements is that they are measures of activity and not particularly measures of performance. The top purchasing executive of PM₂ indicates that he does not have clear objectives or standards whereby the performance of materials management may be measured. None of the hospitals in this category utilize any sort of computerized information system. None of the hospitals have an automated order entry system. PM₁ and PM₂ both believe that the computer should be used to a greater extent in their materials management department.

**Practices in Proprietary Hospitals, 201-Up Beds**

Three hospitals fall within this category as shown in Table XI.
<table>
<thead>
<tr>
<th>Hospital</th>
<th>Organizational Structure</th>
<th>Inventory Control System</th>
<th>Distribution</th>
<th>Indices Used and Information System</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Materials Manager</td>
<td>ABC Used: Yes</td>
<td>Other Departments: Requisition</td>
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<tr>
<td></td>
<td>Reports to: Controller</td>
<td>EQQ Used: Yes</td>
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<td>Functions:</td>
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<td>Purchasing</td>
<td>Extend to User: Yes</td>
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<td>Inventory Control</td>
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<td>Scrap/ Surplus Disposal</td>
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<td>Property Management</td>
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<td>General Stores</td>
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<tr>
<td>PL₂</td>
<td>Top M-M Executive:</td>
<td>Type: Computerized</td>
<td>Nursing Service: PAR</td>
<td>Indices Used: Yes Use Computer: Yes Use Automated Entry: Yes Feel Greater Use: No</td>
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<td>Material Manager</td>
<td>ABC Used: Yes</td>
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<td>Reports to: Assistant Administrator</td>
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<td>Functions:</td>
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<td>Purchasing</td>
<td>Extend to User: Yes</td>
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<td>Inventory Control</td>
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<td>Scrap/ Surplus Disposal</td>
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<td>Property Management</td>
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<td></td>
<td>Central Supply</td>
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*Materials Management
<table>
<thead>
<tr>
<th>Hospital</th>
<th>Organizational Structure</th>
<th>Inventory Control System</th>
<th>Distribution</th>
<th>Indices Used and Information System</th>
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<tbody>
<tr>
<td>PL3</td>
<td>Top N-M* Executive:</td>
<td>Type: Traveling</td>
<td>Nursing Service:</td>
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<td></td>
<td>Materials Manager</td>
<td>Requisition and</td>
<td>Exchange Cart</td>
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<td>Cardex</td>
<td>Other Departments:</td>
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<td>Functions:</td>
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<td>Requisition</td>
<td>Fuel Greater Use: Yes</td>
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<td>Inventory Control</td>
<td>Perpetual: No</td>
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<td></td>
<td>Receiving</td>
<td>Extend to User: Yes</td>
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<td></td>
<td>Property Management</td>
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*M*Materials Management
Organizational Structure

Each top purchasing executive has the title of Materials Manager. However, the only hospital which contains the "typical" materials management structure is PL_2 in that the Purchasing, General Stores, and Central Supply functions report to the materials manager. The top purchasing executives of PL_1 and PL_3 report directly to the controller whereas PL_2 reports to an Assistant Administrator. The fact that two out of the three hospital's top purchasing executives report to the controller may indicate that these hospitals place more emphasis upon greater control of all physical assets of the organization.

Inventory Control System

Two out of the three hospitals utilize a computerized inventory control system with the third, PL_3, indicating that they have definite plans to initiate such a system in the near future. Each hospital in this group indicates that they utilize ABC analysis in managing their inventory. EOQ theory is used by PL_1 and PL_3. Only PL_1 indicates that they utilize a perpetual inventory. All three hospitals extend their periodic physical inventory to the user departments.

Distribution System

Either an exchange cart or PAR distribution system is utilized by each of the three hospitals to Nursing Service
units; this is indicative of the emphasis on a high degree of control. For other non-nursing units, the requisition method is used. The top purchasing executive of PL\textsubscript{3} states that he believes that one of his most important accomplishments is the fact that he has been able to establish an effective exchange cart distribution system. An important fact observed with regards to all of these hospitals is the fact that they have all been constructed within the last few years which would indicate that probably they were architecturally designed to accommodate an exchange cart system.

**Indices Used and Information System**

Each hospital uses indices to track materials management performance. PL\textsubscript{3} only monitors the inventory per occupied bed, whereas the other hospitals monitor numerous other indices. Of the three hospitals, only PL\textsubscript{3} does not use a computerized information system but does indicate that one will be initiated in the future. A possible relationship may possibly be observed in this group between the existence of a computerized information system and the use of performance indicators. If the inventory is computerized, then more indices are available in order to monitor performance. If these performance indicators have to be manually generated, then a decreased number is used. All three hospitals use automated order entry systems with prime vendors. Only PL\textsubscript{2} indicates that he does not feel that the
computer should be used to a greater extent in the materials management area.

Utilization of Selected Materials Management Techniques in All Sample Hospitals

In the previous portions of this chapter, materials management practices now utilized in hospital groupings according to bed size and type of ownership classifications were tabulated and described. Now, an overall tabulation of practices followed by the total group will be presented and explained in order to make comparisons and discern any existing patterns.

Top Materials Management Executive Profile

Summary top materials management executive profiles are presented in Tables XII and XIII. Table XII analyses, based on a numerical tabulation the overall annual salary, title of reporting official, total experience, age, and educational level by type of ownership. In Table XIII, these same profile characteristics are related to hospital size.

Annual Salary.--In analyzing the annual salaries of the materials management executive with respect to ownership and size, it is found that approximately one-third or nine of the top materials management executives earn salaries of $12,000 per year or less. Approximately 40 per cent, 12 of this group, earn salaries in the $20,000- $24,999 range. Twenty per cent or 6 of the top materials management
### TABLE XII

**PROFILE OF TOP MATERIALS MANAGEMENT EXECUTIVE BY TYPE OF OWNERSHIP**

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<th>Proprietary (N=10)</th>
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<tr>
<td>Assistant Adm.</td>
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<tr>
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</tr>
<tr>
<td>Controller</td>
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<tr>
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<td>0</td>
</tr>
<tr>
<td>Vice-President</td>
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<td>Assistant Admin.</td>
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<tr>
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<td>4</td>
</tr>
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<td>Controller</td>
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<td>25 - 50 yrs.</td>
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<tr>
<td>Non-Degreed</td>
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<tr>
<td>Certificate</td>
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</table>
range. Twenty per cent, or 6, of the top materials management executives indicate a salary range of $16,000 to $19,000. Only 10 per cent, or 3, of the group has a salary in excess of $25,000 per year. In showing the salary distribution relative to the size of the hospital, Table XI indicates that 60 per cent, or 6, of the materials managers of small hospitals receive annual salaries of less than $12,000, whereas among large hospitals, 70 per cent, or 7, of these materials managers receive salaries in the $20,000 to $24,999 range. In comparing salaries by type of ownership (see Table XII), proprietary hospitals show the widest variation; for example, 40 per cent, or 4, of the materials management executives earn salaries in the less than $12,000 range, whereas 50 per cent, or 5, of them are in the $20,000 to $24,999 range. Voluntary hospital materials managers indicate a somewhat even distribution of salaries paid to them. Thirty per cent, or 3, of the governmental hospitals pay their materials manager $12,000 or less, whereas 40 per cent, or 4, of them pay in the $20,000 to $24,999 range.

Title of Reporting Official.—Overall, 50 per cent, or 15, of the top materials management executives report to the Administrator of the hospital. Twenty per cent, or 6, of the top materials management executives report to the Assistant Administrator. The Director of Nursing is the reporting official for 10 per cent, or 3, of the top purchasing purchasing executives interviewed. Among the rest of the cases,
there is a relatively even distribution among reporting officials for the top materials management executives.

With regard to the title of the reporting official of the materials manager by size, 60 per cent, or 6, of the small hospitals and 70 per cent, or 7, of the medium-sized hospitals are supervised by the Administrator. In the larger-sized hospitals, 40 per cent, or 4, of the top materials management executives report to the Assistant Administrator and 20 per cent, or 2, report to the Vice-President. Obviously, in larger-sized hospitals, the Administrator does not have the time to directly supervise the top materials management executive.

In looking at the reporting official with respect to ownership, it is found that a high percentage of the top materials management executives report to the Administrator. Seventy per cent, or 7, of the materials managers of voluntary hospitals report to the Administrator; whereas one half, or 5, of the materials managers in proprietary hospitals report to the Administrator. Only 30 per cent, or 3, report to the Administrator in governmentally controlled hospitals. Therefore, the fairly clear pattern of the top materials management executive reporting to the Administrator or Assistant Administrator emerges.

**Total Experience.**--Overall, as indicated in Table X, 50 per cent, or 15, of the top materials management executives
have from 5 to 15 years of experience. Thirty per cent, or 9, have experience in the 2 to 5 years' range. There are 17 per cent, or 5, who have over 15 years' experience. Only 3 per cent, or 1, indicate that he has less than 2 years' experience.

In looking at experience relative to hospital size (see Table XIII), it is apparent that small hospitals employ the least experienced top materials management executives as indicated by the fact that 70 per cent, or 7, of the hospitals in the small-sized category have from 2 to 5 years' experience. On the other hand, 70 per cent, or 7, of the medium-sized hospitals and 60 per cent, or 6, of the large hospitals employ top materials management executives that have from 5 to 15 years' experience. At the other extreme, 30 per cent, or 3, of the top materials management executives of large-sized hospitals have more than 15 years' experience.

In comparing experience levels according to hospital ownership types, very little variation may be observed among the 3 types. All types demonstrate the greatest experience level in the 5 to 15 year range; 60 per cent, or 6, of the proprietary, 50 per cent, or 5, of the governmental, and 40 per cent, or 4, of the voluntary hospital's top materials management executives have from 5 to 15 years.
Age.—Overall, there is a fairly even distribution in the age ranges of the top materials management executives. For example, 37 per cent, or 11, of the top materials management executives are below 35 years of age, whereas 33 per cent, or 10, of them are over 50 years of age.

In comparing the various age ranges of the top materials management executives by hospital size, very little variation is observed. Except for medium-sized hospitals, the overall age categories are in the two younger age ranges of less than 35 and 35 to 50 years of age.

Governmental and voluntary hospitals have the oldest top materials management executives as evidenced by the fact that 50 per cent, or 5, of the governmental hospitals have experience levels in the over 50 year categories. Interestingly, 50 per cent, or 5, of the top materials management executives in the proprietary hospitals are in the less than 35 years' experience category.

Educational Level.—Finally, the educational level of the top materials management executives will be analyzed. Overall, one-third, or 10, of the top materials management executives hold at least a college degree, whereas 53 per cent, or 16, are non-degreed. Fourteen per cent, or 4, of the materials managers have a professional certificate (i.e., a registered respiratory therapist). In relating the top materials management executive's educational level
with the hospital size, it is found that the medium-sized hospitals have the greatest percentage of degreed individuals; 60 per cent, or 6, of the materials managers in medium-sized hospitals are degreed. Among large and small hospitals, only 20 per cent, or 2, in each case are degreed.

Comparing the top materials management executives according to the 3 ownership categories, it is found that there is a relatively even distribution. Forty per cent, or 4, of voluntary, as well as 40 per cent, or 4, of proprietary hospital materials managers are degreed, whereas only 20 per cent, or 2, of governmental hospital materials managers are degreed.

Materials Management Structure and Techniques of Sample Hospitals

Table XIV is a summary of the overall findings of the various topics studied in the thirty sample hospitals. The total number of "yes" responses are tabulated where this question was asked of the top materials management executives in each individual hospital. In the investigation of other topics, such as Inventory Control System usage, the individual type of system is indicated according to ownership and size. The last column in Table XIV is a tabulation of the row.
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</table>
Materials Management Structure

Overall, using Ammer's definition of the organizational arrangement required for a materials management type structure to exist, there are 15 hospitals which utilize this structure and 15 which do not, as indicated in Table XIV. Using size as a criterion for determining materials management structures, one might assume that larger hospitals might use the materials management structure to a greater degree than other categories, but this was not found to be the case. Only 40 per cent, or 4, of the large hospitals have this materials management structure, whereas 60 per cent, or 6, of the small hospitals have this type structure. Relative to ownership, there is a pronounced even distribution as far as the use or non-use of a materials management type structure. Forty per cent, or 4, of the governmental hospitals have the materials management type structure, whereas 60 per cent, of 6, of the voluntary hospitals and 50 per cent, or 5, of proprietary hospitals utilize this organizational form.

Inventory Control System

In this study, each top purchasing executive was questioned as to the type of inventory control system used—visual, cardex, or computerized. Table XIV indicates the responses to the question relative to the type of inventory control system used. From a comparative standpoint, approximately 56 per cent, or 17, of the hospitals use a manual
is a cardex system, whereas 30 per cent, or 9, opt for the visual method and the remaining 13 per cent, or 4, use a computerized type system. In the small hospital category, half, or 5, use the visual method of inventory control, and 50 per cent, or 5, use the manual cardex system; none of the small-sized hospitals use a computerized inventory control system. Among medium-sized hospitals, 30 per cent, or 3, use the visual method, 60 per cent, or 6, use the cardex method, and 10 per cent, or 1, use the computerized method. None of the large-sized hospitals in this sample uses the visual system; 50 per cent, or 5, of them use the cardex method, and 50 per cent, or 5, use the computerized system.

In terms of ownership, there is very little variation in preference with regards to the 3 possible systems. The governmentally owned hospitals use the various methods according to the following distribution—30 per cent, or 3, visual, 50 per cent, or 5, manual cardex, and 20 per cent, or 2, computerized. Sixty per cent, or 6, of the voluntary hospitals use the cardex system, whereas 20 per cent, or 2, use the visual method, and 20 per cent, or 2, also use the computerized method. Among the proprietary hospitals, 50 per cent, or 5, use the manual cardex system, with 30 per cent, or 3, using the visual method, and 20 per cent, or 2, using the computerized system.
Distribution Systems

There are basically two different distribution systems found in the sample hospitals: one system which serves nursing department, and the other system, which serves the other user departments. The distribution systems which were used for nursing service are as follows: requisition PAR, exchange cart, and a combination of the various systems. Table XIV summarizes the usage pattern to nursing service units among the 30 sample hospitals. Thirty-three per cent, or 10, of the study hospitals use a requisition type system for distributing supplies to the nursing service units. The PAR system is used by approximately 27 per cent, or 8, of the institutions. Finally, 17 per cent, or 4, use an exchange cart system, and 27 per cent, or 8, of the hospitals use a combination of methods. Small hospitals, as evidenced by their 70 per cent, or 7, usage pattern, prefer the requisition method of distribution. Ten per cent, or 1, of the small hospitals utilize the PAR method, whereas 10 per cent, or 1, utilize the exchange cart method. Ten per cent, or 1, of the sample hospitals in this category use a combination of methods.

Among medium-sized hospitals, only 10 per cent, or 1, use the requisition method, whereas 40 per cent, or 4, of these hospitals use the PAR system of distribution; 40 per cent also use a mixed system. Ten per cent, or 1, of the medium-sized hospitals use the exchange cart system. There
very even distribution in usage of the various systems among large hospitals. The distribution pattern among the large hospitals is as follows: requisition, 20 per cent, or 2; PAR, 30 per cent, or 3; exchange cart, 20 per cent, or 2; and mixed, 30 per cent, or 3.

Table XIII is a summary of the type of distribution systems used by the hospital units exclusive of the nursing department and its ancillary units. Overall, approximately 86 per cent, or 26, of the hospitals in this category utilize the requisition method for distribution of supplies to the non-nursing units. Seven per cent, or 2, of these hospitals utilized the PAR system; in addition, 7 per cent, or 2, also have their supplies delivered directly to the departments without going through a stores area. No hospitals in the study group utilize the exchange cart system. Because of the high percentage rate of usage of the requisition method to non-nursing unit departments, no further analysis will be necessary in this particular grouping.

Centralized Purchasing

The single factor, whether or not purchase orders are exclusively issued from the materials management department, is studied in this data display. Table XIV provides a data display of the extent to which purchase orders are issued exclusively from the materials management department. Only 40 per cent, or 12, of the sample hospitals issue their
purchase orders exclusively from the materials management area. Fifty per cent, or 5, of the small hospitals issue their purchase orders exclusively from the materials management area, whereas 30 per cent, or 3, of the medium hospitals and forty per cent, or 4, of the large hospitals do not. As a group, according to this as a criterion, voluntary hospitals have the most centralized purchasing policy, with 50 per cent, or 5, indicating that purchase orders are exclusively issued from the materials management department. Only 30 per cent, or 3, of the proprietary sample hospitals and 40 per cent, or 4, of the governmental hospitals have their purchase orders issued from a central location.

Indices Used

Table XIV provides a summary of whether or not indices are used by the sample hospitals. From an overall comparative standpoint, approximately 53 per cent, or 16, of the hospitals indicate that they do not use any type of indicator to monitor performance in the materials management organization. There does seem to be a definite relationship between size and the presence or absence in the usage of performance indicators. For example, among the small-sized hospitals, 100 per cent, or 10, of them do not use indices to monitor performance. Among medium-sized hospitals, 70 per cent, or 7, of the hospitals indicate that they utilize indices at least to some degree. Then, among large hospitals,
90 per cent, or 9, of them use indices in their efforts to monitor performance of the materials management system.

Only 40 per cent, or 4, of governmental hospitals indicate that they use indices to monitor performance. Among voluntary hospitals, the reverse is the case in that 60 per cent, or 6, of them do at least use performance indicators to a minimum degree. The same usage pattern exists for proprietary hospitals in that 60 per cent, or 6, of them utilize performance indicators in the control of the materials management function.

**Group Purchasing**

The extent to which the study hospitals are involved in group purchasing is summarized in Table XIV. A hospital was classified as being involved in group purchasing if it was a member of either a metropolitan, state, national, or corporate buying organization. Overall, 80 per cent, or 24, of all the study hospitals participate in group purchasing to at least a minimal extent. Governmental hospitals as a category were found to participate in group purchasing to a slightly lesser extent than voluntary and proprietary hospitals. Seventy per cent, or 7, of the governmental hospitals participated in these groups, whereas 80 per cent, or 8, of voluntary hospitals and 90 per cent or 9 of proprietary hospitals bought at least minimally through shared purchasing groups. Only 60 per cent, or 6, of small hospitals
per cent, or 9, of medium sized hospitals and 90 per cent, or 9 of large-sized hospitals do.

**Computerized Information System**

Table XIV provides a summarization of the usage of an in-house computer in materials management operational control other than for inventory control among the thirty study hospitals. Overall, only 20 per cent, or 6, of the hospitals use an in-house computer for control purposes of the materials management area. Among smaller hospitals, there are none which use a computer in the materials management function. Only 10 per cent, or 1, of the medium-sized hospitals use an automated information system. Among large hospitals, 50 per cent, or 5, use a computerized information system which is the highest utilization rate by any group of the study hospitals. Finally, 20 per cent, or 2, of the hospitals in the ownership categories of government, voluntary, and proprietary, each utilized a computerized system.

**Product Evaluation/Standardization Committee**

As indicated in Table XIV, overall, 50 per cent, or 15, of the study hospitals have a Product Evaluation and Standardization Committee. As a group, governmentally owned hospitals were found to have a greater percentage of Product Evaluation and Standardization Committees; 70 per cent, or 7, of them have these committees, whereas only 30 per cent, or 3, of the voluntary hospitals have them, and 50 per
cent, or 5, of proprietary hospitals utilize them. Seventy per cent, or 7, of the large hospitals utilize this standardization technique, whereas half, or 5, of the medium-sized hospitals use this organizational unit. Only 30 per cent, or 3, of the small hospitals have a formalized Product Evaluation and Standardization Committee.

Value Analysis

Table XIV provides a data display of the extent to which the study hospitals use value analysis in their product evaluation process. As a group, 77 per cent, or 23, of the study hospitals indicate that they do not use a formal value analysis approach in their purchasing decisions. Small sized hospitals do not use the technique at all, whereas only 20 per cent, or 2, of medium-sized hospitals as a group utilize this technique. Fifty per cent, or 5 of large-sized hospitals indicate that they do use the technique in their acquisition process. Twenty per cent, or 2, of both governmental hospitals and voluntary hospitals indicate that they utilize this method, whereas 30 per cent, or 3, of the proprietary hospitals indicate their use of this approach.

Analysis of Materials Management Scores

As previously described in Chapter III, a rating guide (see Appendix C) was developed in order to evaluate in some quantitative manner each study hospital's utilization of the materials management concept. Scores were assigned
to the eleven categories which were thought to be critical in regard to specific aspects of a materials management system. For example, relative to the performance of certain functions in the materials management organization, it was thought that the optimal structure would be one that integrates the functions of Purchasing, Central Supply, and General Stores. If a particular sample hospital utilized the structure, it was assigned the maximum score in this category of four. If, however, only Purchasing and General Stores were integrated, then a score of two was assigned and if Purchasing were in the materials management structure, then only one point was assigned. Each category was assigned scores based upon an optimal level relative to the materials management concept. Table XV is a breakdown of the assigned scores by categories of each of the thirty sample hospitals—each hospital may be keyed to the codes previously discussed in Chapter III. For example, under the small governmental hospitals, there are three hospitals: GS\(_1\), GS\(_2\), and GS\(_3\).

**Descriptive Data Analysis**

Table XVI is a summary of the key statistical measures which describe the overall sample population in terms of the materials management scores which have been tabulated. As previously indicated, these scores should not be considered as absolute measures of the degree to
### Table XV

**Derivation of Materials Management Scores for Sample Hospitals**

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<thead>
<tr>
<th>Category</th>
<th>Government</th>
<th>Ownership and Size</th>
<th>Proprietary</th>
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<tr>
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</table>
which the study hospitals utilize the materials management concept, but are theoretical approximations of the hospitals' use of this concept. First, the thirty scores are examined; next, the scores are descriptively examined relative to the variables of type of ownership and size.

The overall mean of the scores of the total study population is 28.8. This score is very similar to the average scores of the hospitals according to type of ownership. The mean score of governmentally owned hospitals is only slightly higher than voluntary and proprietary hospitals; this higher score is not considered to be greater enough to be significant. There does appear to be a relationship between hospital size and materials management score. As the hospital size increased, the average score of the hospitals increased. For example, there is a ten-point difference between the scores of small hospitals versus medium hospitals. The difference between medium size hospitals and large size hospitals is approximately eight points. Relative to the average scores of the hospitals by ownership, there is not over a two-point difference between the average scores. In summary, these descriptive statistics indicate a relationship between size and score.

The standard deviation of all the sample hospitals is 10.193. The greatest dispersion is among governmental and proprietary hospitals. The standard deviation of 8.922 is least for voluntary hospitals. Overall, the standard
TABLE XVI

DESCRIPTIVE STATISTICS FOR MATERIALS MANAGEMENT
SCORES FOR SAMPLE STUDY HOSPITALS

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<th>Variable</th>
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<td>32.00</td>
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<td>40.00</td>
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<td>8.433</td>
<td>25.00</td>
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</table>

deviation is smallest among hospitals according to size. Medium-sized hospitals demonstrate the least dispersion with regard to scores among the three categories of size, with a standard deviation of 5.493. There is a direct relationship between the standard deviation statistics and the range of the scores studies. For example, the scores of medium-sized hospitals have a range between the highest and lowest scores of 17.00, whereas the range of
proprietary scores is 40.00, with a standard deviation of 11.535.

Summary

Chapter IV has been devoted to the analysis of hospital materials management practices according to type of ownership and size; in addition, an overall analysis was accomplished for all thirty study hospitals as a group.

Patterns found to exist include the following: (1) 50 per cent of the sample hospitals utilize a materials management type structure; (2) approximately 53 per cent of the hospitals use a manual cardex inventory control system, whereas 27 per cent utilize a visual system with the remaining 20 per cent using a computerized system; (3) 33 per cent of the sample hospitals utilize a requisition system for distribution of supplies to nursing service units, with the PAR system and exchange cart system being used by 27 per cent and 17 per cent of the hospitals respectively; (4) it was found that only 40 per cent of the sample hospitals issue purchase orders exclusively from the materials management area; (5) approximately 53 per cent of the hospitals indicate that they do not use performance indicators to any degree to monitor materials management activities; (6) overall, 80 per cent of the study hospitals participate in group purchasing activities; (7) among the sample hospitals studied, 20 per cent of the hospitals use an in-house computer system to operationally control the materials
management function; (8) one-half of the hospitals have Product Evaluation and Standardization Committees; (9) only 23 per cent of the hospitals utilize the value analysis technique in their acquisition process; (10) in examining the descriptive statistics of the sample, it appears that there is a relationship between hospital size and the degree to which the materials management concept is utilized.

Conclusions on the basic overall findings as listed above as well as other salient data in this study are included in Chapter V.
Numerous environmental pressures are being brought to bear in regard to cost containment in hospitals. Governmental agencies, consumer groups, and private corporations are among many constituencies which are complaining that the health care system is out of control, with regard to escalating costs. Since it has been estimated that approximately 30 per cent of a typical hospital's operating budget is devoted to the acquisition, storage, and distribution of materials, the materials management function becomes a critical factor in the overall management of health care facilities.

Governmental influence has been amplified by a General Accounting Office study which indicates that purchasing practices in many hospitals may be greatly improved by applying materials management methods to a greater extent. Various writers have indicated that unless hospitals adopt principles derived from the materials management concept to a greater extent, then governmental intrusion into this aspect of hospital management may result.

The Problem

In the past, hospitals have not utilized the materials management concept to the extent that the business sector
has. Currently, the literature indicates that hospitals have not applied the materials management approach to their organizational structure but have retained older, less effective approaches. The materials management concept is a general model composed of activities related to the flow of materials into, through, and out of an organization; this model is thought to provide for more efficient planning, coordination, and control of all materials activities within the hospital.

The specific problem that has served as the focus for this study, therefore, is the potential need for hospitals to utilize the materials management concept to a much greater extent. This study, therefore, was formulated to perform an in-depth analysis of hospitals' materials management practices in the North Central Texas area in order to determine the extent and manner in which they utilize the materials management concept. The study focused, also, on determining if there are any relationships between the variables of type of ownership, size, and the extent to which the hospitals subscribe to the materials management concept.

The Procedure

An extensive survey of the literature serves as the basis for identifying materials management concepts and techniques that were used in formulating the integrated approach for this study. From the identification of these
concepts and techniques, an interview instrument was formulated to determine the extent to which the materials management concept is used in the study hospitals.

The primary data for the study were obtained from personal interviews with top materials management executives or their representatives in a sample of thirty hospitals in the Texas Health Systems Agency 5. The interviews were conducted during the months of April, May, and June, 1980. The study sample was drawn from a population of ninety hospitals in the nineteen-county area.

Each hospital was described as an individual case, and then cross comparisons were made by classifications of hospitals according to size and type of ownership. In addition, a materials management numerical score was tabulated based upon a rating guide which was formulated to include the major phases of materials management. A descriptive statistical analysis was accomplished utilizing a computer program from an overall standpoint as well as by type of ownership and size categories. In order to maintain confidentiality, the hospitals were identified only by a previously developed code based upon type of ownership and size classifications.

The results of the interviews with the top purchasing executives were tabulated, presented in narrative form, and analyzed in Chapters III and IV.
Findings

Based upon the information received in the interviews with all of the thirty sample hospitals, the following findings were formulated concerning materials management observed: (1) 50 per cent of the sample hospitals utilize a materials management type structure; (2) approximately 53 per cent of the hospitals use a manual cardex inventory control system, whereas 27 per cent utilize a visual system, with the remaining 20 per cent using a computerized system; (3) approximately 23 per cent of the hospitals utilize a requisition type system for distribution of supplies to nursing service units, with the PAR system and exchange cart system being used by 27 per cent and 17 per cent of the hospitals respectively; (4) it was found that only 40 per cent of the sample hospitals issue purchase orders exclusively from the materials management area; (5) approximately 53 per cent of the hospitals indicate that they do not use performance indicators to any degree to monitor materials management activities; (6) overall, 80 per cent of the study hospitals participate in group purchasing activities; (7) among the sample hospitals studied, 20 per cent of the hospitals use an in-house computer system to operationally control the materials management function; (8) one-half of the hospitals have Product Evaluation/Standardization Committees; (9) only 23 per cent of the hospitals utilize the value analysis technique in
the acquisition process; (10) in examining the descriptive statistics of the sample, it appears that there is a direct, positive relationship between hospital size and the degree to which the materials management concept is utilized. These findings are basically derived from an overall analysis of the sample population. With regard to the descriptive statistics of the scores according to both ownership and size together, it was thought that the small sample would render them unreliable.

Conclusions

In Chapter I, five exploratory questions were posed to serve as a framework for the conclusions of this study. These exploratory questions are as follows:

1. What is the general competence of the materials managers in the study hospitals as measured on the basis of certain profile characteristics?

2. How is the materials management function organized and what materials management functions are performed in the sample hospitals?

3. Do various operational systems such as materials handling, inventory control, etc., exist within the materials management organization which are adequate for proper control of the materials flow through the institution? If so, what is their nature and form?

4. Does top management periodically evaluate the efficiency of the materials management function, i.e.,
efficiency measured in terms of such indices as inventory per bed, inventory turnover rate, etc.?

Based upon the analysis of the findings in this study, the following conclusions were derived.

1. From an overall perspective, it is difficult to assess the competence of the top purchasing executives in the study hospitals because no firm criteria have been developed to make this determination. Perhaps the best assessment may be based upon some of the profile characteristics gathered in this study. If the basic criterion were said to be education, then the competence of the top purchasing executives would have to be judged very low because only about one-third of them have college degrees. It was determined, however, that some of the top purchasing executives were pursuing their college degrees on a part-time basis.

In terms of experience most of the top purchasing executives (approximately 50 per cent) are grouped in the five- to fifteen-year group. The younger, less experienced group of top purchasing executives appear to be more familiar with the materials management concept and are more inclined to implement it to the fullest extent possible. On the other hand, the older, more experienced materials managers are more comfortable with organizational structures which are not based upon the materials management concept. The older, more experienced top materials
management executives appear to be basically satisfied with the purchasing function being more widely dispersed throughout the organization. An alternative reason for this might be the fact that they are more realistic about the situation and the power structure in the organization and have just accepted it as unchangeable. However, the younger, less experienced materials managers seem to be more assertive in their desire to utilize a materials management approach to a much greater extent.

In regard to the salary range, the important question would be whether the salaries paid are competitive with other industries in order to be able to attract the most qualified top purchasing executives. As expected, the study reveals that the larger hospitals pay the highest salaries, with eight out of the thirty hospitals being paid in the above $20,000 per year range. At the other extreme, six out of the sample make $12,000 per year or less.

In summary, it may be stated that many of the top materials management executives have experience that has been gained only in the institutions for which they presently work; the fact is that they do not have a variety of experience in different organizations, and this tends to perpetuate the system with which they are familiar. As the results of this fact, many of these top purchasing
executives are behaviorally linked to a non-materials management type orientation.

2. From an overall perspective, it appears that there is a wide range of interpretations as to the meaning of the materials management concept and the structural implications that are derived from it. The range of understanding is from materials management as being perceived as the same as purchasing to a definition which states that it is related to the "flow of all materials into, through, and out of the institution." Ammer has stated that the minimum organizational structure for a "true" materials management approach is for the purchasing, central supply, and general stores functions to be combined under one executive. Using Ammer's definition of a materials management type structure, approximately 50 per cent indicate that this organizational form is used. It appears that the use of this organizational arrangement may not be critical in some hospitals because their smaller size would not economically justify the specialization required in applying the materials management concept.

The number of discrete functions performed by the top purchasing executive ranges from a minimum of five to a maximum of eleven. There do not appear to be any clear relationships between organizational size or ownership type and the number of functions performed. Many of the
small hospitals perform as many of these functions, numerically, as the large and medium-sized hospitals. It may be surmised that the organizational structure is the result of situational forces relative to the specific hospital. For example, the particular expertise of the top materials management executive might result in the chief executive officer's expanding the materials manager's role based upon this fact. Perhaps the top materials management executive is eager to assume additional roles and presses for these added responsibilities.

Another aspect of materials management structure that should be addressed relates to the line of authority from the top purchasing executive to the chief executive officer. To whom does the top purchasing executive report? Approximately half of the top purchasing executives report directly to the administrator of the hospital. There does not appear to be a greater number of top purchasing executives among large hospitals, as opposed to small hospitals, who report to the chief executive officer; therefore, there is apparently no relationship between size and the reporting official of the top purchasing executive. In addition, a high or low position in the hierarchy apparently does not indicate either a greater or lesser amount of top level support.

Another important question that should be addressed relates to the issue of how much authority resides in the
materials management function. More specifically, the question revolves around the degree to which purchasing is centralized with the top purchasing executive. How much authority does the top purchasing executive have in the decision-making process regarding: for example, which brand should be purchased? In industrial purchasing situations, the materials manager has a great deal of power relating to brand preference; this is not the case for most material managers in hospitals. In general, the personal interviews indicate that the materials manager has only a minimal role in the selection of specific brands. In certain cases, the materials manager is just an "order taker" and does not enter into the decisions with regard to which brand is to be purchased. In such single-user areas as laboratory, maintenance, dietary, and radiology, the materials manager's authority is especially weak. Whenever the supply is used by several departments, the materials manager is able to exert more influence as to which product should be purchased.

3. The two basic operational control systems studied are inventory control and materials handling and distribution. Although the literature indicates that the four basic types of inventory control systems are the two-bin, requisition, cardex, and computerized, it was found that the two-bin system is not used in the sample hospitals. From a materials management perspective, the two preferable
systems are the cardex and computerized because of the greater degree of control possible.

Among the sample hospitals, 70 per cent use either the manual cardex or computerized approach; this would seem to indicate that there is a relatively high degree of inventory control exercised by the study hospitals from a paperwork perspective. However, the question of how accurately the systems are maintained arises; in either system, the inputs into the system must be accurate. The research indicates that the hospitals which utilize a computerized inventory system are more likely to use such quantitative techniques as ABC analysis and Economic Order Quantity theory. Another trend observed is the fact that proprietary hospitals, as a group, tend to extend their inventory control systems to the various user areas in the hospitals to a greater degree than both governmental and voluntary hospitals. The type of record-keeping system chosen is a very important aspect of inventory management. Another important aspect of inventory management is the type of materials handling and distribution system chosen.

The three types of distribution systems used are requisition, PAR, and exchange cart. The requisition system is envisioned as being user-controlled by virtue of the fact that the department orders when it is thought that something is needed; the requisition method is considered to be the basis of the traditional distribution
system. The implication of the materials management concept would be to centralize control at the expense of the user department; therefore, the other two systems, PAR and exchange cart, would allow for the greatest degree of managerial control. About 30 per cent of the sample hospitals utilize either the PAR or exchange cart system for distributing supplies to nursing service departments, whereas about 30 per cent use the requisition method; the other third use a combination of the basic types.

In essence, there is a dual distribution system which exists in all the study hospitals; there is one system as indicated above which services nursing care units and another which services all other non-nursing unit departments. For these non-nursing unit areas, the requisition method is used almost exclusively among the sample hospitals. The rationale for this dual-type system is that the advantages gained from centralized control of medical-surgical supplies are greater because these supplies are used by many departments throughout the hospital. On the other hand, certain other supplies are used only by one department such as dietary, and supplies such as these are not controlled from a centralized location. Also, as indicated in the literature, it was found that there is a tendency for hospitals with new facilities to utilize the exchange cart method as the system of choice. Most new hospitals are designed to accommodate this type system.
4. In general terms, the research indicates that the chief executive officer does not receive a great deal of formal input from materials management. Even though it was found that approximately 50 per cent of the study hospitals utilize indices to monitor performance, several of the hospitals in this group use only a minimum number of indicators. From the responses of the top purchasing executives, it is obvious that there is only a minimal degree of formalized reporting to top management.

This obvious weakness in the materials management system may be related to the possible lack of institutional long-range planning. The objectives of the materials management department should be linked to the overall institutional goals. Several of the top purchasing executives were asked if the hospital has an overall hospital planning process in which materials management plays a role; none of the top materials management executives indicated that they have an input into such a process. In only two hospitals did the top materials management executive indicate that materials management objectives were formally developed, and in only one of these cases did the chief executive officer formally request that they be formulated and submitted. Also, it is evident that no overall strategy for the materials management function has been formulated based upon the long-range objectives of any of the study hospitals.
One factor which appears to be significant with regard to the extent to which performance indicators are used is whether or not a computerized inventory control record-keeping system is utilized. Whenever a computerized system is used, the various indices are automatically generated. On the other hand, whenever a manual cardex system is used, it takes many man-hours to manually compute the indices. Because of this time factor, there is a tendency for fewer performance indicators to be used by hospitals which use a cardex inventory control system.

5. The data do not suggest that there is a strong relationship between either size or ownership type and the materials management scores which are designed to measure the degree to which the hospital utilizes the materials management concept. However, the data may suggest a relationship between the variable of size and materials management score; for example, there is a definite increase in the mean of the scores according to the sizes of small, medium, and large.

Recommendations

Based upon the study of the materials management concept and its current usage, as well as upon findings and conclusions arrived at through primary data obtained from the sample hospitals, some general recommendations are presented for consideration by top purchasing executives and chief executive officers of hospitals.
1. This research indicates that among the study hospitals the materials management concept is not being used to a significant degree. The major reason for this seems to be based upon the fact that the chief executive officers are not sold on the concept to a significant degree. Part of the reason for this may be attributed to the fact that administrators are not cognizant of the meaning and implication of the materials management concept. This inadequacy of knowledge may be alleviated by the top materials management executive's attempting to educate the administrator concerning the implications of the materials management concept.

2. After the chief executive officer and the top purchasing executive are more fully informed regarding the materials management concept, a plan should be formulated to implement its key elements. In order to accomplish this, an internal audit of the materials management function should be accomplished in order to ascertain the extent to which it is being utilized. This operational audit should indicate those areas of weakness that should be addressed.

3. In most of the hospitals studied, it was observed that there are problems in the organizational structure of the materials management function. Purchasing authority is dispersed throughout the organizational structure. In most hospitals, it was found that the top materials management executive's authority is limited to basically medical-surgical
supplies; even among these items, his authority is rather limited as far as brand selection is concerned. It is recommended that the chief executive officer clearly delegate the final authority for purchasing decisions regarding all types of supplies to the materials management department; this statement should be in writing and promulgated to all user departments. A very useful tool for resolving problems related to brand selection is the use of a Product Standardization and Evaluation Committee.

The study indicates that the product Standardization and Evaluation Committee structure is not being used as extensively and effectively as it should be. This committee mechanism may be used to gain consensus regarding the purchase of one product brand versus another without the top purchasing executive having to take this burden completely upon himself. Therefore, it is recommended that this mechanism be used, along with value analysis as a framework, to a much greater extent.

Another means for promoting a more centralized purchasing system is the creation of a materials management organization which includes purchasing, general stores, and central supply activities within the same structure. This organizational structure promotes a higher degree of control by reducing certain duplication of personnel and materials by having these functions separated organizationally. By integrating these functions, the materials manager, therefore,
is allowed to control supplies through the distribution phase through the organization because oftentimes the distribution function is handled by the central supply department. In summary, the materials manager must have an organizational structure that centralizes purchasing to a degree that ensures needed control and must be given the proper amount of authority to do the job adequately.

4. Hospitals should strengthen their control over all inventories—within the materials management structure and these inventories controlled at the user level. Most of the study hospitals apparently have adequate control over the stock within the materials management structure. The main problem that exists in this area is related to the fact that once the stock leaves the materials management department and is transferred to the user areas, control is lost. For example, whenever the stock is transferred to a nursing unit, then accountability is lost in terms of inventory control. This is especially so if a requisition system, as opposed to a PAR or exchange cart system, is used. Theoretically, if a PAR or exchange cart system is used, then materials management retains control even when the stock is transferred to the user area. Therefore, it is recommended that either a PAR or exchange cart system be used in most situations. By maintaining control until it is charged to the patient or nursing unit at the
point of use, the unofficial inventory in the hospital is reduced to a substantial extent.

5. Also, it was discovered that there are still a number of hospitals which determine their stock levels visually, as opposed to maintaining a manual cardex system or a computerized system. It is recommended that hospitals consider utilizing at the very least a manual cardex system for inventory control. Due to the fact that computerized inventory systems are becoming much more economical to purchase, this approach seems likely to gain acceptance rapidly in the near future.

6. Top materials management executives should strive to develop materials management objections to monitor performance. These objective performance measures should be developed in order to keep track of performance in the areas of inventory management, operating expenses, and purchase prices. It is only by monitoring these indicators that the chief executive officer and top materials management executive can determine the effectiveness and efficiency of the materials management function.

7. Ideally, these performance indicators should be based upon the overall objectives of the hospital; and they should be linked to the strategic plans of the hospital. However, as explained previously, most of the study hospitals indicate that they do not have a formal long-range planning process. Even though the hospital may not have
institutional planning, it is recommended that the top materials management executive develop materials management goals on an annual basis and that these goals be formally submitted to the chief executive officer.

8. Hospitals should be constantly evaluating whether to join purchasing groups. Because of the economic savings potential, it is thought that most institutions may realize substantial savings by becoming affiliated with these purchasing groups. It is recommended, however, that a detailed cost analysis be carried out before entering into such an arrangement and that savings which may result from such an affiliation be closely monitored.
# TYPE I HOSPITALS IN HEALTH SERVICE AREA 5*

## Dallas County

<table>
<thead>
<tr>
<th>Hospital</th>
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<th>Service</th>
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<tbody>
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Dallas County--Continued

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<td>Granville C. Morton</td>
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Tarrant County

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Tarrant County—Continued

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Collin County

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<td>Wysong Hospital, Inc.</td>
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Cooke County

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Denton County

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### Kaufman County

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<td>Terrell Community Hospital</td>
<td>73</td>
<td>General</td>
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### Navarro County

<table>
<thead>
<tr>
<th>Hospital</th>
<th>Size</th>
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<td>Navarro County Memorial</td>
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### Palo Pinto County

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<td>Palo Pinto General Hospital</td>
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### Parker County

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<td>Campbell Memorial</td>
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### Somervell County

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<td>Mark-English Hospital, Inc.</td>
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### Wise County

<table>
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<td>Decatur Community Hosp.</td>
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<td>Bridgeport Hospital, Inc.</td>
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<td>Corporation</td>
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*Source: Hospitals and Related Institutions in Texas, 1978-1979, Texas Hospital Association*
APPENDIX B
Hospital

I. Institutional Characteristics
   Service-
   Ownership-
   Classification Codes-

II. Top Materials Management Executive Profile
   Education-
   Experience-
   Age-
   Present Salary-
   Membership in Professional Organization(s)-

III. Organizational Structure of Materials Management System
    Top Materials Management Objective
    Reports to-
    Functions Performed-

IV. Inventory Control System
    Type-
    ABC Analysis Used-
    Economic Order Quantity Used-
    EOQ-
    Perpetual Inventory Used-

V. Materials Handling and Distribution
   Nursing Service-
   Other Major Departments-
VI. Centralized Purchasing

P.O.'s Issued by Purchasing/Materials Office

Role of Purchasing/Materials Management in Acquisition of Principal Types of Goods-

No Role:

Minimal to Major Role:

VII. Use of Indices to Control Materials Management Effectiveness

Indices to Monitor Performance-

Index Used to Track Changes in Cost-

Periodic Reports Submitted to Administration-

Follow-up Action Required by Administration-

VIII. Group Purchasing

Membership in Which Group(s)-

Foresee More/Less Group Purchasing-

IX. Purchasing/Materials Management Computerized Information System

Utilize Computerized Information System-

Should Computer Have More Use-

Utilize Automated Entry System-

Type of Computerized System-

X. Product/Standardization Committee

Established-

Role of Materials Manager-

Effectiveness of Committee-

XII. Narrative
APPENDIX C
### Rating Guide

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<tr>
<th>Category</th>
<th>Assigned Score</th>
<th>Actual Score</th>
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<tr>
<td><strong>I. Title of Top Purchasing Executive</strong></td>
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<tr>
<td>Assistant Administrator/Materials Manager</td>
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<td>Purchasing Agent</td>
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<tr>
<td>Central Supply Supervisor</td>
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<td>Administrator</td>
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<td>Assoc. Admin., Assist. Adm., Controller</td>
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<td>Director of Nursing</td>
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<td><strong>III. Functions Performed</strong></td>
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<td>Exchange Cart</td>
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<td>Role of Materials Manager</td>
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<td>Total Score</td>
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