DATA BASE

VOLUME 2

Volume Two, the Data Base, contains information on user needs, functional requirements, costs of existing hospitals, labor unions, and laws and regulations. It is intended to serve in conjunction with the Design Manual during application of the system to a specific building project.

500 DATA BASE REQUIREMENTS

550 LAWS AND REGULATIONS

510 Generalized Needs and Requirements: Total Hospital

511 INTRODUCTION

511.1 The following is a generalized set of user needs and functional requirements for hospitals having a range of sizes, a variety of nursing and supportive or ancillary units and a range of relationships between these elements. It is intended that these will provide:

1. a basis from which subsystem performance requirements can be formulated;

2. a basis against which space organization and component selection trade-offs can be measured; and

3. a basis from which the Veterans Administration may, if it desires, develop a comprehensive statement of current and future needs as a guide for those responsible for the design and construction of VA hospitals.

In this section users needs have been distinguished from functional requirements. User needs are illustrated by a description of the activities necessary to perform a given function and the resulting environmental context. Functional requirements are derived from these needs and can be defined as user related building performance criteria. The generalized needs and requirements in this section relate to the performance of the building system as a whole and may be used for the evaluation of individual system projects.

Section 520 illustrates a more detailed development of needs and requirements for a particular area of the hospital, the bed care portion. This level of detail is beneficial in providing a means of communication between the VA and an A/E in the design of individual projects.

The material presented in this section and Section 520 has been obtained from discussions with persons functioning in many capacities in VA and community hospitals, extensive discussions with medical and administrative personnel at the Veterans Administration Central Office (VACO) and a survey of relevant literature.

Any user need statement will, in time, become obsolete. It is recommended that these statements be periodically revised to maintain a relevant body of information for the Veterans Administration and its architect-engineer contractors. (See Section 630).

512 USER NEEDS FOR THE TOTAL HOSPITAL

Certain user needs common to all of the hospital are highlighted in the following sections: growth and change, maintenance, building management, fire safety, asepsis, materials handling and transportation, and communications.

512.1 GROWTH AND CHANGE

512.1.1 Change is inherent in the practice of medicine. Currently, hospitals must respond to changing operational and social needs as well as those of medicine. Traditionally, the ability to respond to change has been, for all practical purposes, frozen during the period necessary to plan and construct a hospital. This pattern is no longer desirable. Hospitals must be capable of responding to changing needs at any time before or after occupancy.

A building's configuration determines, to a large extent, the limits of its subsequent ability to adapt. Shape and the location of fixed (permanent) elements are particularly important in the nursing tower portion of the hospital where many activities require perimeter exposure and where patterns of space organization are relatively rigid.

The performance of non-replaceable elements, such as the building structure, also limits future adaptability. Hospitals are normally not demolished because they cease to function as basic shelter; most are adequate to house people comfortably and safely. Rather, demolition is the result of the inability to meet changing user needs to a degree, which is totally unacceptable.

Long before the demolition point is reached, most hospital buildings impose constraints which result in sub-optimal performance. It is highly desirable to minimize the constraint imposed by the building upon the activities and environment contained therein.

512.1.2 National medical care patterns are currently undergoing close scrutiny at the highest levels of government. It is probable that, as a result of this examination, reorganization of the national health care system will affect all health facilities, including those of the VA. It is also likely that this will

result in substantial change in the current pattern of inpatient and outpatient utilization. Development of a strategy for growth and change is therefore considered fundamental to the long-range effectiveness of a hospital building system for the VA.

512.1.3 Non-nursing areas of the hospital may be contrasted with nursing areas with regard to growth and change. In nursing areas:

1. The frequency of change is less than in non-nursing areas.
2. The type of change is more predictable.
3. Growth is apt to be in functional unit increments, so existing units are not affected.
4. The density of services is considerably less than many non-nursing areas, consequently service change is also less.

In the supporting areas of the hospital, growth and change assume a quite different character. Procedures, both medical and industrial, are more sophisticated. Therefore, change for technological reasons is apt to more frequent and more demanding of services. In addition, activities in these areas are apt to be of a more critical nature, and thus are less capable of being disrupted during change. Expansion of any element in the hospital ”base” is apt to affect other areas. Significant growth of a department is often not merely additive, but also requires a partial reorganization of existing spaces. In addition, growth may require modification or relocation of adjacent departments. This is particularly true in large base units seen in most current VA hospitals.

512.1.4 In addition to growth and change of existing departments, the supporting medical service units must be able to accommodate the introduction of additional treatment modalities. In recent years, we have seen the introduction of cardiac catheterization, inhalation therapy, pulmonary function evaluation and other new diagnostic and treatment functions requiring new departments or space in existing departments.

512.2 MAINTENANCE

512.2.1 Maintenance activities are conducted on both a routine preventative and an as-needed basis. Activities include all repairs and alterations not requiring the services of an outside contractor. The primary objective of building maintenance is to provide an optimum medical and operational environment at all times.

512.2.2 Maintenance needs and building adaptability are closely interrelated as the following examples illustrate:

1. Adequate work space provided to allow for future change also facilitates routine and emergency maintenance.

2. An ability to replace major equipment items is necessary for proper building performance and efficient maintenance and, in addition, it provides for future upgrading to meet changing requirements.

512.3 BUILDING MANAGEMENT

512.3.1 Primary objectives of the building management program are hospital-wide asepsis, an attractive milieu, and patient and staff comfort. This is achieved through technical cleaning procedures and frequent bacteriological monitoring. The ability to provide prompt and thorough performance of housekeeping activities is vital to establishing a high level of care.

512.3.2 The selection of floor, wall and ceiling materials has an important affect on building management cost as well as on the ability to obtain an appropriate environment.

512.4 FIRE SAFETY

512.4.1 One of the most controversial subjects in building design today is that of fire safety. Codes currently in effect are under criticism from many directions. They are alleged to favor safety of property over safety of life, to be based on experience with low rise buildings and inappropriate for high rise, to provide inadequate protection from smoke as compared to fire, and to be based on the unrealistic principle of complete building evacuation. The majority of patients who die in hospital fires succumb to asphyxia, not burns. The rate at which bedridden patients can be evacuated vertically from the upper floors of a high rise nursing tower precludes clearing of the building as a means to safety.

The process of code writing rarely derives from scientific analysis of how buildings burn. The testing of building components to establish fire ratings is expensive, of doubtful relevancy, and in fact impossible for many assemblies due to limitations in test furnace capabilities.

The amount of combustible material in VA Hospitals is now under very tight control, and is much lower than code imposed requirements assume.

A very significant portion of the cost of a building is attributable to the elaborate precautions required by the codes. And in spite of the cost and the precautions, many authorities regard modern buildings as unsafe.

512.4.2 The state-of-the-art in fire protection engineering is quite adequate to increase safety while reducing costs. The Veterans Administration, not being legally constrained to follow codes, is in an excellent position to apply modern techniques. The building system under development should make full use of these new approaches. In fact, as a prototype it should set the pace for future development.

512.5 ASEPSIS

512.5.1 "At present, there are no clearly defined standards for asepsis in any area of the hospital. The problems of asepsis have been frequently studied with little agreement as to results. Mr. A. Samdo, in March 1968 issue of Modern Hospitals, is able to state: 'The thoroughly documented evidence of airborne infection make it clear that the principal function of a hospital air conditioning system is not mere personal comfort but instead control of airborne pathogens.' At the same time, the U.S. Public Health Service in Publication 930-C-15 quotes the work of Rommelkamp in stating, '. . . . an evaluation of total room ultraviolet irradiation in operating theatres has shown that although total counts of airborne bacteria may be reduced up to 63%, the overall incidence of post-operative infection was not changed. Thus, at least in this study, which involved 14,854 operations, the airborne route of infection was not considered important.' These two statements may not be completely contradictory but they do show the lack of agreement of this subject."

In isolation environments, a technique of hand washing and gown changing should be used. Face masks and sterile gloves may also be required in some instances.

In addition, air locks have been employed occasionally to maintain an aseptic barrier.

To maintain an acceptable level of asepsis, certain conditions or activities should occur. These include:

1. Frequent cleaning, particularly of floors and other horizontal surfaces which may collect dust and moisture droplets.

2. Periodic windows (or germicidal fogging) of walls and semi-concealed areas where pathogenic colonies may grow.

3. Proper techniques by staff members to avoid cross contamination between rooms (or patients) and to avoid circulating unnecessary dust and moisture particles while conducting their assigned tasks.

4. Pathogenic control of ventilation air through a program of periodic inspection and replacement (or cleaning) of air filters plus periodic germicidal cleaning of duct work and terminals.

5. The organization of service systems or equipment to minimize entry by maintenance personnel into the patient environment and particularly to avoid the opening of concealed spaces which may harbor uncontrolled pathogenic colonies, for example the removal of a “lay-in” ceiling tile in a patient’s room to reach a valve or change a filter.

512.6 MATERIALS HANDLING AND TRANSPORTATION

512.6.1 Supply and Disposal Systems

1. Trends

   These systems along with the transportation system have for many years been a major determinant of hospital organization and configuration.

   Hospital supplies may be categorized as either reprocessed or disposable. As hospital based labor costs increase, fewer items will be reprocessed in the hospital; however, in certain instances, groups of hospitals are likely to organize joint industrialized plants to reprocess supplies. Out-of-hospital processing usually implies increased storage capability either in individual departments or, more often, at a central location.

Increasing labor costs have also resulted in an increased use of disposables. This has simplified quality control and reduced hospital based labor for many procedures. Use of disposables has also increased the demand for soiled material storage in individual departments and led to renewed interest in trash chutes, particularly the pneumatic type.

Supply and disposal systems will continue to change at a rather rapid rate for the foreseeable future. It is imperative therefore that space configuration and building organization be highly adaptable with regard to these systems.

2. Current Systems

The following summarizes the general patterns of supply and disposal in use today. A considerable degree of variation and many combinations of the systems described may be found.

a. Recycled Items

(1) Linen

(a) Process. Processed in the hospital or at a central facility.

(b) Delivery. Delivered to departments by cart or occasionally in a tote box, usually on a 12 or 24 hour schedule.

(c) Clean Storage. Usually stored on a delivery cart or transferred to shelving. Often bed linen is delivered directly to the patient's room.

(d) Soiled storage. Usually held in plastic bags in a central location on the unit or deposited in a trash chute.

(2) Disposable (consumed) Items

(a) Food

(1) Delivery. Delivered by heated or unheated cart or by tray conveyor.

(2) Clean storage. No clean storage, except when a system of precooked food and a microwave reheat system on each unit is used. This requires refrigerated storage.

(3) Soiled storage. Usually no soiled storage; trays are picked up on a cart for immediate transfer to the dietary area.

(b) Drugs

(1) Delivery. Usually delivered by cart, tote box or dumbwaiter; normally, each 24 hours. Specially requested drugs are carried by hand or delivered by tote box, dumbwaiter, pneumatic tube or, recently, by monorail.

(2) Clean storage. Stored in a central area or in nurse servers (on patient units).

(3) Soiled storage. Unused drugs are returned after patient discharge by one of the above mentioned means.

(c) Medical supplies. See a (2), (b) above.

(d) Administrative supplies

(1) Delivery. Usually delivered on a request basis by hand, tote box, dumbwaiter, pneumatic tube or, recently, by monorail.

(2) Storage. Stored in various administrative areas on shelving or in drawers.

(3) Disposal. In waste containers for periodic pick up.

512.6.2 Materials Handling and Transportation Systems

1. Trends

   Transportation systems have, to large a degree, been the major determinent of hospital configuration. The “cottage” hospital gave way to the “tower on the base” when the elevator was introduced (and mechanical ventilation became available). The introduction of vertical conveying systems reinforced this form of vertical configuration, and, particularly, the close grouping of functional units around a vertical distribution shaft.

   Recently, the availability of horizontal/vertical systems has caused a re-examination of the vertical hospital concept. In addition, the application of cost/benefit analysis techniques involving transportation systems has given impetus to a reevaluation of hospital configuration and distribution systems in general.

   Transportation systems are inherently inflexible in the quantity of goods they can carry, the paths which they follow, and their method of terminal distribution. In addition, many are slow, most are noisy, and almost all require highly skilled maintenance at frequent intervals. The introduction of horizontal/vertical systems have only served to compound problems of inflexibility, noise and maintenance. Current experience indicates that simplicity and reliance on manually guided systems provides a desired degree of adaptability. The cost benefits of more sophisticated transport systems have yet to be established.

2. Current Systems

   a. Elevators. Satisfies the entire range of vertical hospital transportation requirements. Particularly suitable for wheelchair or stretcher patients or large carts. Not efficient for large numbers of people moved in a short period of time. Vertical capability only.

   b. Dumbwaiters. Used for high speed transportation of small items (usually requested items). Vertical capability only.

c. Escalators. Particularly efficient for transporting large numbers of people for a relatively few floors vertically. Diagonal capability only.

d. Tote box conveyors. Efficient for transportation of small items to many floors, particularly when combined with an ejection device. Not suitable for large bulky items. Vertical and horizontal capability.

e. Tray conveyors. Suitable for mass distribution of items where a sender and receiver are in constant attendance. Horizontal and vertical capability.

f. Pneumatic tube (small). Suitable for irregular distribution of small amounts of paper or packages. Horizontal and vertical capability.

g. Pneumatic tube (large). A means of distributing large (20”), prepackaged, non-breakage items. Current experience is insufficient to allow proper evaluation. Horizontal and vertical capability.

h. Chutes. Efficient and effective if properly maintained. Vertical capability with limited horizontal movement.

i. Monorail (large). Possibly suitable for distribution of large items on a request basis. Horizontal and vertical capability.

j. Monorail (small). Efficient for distribution of paper, records, x-rays, drugs, etc. Horizontal and vertical capability.

k. Automated carts. Uses special elevators and a pre-programmed horizontal route. May require special distribution corridors. Horizontal and vertical capability.

l. Motorized carts. High degree of horizontal flexibility. Can be used to transport several large carts simultaneously. Requires a person in attendance.

512.7 COMMUNICATIONS

Hospital communication systems are essential to efficient operation and quality medical care. A wide range of technological innovation in this field is probable over the next few years.

Currently, communications comprise the area of greatest frequency of change in the hospital.

513 FUNCTIONAL REQUIREMENTS FOR THE TOTAL HOSPITAL

513.1 Introduction

Functional requirements define user related building performance criteria. As such they are major determinant of the building system and provide a framework against which the system should be evaluated. These requirements are supplemented with the constraints of component characteristics, building codes, VA regulations, construction trade standards, cost criteria, etc, all of which are additional building system determinants.

The requirements in this section are based on particular activities or sets of activities which are thought to establish building system performance criteria. Since individual activities are transitory, the building subsystem performance requirements derived from these functional requirements will in many cases exceed the requirements for individual activities in order to accommodate probable future needs.

513.2 ADAPTABILITY AND GROWTH REQUIREMENTS

513.2.1 The opening configuration and initial building performance should represent only one option of total building capability.

The initial phase normally achieves the highest level of user need satisfaction. While subsequent alterations usually result in a lesser degree of need satisfaction as a consequence of constraints imposed by an established configuration and by component performance limits, the building system should minimize the effect of these constraints.

513.2.1 The building system should allow for growth and change in an economical manner with minimum disruption to ongoing activities and in a way which will achieve desired performance.

513.2.2 The building system should permit the following types of growth and change:

1. relocation of furnishing or equipment;

2. change of utility services;

3. change of occupancy;

4. relocation of building components, e.g. partitions;

5. major demolition and reconstruction of building components; and

6. expansion of the facility.

512.2.3 The building system should provide for convenient accessibility to and a rational organization of service subsystems.

The most frequent demand for change in hospitals involves services. The keys to efficient service alteration are accessibility and rational organization of distribution routing. Accessibility implies sufficient work space as well as reasonably convenient access. The organization of routing implies preplanned zoning of the service space to preclude interference of distribution sub-systems. Such preplanning can make better use of space currently wasted and can provide for future expansion on a rational basis.

Current problems are, in part, the result of an attitude toward building design characterized by designation of service space as “non-assignable” and therefore deserving of reduction to an absolute minimum. This has proved to be false economy in the context of long term costs, but the attitude persists because of the presumed high first cost of providing services with their own functional space sized, designed, and laid out according to their own requirements. The growing density of services in a modern hospital makes it mandatory to include a thoroughly planned and programmed service space as an integral part of basic building design. A cost effective way of providing this space must be found.

513.2.4 The building and its systems should be capable of unanticipated growth.

513.3 REQUIREMENTS AFFECTING THE CONFIGURATION OF FUNCTIONAL UNITS

513.3.1 Definition

Functional units are defined as assemblies of rooms, closely linked by interrelated activities. A functional unit is often identical to an administrative department such as “surgery” or “radiology”.

513.3.2 Area Requirements

The building system should be capable of accommodating functional units which vary in size.

In contrast to nursing area functional units, non-nursing functional units vary widely in size. In addition, the same unit will often vary in size from one facility to another, depending upon the relative number of beds served, outpatient load, degree of medical specialization, etc. An example range of areas can be seen in Table 510-1.

513.3.3 Perimeter and Aspect Requirements

The building system should provide for the introduction of natural light where required.

Perimeter length and aspect characteristics are of paramount importance in nursing units in order to achieve sufficient natural light for patient bedrooms. In non-nursing areas, these factors are secondary to the achievement of an optimal organization of functional units.

Generally, natural light is advantageous in rooms where diseases affecting skin color, e.g., jaundice, might be diagnosed, in dental treatment areas where tooth enamel color must be evaluated, and in psychiatric areas. In addition, natural light is desirable in corridors and waiting spaces to provide relief from the uniformity (monotony) which pervades most major institutions. The introduction of natural light into corridors can also provide a sense of orientation often missing in large institutions.

513.3.4 Dimensional Requirements

1. Dimensional Discipline

    a. The dimensional discipline of the building system should be compatible with the required organization of functional units.

        Nursing and non-nursing functional units have been examined to identify consistent patterns of organization which might be sufficiently extensive to justify a new structural discipline. The following features relating to the internal organization of nursing areas are outstanding:

Table 510 – 1. GROSS DEPARTMENTAL AREAS

Department	Approximate Gross Area* Cleveland 800 Beds	Lexington 370 Beds	Columbia 480 Beds
Admission & Outpatient Service	31,941	5,145	2,941
Audiology		1,415	1,224
Canteen	8,813	7,073	7,863
Cardiopulmonary Lab	3,212	3,183	2,351
Central Service	7,119	4,663	4,413
Chaplain Service	4,382	3,053	3,192
Conference Rooms	1,625		
Contract Division	435		348
Credit Union	290		261
Dental Clinic	4,051	3,119	2,349
Dietetic Service	20,970	10,335	18,104
Director, Professional Services	935		
EEG Clinic	486	819	819
EENT Clinic (or ENT Clinic)	3,110	1,439	583
Engineering Division	6,900	5,813	6,163
Eye Clinic			682
Fiscal Division	2,625	218	1,363
Gastroenterology Unit		1,073	
General Clinics	11,238	1,691	2,255

* Gross area figures based on programmed net areas from Master Plan Documents for indicated hospitals multiplied by an estimated net/gross factor.

Table 510-1. GROSS DEPARTMENTAL AREAS

Department	Approximate Gross Areas* Cleveland 800 Beds	Lexington 370 Beds	Columbia 480 Beds
GU Clinic	2,494	1,228	1,269
Hematology Unit		725	
Hospital Director's Suite		2,842	5,097
Housekeeping Division	8,432	3,631	5,786
Inhalation Therapy		406	174
Laundry			5,410
Library Service		2,415	2,716
Lockers, Lounges, Toilets & Showers	18,965	8,651	8,567
Main Lobby	2,563	463	1,181
Manager's Suite	1,378		
Medical Illustration Lab	3,002	1,878	2,030
Medical Incinerator	165		165
Medical Record Librarian	869		
Medical Service Administration	711	1,146	566
Mental Hygiene Clinic		1,969	
Miscellaneous Activities	1,863	1,233	1,392
Nursing Service Education and Training	1,827	1,813	1,813

* Gross areas figures based on programmed net areas from Master Plan Documents for indicated Hospitals multiplied by an estimated net/gross factor.

Table 510-1. GROSS DEPARTMENTAL AREAS

Department	Approximate Gross Area* Cleveland 800 Beds	Lexington 370 Beds	Columbia 480 Bed
Nursing Unit Facilities	203,781	100,040	132,821
Orthopedic Brace Shop	1,668		
Orthopedic Clinic	1,834	2,008	1,566
Pathology & Allied Sciences Service	16,458	12,651	11,854
Pathology Reference Lab	725		
Personnel Division	1,560		1,189
Pharmacy	2,406	1,775	1,806
PM & R Service	16,559	8,392	25,243
Plastic Eye Clinic	885		
Psychiatric Admin. & Teaching Service	1,247	1,088	827
Psychology Service	1,102	2,567	2,567
Quarters – OD & Residents	2,524	2,524	2,524
Quarters – Relatives of Ill Patients	675		
Radioisotope Unit		983	
Radiology Service	12,943	5,242	5,156
Recovery Room (Surgical)	2,220	1,500	1,200
Registrar Division	17,875	5,302	5,071
Research Service	25,762	17,400	36,250

*Gross area figures based on programmed net area from Master Plan Documents for indicated hospitals multiplied by an estimated net/gross factor.

Table 510-1. GROSS DEPARTMENTAL AREAS

Department	Approximate Gross Area* Cleveland 800 Beds	Lexington 370 beds	Columbia 480 Beds
Service Organizations	290		348
Social Work Service	2,563	1,598	2,736
Special Service	13,397		
Supply Division	188		1,363
Surgical Service	13,059	10,749	8,570
Vocational Counseling Service	667		
Voluntary Service		928	1,088
Warehouse	1,320	1,254	7,381
Women Patients' Laundry			150
TOTAL	492,109	254,789	340,787

*Gross area figures based on programmed net areas from Master Plan Documents for indicated hospitals multiplied by an estimated net/gross factor.

1. The nursing tower consists of generally repetitive elements (functional units).

2. These functional units are often consistent in size and arrangement from one hospital to the next.

3. They have particular requirements for aspect (outlook) and perimeter to area ratios.

Consequently when viewed in the context of the total hospital, the nursing tower portion is somewhat unique.

In the case of non-nursing functional units it is quickly apparent that no consistency of plan organization exists between functional units. Each was optimized in response to the medical and operational needs of a particular set of activities. It is unlikely, therefore, that any non-nursing unit or combination of units will become a generator of a new dimensional discipline (See Section 513.3.2).

Structural and mechanical subsystems will both impose dimensional discipline. Of these, the structural discipline is generally most critical in relation to internal functional unit organization. The mechanical discipline, i.e., the mechanical service module, should be sufficiently large so as to encompass most departments, and thus remain independent of any particular internal organization.

b. The dimensional discipline of the building system should provide for a generalized building performance capable of accommodating a range of activities in any given space.

2. Unobstructed Area Requirements

The building system should be capable of accommodating unobstructed areas where required.

Functional units have been examined to determine individual spaces in which a clear, column-free area is required. A list of these spaces is itemized in Table 510-2.

As this list indicates, certain large areas must be column-free. Although relatively few in number, they must be accommodated within the building system. For other areas, it is obvious that any reduction in the number of permanent elements such as columns reduces constraints in planning.

In addition to considering large spaces, non-nursing areas have been reviewed to determine inherent relationships between spaces which might not be compatible with structural column locations. There appears to be no relationship which could not be adjusted in a minor way to accommodate a structural discipline.

3. Critical Dimension Requirements

In addition to unobstructed areas, hospitals activities have been reviewed to determine whether any were dependent upon critical minimum or maximum ergonometric space dimensions. In the case of nursing areas the repetitive nature of spatial requirements is apt to generate a similarly repetitive structural response. In the review of non-nursing activity requirements these dimensions were not in most cases the generators of a dimensional discipline. Hence it is assumed that no dimension in these areas is so critical that it can not be adjusted to accommodate the nursing area structural discipline given the presence of a reasonable structural span. Rather, the problem is identical to conventional planning in that spaces can be “made to fit” the established discipline.

4. Floor To Ceiling Height Requirements

Most activities in the hospital, particularly those in bed care areas can be accommodated with a 9’-0” ceiling height. However, there are some non-nursing areas that require additional height or have heights specified by VA Standards. An example list is included in Table 510-3.

Table 510-2. SPACES REQUIRED TO BE COLUMN FREE

SPACE	SHOULD BE COLUMN FREE
Autopsy	yes
General Storage	no
Laboratory	no
Maintenance Shops	no
Mechanical Rooms	yes
Research Laboratories	no
Medical Illustration Studio	yes
Processing and Delivery	no
Audiology Classroom	yes
Operating Rooms	yes
Locker Rooms	no
Surgical Recovery	yes
PM & R Pool	yes
PM & R Treatment Areas	no
Chapel	yes
Libraries	no
Clerical Areas	no
Conference Rooms	yes
Kitchen and Dining Areas	no
Retail Stores	no
Main Lobby and Waiting Areas	no
Pharmacy	no
Ambulance Garage	yes
Records Storage	no
Patients' Clothing Storage	no
Day Rooms	no
16-bed Patient Rooms	no
Laundry	no

Table 510-3. MINIMUM CEILING HEIGHTS

9’-6”:
- General Operating Rooms *
- X-ray Rooms (general) *
- Physical Therapy
- Audiometric Testing
- Therapy Pool

10’-0”:
- Kitchen *
- Laboratories *
- Utility Shops *
- Animal Labs *
- Laundry Receiving and Issue *
- Physical Medicine and Rehabilitation *
- Bowling Alley *
- Storage

10’-6”

12’-0”:
- Laundry Work Space (11’-9” to underside of ducts)
- Transformer *
- High Voltage Switch Gear *
- Emergency Generator (11’-0”) *
- Warehouse * (11’-0” to underside of ducts)
- Garage Vehicle Storage *
- Radiographic Rooms (certain brands of equipment require 10’-6” to 10’-8”)
- Trash Room *

* VA Standard Details or Construction Standards
Indications are that certain of above ceiling heights may not necessarily be required. A careful re-evaluation of these standards is suggested.

513.3.5 Internal Organization Requirements

The building system should satisfy the internal organization requirements of functional units.

The general objectives of the building system which relate to the internal organization of functional units are:

1. To satisfy user needs and the corresponding detailed performance requirements.

2. To provide the ability to achieve the widest possible range of internal organizations of functional units.

513.4 REQUIREMENTS AFFECTING THE CONFIGURATION OF THE TOTAL HOSPITAL

Major building configuration variables include:

1. the type and number of functional units to be accommodated,

2. the interrelationship of these units,

3. the relationship to elements outside or partially outside the hospital which require association with one or more functional units,

4. the organization of the hospital as a whole, with all primary operational requirements, including all movement and support systems, and;

5. site considerations and other governing constraints, which apply to the specific project.

513.4.1 General Options for Organization

The building system should accommodate all basic configuration options which are commonly in use or which would offer significant advantage should they be used.

All VA hospitals examined to date could be categorized as “tower on a base”; that is, nursing unit “towers“ stacked on a base consisting of non-nursing functions. This configuration is perhaps the most typical organization for hospitals in the United States today.

Recently, other configurations have been put forth. Foremost among these are: (1) the nursing "tower" adjacent to a non-nursing "base" (articulated tower), (2) nursing units and non-nursing functions interspersed on each floor (low block, pavilion or high block), and (3) a nursing tower adjacent to separate industrial and medical support units (articulated tower). These options are discussed more fully in Section 250.

The four organization options described above represent basic types. Undoubtedly, there are others, each type has hundreds of variations developed in response to site conditions, the constraints of existing related buildings, variations in administrative policy, etc. With this variety, it is clearly impractical to define a rigid hospital organization around which a building system could be developed. In certain cases, it may be possible to identify configurations which optimize medical or operational efficiency. History indicates, however, that operational factors which generate "optimum" solutions change in time, and a different "optimum' is created. The building system will remain a valid, self-improving system only so long as it can accommodate all "optimum" options proposed.

513.4.2 Relationship Between Functional Units

1. The building system, should be capable of accommodating a wide range of operational patterns.

   Relationships within the hospital are determined by both operational and physical requirements.

   The operational relationships which most affect configuration are those of transportation or movement. These may be categorized as (1) patient movement, (2) staff movement, and (3) material movement. Each category must be evaluated in terms of (a) the characteristics of the object being moved, (b) the frequency of movement, and (c) the urgency of movement. Materials handling systems are closely interrelated with the organization of distribution and receiving stations and the type of movement equipment provided. A highly mechanized distribution system may allow relationships which would be undesirable in a hospital with manual distribution systems. Or, a highly organized and compact "vertical" hospital may be optimum for patterns of distribution and equipment which would be quite inefficient for a "horizontal" hospital. No one pattern can fit all circumstances.

The nature of the operational relationships between functional units in the hospital today is such that it is frequently possible to group certain units in order to maximize building efficiency. This is particularly true of the "industrial" functions such as laundry, kitchen, processing and distribution, storage, etc. In certain instances, these functions have been totally detached from the hospital complex and constructed as an industrial building in a remote location.

While operational relationships are of prime importance in determining initial building configuration, it is also important to consider the physical relationships generated by optimizing building component organization. Examples of such component organization include certain mechanical and electrical services, accommodation of unusually heavy floor loads, unusual floor-to-ceiling height, etc.

In addition to factors of operational efficiency and optimization of building component organization, physical relationships are influenced by a need for future expansion of functional units. It is desirable to locate complex areas with high growth potential adjacent to elements with minimum service demands or next to exterior walls. In the former case those areas which are displaced may be economically relocated as other areas expand. Factors of growth and change are discussed more fully in Section 513.2.

It is apparent from the above discussion that the physical relationships between functional units cannot be generalized in any precise way. The operational relationships in each facility are to some extent unique and transitory. New medical techniques, new materials handling systems, altered pattern of labor cost, etc., result in a need to change relationships between functional units. In most instances, there is latitude to adjust methods of operation to suit a desired configuration. In one sense, then, hospital design is a trade-off between suitable patterns of operation and an optimum configuration.

2. The building system must provide the capability to achieve a desired initial configuration.

513.4.3 Building Height Limitations

The building system should accommodate a reasonable range of building heights.

Height is a function of site size and site utilization. It is also often influenced by administrative policies such as the distribution of supplies or by medically desirable relationships. There currently is a trend to optimize horizontal relationships between nursing and non-nursing units. The resulting buildings do not often exceed nine stories in height. In large vertical hospitals, however, where distribution centers are stacked, a height in excess of nine stories is sometimes necessary.

From the VA projects examined to date, there is no apparent disadvantage in limiting the height of the system to nine stories. It is recognized, however, that in a minority of cases, an extremely small site would necessitate a taller structure.

513.4.4 Materials-Handling and Transportation

1. The building system should allow the widest possible options in the selection of materials handling and transportation systems. Furthermore, an ability to accommodate a change or an addition to these systems should be provided where possible, i.e., it should allow the introduction of horizontal and vertical distribution systems either in initial construction or as a subsequent addition.

   A survey of available materials handling systems indicates the following example characteristics which should be accommodated within the building system. Such accommodation must also include acoustical characteristics, effect on sensitive electronic equipment, e.g., electron microscopes, and constraints on future adaptability.

EXAMPLE CHARACTERISTICS OF MATERIALS HANDLING SYSTEMS

SYSTEM	WEIGHT CARRIED (POUNDS)	MINIMUM CLEAR OPENING IN STRUCTURE VERTICAL*	HORIZONTAL*
Elevator	4,000	8.0’ x 9.5’	
Dumbwaiter	800	4.0’ x 4.5’	
Totebox Conveyor	425	3.5’ x 5.0’	
Self-guiding Cart	1,525	5.0’ x 5.0’	4.0’ x 6.5’ high
Monorail Cart	1,000	5.0’ x 5.0’	5.0’ x 7.5’ high
Monorail Totebox	30	1.5’ x 1.5’	1.5’ x 2.0’ high

* Rounded up to nearest ½ foot.

2. The building system should maximize areas of free space by grouping vertical and horizontal transportation elements near other permanent elements, or on the boundaries of open areas.

   Certain exceptions to this may occur in supporting units where it is essential to deliver supplies directly to a work station, e.g., delivery of sterile supplies to an isolated surgery supply area.

513.5 ENVIRONMENTAL REQUIREMENTS

513.5.1 Air Quality Requirements

Specific air qualities for the various functional units should meet the requirements of the various applicable VA Construction Standards. Some of these standards are presently under revision or development using data contained in recently completed VA Air-Conditioning research studies. In general, most functional unit requirements are for a temperature range of 70 - 80ºF with a mean temperature of 76º $\pm$ 2 and a relative humidity range of 30 - 60%.

513.5.2 Acoustical Requirements

1. The building system should provide a range of acoustical separation from STC 30 to STC 55 and an impact rating up to INR +10.

   It is evident that the acoustical performance of each element in the acoustical shield must be at least equivalent to the total STC desired. In most hospitals, inconsistencies in the selection of materials, detailing or supervision result in actual acoustical values substantially less that those of individual components. It is essential that the detailing of floor, wall ceiling joints and penetrations be consistent with the major acoustical components selected.

2. While attenuation and absorption values for each space must be selected on an individual project basis, it is possible to generally define the acoustical factors to be accommodated in individual spaces. Four categories have been identified:

   1. Noise Generator: Equipment or people within the space create sufficient sound to disturb activities in adjacent spaces.

   2. Quiet Required: Activities within the space are such that they would be disturbed by sounds from adjacent spaces.

   3. Privacy Required: Activities within the space are such that intelligible conversation should not be heard in any other space.

   4. Absorption Required: Activities within the space are such that they would be disturbed by sounds generated within the space itself.

   Criteria for the selection of attenuation and absorption characteristics for rooms in the hospital will vary from project to project. Program variables such as the selection of a particular item of equipment in a utility room or the use of pillow speakers in patient rooms will substantially affect acoustical requirements. Background (ambient) noise generated from external sources such as an adjacent freeway or internal sources such as the mechanical ventilation system will help to mask the intelligibility of sounds and may modify acoustical requirements.

Table 510-6 is a sample list of spaces, which fall into one or more of the above categories. It has been selected to represent almost all activities occurring within the hospital.

3. Table 510-7 indicates a generalized set of STC sound resistance performance criteria for nursing unit spaces, which have been developed from a detailed study of needs and requirements. These should be modified for individual projects to accommodate the variables mentioned above.

513.5.3 Lighting Requirements

1. Natural Lighting Requirements

   See Section 513.3.3

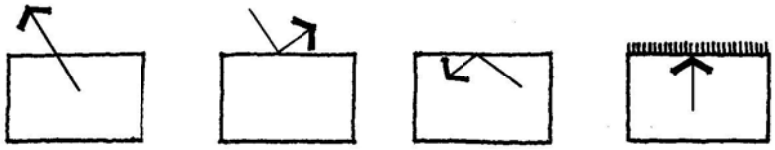
2. Artificial Lighting Requirements

   The building system should be capable of accommodating all types of lighting systems commonly found in hospitals.

   Although lighting is not apt to be a major determinant of the building system, accommodation for various lighting components must be considered. A careful review of activity requirements indicates that surface mounting of fixtures is acceptable for a large majority of spaces. In rare instances, however, recessed lighting may be desired. For example, areas where the patterns of air movement are critical and might be disrupted by projecting ceiling mounted lights, e.g., in surgery or a laminar flow room. Also, in areas where cleanability is a major and difficult task, such as the kitchen, recessed lights may minimize maintenance chores.

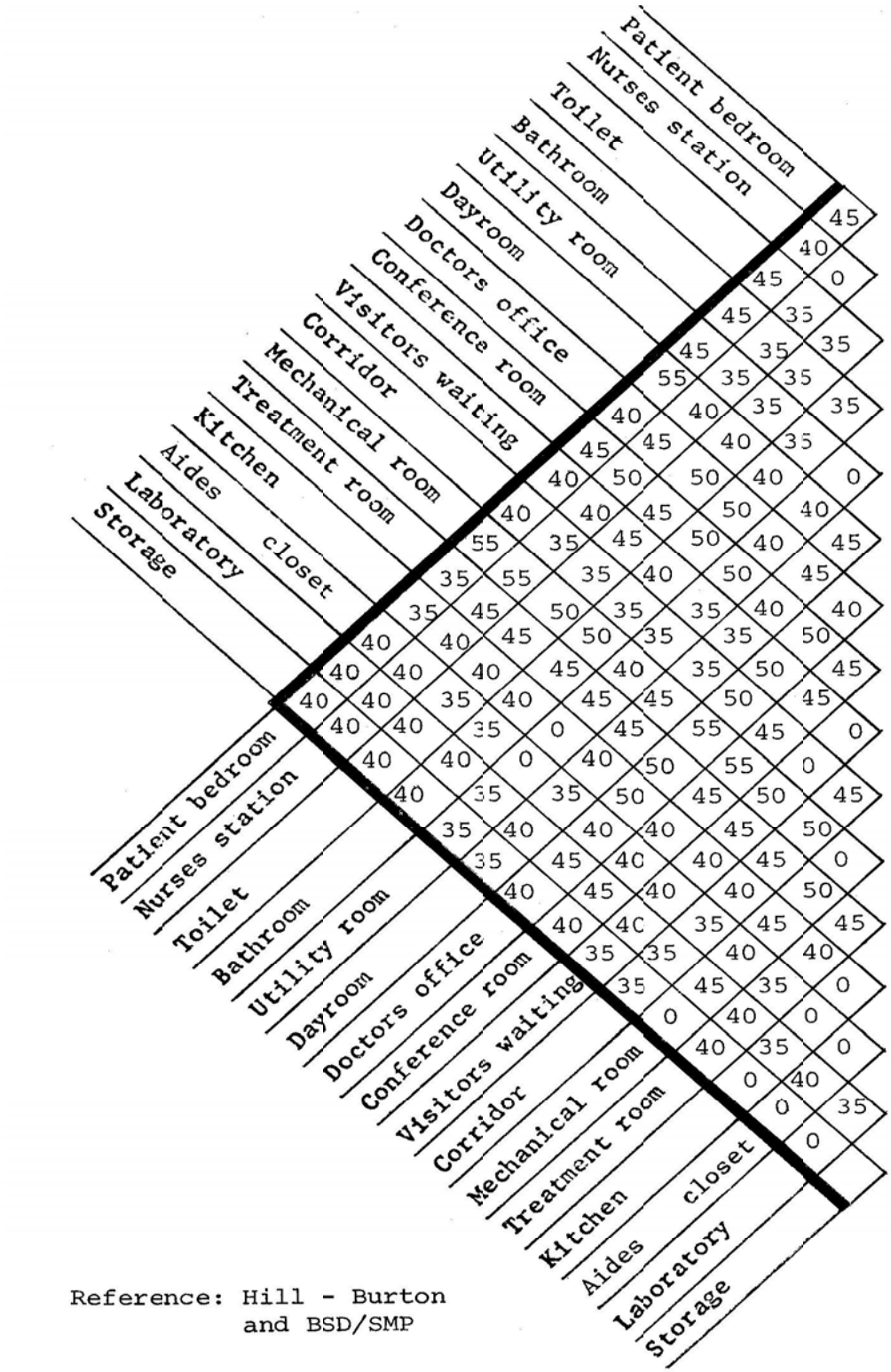
   Variation in lighting levels and fixture location are more ranging in non-nursing areas, than in nursing areas. An operating room lighting layout, for example, must be carefully designed to ensure a shadow-free pattern. This may necessitate fixtures both parallel and perpendicular to the secondary ceiling support system. In addition to general illumination, ceilings and partitions must accommodate a wide variety of special fixture types. Examples include surgical lights, examination lights, positioning lights in radiation therapy areas, dark room lights, etc.

Table 510-4. ACOUSTICAL REQUIREMENTS



Room Name or Type	Noise Generator	Quiet Required	Privacy Required	Absorption Required
Mechanical Room	X			X
Rooms with Pneumatic Tube Stations	X			X
Shop	X			X
Kitchen	X			X
Conveyor Dispatch Rm.	X			X
Rooms with heavy motors (walk in refrigerator, etc.)	X			
Supply Processing Work Room	X			X
Storage	X			X
Clerical Office	X			X
Administrative Office		X	X	
Physician's Office		X	X	
Clinical Laboratory	X			X
Research Laboratory	X			X
Animal Holding Area	X	X	X	X
Operating Room		X	X	
X-Ray Room		X	X	
Audiometric Testing Rm.		X	X	X
Group Therapy Room	X	X	X	X
EEG Room		X		
Therapy Pool	X			X
Dental Clinic		X	X	
Exam. & Treatment Rm.		X	X	
Corridor Inpatient Area	X			X
Other Corridors	X			X
Waiting Area	X			X
Conference & Meeting Rm.	X	X	X	X
Dining Area				X
Retail Store				X
Library		X		X
Chapel		X		X
Patient Bedroom	X	X	X	X
Patient Toilet	X			
Nursing Station	X		X	X
Day Room	X			X
Intensive Care Unit		X	X	X

Table 510-5. SOUND TRANSMISSION RESISTANCE BETWEEN NURSING UNIT SPACES, STC.



513.5.4 Requirements for Finishes

1. The building system should accommodate those floor, wall, and ceiling finishes commonly found in hospitals.

   Where acceptable performance can be obtained, it is desirable to standardize materials and finishes throughout the hospital in order to simplify, and thus speed, the construction process and to facilitate later changes in room function. The standard or preferred finishes are: resilient tile flooring, painted gypsum board mounted on metal studs and acoustic tile ceilings. It is apparent that these finishes are not appropriate for tile ceilings. It is apparent that these finishes are not appropriate for certain hospital functions. The following discussion indicates the areas in which other materials should be considered.

2. Required Floor Finishes

   The preferred floor finish is resilient tile. However, resilient tile flooring applied to a concrete slab is generally considered inappropriate where heavy loads, frequent wetting, stringent asepsis, high acoustical absorption or particular visual effects desired. In addition, it is often omitted in areas where its features of cleanability and appearance cannot be justified for reasons of costs. In some instances resilient sheet material may be preferred to resilient tiles. However, if the flooring is applied after the installation of partitions, sheet-flooring cost will be considerably more than tile. In addition, patching of sheet flooring is somewhat more difficult. Areas where other flooring materials should be considered include:

FUNCTIONAL REQUIREMENT	FLOOR	BASE
Heavy Loads, Wet (Example: kitchen)	Quarry tile or industrial flooring	Integral, same as floor
Heavy Loads, Dry (Example: general stores)	Hardened concrete or industrial flooring	Resilient
Aseptic (Example: surgery)	Sheet resilient	Integral, same as floor
Frequently Wet (Example: patients' shower room)	Ceramic tile or sheet resilient	Integral, same as floor
Conductive (Example: surgery)	Conductive Sheet resilient	Integral, same as floor
Acoustical Absorption (Example: meeting room)	Carpet	Resilient
Special appearance (Example: lobby)	Carpet	Resilient or same as floor

3. Required Wall Finishes

Selection of wall materials should be based on speed of installation, ease of removal and reusability as well as functional performance. The preferred wall, gypsum board with a panted finish, has acceptable installation and removal characteristics and provides satisfactory performance for most hospital functions. In addition, this wall can be upgraded in performance either initially or at a later date by replacing the gypsum board surface and applying ceramic tile or special coatings. Functions for which other than paint on gypsum board may be appropriate include:

FUNCTIONAL REQUIREMENT	MATERIAL
Continuously Moist (Example: dishwashing area)	Ceramic tile on plaster
Frequently Moist (Example: patient bath or shower room)	Thin set ceramic tile on waterproof gypsum board
Aseptic (Example: surgery)	Special coatings
High Noise Absorption (Example: boiler plant)	Acoustically absorbent material on concrete block
High Impact (Example: engineering shops)	Concrete block with appropriate finish
Lead Shielded, Above Normal Thickness (Example: x-ray therapy)	Paint on plaster

4. Required Ceiling Finishes

Ceiling finishes may be restricted to relatively few materials. Acoustical tile is preferred and is acceptable for most hospital functions. A cleanable (plastic film) tile should be selected for all applications if budget permits. Functions which require other than acoustical tile include:

FUNCTIONAL REQUIREMENTS	MATERIAL
Aseptic (Example: surgery)	Painted gypsum board on plaster
Frequently Moist (Example: wheel chair shower)	Painted plaster
High Cleanability (Example: kitchen)	Vinyl coated acoustic or metal pan
High Noise Absorption (Example: boiler plant)	Special acoustical material
Continuously Moist (Example: cart wash area)	Paint on plaster
Lead Shielded, Above Normal Thicknesses (Example: x-ray therapy)	Paint on plaster
Minimum Acoustical Need (Example: general storage)	Exposed structure or gypsum board

513.5.5 Asepsis Requirements

1. A reasonably aseptic environment should be maintained in all areas frequented by patients and in work areas used by staff having contact with patients or preparing material for delivery to patient areas. Additional controls must be exercised in areas frequented by patients with infectious diseases (isolation) or those with a decreased level of resistance to infection (reverse isolation).

2. In order to maintain an acceptable level of asepsis, certain conditions or activities should occur. These include:

   a. Pathogenic control of ventilation through a program of periodic inspection and replacement (or cleaning) of air filters plus periodic germicidal cleaning of duct work and terminals.

   b. The organization of service systems or equipment to minimize entry by maintenance personnel into the patient environment and particularly to avoid the opening of concealed spaces which may harbor uncontrolled pathogenic colonies, for example, the removal of a “lay-in” ceiling tile in a patient’s room to reach a valve or change a filter.

513.5.6 Maintenance Requirements

1. Where possible, compatible surfaces should be selected for all nursing units. Alterations of a minor nature should not create excessive dust or other potential housekeeping problems. Surface materials should be replaceable with an ability to match seams, textures and colors throughout the building's life span.

   The selection of floor, wall and ceiling materials has an important affect on building management cost as well as on the ability to obtain an appropriate environment. Change of surface materials may require different cleaning compounds, equipment or techniques.

2. Routine equipment servicing should not interfere with ongoing activities and disruption caused by emergency repairs should be minimized.

   Methods of reducing equipment down-time and the extent and nature of the activities affected by individual items of equipment are important considerations in achieving the stated objective. Maintenance needs and building adaptability are closely interrelated as the following examples illustrate:

   1. Adequate work space provided to allow for future change will also facilitate routine and emergency maintenance.

   2. An ability to replace major equipment items is necessary for proper building performance and efficient maintenance and, in addition, it will provide for future upgrading to meet changing requirements.

   3. Service distribution networks may be partially redundant to minimize activities affected by repairs. Redundancy also facilitates alteration and extension of services.

   4. Repairs or minor alterations must not be made in a way which will reduce the capability for future change. A system discipline, once established, must be respected by maintenance personnel as well as independent contractors.

513.6 FIRE SAFETY REQUIREMENTS

The building system should meet the following basic requirements:

1. Early detection of smoke and fire.
2. Containment of smoke and fire with minimum disruption of other patient care activities.
3. Rapid evacuation of threatened areas with minimum disturbance to patients.
4. Maximum safety for patients and staff plus reasonable protection of property consistent with cost effective criteria.
5. Protection of fire fighting personnel and facilitation of suppression activities.

513.7 UTILITY SERVICE REQUIREMENTS

513.7.1 Plumbing Distribution Requirements

All hospital activities have been reviewed to determine the types of plumbing distribution required for each. These requirements are illustrated in Table 510-8.

513.7.2 Electrical Distribution Requirements

The electrical distribution subsystem should meet the requirements for:

1. the types of service delivered to each functional unit and
2. the generalized power requirements for functional units by system type. These requirements are illustrated in Table 510-9.

Table 510-6. PLUMBING DISTRIBUTION REQUIREMENTS

	Soil	Normal Waste	Acid Waste	Radioactive Waste	Vent	Water Supply	Gas	Steam	Hot Water	Distilled Water	Deionized Water	Compressed Air	Vacuum	Oxygen	Medical Air	Nitrous Oxide
Auditorium	X	X			X	X			X							
Canteen	X	X			X	X	X		X							
Central Service	X	X			X	X		X	X	X	X				X	
Clinics	X	X			X	X			X				X	X	X	
Dental Service	X	X			X	X	X		X				X	X	X	X
Dietetic-Dining	X	X			X	X	X	X	X							
Dietetic-Kitchen	X	X			X	X	X	X	X							
ECG Lab	X	X			X	X			X					X		
EEG Lab	X	X			X	X			X							
Hemodialysis Unit	X	X			X	X			X	X			X	X	X	
Inhalation Therapy	X	X			X	X			X					X	X	
Laundry	X	X			X	X			X			X				
Library Service	X	X			X	X			X							
Lobby	X	X			X	X			X							
Medical Illustration	X	X	X		X	X			X							
Nuclear Medicine	X	X		X	X	X	X		X					X		
Lockers, Lounges, Toilets & Showers	X	X			X	X			X							

Table 510-6. PLUMBING DISTRIBUTION REQUIREMENTS (Continued)

	Soil	Normal Waste	Acid Waste	Radioactive Waste	Vent	Water Supply	Gas	Steam	Hot Water	Distilled Water	Deionized Water	Compressed Air	Vacuum	Oxygen	Medical Air	Nitrous Oxide
Nursing Units	X	X			X	X			X				X	X	X	
Office Functions	X	X			X	X			X							
Pathology Clinical Lab	X	X	X		X	X	X	X	X	X	X		X	X	X	
Pathology Morgue	X	X			X	X	X		X	X	X	X				
Pharmacy	X	X			X	X			X	X	X	X			X	
PM & R	X	X			X	X			X							
Pulmonary Function	X	X			X	X			X					X	X	
Radiology	X	X			X	X			X					X		
Recovery	X	X			X	X			X				X	X	X	
Research Labs	X	X			X	X	X	X	X	X	X	X	X	X	X	
Residents' Quarters	X	X			X	X			X							
Storage	X	X			X	X			X							
Surgical Service	X	X			X	X		X	X				X	X	X	X
Workshops	X	X			X	X			X			X				
Mech. Equip. (HVC)	X	X			X	X		X	X							

Table 510-7. ELECTRICAL POWER DISTRIBUTION REQUIREMENTS

	Power (Watts Per Sq. Ft.)			
	480/277V		208/120V	
	Lighting	Other	Lighting	Other
Auditorium	0.5	-	9	8
Canteen	2.4	14	0	6
Central Service	2.4	0.5	0	4
Clinics	2.4	0	0	4
Dental Service	2.4	0	0	4
Dietetic –Dining	2.4	0	0	2
Dietetic-Kitchen	2.4	24	0	5.8
ECG Laboratory	2.4	0	0	4
EEG Laboratory	2.4	0	0	4
Hemodialysis Unit	2.4	0	0	5.0
Inhalation Therapy	2.4	0	0	4
Laundry	2	30	0	0.5
Library Service	2.4	0	0	0.5
Lobby	1.0	0	0	0.3
Lockers, Lounges, Toilets & Showers	1.5	0	0	0.4
Medical Illustration	2.0	0	0	4
Nuclear Medicine	1.5	0	0	6.0
Nursing Units	1.5	0	1.3	2.0
Office Functions	3.2	0	0	3.0
Pathology--Clinical Lab	3.0	2.3	0	8.0
Pathology--Morgue	3.0	1.0	0	1.5
Pharmacy	3.0	0	0	0.5
PM&R	3.0	0	0	5.2
Pulmonary Function	3.0	0	0	4.5
Radiology	0.5	3.1	2	17
Recovery	1.5	0	0	4
Research Labs	3.0	2.8	0	7.6
Residents' Quarters	1.0	0	0	1.0
Storage	1.0	0	0	0.5
Surgical Service	10.0	0	5	5
Workshops	2.0	0.5	0	5.0
Circulation Areas	1.5	0	0	0.5
Mech Equip. (HVC)	-	10.2	-	-

513.8 MISCELLANEOUS REQUIREMENTS

513.8.1 Vertical Load Requirements

The building system should meet the following vertical load requirements:

1. VA standards generally are in accordance with the National Building Code, with the exception of a projection booth area, which requires a 200 psf loading.

   The nursing areas require a uniform live load of 75 psf.

2. An investigation of high, concentrated loads in non-nursing areas has indicated that areas other than those listed in the NBC may require special consideration. An example list includes:

Area	Total Dead Load
a. Radiology:	
Cobalt 80 Teletherapy unit	13,750#
Topographic table	3,190#
X-ray table	600#
b. Physical Therapy:	
Hubbard Tank	4,130#
Therapy Pool	30,000# or more
c. Central Processing and Distribution:	
Automatic Cart Washer	5,800#
Sterilizer	4,600#
d. Office:	
Electric File	4,900#
e. Kitchen:	
Dishwasher	5,000#
Baking Oven	13,700#
Cooking Oven	11,000#
f. Laundry:	
Flat work ironer	47,500#
g. Diagnostic Area:	
Audiometric Room (9’ x 16’)	12,000#

513.8.2 Attachment Requirements

The following items may be attached to a partition, a ceiling or to the structural slab:

Items	Example Loading
1. Moving radiographic tube hanger	750#
2. Moving laundry bag conveyor	400#
3. Moving patient hoist	300#
4. Lead lined 4'-0"	1,200#
5. Image Intensifier	185#
6. Lead shielding	32 psf
7. X-ray Transformer	185#
8. 10-gal. distilled water carboy	630#
9. Exhaust hood in kitchen	4,000#
10. Surgical gas column	350#
11. Orthopedic hook	300#
12. Surgical light	3,600#
13. X-ray shielding	32 psf max.
14. Grab bars	200#

513.8.3 Floor Slab Depression Requirements

An example list of requirements in excess of 3” includes:

Item(s)	Depression
1. Prefabricated rooms including: audiometric, freezers and refrigerators, R.F. shielded, clean, and environmental control rooms	4” - 8”
2. Recess for cobalt machine.	10”
3. Recess for hydrotherapy tank.	37”
4. Recess for drainage in kitchen and laundry.	6” - 8”
5. Recess for automatic cart washer.	10” - 12”
6. Therapy pool.	66” - 108”
7. X-ray raceway system.	6” - 8”

513.8.4 Other Requirements

The following items in the VA standards or construction details have been identified as potential “misfits” or areas for consideration during the development of the prototype design:

1. Furred space above built in refrigerators required to extend to structural slab above.

2. Floors of built-in freezers and refrigerators required to be flush with adjacent floor in new construction.

3. Concrete slab topping, where used, is required to be 1-1/2”.

4. Equipment required to be recessed in partitions:

    Drinking fountains

    Soap holder

    Razor blade receptacle

    Cassette transfer cabinet

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520 DETAILED NEEDS AND REQUIREMENTS: NURSING UNITS

521 INTRODUCTION

The following are detailed needs and requirements for nursing units occurring in VA hospitals. This information is based on extensive interviews with the VA personnel at field stations and in the Central Office, considerable field observation and survey of relevant literature.

It is recommended that detailed needs and requirements be developed for all other areas of the hospitals to ensure a comprehensive understanding of the functioning of each unit by VA's A/E contractors as well as by all components of the VA itself. Such a document if adequately prepared and frequently updated would offer a significant benefit to the VA in obtaining desired performance in their buildings.

522 GENERAL NURSING UNIT

522.1 User Needs

General nursing units, including medical, surgical, orthopedic and neurological units, serve the largest number of patients in the hospital. Each of these units has certain special requirements; however, their basic needs are similar.

522.1.1 Objectives

General nursing units have the common aim of stabilizing the patient's condition to prevent further disability and restoring his physical functions and ability to care for himself.

522.1.2 Operational Relationships

The relationship between general nursing units and other functional units may be defined in part in terms of movement systems. Movement patterns, particularly with respect to material movement vary considerably with different operational patterns, physical facilities and transport systems.

Generally the factors affecting relationships include the following: frequency of movement, urgency of movement (as in a patient's critical life state) and condition of movement (patient on stretcher or linen on a large cart).

Table 520-1 on the following page indicates, in general, the relationships affecting the general nursing unit. Relationships with high frequency urgent need or a controlling condition of movement are indicated. In addition Figure 520-1 depicts the volume of nursing staff traffic between various of the nursing unit.

522.1.3 Characteristics

1. Environment

   The general nursing unit consists of the following environmental zones.

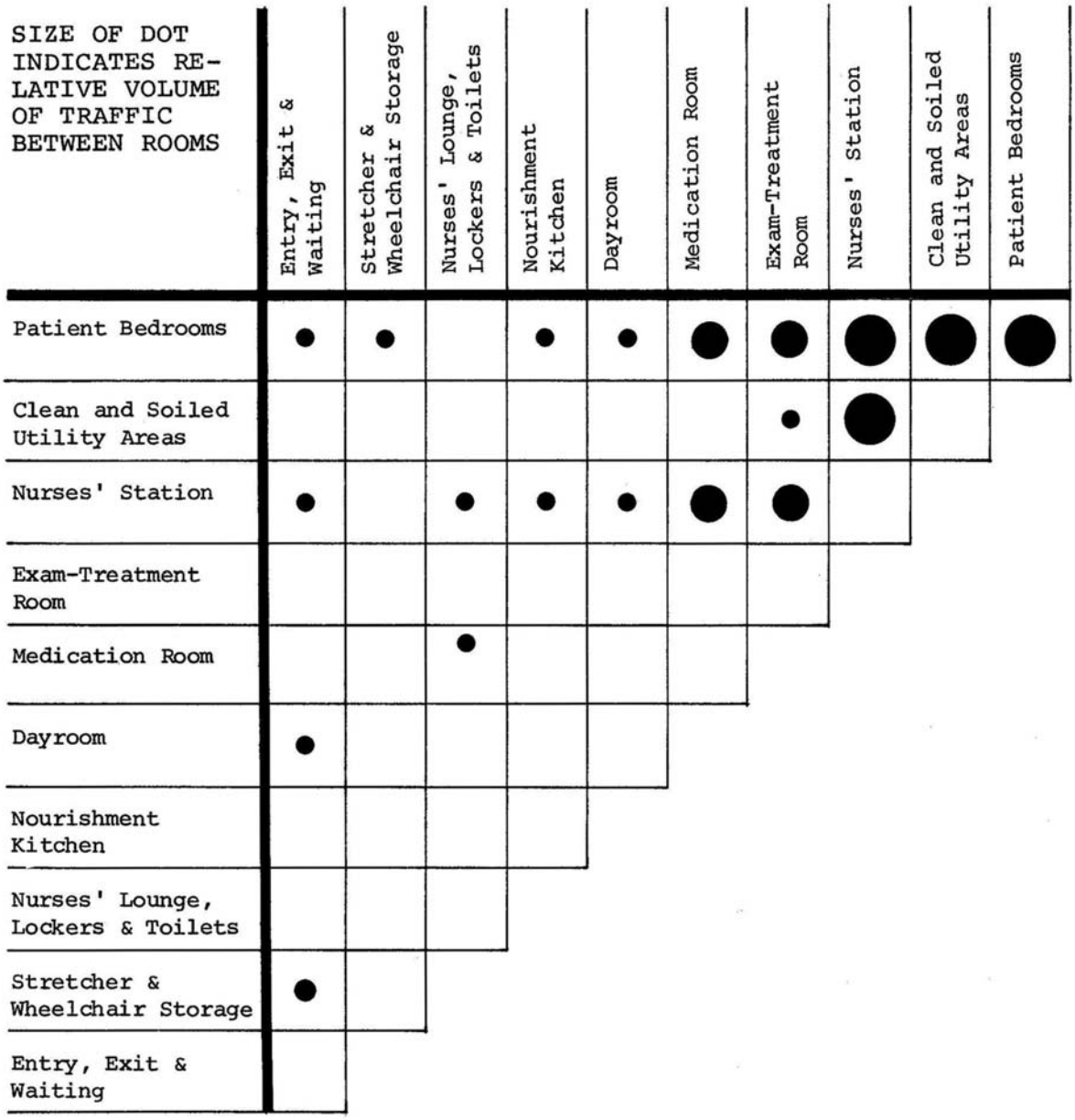
   a. Patient room. This area must accommodate a wide range of medical and social activities including: many diagnostic and treatment procedures, sleeping at any time of the day or night, eating, talking, to visitors, other patients, or the physician, listening to the radio, watching television, etc.

Table 520-1. MOVEMENT FACTORS: GENERAL NURSING UNIT

Persons	Non-ambulant patient(stretcher)	Ambulant and wheelchair patient	Physician	Nurse	Technician, etc.	Students	Visitors	Material	Food	Drugs	Specimens	Supplies	Records
Cardio/Pulmon.	C	M	M		M	M							
Diag. Radio.	F C	F	M		M	M							
EEG/EMG	U C C	M	M		M	M							
EKG	U C C	M	M		M	M							
ICU Units	U C		F			F							
Inhal. Ther.		F			M								
Nuclear Med.	C	M											
Occup. Ther.		F			M								
Other D&T	C	M	M		M	M							
Other Nurs.Units	F C	F	F		F	F							F
Outpatient Clinic		F	F			F							
Phys. Ther.	C	F			M								
Rad. Ther.	C	M											
Surgery	C		M			M							
Admin.			M				F						F
Canteen		F	F	F		F	F						
Dietary					F				F C				
Recreation, Etc.		F											
Supply & Process												F C	
Cent.Teach.Facil.			F	F		F							
Laboratory					M F						F C U		
Pharmacy					M F					F			
Research			M			M							

F - High frequency
U - High urgency
C - Special Condition Factor
M - Some movement

Figure 520-1. GENERAL NURSING UNIT: NURSING STAFF TRAFFIC PATTERNS



This information has been abstracted from John B. Thompson and R.J. Pelletier, “Yale Studies of Hospital Function and Design” (New Haven, Conn.: Yale University, Department of Public Health, 1959)

Patients may bathe and use portable toilet facilities in their rooms. The environment must encourage the patient to maintain a sense of personal dignity while providing optimum conditions for medical diagnosis and treatment.

b. Corridor. Circulation areas on these units are heavily used both by staff and visitors. In addition they are used for distribution of carts and wheeled equipment. Noisy or unnecessary traffic should be minimized. The environment should serve to reduce the sound transmitted to patient rooms and staff work areas. This is particularly important in the evening and night hours. Many conversations of an important or confidential nature occur in corridors. They should not be overheard by patients or staff. Finally, nurses and other personnel spend considerable time in corridors so an interesting and non-institutional character is desirable for this area. Excessive length should be avoided and natural light introduced where possible.

c. Staff support area. The staff support zone must have a variety of environments appropriated to each activity. Activities include clerical work, conferences, informal discussions, and preparation of drugs, dressing, etc., storage and cleaning of utensils and equipment.

2. Organization

The general nursing unit requires a high level of efficiency for routine task plus the ability to observe and treat those patients who are or become seriously ill. Efficiency implies primarily the use of skilled paramedical and medical personnel in an optimum way. For example, nurse/patient contact hours should be increased, while time devoted to walking or clerical work is minimized.

The work load on any nursing unit may vary considerably from day to day depending upon the number of patients assigned to the unit and the required level of nursing care. There is also a variation in the work load throughout the course of a day; the highest level of activity occurring during the daylight hours, diminishing activity during the

evening, and the lowest level at night. It may be desirable to allow for adjustment in staffing patterns and in the assignment of beds to a particular nursing unit or nursing station to accommodate these variations in work load.

Many of the patients treated in these units are or have been severely ill and may be in danger of rapid and unpredictable changes in condition. The unit personnel should be able to detect and rapidly respond to these changes.

This requires that supplies, equipment, and staff be available to cope with such emergencies; and it may also require routine monitoring or observation of a wide range of physiological indicators of patient condition. These include the "vital signs", but may also include such general indicators as skin color, nervousness, breathing difficulties, response to medications, tendencies to sleep too much or too little, etc. Adequate awareness of these indicators may require constant or frequent observation of patients by the nursing staff.

Figure 520-2 indicates four alternatives for general nursing unit organization.

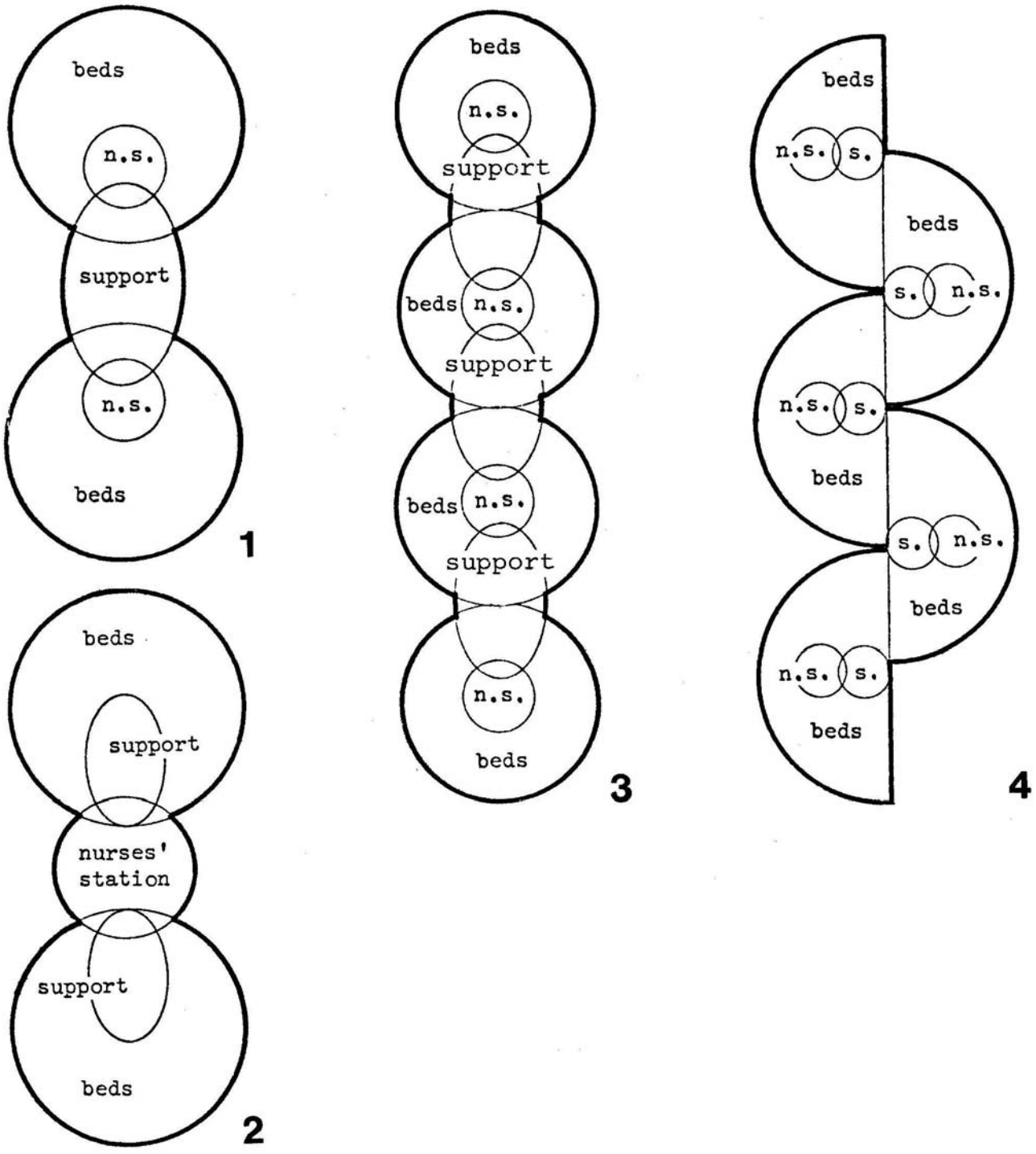
522.1.4 Primary Users

1. Patients

   General nursing units provide accommodation and nursing care to patients with a broad range of conditions from serious illness to minor disability. Patients may be confined to bed, semi -ambulant, i.e. in wheelchairs or on crutches, or ambulant. Their need for nursing assistance varies with the intensity of illness.

   Patients may require sleep or rest at any time of the day or night without disturbance from the activities of other patients, nurses or other staff. They may require physical isolation from other patients for medical or psychological reasons. Their movement within or out of the units may be limited due to requirements for examinations, specimen collection, routine nursing task, physicians' rounds, etc. They should be able to quickly and easily call a nurse if they need care or assistance.

Figure 520-2. GENERAL NURSING UNITS: ORGANIZATION OPTIONS



Nursing assistance may be required for eating, dressing, hygiene, and toileting functions; however, where possible, potential for self help in these activities should be maximized. Patients should be encouraged to use beside commodes or standard toilet facilities, dress and feed themselves, and take care of their personal hygiene requirements. They may also be encouraged to get out of bed and move about the unit.

Patients may require care and assistance in reinforcing and maintaining positive psychological as well as physical condition. They should be able to freely discuss problems with social workers and psychologists well as with unit staff and visitors. They should be able to utilize recreational and diversional facilities, e.g. T.V., radio, games, reading material, and to socialize with other patients to avoid boredom or excessive introspection. However, they should be able to have an appropriate degree of seclusion or privacy. They should be aware of the availability of nursing care and assistance and of their ability to call upon the staff in times of need.

The transportation of certain patients to diagnostic/treatment facilities or the need to transfer a patient from bed to a stretcher for transportation may be harmful to certain patients and should be minimized where possible for these patients. Examples include: a stroke patient who should avoid the jostling of transfer and the bump when entering an elevator, a patient who must abandon the protection of physiological monitoring during transfer or, an orthopedic patient in traction who must be “unstrung” for stretcher transfer.

Some patients on general nursing units may have infectious conditions or be particularly susceptible to infection and require isolation from the rest of the patients on these units.

Most patients currently accommodated on general nursing units are male; however, a small but increasing percentage of females receive care on these units.

Length of patient stay in a V.A. hospital is currently averaging approximately 18 days. Orthopedic and neurological patients may remain in a general nursing unit six weeks or more.

2. Physicians

Specialists assume responsibility for diagnosis and treatment of some of the patients on general nursing units. Their activities involve visiting patients on rounds, conducting examinations, administering treatment, prescribing medications, ordering special diagnostic studies or treatment programs, referring to or making entries in the patient record, and consultation with other specialists, residents, interns and nursing staff. They may also conduct teaching rounds and individual or group instruction of medical students on the unit.

In addition to their activities on these units the physicians may have numerous responsibilities that involve them in other areas of the hospital. For example, they provide consultative services in other areas, work in outpatient clinics, and are involved in hospital staff activities. The surgical specialists spend a great deal of their time in surgery.

Physicians in certain specialties, neurology for example, must supervise diagnostic procedures for both in and out patients. Where such procedures require extensive equipment, contiguous in and out patient facilities may be desirable.

3. Residents and Interns

Residents and interns assume responsibility for the diagnosis and treatment of most patients. Their activities in this respect are similar to those of specialist; however, they are involved with more patients on the unit and spend a greater amount of time on the unit.

They should be able to consult with specialists, other residents and interns, and the nursing staff as needed.

They accompany specialists on routine or teaching rounds, and may supervise and instruct medical students in their activities on the unit. The residents may also be involved in research or study activities while on the unit.

4. Nursing Staff

The nursing staff is charged with providing the broad range of nursing care necessary to serve patients and stabilize and improve their conditions.

Activities on the unit related to nursing are supervised by a head nurse. The head nurse plans and evaluates patient services, schedules and supervises nursing activities, records and reports on nursing care and patient condition, and provides direct care for patients. She should also be aware of the condition of all patients of the unit. She may, therefore, accompany attending physicians, residents, and interns on rounds or make rounds independently or with other members of the nursing staff.

The nursing staff administers various aspects of treatment programs as directed by attending physicians, residents and interns, e.g. preparing and administering medications, applying dressings, giving enemas, etc. and assisting with more complex diagnostic or therapeutic procedures. They observe and measure physiological indicators of the patient's condition. They provide necessary supportive care and assistance to patients and supervise or control patient activities to insure conformance to therapeutic or diagnostic requirements.

In conjunction with these activities the nursing staff will need to make notes or entries on the patients' charts; however, their involvement with general clerical activities should be minimized.

The nursing staff may arrive on the unit in uniform. Purses, overcoats, etc., must be kept secure while they are on duty. Locker facilities are desirable on or close to the unit for the storage of such personal articles or for changing uniforms in certain instances.

The unit staff will take work breaks while on duty. During these breaks they should be able to rest and relax away from normal unit activities. Lounge facilities on or adjacent to the unit will minimize circulation time and permit emergency calls for staff assistance during work breaks.

Toilets for the use of the nursing staff should be available on the unit.

Frequent nursing staff conference are necessary on the unit to transfer information regarding patient condition and treatment schedules from one nursing shift to another and for continuing education of nurses during duty hours.

5. Medical Students

   Medical students will do much of the routine patient diagnostic work, e.g. patient histories, physical examinations, routine laboratory determinations, and may assist physicians, residents, and interns with more complex diagnostic or therapeutic procedures. They will accompany physicians during teaching rounds and may also attend routine rounds with residents and interns. They will participate in group and individual discussions or instruction sessions and may be involved in individual study on the unit.

6. Nursing Students

   Nursing students participate in patient care activities as well as receive instruction on the general nursing unit. They will carry out routine nursing care activities, e.g. administering medication, measuring “vital signs”, collecting samples, etc. and will observe and assist nurses, physicians, residents, and interns with more complex procedures. They may also accompany physicians and nurses on patient rounds.

   Nursing students may receive classroom instruction and participate in group discussions conducted by nursing instructors in conjunction with their work on these units.

7. Ward Clerk

   The ward clerk is responsible for most clerical work, e.g. processing request and order forms, routine charting, preparing schedules, typing memoranda and letters, processing telephone calls, processing admission or disposition records, maintaining personnel records, processing mail, etc. She will also act as the unit receptionist and may run essential errands for physicians or nursing staff.

8. Social Work

   A social worker will be available for consultation with patients and their families. This person should be aware of the functions of the unit and will assume the position of a recognized member of the unit staff. Generally, however, the social worker will not be needed full time on any one unit.

9. Psychology

   A psychologist may administer psychological tests to non-ambulant patients on the unit to determine psychological factors inhibiting the recovery process or a need for vocational rehabilitation.

   Ambulant patients will normally go to central facilities for counseling therapy or vocational assistance.

10. Clinical Laboratory

    Laboratory personnel will come to each unit for collection of specimens.

11. Radiology

    X-ray technicians will come to each unit to make exposures with portable equipment.

12. Maintenance

    See 512.2.

13. Building Management

    See 512.3.

14. Dietary

    Dietary personnel will deliver meals to the patients and collect soiled trays and utensils.

15. Volunteers

The voluntary service provides non-professional nursing and administrative assistance. Volunteers will be involved on all general nursing units.

16. Visitors

Visiting hours on general nursing units are established at each hospital according to local requirements or policies.

Visitors should not disrupt normal operation of the unit. For this reason, their activities should be subject to some degree of control by administrative and nursing personnel. They should be received onto the unit and directed or conducted to the patient's bedside or to visiting spaces. Their access to administrative, nursing and support areas should be restricted. Circulation of visitors through the unit or conversations with patients should not disturb other patients.

Visitors should have access to toilet facilities and drinking fountains while on the unit.

522.1.5 Trends

1. Unionization

There is a trend throughout the country toward unionization of nursing personnel. As unions gain bargaining power their demands will be felt throughout the health care field. This may have a significant effect on the staffing patterns in VA hospitals.

Unions are demanding an increase in the staff/patient ratio. This may bring about an increase in the number of nurses and nursing teams required to cover the general nursing units in VA hospitals, for example, a 40-bed unit now staffed with two teams may require three or four teams in the future. Increased staffing ratios will, in turn, result in a need to reorganize nursing unit facilities to achieve greater efficiency.

2. Patterns of Care

   The ratio of patients that may appropriately be cared for on general nursing units may decrease in the future while the percentage of intensive care patients may increase due to increased ability to preserve life and to conduct complex surgical procedures. The percentage of self care or home care patients may increase as such programs are expanded in the Veterans Administration.

3. Relation to the Community

   The Veterans Administration may play an increasing role in community health care. Therefore, there may be a demand to care for children and increasing numbers of women on general nursing units in VA hospitals.

4. Technology

   The use of physiological monitoring equipment, computers and other sophisticated equipment on nursing units will undoubtedly increase in the future.

522.2 FUNCTIONAL REQUIREMENTS

Patient condition, length of stay, treatment procedures and supportive activities vary appreciably on each of the general nursing unit types: medical, surgical, neurological and orthopedic. In order to achieve flexibility in “floating” patients from one unit to another as bed demand varies and interchangeability of nursing staff with a minimum of disorientation, it is desirable to standardize, to the extent possible, the plan arrangement and space allocations for all unit types.

522.2.1 Functional Relationships

Two general philosophies currently prevail: 1) general nursing units should be separated from intensive care areas in order that I.C.U. ‘s and specialized diagnostic and treatment units may be closely clustered to maximize use of special equipment and technical staff, and 2) general nursing units grouped with intensive care units of the same specialty to allow continuity of patient care. Both options are considered to have merit.

Theoretically, a plan solution could provide both relationships.

1. Medical Service

   It is desirable to establish a horizontal relationship with:

   a. other medical units;

   b. medical intensive care units;

   c. cardiac care units;

   d. diagnostic/ treatment units such as gastroenterology;

   e. outpatient clinics.

2. Surgical Service

   Desirable horizontal relationships include:

   a. other surgical units;

   b. surgical intensive care units;

   c. surgical recovery units and;

   d. outpatient unit.

3. Orthopedic Unit

   Desirable horizontal relationships include:

   a. other surgical units;

   b. surgical recovery unit;

   c. radiographic unit;

   d. cast room and;

   e. outpatient unit.

4. Neurology Unit

   Desirable horizontal relationships include:

a. other neurosurgery units;

b. diagnostic/treatment facilities such as EEG, EMG and a visual field room;

c. outpatient clinics and;

d. physical therapy facilities.

522.2.2 Space Requirements

1. Patient Bedroom

Most diagnosis, treatment and supportive care occurs in the patient bedroom. Facilities required for this may include: oxygen, vacuum, compressed air, electrical power, nurse call systems, electrical isolation systems and physiological monitoring.

Adequate space should be available at the patient beside to accommodate routine diagnostic and treatment equipment and procedures, e.g. I.V. infusions, orthopedic attachments, portable X-ray exposures, etc. This space should also be sufficient to allow for the equipment and personnel required for emergency treatments. Hand washing facilities should be available for the use of staff.

The patient bedrooms must accommodate the wide range of personal and social activities indicated previously. The necessary privacy, space, lighting, and facilities for these activities should be provided.

Single-bedrooms should be available on general nursing units for those patients who require separation from others, e.g. infectious, terminal, disturbed, or offensive patients. In addition, patients who are severely ill benefit from the privacy of an individual room. Therefore, the single-bed rooms should be easily accessible and observable from the nurses' station. Separate toilet and shower facilities are desirable with each of these single-bedrooms; however, such facilities are mandatory only in isolation rooms.

Many of the patients on general nursing units may be adequately accommodated in multi-bedrooms. These rooms should provide some degree of privacy for each of the patients and the total number of patients in each room should generally not exceed four.

One security bedroom may be required on the neurology unit.

It is desirable to provide separate toilet facilities with each patient bedroom to facilitate patient self help and to allow for greater flexibility in room assignment; however, central patient toilets may be acceptable in some cases. Facilities usable by wheelchair patients must be available on each unit. It is desirable, in orthopedic and neurological units, to allow for a high percentage wheelchair use.

2. Patient Bathing Facilities

   Central shower and bathing facilities may be provided on general nursing care units; however, isolation spaces and some additional patient rooms for use by female patients should be provided with individual showers. In the future it may be necessary to provide showers with a greater number of patient rooms in order to accommodate an increasing number of female patients. In some instances, bath tubs may be provided in lieu of showers.

   Shower facilities adjacent to each patient room will facilitate patient self help and may increase his psychological sense of independence and dignity and thus prepare him for discharge to a home environment.

3. Dayroom

   A dayroom for the use of patients and their visitors should be located on or adjacent to each unit. This space should facilitate activities such as watching T.V., reading, playing games, and conversation.

4. Nurses' Station

   The nurses' station is located to allow convenient observation and control of unit entrances and exits and of all patient occupied spaces. These may include dayrooms as well as patient bedrooms and circulation spaces. Observation of and proximity to rooms containing seriously ill patients (generally single-bed rooms) is desirable.

Visual and acoustic privacy should be provided for a ward clerk who is normally located within or adjacent to the nurses' station. Space for nurse and physician charting functions, patient records and clerical supplies and communication and monitoring equipment should also be included in the nurses' station. Provision for future additional patient monitoring or communication equipment and a computer terminal is desirable.

5. Examination/Treatment Room

   The requirements for this space vary somewhat between medical, surgical, neurological and orthopedic nursing units.

   a. Medical and neurological units. In these units the exam/treatment room is primarily used for examinations rather than treatment. It should be equipped with an examination table, a portable examination light, a sink for hand-washing, countertop work space, and facilities for equipment storage and x-ray viewing. Neurology requires sufficient room to allow work space on four sides of a stretcher. The room must be capable of being darkened.

   b. Surgical units. The requirements of an exam/treatment room in surgical nursing units are similar to those in medical units except that the room is used more frequently for treatment activities, e.g. dressing changes and suture removal. There may, therefore, be a greater need for supply and equipment storage and for countertop work space.

   c. Orthopedic units. The exam/treatment space in orthopedic units should be equipped for application and removal of casts. This requires special sink facilities and additional supply storage. A radiographic room may also be desirable conjunction with the exam/treatment room in orthopedic units.

6. Medication Room

   A space for the storage and preparation of medications should be provided. The nature of this space should be determined by the type of medication supply and distribution system to be used. Space needs vary from a separate room with sink, countertop work space and refrigerated, locked, and open storage space, to a small area in nurses' station for a cart used for delivery and dispensing of medications. In every case, medications should be secure from patients, visitors, and unauthorized personnel.

7. Nourishment Kitchen

   A nourishment kitchen maybe required on the unit for storage and preparation of patient snacks, e.g. coffee, fruit juices, etc.

8. Support Areas

   Support areas should include: clean and soiled utility rooms, clean and soiled linen holding, a housekeeping aids closet, equipment storage, and stretcher and wheelchair storage space.

9. Employees' Lockers

   Employees' lockers and lounge space may be centralized; however, there may be staff morale and utilization benefits in locating these near the nursing units. Currently, decentralized lockers for the nursing staff appear to be particularly desirable; in the future, however, all employee lockers may be so situated.

10. Laboratory

    A small laboratory may be provided on or adjacent to each unit for doing routine determinations. This lab should be equipped with work benches, a sink, natural gas, vacuum, minimal reagent storage, and, in some cases, a fume hood.

11. Offices

    The following offices may be required on or in conjunction with general nursing units:

    a. physicians' offices;

    b. residents' and interns' offices;

    c. nurse supervisor or head nurse's office;

    d. social worker's office and;

    e. nursing instructor's office.

12. Carrels

    Study carrels may be provided for the use of medical and nursing students while they are on the unit.

13. Conference Room

    A conference room should be provided on the unit for small group meeting of 10-12 persons. This room may be used jointly for instructional seminars and, perhaps, patient demonstrations.

14. Corridors

    Corridors are frequently used for patient exercise. Neurology unit corridors should be equipped with handrails. A non-slip material should be used on the floor in all units.

15. Classroom. See 5212.2.1

523 INTENSIVE CARE UNITS

523.1 USER NEEDS

Intensive care units (I.C.U.'s) currently treat between 2% and 10% of all hospitalized patients. Units are organized around a medical specialty, (such as a medical unit or a surgical unit), or on a body systems basis (such as cardiac care or respiratory care). Many user needs for these units are similar to those of the general nursing unit. The following highlights those needs, which are characteristics of I.C.U.'s.

523.1.1 Objectives

The intensive care unit was developed to treat patients who are in a critical life state in an effective and an efficient manner.

523.1.2 Operational

The relationship between an I.C.U. unit and other hospital functional units is determined primarily by a desire to optimize patient care and to efficiently use available resources.

There are a number of major determinants affecting the location of intensive care units.

1. Intensive care units should be located such that personnel from various hospital locations can assemble at a patient's bedside in the shortest possible time. This implies a location adjacent to major vertical and horizontal circulation systems.

2. Units should be located to maximize physical continuity of care. Thus a cardiac unit located next to a medical GM & S cardiac unit would facilitate post-intensive follow-up and insure the availability of the physician in an emergency.

3. Intensive care units are often located to facilitate consultation by various specialists. Many patients in an intensive care unit will have a disability affecting more than one of the basic body systems. Thus consultation between specialists is frequent. If the intensive care unit is adjacent to units served by specialists in other disciplines, both formal consultation and informal interaction are apt to occur more frequently. The interrelation of specialty and intensive care units provides the desired proximity of medical specialists.

4. The distance patients must travel to receive diagnosis or treatment assumes more than normal importance for intensively ill patients. Often patients whose condition may change rapidly are continuously monitored. Transportation of the patient breaks this vital warning system. Patients are weak and may be susceptible to infection. Certain patients require continual rest, freedom from disturbance or emotional upset. These factors all are aggravated by transportation.

5. Intensive care units are often located to provide the most efficient utilization of shared services, equipment and in some cases staff. For example, a cardio-pulmonary laboratory adjacent to several intensive specialty units can easily be used by all. Likewise, a surgical intensive care patient with a cardiac arrest may receive better care if the cardiac unit is directly adjacent.

Tables 520-2, 520-3 and 520-4 indicate in general the movement factors affecting intensive care nursing units.

523.1.3 Characteristics

1. Environment

   The general environmental focus of the unit is to facilitate the treatment of extremely ill patients. Intensive care units usually consist of a general patient care area and staff support facilities. The latter are similar to a general nursing unit.

   To the extent possible the patient care area should resemble a general nursing unit patient room. Patient activity will be subdued; however, some patients will be fully aware of their surroundings and will eat meals, read and receive visitors. Patient apprehension should be reduced where possible.

   A common requirement of all intensive care units is the ability to recognize and respond to rapid and potentially serious changes in patient condition. This requires close, twenty-four hour, observation and care. When a sudden change in a patient's condition requires emergency action, key members of the hospital staff may be called upon to administer emergency treatment.

Table 520-2. MOVEMENT FACTORS: MEDICAL INTENSIVE CARE UNIT

Persons	Non-ambulant patient (stretcher)	Ambulant and wheelchair patient	Physician	Nurse	Technician, etc.	Students	Visitors	Material	Food	Drugs	Specimens	Supplies	Records
Cardio/Pulmon.	C C U	C C	M M		M F	M M							
Diag. Radio.	C C U	C C	M M		M F	M M							
EEG/EMG	C	C C	M M		M F	M M							
EKG			M		M F	M M							
ICU Units													
Inhal. Ther.					F								
Nuclear Med.	C	C											
Occup. Ther.													
Other D&T	C C U	C C	M		M F	M							
Other Nurs.Units	C	C	F F		M F	F F							F
Outpatient Clinic			F F		M	F F							
Phys. Ther.					M								
Rad. Ther.	C C	C											
Surgery	U												
Admin.			M				F F						F
Canteen			F	F		F	F F						
Dietary					F				F C				
Recreation, Etc.													
Supply & Process												F C	
Cent.Teach.Facil.			F	F		F							
Laboratory					M F						F C U		
Pharmacy										F			
Research			M			M							

F - High frequency
U - High urgency
C - Special Condition Factor
M - Some movement

Table 520-3. MOVEMENT FACTORS: SURGICAL INTENSIVE CARE UNIT

Persons	Non-ambulant patient (stretcher)	Ambulant and wheelchair patient	Physician	Nurse	Technician, etc.	Students	Visitors	Material	Food	Drugs	Specimens	Supplies	Records
Cardio/Pulmon.	C C U	C	M		F	M							
Diag. Radio.	C C U	C C	M M		M F	M M							
EEG/EMG	C	C	M M		M F	M M							
EKG			M		M	M							
ICU Units													
Inhal. Ther.					F								
Nuclear Med.	C	C											
Occup. Ther.													
Other D&T	C C U	C C	M		M	M							
Other Nurs.Units	C	C	F F		F	F F							F
Outpatient Clinic			F			F							
Phys. Ther.					M								
Rad. Ther.	C C	C											
Surgery	C U		F			F							
Admin.			F M				F F						F
Canteen			F	F		F	F F						
Dietary					F				F C				
Recreation, Etc.													
Supply & Process												F C	
Cent.Teach.Facil.			F	F		F							
Laboratory					M F						F C U		
Pharmacy					M					F			
Research			M			M							

F - High frequency
U - High urgency
C - Special Condition Factor
M - Some movement

Table 520-4. MOVEMENT FACTORS: CARDIAC INTENSTIVE CARE UNIT

Persons	Non-ambulant patient(stretcher)	Ambulant and wheelchair patient	Physician	Nurse	Technician, etc.	Students	Visitors	Material	Food	Drugs	Specimens	Supplies	Records
Cardio/Pulmon.	C C U	C	M		F	M							
Diag. Radio.	C U	C C	M M		M F	M M							
EEG/EMG	C	C C	M M		M M	M M							
EKG			M		M	M							
ICU Units													
Inhal. Ther.					F								
Nuclear Med.	C	C											
Occup. Ther.													
Other D&T	C C U	C C	M		M	M							
Other Nurs.Units	C	C	F F		F	F F							F
Outpatient Clinic			F			F							F
Phys. Ther.					M								
Rad. Ther.	C	C											
Surgery	C U		F			F							
Admin.			F M				F F						F
Canteen			F	F		F	F F						F
Dietary					F				F C				
Recreation, Etc.													
Supply & Process												F C	
Cent.Teach.Facil.			F	F		F							
Laboratory					M F						F C U		
Pharmacy					M					F			
Research			M			M							

F - High frequency
U - High urgency
C - Special Condition Factor
M - Some movement

Instant communication to these staff members, their rapid arrival on the unit, and the immediate availability of necessary supplies and equipment are all vital at such times.

As many as fifteen persons may be involved in these emergency procedures and they may need quick access to all four sides of the bed. Several pieces of equipment are also required adjacent to the bed in these circumstances.

2. Organization

Many environmental and operational characteristics of these different units may be similar, but there are significant reasons to provide separate facilities for each. For example, the nursing skills required to observe and care for critically ill surgical, medical, and cardiac patients differ and separate staffing may be necessary. In addition to separate staffing requirements, each of these units may need to relate to other areas in the hospital such that a combination of intensive care facilities is precluded.

The prime organizational factor is constant patient observation by the nursing staff. This implies a limited number of beds grouped around a central work station.

A secondary, but important, factor is rapid access to equipment and supplies. Supplies are used in relatively large quantities and access is frequent. Activities requiring preparation on the unit should occur in a manner which will allow nurses to maintain observation of patients whenever possible.

Generally the level of activity on I.C.U.'s is constant throughout the day with only a slight reduction during the night hours. An ability for the staff to leave the pressures of the unit for short periods of time, while remaining on call, is highly desirable.

523.1.4 Primary Users

1. Patients

Patients will be brought to the surgical intensive care unit from the surgical recovery room, the operating theater, the emergency room, or from general nursing units. Medical or cardiac patients, on the other hand, may be brought to intensive care units from the emergency room, admitting areas, or from general nursing units.

Many intensive care patients are in a critical life state when brought to the unit; however, some patients may be admitted to receive this level of care to prevent the development of critical conditions. Patients will be kept on the unit until their conditions are stabilized such that they may be safely cared for in a less intensive nursing environment. The duration of stay, therefore, may vary from a matter of hours to weeks.

Some intensive care or cardiac care patients may be unconscious or heavily sedated. Many patients however, will be conscious or semi-conscious. These patients may be uncomfortable or in pain, confused, and frightened or apprehensive about their condition. The activity in the unit, the essentially strange environment, possibly compounded by dependence on monitoring and life support equipment, the awareness of other critically ill patients, and the loss of ability to care for themselves may increase this fear or confusion. In some cases, patients have developed moderate to severe neuroses during their stay on intensive care of cardiac care units as result of such factors.

Steps may be taken to avoid these adverse psychological effects. Patient exposure to potentially disturbing aspects of these units may be minimized, e.g. they may be visually and acoustically isolated from other critically ill patients and from activities such as emergency treatment or removal of deceased patients. Unfamiliar life support and physiological monitoring equipment required at the patient's bedside may be located, when possible, out of the patient's normal field of vision. The patient's awareness of his environment may be reinforced by making his personal possessions visible and easily accessible and by providing windows so that he can observe the time of day or night.

In addition to positive psychological effects, acoustic isolation of individual patients in intensive and cardiac care units would provide areas for confidential and often emotional conversations with physicians, clergy, nursing staff, social workers, or visitors.

Some patients in intensive care and cardiac care units are fed intravenously; however, many will be served meals and between-meal snacks at the bedside.

Many patients are attached to physiological monitoring leads, intravenous fluid tubes, respirators, wound and airway suction, and other devices. Any movement of a patient which would require these monitoring or life support devices to be disconnected may be dangerous; therefore, activities such as bathing, toileting, receiving visitors, etc, may be carried on in the bed or the immediate bed area. In some cases bedside facilities may be available for such activities, e.g. bedside commodes and bathing facilities. Patients may be encouraged to use such out-of-bed facilities if their condition permits. Diagnostic or treatment procedures which require relocation of patients and removal from monitoring and life support devices should be minimized.

Some patients in intensive care units may have infectious conditions. These patients should be physically isolated from other patients. Facilities for handwashing and storage for clean and soiled gowns and masks should be available at the point of access to and/or within isolation spaces. Relative air pressures should insure minimal movement of air from the isolated area to other patient or staff areas.

Other patients may require isolation because of extreme susceptibility to infection, e.g. burn patients. The isolation facilities and precautions required for these patients are similar to those described above, with the exception that air flow patterns should be reversed.

2. Physicians

While one specialist may assume general responsibility for providing emergency coverage and consultative service on an intensive or cardiac care unit, programs for the care of individual patients are generally established by their attending physicians. These attending physicians may visit their patients frequently and are called in times of emergency.

The specialists responsible for an intensive or cardiac care unit should be readily available to the unit while the hospital. Facilities for eating, sleeping, and a relaxing as well as office and conference space on or near the unit may be required for this physician.

Attending physicians may likewise need to stay on or near the unit during periods of emergency or potential emergency and may also need facilities for sleeping, eating and relaxing.

Because of the potential for a rapid change in patient condition, the results of diagnostic procedures should be quickly available to physicians. For example a maximum of two to four hours may be allowable for routine clinical laboratory test results; however, test results may be required within minutes during emergencies.

Physicians may require privacy in the unit for discussions with patients and relatives and conferences with the nursing staff, students and colleagues.

3. Residents and Interns

Residents carry out the same general activities as specialists in intensive care or cardiac care units. Some are assigned to units and require office space and access to conference facilities and, possibly, facilities for sleeping, eating, and relaxing while on duty. Others attending patients in the unit may require similar facilities for eating, sleeping, or relaxation.

Residents carry out the same general activities as specialists. Interns may assume patient care responsibilities under the supervision of residents or specialist. Facilities should be available for the use of residents and interns for charting, diagnostic study, discussion, etc. Residents may be assigned office space on some units. Access to conference space plus facilities for eating, sleeping and relaxation may be desired.

4. Nursing Staff

Nurses on an intensive or cardiac care unit are highly skilled in their knowledge of nursing procedures and their ability to manipulate the complex equipment required. They work under considerable pressure in an environment where disappointment is frequently encountered.

Nurses must maintain almost constant visual surveillance of each patient in the unit and of monitor read-out screens. The nurses' station provides a base of operations for these activities; however, the focus of nursing activity is at the patient's bedside. Optimum observation of patients should be obtained from the nurses' station. Ideally, however, all patients should be visible from any point in the unit.

Nurses should not be required to leave the unit while they are responsible for the care of patients. Therefore, all necessary supplies, medication and equipment should be available on the unit or readily obtainable without leaving the unit. Disposal of human wastes, dressings, food, paper, etc., and return of soiled linen and supplies should also be possible without suspension of nursing care responsibilities.

The staff should be able to take brief work breaks in an environment that will provide relief from the tensions of the unit and yet is immediately adjacent to it.

5. Medical Students

   Exposure to intensive and cardiac care patients is an important part of the instruction of medical students; however, their education should not disrupt the activities of the unit. Maximum use of closed circuit television and other devices may facilitate instruction without interfering with patient care in these units.

6. Nursing Students

   Small groups of nursing students may assist with patient care and receive instruction on these units.

7. Social Work

   See 522.1.4, 8.

8. Psychology

   A psychologist may visit the unit to counsel with patients and relatives. Privacy is important for these sessions.

9. Clinical Laboratory

   Laboratory personnel may come to these units for the collection of samples to be processed in the central clinical laboratory. In some cases, laboratory personnel may work part-time or full-time in laboratories on the units.

10. Radiology

    Personnel may come to these units to make exposures with portable equipment. If the work load is great enough and facilities are provided, they may be assigned to these units on a part-time or full-time basis.

11. Maintenance

    See 512.2.

12. Building Management

    See 512.3.

13. Dietary

    See 522.1.4, 14.

14. Visitors

    It may be desirable to allow relatives of patients in intensive or cardiac care units to visit them frequently at any time of the day or night. Such visits should not conflict with other activities on the unit, and therefore, they may be unpredictably suspended at times. A waiting area adjacent to the unit should be available for the use of visitors before or between allowed visits. Visitors should be able to travel from this area to the patient's bedside without disturbing or observing other patients.

    Facilities for private conversations between relatives and attending physicians or social workers should also be available.

523.1.5 Trends

1. Patterns of Care

   Intensive care units may become increasingly specialized in the future. For example, medical intensive care units may be divided into separate specialties such as neurological, gastroenterological, respiratory, and cardio-pulmonary intensive care.

   Surgical specialty units may also be developed, e.g. orthopedic, neurosurgical, and cardiovascular intensive care units. These units may be sufficiently interrelated so that the formation of an "intensive hospital within-a-hospital" may result.

   The percentage of the total beds in the hospital devoted to intensive care will probably increase in the future.

   It is possible that the treatment of critically ill patients may become a recognized medical sub-specialty.

2. Technology

   Physiological monitoring equipment will become smaller and more sophisticated in the future. This equipment may allow for more comprehensive monitoring and greater patient mobility, and facilitate nursing care by minimizing the size and/or number of obstructions at the patient bedside.

   The requirements for sophisticated supporting services, e.g. computers, will undoubtedly increase.

523.2 FUNCTIONAL REQUIREMENTS

523.2.1 Functional Relationships

Figure 520-3 and Figure 520-4 illustrate the two basic intensive care relationship options: 1) primarily to other intensive care units and diagnostic support or, 2) primarily to post intensive beds for each service.

Figure 520-3. INTENSIVE CARE UNIT: OPERATIONAL RELATIONSHIP OPTION 1

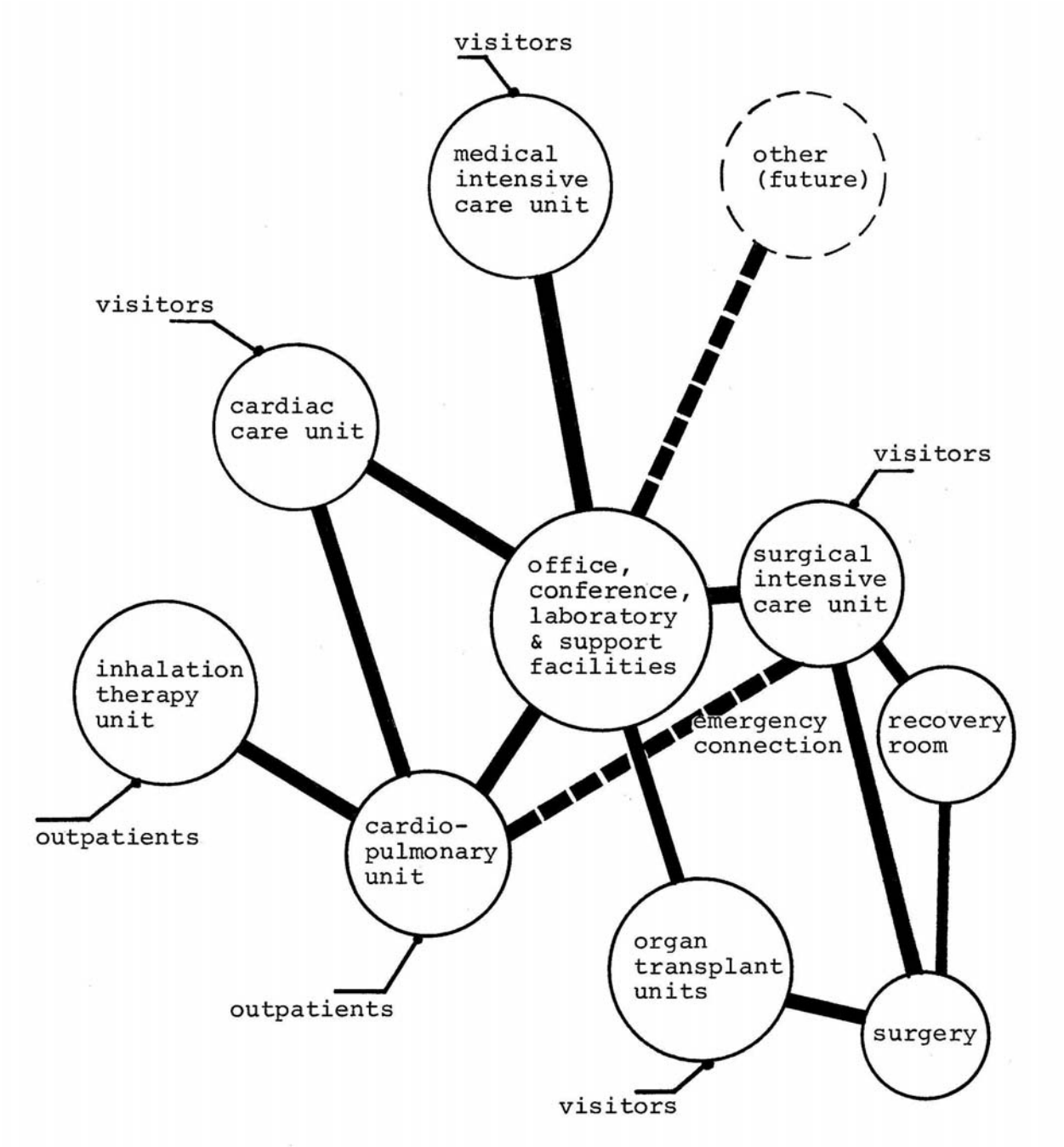
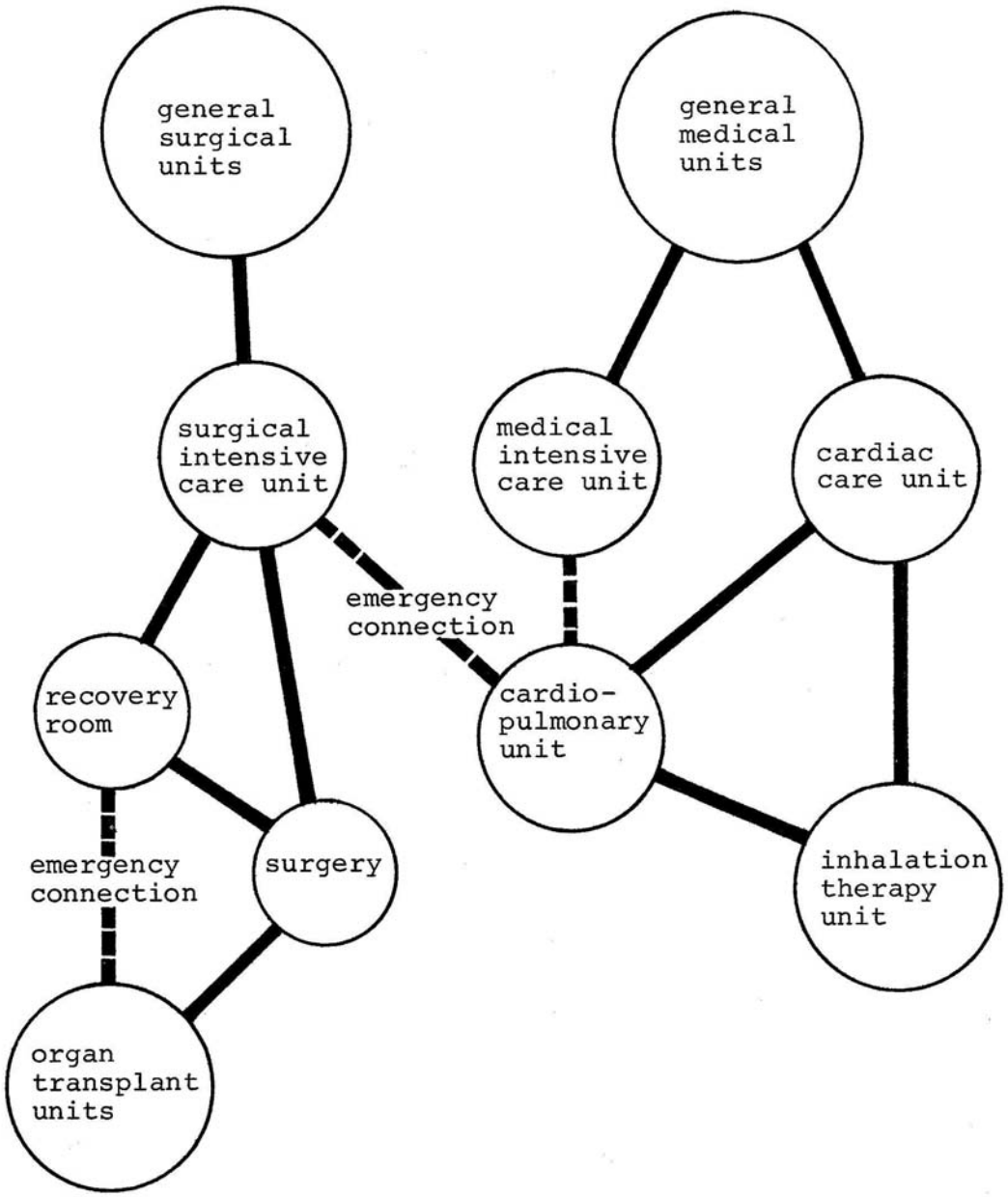


Figure 520-4. INTENSIVE CARE UNIT: OPERATIONAL RELATIONSHIP OPTION 2



523.2.2 Space Requirements

1. General

   The intensive care unit should provide optimum working conditions for physicians and nurses and a reassuring atmosphere for the patient. This implies a quiet area where conversations or other sounds will not disturb patients or be overheard by them. Lighting levels should be such that nurses can observe patient respiration rates and skin color 24 hours per day, while allowing patients to sleep when they desire.

   Temperature levels should be controllable within a normal range. Windows in the unit not only serve to orient patients but also provide relief from the intensive environment for the staff.

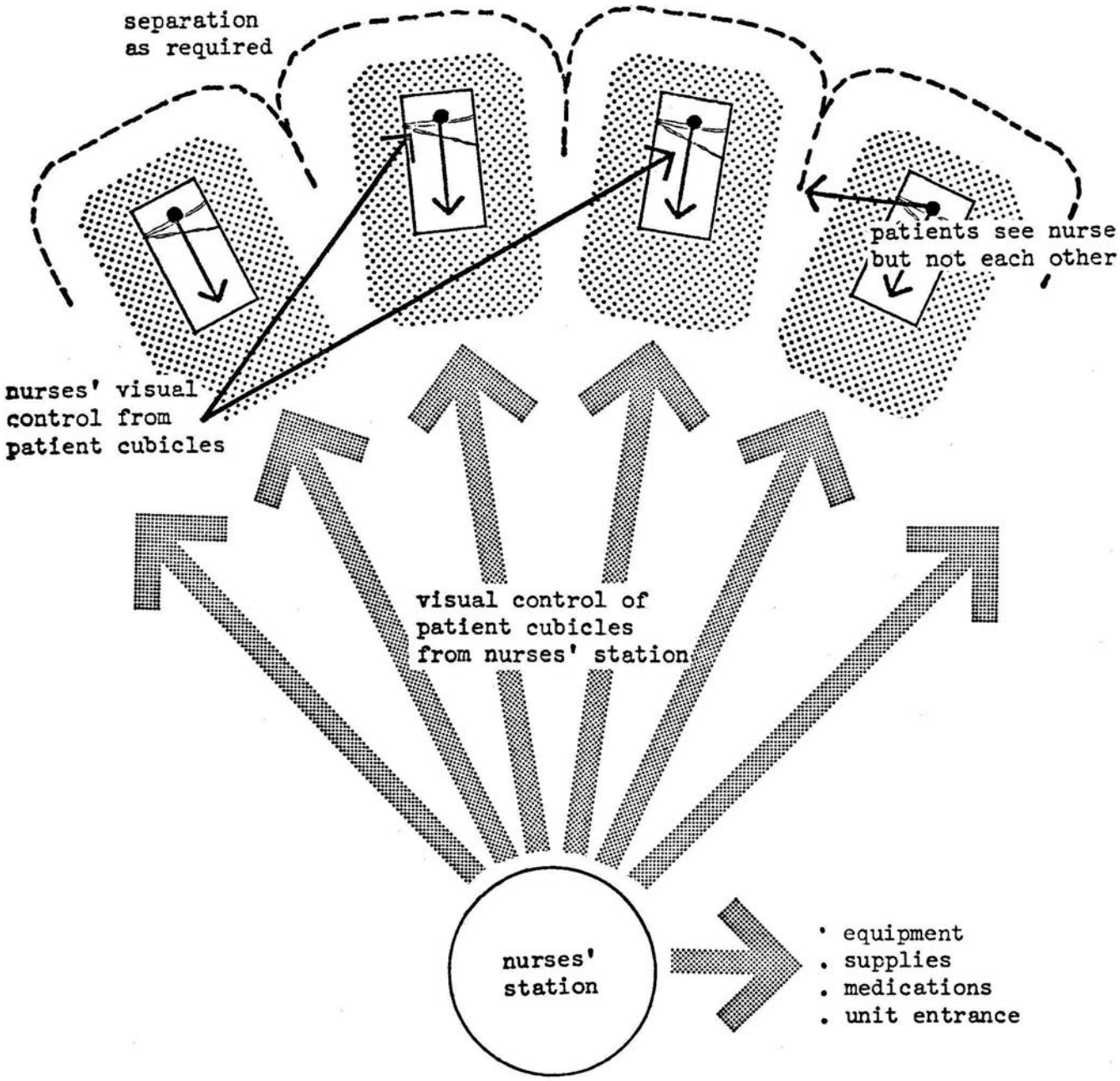
2. Patient Room

   Each patient bed area in intensive and cardiac care units should be supplied with necessary services for emergency as well as routine care. These may include multiple oxygen and vacuum outlets, compressed air outlet, electrical power, and connection to central monitoring terminals. The space around each patient bed should accommodate necessary personnel and equipment for emergency procedures. Each patient bed should be visible from the nurses' station to allow for the requisite level of observation (see Figure 520-5). Provision should be made at the patient's bedside for the storage of some personal possessions and individually assigned utensils and equipment for patient care.

   As mentioned previously, some intensive care patients may require physical isolation from other patients in the unit due to infectious conditions. Isolation spaces should provide the requisite degree of separation, but should also allow for necessary observation from nursing areas. Facilities for gowning and handwashing should be provided at the entry to these spaces. Services provided in isolation areas should be the same as those in other bed areas of the unit.

   Cardiac care patients should be protected as much as possible from disturbing sights or sounds on the unit. For this reason, each patient should be provided with some degree of visual and acoustical isolation from other patients in the unit.

Figure 520-5. INTENSIVE CARE UNIT: VISUAL CONTROL DIAGRAM



It may also be desirable to provide for acoustical as well as visual isolation of patients in medical and surgical intensive care units; however, the provision of such isolation should not limit the ability of staff to observe patients or administer appropriate levels of routine or emergency care. (See Figures 520-6 and 520-7).

3. Nurse's Station

   The nurses' station should be located to permit direct visual observation of all patients at all times. Monitor terminals at the nurses' station should be located for easy visibility while not obstructing the nurses' view of the patients. Space and facilities should be provided for a clerk and for nurse and physician charting functions. Adequate storage should be available in the nurses' station for patient's records and clerical supplies. It should be possible for staff to converse without disturbing patients. Lighting levels at the nurses' station should be adequate for performance of staff duties; however, this lighting should be controlled to eliminate glare or unnecessary distraction to the patients. Facilities for storage and preparation of medications may also be included as part of the nurses' station.

4. Toilet Rooms

   Some patients in intensive or cardiac care units may be able to use standard toilet facilities. One patient toilet room should be adequate for the use of these patients.

5. Equipment Storage

   Storage space should be provided for equipment used in the unit, e.g., portable toilet, in-bed scale, Stryker frame, external cardiac compressor, etc.

6. Staff Facilities

   Facilities may be required for on call staff to relax, sleep, and bathe within the immediate area of intensive care or cardiac care units. A minimum facility for such use would be one room with a bath which might serve two or more units.

Figure 520-6. INTENSIVE CARE UNIT: PATIENT ENVIRONMENT DIAGRAM

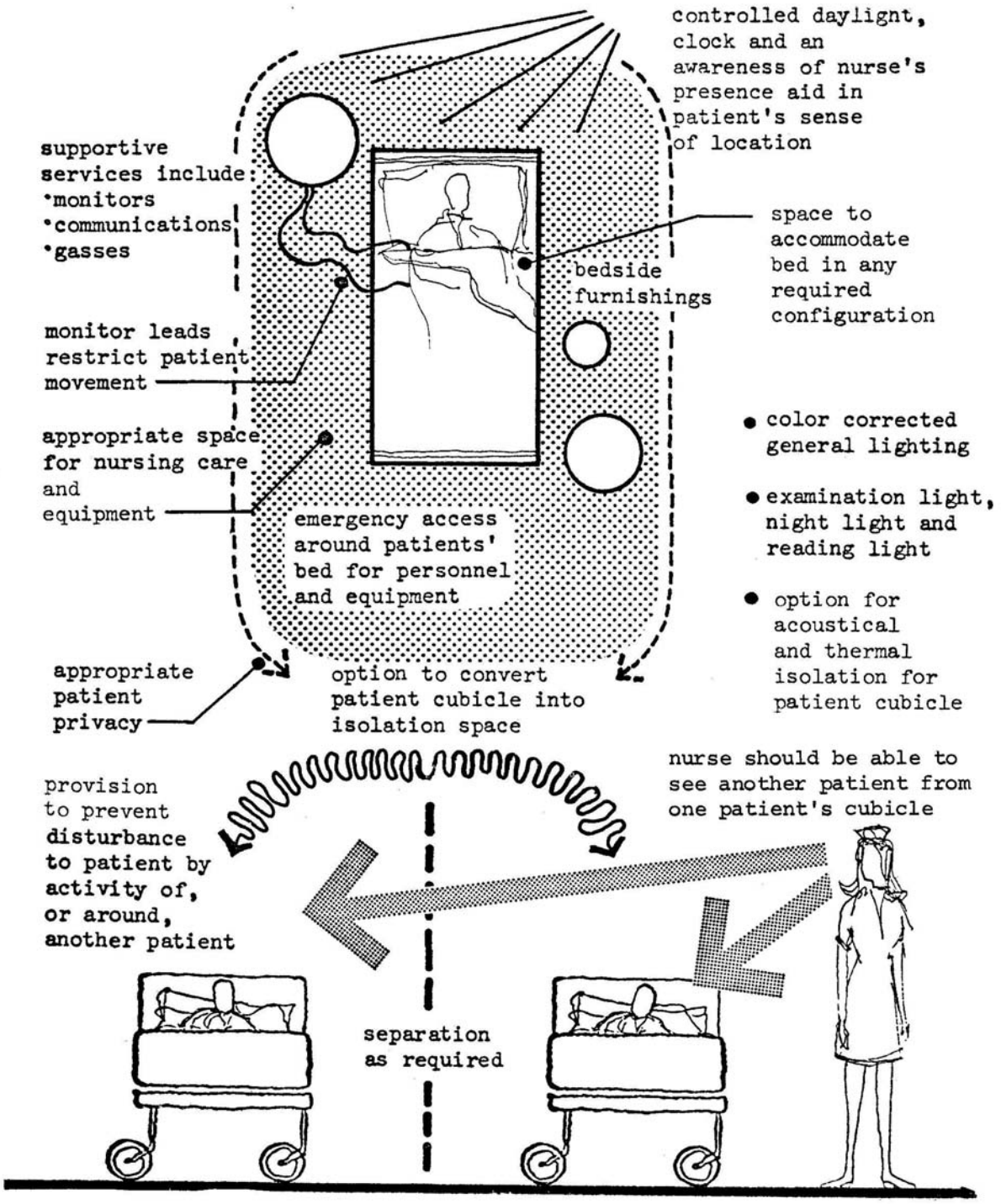
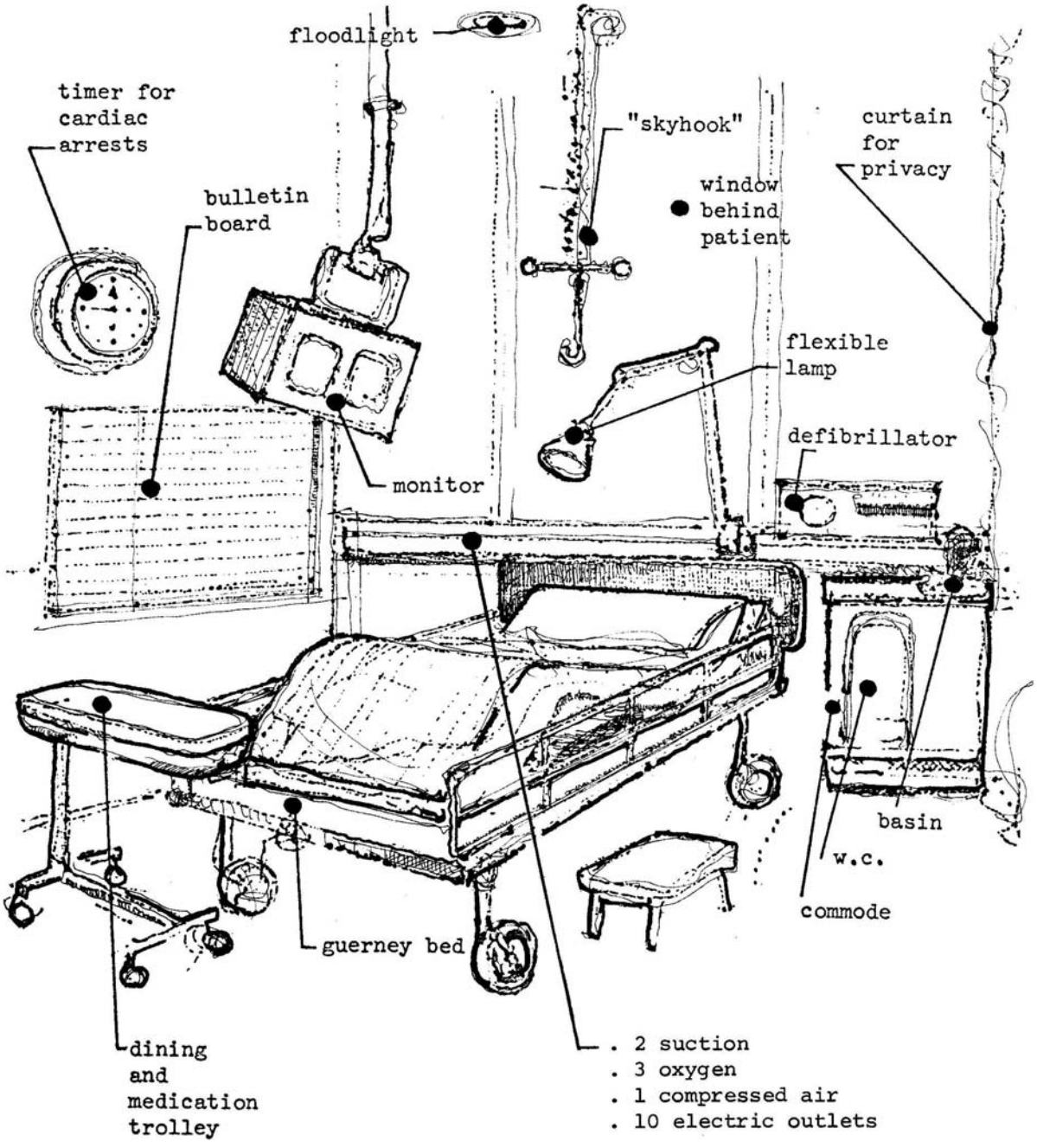


Figure 520-7. CARDIAC CARE UNIT: PATIENT ROOM EXAMPLE UNIVERSITY OF CALIFORNIA MEDICAL CENTER



It may be desirable to provide separate facilities for each of the units, and, in some cases, multiple facilities may be needed for the additional use of nursing staff and attending physicians.

Lounge facilities for the use of on-duty staff may also be desirable. Such facilities could be used by staff from more than one unit.

7. Waiting Room

   A separate waiting room should be provided for visitors to intensive and cardiac care units.

8. Consultation and Interview Room

   A room for during professional consultation or interviews with patients' families should be available to the intensive and cardiac care units.

9. Laboratory

   A small laboratory space should be provided for conducting blood gas, blood volume, and other determinations during time when central clinical laboratories may be closed. This laboratory may be shared with other intensive care units if the relationship between units permits.

524 SELF CARE UNIT

524.1 USER NEEDS

A self-care unit will serve ambulant general medical and surgical patients. It will provide accommodations for a substantial number of patients (perhaps 20% of the total GM & S patients) who require intermittent contact with hospital diagnostic or treatment services and who are able to function with a minimum of nursing support.

524.1.1 Objectives

The self care unit has been developed for use by certain types of patients as an alternative to acute GM & S bed assignment in order to effect economies in facility construction and paramedical staffing while providing an acceptable level of medical care.

524.1.2 Operational Relationships

Patients will be generally ambulant or in wheel chairs. They will use various medical support facilities including out-patient clinics, diagnostics and therapeutic radiology, clinical laboratory, physical medicine, pulmonary function, inhalation therapy and nuclear medicine. In addition, the canteen and recreational facilities will receive frequent use.

Movement to diagnostic or treatment facilities will be non-urgent and of an intermittent nature. Drugs, supplies, food, etc., will be delivered in a manner similar to other nursing units.

Nursing service will, in many instances, be provided to the unit on an “on call” basis similar to home nursing programs.

524.1.3 Characteristics

The general environment and organization will be similar to a hotel. Space and furnishing should facilitate day ambulant patient use as well as sleeping.

524.1.4 Primary Users

1. Patients

   All patients on the unit will feel relatively well and function as in a home environment. They will be admitted to the unit from the community or from a general nursing unit for the purpose of undergoing diagnostic studies or therapy which cannot feasibly be provided on an outpatient basis, or for instruction in the management of a chronic illness, e.g. diabetes. In addition, individual hospitals may elect to use self care units for pre-operative patients.

   Pre-operative patients will be visited by the surgeon and the anesthesiologist. Other patients will not ordinarily see physicians on the unit.

   The patient may be anxious about his condition. He may frequently seek information about test results and test schedules. Patients will be individually responsible for keeping appointments and for remaining on the premises. The patient will likely seek social or recreational activities with other patients on the unit to occupy time not devoted to scheduled activity.

   Patients will receive individual instruction on the unit from nursing personnel, dietitians, physiotherapists or other members of the staff. On occasion, however, this instruction will occur off the unit. Automated teaching devices may be employed for supplemental instruction. Group instruction may be given to patients assembled on the unit or in the outpatient clinic.

   All patients will be dressed in street clothes during the day. With the exception of those on special diets, patients will be expected to eat their meals in the hospital canteen. Meals served on the unit will not be eaten in patient rooms.

2. Physicians

   Normally a physician will not be required on the unit; however, one should be immediately available if needed for emergency treatment.

3. Residents, Interns and Students

   It is not anticipated that teaching programs will be conducted on the unit.

4. Nursing Staff

   Staff will be required on the unit for minimal supervision, treatment and patient instruction. Convalescing patients may require a minimum of assistance with certain therapeutic procedures and changing dressings. Pre-operative patients will require surgical preparation procedures including pre-anesthesia medication, washing and shaving.

5. Maintenance

   See 512.2.

6. Building Management

   See 521.3.

7. Visitors

   Visitors are anticipated on the unit throughout the daytime and evening hours. Patients will converse with visitors in their individual rooms or in general social areas.

524.1.5 Trends

The use of self care units is somewhat experimental and adequate operating cost data has not been developed. It is probable, therefore, that initially; a small percentage of beds will be devoted to self care.

Ultimately, 20-30% of the total patients could possibly be housed in such units. It is conceivable that self care units could serve as “float” beds for specialized or general nursing units in which case the facilities would be constructed for this dual function.

524.2 FUNCTIONAL REQUIREMENTS

524.2.1 Functional Relationships

No critical relationships established. Convenient access to diagnostic and treatment functions is desirable.

524.2.2 Space Requirements

1. Patient Room

   Bedrooms may be single or multiple. They should be hotel-like in character with the bed placed against the wall. Preferably the bed should convert into a sitting position for day use. Additional chairs should be provided for visitors. The room should be attractive and suitable for daytime activities such as writing letters, reading or watching television. Medical gases, a nurse call system, or other medical support equipment are not required.

2. Nurses' Work Space

   A nurses' station similar to a GM & S unit may not be required. An office equipped with a desk, two chairs and a filing cabinet for nursing personnel may be sufficient in lieu of a GM & S type facility. This space would be used for counseling, charting and general record keeping.

   Patients may leave the unit to receive medications. In this case, a medication room would not be required. Likewise, the provision of utility space would depend on policy regarding patient treatment on the unit. If treatment were performed in the outpatient unit, utility rooms would not be required.

3. Day Room

   Currently, criteria for day rooms are identical with those of GM & S unit. Utilization experience may indicate that some additional space is desirable due to the higher proportion of ambulant patients. This room should be sub-divisible into a group instruction area seating approximately twelve persons with remaining space devoted to normal day room activities. Natural light is desirable for the day room area.

4. Nourishment Area

   A small room in which patients may prepare coffee and snacks or obtain ice cubes would be desirable.

525 PSYCHIATRIC UNIT

525.1 USER NEEDS

In most recent years psychiatric units have been included in most new Veterans Administration hospitals. It appears that this pattern will continue although the percentage of hospitalized psychiatric patients apparently is declining at this time.

525.1.1 Objectives

The psychiatric unit is an integral part of a comprehensive system of mental health care. This system also includes day care programs, outpatient treatment and consultation for patients in other units of the hospital. The psychiatric unit is mainly employed for the treatment of veterans for the acute phase of an emotional disorder.

Emphasis, generally, is on brief rather than long-term therapy for patients with relatively favorable prognosis. Patients with resistive disorders who fail to respond to treatment are transferred to other specialized V.A. hospitals.

525.1.2 Operational Relationships

The relationship between this unit and other functional units is much less exacting than between most other units in the hospital. However, a strong relationship with other psychiatric programs such as day care or outpatient can be prime importance for particular psychiatric programs.

An active occupational therapy program is important in patient rehabilitation. This therapy may occur on the unit or, if not feasible, in closely related facility. Occupational therapy should be available to patients on a 16 hour per day, 7 day per week basis.

The use of medical and other supportive supplies on the psychiatric unit is minimal. Drugs, linen and nourishment comprise the bulk of required supplies.

A relation to the out-of-doors, preferably at ground level, provides a substantial benefit for patient treatment as will as easing the burden on the staff in their attempt to provide a range of environmental exposure.

Table 520-5 indicates the major psychiatric unit operational relationships.

525.1.3 Characteristics

1. Environment

   The aim of psychodiagnosis and psychotherapy is to build and restore the patient's ability to cope with his normal life situations. To this end, the psychiatric unit represents, in essence, a microcosm of the real world with the essential difference that the demands made on the patient can be controlled and necessary medical intervention applied. Ideally, the psychiatric unit should provide a variety of behavioral setting where patients can be exposed to human interactions and discussions on a variety of levels appropriate to their condition and progress. Control, on the one hand, and relative freedom of choice and self-responsibility on the other, are the two factors which have to be reconciled, both environmentally and administratively, in order to generate the atmosphere of trust and security that is a useful complement to the patient care programs.

   An inherent conflict exists in the desire, on the one hand, to maintain facility appearance and security and, the desire to encourage patient independence and self trust on the other. Current philosophy resolves this conflict in favor of patient self trust. Generally, facilities are constructed and furnished in a manner, which maximize the image of and reliance on patient responsibility.

   With regard to noise control, it is necessary for confused patients to be able to distinguish between signals and noise. Therapeutic sessions between professional staff and patients should be without sound transfer to other areas, and without sound disturbance from other areas.

2. Organization

   The treatment philosophy with regard to the integration of day and outpatient programs with unit activities will affect the organization and allocation of physical facilities.

Table 520-5. MOVEMENT FACTORS: PSYCHIATRIC UNIT

	Persons															
	Non-ambulant patient(stretcher)	Ambulant and wheelchair patient	Physician	Nurse	Technician, etc.	Students	Visitors	Material	Food	Drugs	Specimens	Supplies	Records
Cardio/Pulmon.													
Diag. Radio.													
EEG/EMG			M			M							
EKG													
ICU Units													
Inhal. Ther.													
Nuclear Med.													
Occup. Ther.		F	M			M							
Other D&T													
Other Nurs.Units			M			M							
Outpatient Clinic			F M			F M							
Phys. Ther.													
Rad. Ther.													
Surgery													
Admin.			M			M	F						M
Canteen		M	F M	F		F M	F						
Dietary									F C				
Recreation, Etc.		F											
Supply & Process												M C	
Cent.Teach.Facil.			M	M		F							
Laboratory											M C		
Pharmacy										F			
Research													

F - High frequency
U - High urgency
C - Special Condition Factor
M - Some movement

Social spaces are important as a setting for diagnosis and therapy. Generally these become the focus of the unit's activity.

Staff work areas adjacent to social areas provide an opportunity for unobtrusive observation, informal social interaction, or direct intervention where appropriate.

Current treatment patterns are such that any member of the psychiatric team may be involved with a particular treatment.

525.1.4 Primary Users

1. Patients

The diagnostic make-up of a typical psychiatric unit will include patients with psychotic, neurotic and character disorders.

Regardless of the diagnosis, patients may be sad, apprehensive, resentful, apathetic or blasé. Their feelings about themselves typically include a sense of failure, anxiety, uncertainly, anger, frustration, loneliness or depression.

Admission procedures include routine physical, laboratory and X-ray examinations as well as a careful patient history and a range of psychodiagnostic tests.

Patients' needs vary from time to time according to treatment and progress. Sometimes patients need seclusion and privacy, while at other times they need to be able to join with individuals or larger groups. There is a general tendency to withdraw socially, which needs to be sympathetically discouraged.

The majority of patients are physically fit, out of bed and active, and capable of caring for themselves and performing a variety of task under nominal supervision. Their activities include many things which are routinely done in the home or place of work. They feed themselves, and take care of hygiene and toilet requirements.

The range of activities at any time may be diverse with a number of patients engaged in individual or group sessions and the remainder pursuing individualized treatment schedules. Some patients may watch T.V., play cards, chat, or receive visitors, while others may take an occasional nap, go for a walk, exercise, or engage in hobbies and work, either individually or in groups. Group recreational and occupational activities are generally attended by a member of staff who supervises and encourages the patients in their pursuits.

Patients characteristically participate in the maintenance of the ward, wash and iron their own clothes and prepare snacks. Most patients have relative freedom of the hospital and may be permitted off the hospital grounds, accompanied or unaccompanied. On occasion, groups of patients may be taken on an excursion.

The majority of patients need not maintain continual direct visual contact with a nurse but an awareness of a nurses' presence generates reassurance. A few patients, particularly at the beginning of treatment, while able to engage in simple, occupational pursuits, may need to remain continually close to a nurse during their waking hours. Other patients, although free to circulate within the unit, may require continual twenty-four hour observation until treatment becomes effective.

On infrequent occasions, non-ambulant patients may be admitted to the psychiatric unit. These patients require a complete range of diagnostic, therapeutic and supportive care normally accorded GM & S acute patients.

Female patients represent only a small percentage of the total patient load.

While the use of drugs is effective in controlling disturbed patients, there is still need for patients in extreme states to be isolated and protected in order to prevent their becoming a danger to themselves and others.

In general, drugs, medications, treatment equipment, diagnostic and other treatment facilities must be adequately secured from patients.

2. Psychiatrist

   The psychiatrist functions as director, coordinator and counselor of other members of the psychiatric team. The psychiatrist, in consultation with the team, determines the diagnostics program for specific patients, evaluates the results of tests, prescribes the treatment, supervises the administration of treatment, programs and checks and analyzes patients' progress. In addition he will interview patients and patients' relative and conduct individual and group psychotherapy sessions. He may also conduct teaching rounds and conferences on the unit and in certain instances initiate and conduct psychiatric research.

   The psychiatrist may be actively involved in the outpatient or day care clinics, particularly, in the follow-up of patients who have been previously treated. In addition, he may provide consultation for patients on other units in the hospital.

3. Psychologist

   The psychologist in the psychiatric unit is responsible for the administration and evaluation of psychological test of all types. The psychologist is also continually involved in the treatment of patients, and is specifically responsible for vocational counseling and rehabilitation.

   The psychologist is actively involved in the teaching of staff, interns, medical students, and psychology trainees. He may also participate in or conduct research projects.

4. Residents and Interns

   Residents in psychiatry may be directly involved in psychodiagnostic and psychotherapeutic procedures. Most arranging and managing of examinations and tests and treating patients will be done by the residents. They have major responsibility for patient care when the psychiatrist is not available i.e., nights and weekends. Residents may wish to study or have an opportunity to relax "on call".

   Interns have patient responsibility which is similar to the resident in some cases. They may assist the psychiatrist and/or resident on their rounds, assist in diagnosis and treatment procedures and patient charting. They may need to study during their assignment to the unit.

5. Psychiatric Nurses

The nursing staff of a typical unit may consist of a head nurse, R.N.s, L.P.N.s and nursing assistants.

The head nurse is responsible for all nursing care on the unit and cooperates with the psychiatrist in developing nursing techniques that will most effectively carry out the therapeutic program. Her activities, in addition to the supervision of nursing care, will include scheduling and supervision of the functions of the nursing staff.

The nursing staff participates in all phases of the patients' treatment and, accordingly, plays a key role in creating a therapeutic environment. They attend to both the physical and emotional needs of the patient and serve as a useful information source on patient behavior for the psychiatrist and other members of the team. The nursing staff assists in the administering of the various somatic therapies and is responsible for the maintenance and security of patient records.

In addition to their clinical duties, the nursing staff may act as recorders, observers and participants in research, and as teachers to the auxiliary nursing staff and nursing students.

Nursing care constitutes most of the daily personal contact between patients and staff and, through this, the nursing staff, in their general behavior, serves as a model for influencing patient behavior. Patients should be free to approach the nursing staff, on inclination, to discuss, ask questions or ask assistance. The nursing staff, on the other hand, should have a means to avoid over-exposure by being able to retreat from patient attention occasionally.

The role of the nursing staff is essentially therapeutic and administrative, not custodial. However, the nurse should be able to observe and control any patient who may be under sedation or undergoing special treatment and to observe patient group activity areas.

The nursing staff may wear uniforms or everyday clothes according to preference. It is desirable that overcoats and other personal articles be kept secure while they are on duty.

6. Medical Students

   A maximum of eight medical students will accompany the psychiatrist, resident or intern on patient rounds. They conduct patient interviews of a confidential nature, observe therapy sessions and participate in seminars or formal instruction on the unit. They may also need to study and perform simple laboratory test while assigned to the unit.

7. Nursing Students

   Nursing students also participate in patient care activities. They administer medications, are active in some therapeutic procedures, and may assist on patient rounds. They may receive classroom instruction or participate in seminars on the unit. The number of nursing students on the unit varies.

8. Psychology Trainees

   Psychology trainees are normally Ph.D. candidates. They function in a manner similar to the psychologist and under his direction, and there are usually several on a 30-bed unit.

9. Ward Clerk

   The ward clerk is responsible for the bulk of the administrative paper work relating to the admission, care, and discharge of patients, the preparation of all dispositions, the processing of physicians' orders for medication and treatment, the updating of patient charts and records, and the distribution of mail. In contrast to GM & S units, which have a greater turnover of patients, the psychiatric ward clerk can cope with a larger patient load.

10. Social Worker

    The role of the social worker in the psychiatric team is to appraise the social background of patients and to help establish attainable goals for patient treatment.

The social worker also provides a service to patients and their families, and, is responsible to seek improvement, where appropriate, of the social situation to which the patient will return.

The social worker may participate in training programs of the hospital and may undertake or participate in research projects.

11. Laboratory Personnel

Laboratory Personnel will collect specimens not collected by the unit staff.

12. Researchers

Psychiatric research is concerned with the normal and abnormal ranges of mental health. It may be carried out by professionals with patient care responsibilities or those almost exclusively involved in research. Areas of research include behavioral studies, psycho-pharmaceutical studies, psychobiological studies and studies of treatment program effectiveness.

Methods involve clinical observation and clinical and laboratory testing. Many measurement procedures are routine and may be done in a central clinical laboratory; however, lab work may, in a few special instances, be done on the unit.

Audio-visual monitoring systems linked to patients' rooms may be used for observation of physiological and behavioral symptoms. Centralized computer systems may be used to process statistical data.

13. Maintenance

See 512.2

14. Building Management

See 512.3

15. Dietary Personnel

Dietary personnel will be responsible for the delivery of patients' meals either on individual trays or in bulk and for the collection and return of the soiled food receptacles to dishwashing and disposing area.

16. Visitors

Relatives and friends of the patients are an essential part of the therapeutic program. They are encouraged to visit and to take part occasionally in the patients' activities. Visitors may at times conflict with certain diagnostic and therapeutic routines, so control of visitor traffic may be desirable. The staff should be able to maintain observation of certain patients during visits. Visitation may require safeguards to protect patient well-being.

Visitors arriving for staff interviews should be able to wait in comfort outside the general area of patient activity.

525.1.5 Trends

Knowledge of the etiology of mental disease is rapidly increasing and new diagnostic and treatment programs are continually evolving.

The recent decrease in inpatients, and in length of inpatient stay is expected to continue. A corresponding increase in outpatient load is anticipated.

The separation between impatient and outpatient programs is becoming blurred. Currently, the day care program is being integrated with outpatient programs. Eventually inpatient and outpatient programs may be combined to minimize staff duplication and preserve continuity of care.

Outpatient care may, increasingly, extend to family members or whole families.

An additional trend is the decentralization of patient care as a result of the availability of psychiatric services close to a patient's home. Parallel with this, there may be increased centralization of specialized psychiatric treatment programs on a regional level.

525.2 FUNCTIONAL REQUIREMENTS

The size of the unit is a function of patient care programs and staffing patterns. Currently, units of not less than 20 beds nor greater than 30 beds to be suitable.

525.2.1 FUNCTIONAL RELATIONSHIPS

The psychiatric unit should have direct access to the outdoors and be convenient to physical, occupational and recreational facilities. In addition, immediate proximity to the psychiatric outpatient department may be desirable.

Access to the unit for visitors should be simple and direct.

Orientation within the unit should be as obvious as possible. There should be no unusual configuration, patterns, areas of glare, or excessive length of corridor to cause loss of orientation. Similarly, the treatment of floors, walls and ceilings should respond to the need to de-emphasize or reinforce awareness of the environment as may be desirable. Patients should be helped to familiarize themselves rapidly with the general layout of the unit and the hospital.

Sources of noise, such as kitchens and workshops, should be kept away from sleeping quarters and other areas where quiet is required.

Some control of patient movement into and out of the psychiatric unit is generally required. In some cases visual control of points of access and egress is sufficient; however, it should be possible to lock each psychiatric unit. (See Figure 520-8).

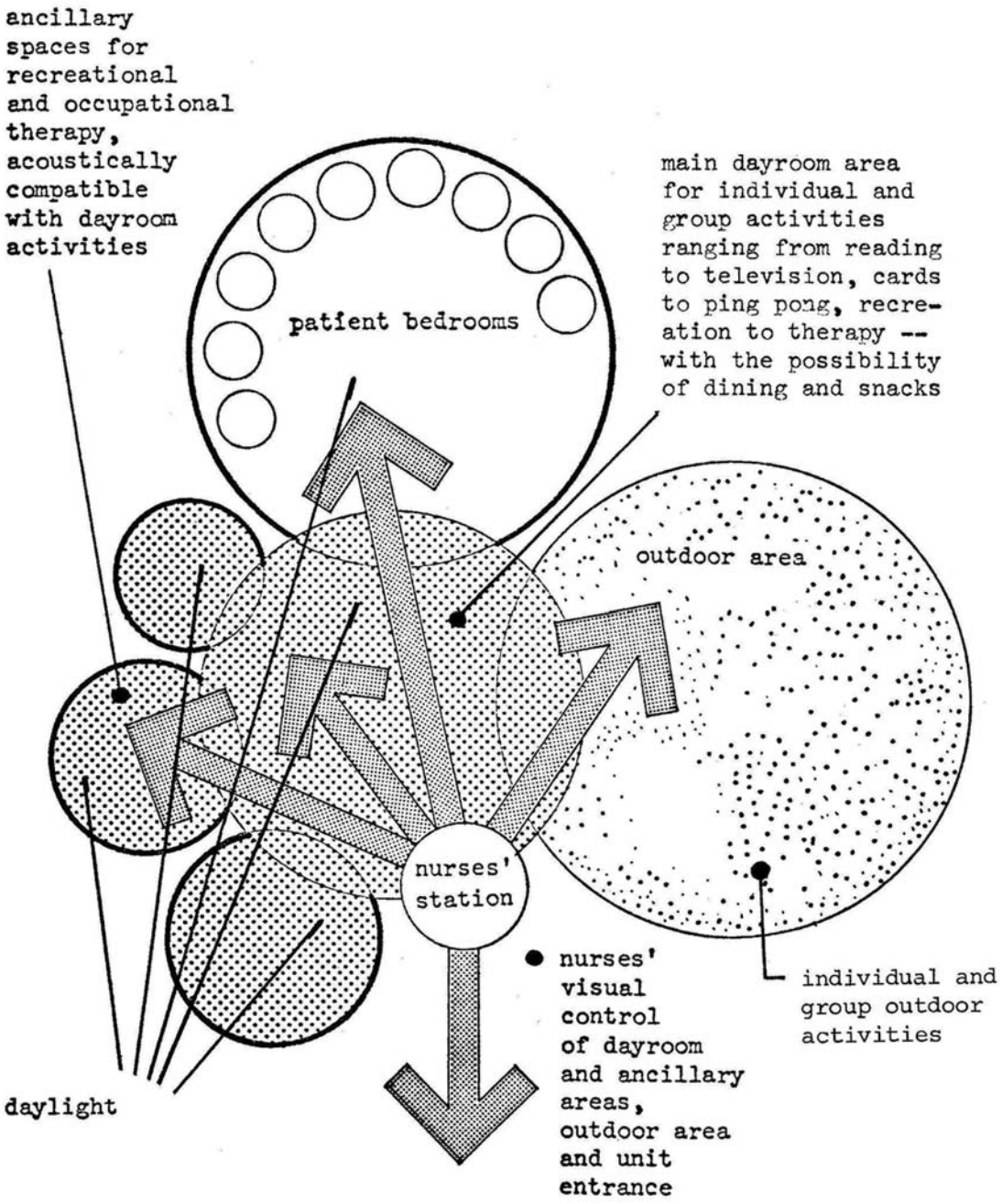
525.2.2 Space Requirements

1. Patient Room

   Patient groupings are significant in terms of patient care interrelationships. Two-bed rooms may, in some cases, stimulate strong patient reactions. Three-bed rooms may tend to lead to ambiguous situations where the drawing together of two patients makes the third feel rejected. Many patients fare best in four-bed units.

   Multiple bedrooms, preferably, should be so arranged that there is a degree of privacy for each patient. Each individual's space should be appropriately defined and conducive to personal activities such as reading, writing, conversation, entertaining visitors, and sleeping.

Figure 520-8. PSYCHIATRIC UNIT: PRIMARY RELATIONSHIPS



Each personal space should contain a daybed, a chair, individual locked wardrobes for clothes and other possessions, together with facilities for the placement of belongings such as radios, books, and pictures, etc. Where doors are provided, they should open into the patients' room with emergency provision for opening by the staff if necessary.

Single rooms may be needed to help anxious patients achieve an increase sense of security. They may also be needed for patients who work outside the unit and need to return to a private space to offset the effect of stressful social encounters during the day. Single rooms should also be provided to accommodate the small number of female patients.

Currently, patients who require general nursing care are normally transferred to the appropriate medical unit. In the future, it may be desirable for non-ambulant patients to be treated in the unit, in which case, oxygen and suction may be required in the patients' rooms.

The degree of patient compatibility with regard to the physical environment within the unit is established not only by the shape and organization of the spaces but also by the lighting, color, acoustics, ventilation and heating. With regard to patient areas, local lighting should be under the patients' control and be bright or dim as required. Subdued night lighting near the floor level is necessary for nocturnal traffic without interfering with sleep.

2. Security Room

Some patients may require temporary seclusion during extremely distressed states. At least one security room should be provided for such use in each psychiatric unit. This room should be similar to a normal 1-bed room; however, the finishes, equipment and furnishings should be chosen to minimize the risk of self-injury during confinement.

3. Patient Shower and Toilet Facilities

   Patients should have convenient access to toilets and showers and/or baths. The desire to maintain and promote patient dignity and self-reliance may justify the allocation of toilets and showers to each patient room. One centrally located bathroom should have the capability to contain a free standing tub which, in addition to being used to bathe infirm patients, may be used for physical therapy.

4. Dayrooms

   Day spaces should be compatible with the formation of various groups of different sizes and different social, recreational and therapeutic activities, ranging from reading to T.V., from cards to ping pong, etc. In planning dayrooms, it must be assumed that all patients in the unit are likely to be out of bed and may all be occupying the dayrooms simultaneously. The multi-use of space is desirable but not at the expense of any essential individual function within that space.

5. Exterior Area

   Several recreational activities can usefully take place outdoors, such as shuffleboard, ping-pong, etc. A congenial outdoor area with direct and easy access from the unit is desirable.

6. Dining Room

   Mealtimes provide a useful opportunity to encourage a patient to associate with groups. A central dining area, on the unit, should be provided for this purpose.

7. Nourishment Kitchen

   A nourishment kitchen should be located adjacent to the dining area and should be easily accessible to the patients to prepare coffee, snacks and occasional meals.

8. Group Therapy Room

   Currently, there is inadequate space for group therapy functions in many units. It may be desirable, to provide a designated group/therapy room that is appropriately equipped, functionally and environmentally for that function. A student observation area adjacent to this space may also be desirable.

9. Occupational Therapy Room

   Similarly, it may desirable to provide a small occupational therapy room, either on the unit or shared between adjacent units, to enable patients who may wish engage in therapy on an informal unscheduled basis to do so without leaving the unit.

10. Patient Utility Room

    A patient utility room for washing, ironing and mending clothes may be desirable and could be shared between units. Equipment would include a washing machine, a drying machine, an ironing board, and perhaps, a sewing machine.

11. Nurses' Station

    The nurses' station should be located to allow for easy observation and control of entrances and exits and of patient activity areas. Space and facilities with reasonable visual and acoustical privacy should be provided for the ward clerk's activity. Privacy for conversations between staff members is usually desirable. Patient records contain personal and confidential information and should be appropriately secured.

12. Examination/Treatment Room

    An examination/treatment room with facilities similar to that provided in the general medical unit is sufficient for shock therapy and other procedures. This room may also be used for history-taking and interviews. A small desk and chairs may be provided for this purpose. Examinations and treatment require natural light to facilitate the detection of illness. Lighting and lighting controls should respond to particular program needs: For example, perception testing might require total darkness, T.V. playback of patient videotapes might require semi-darkness, and group or individual therapy might require normal light.

13. Offices

    Offices for psychiatrists, psychologists, residents, head nurse and social workers and certain categories of trainees may be required in conjunction with the unit. Some flexibility in the trainee office assignment may be required to meet the variable student teaching commitments. The use of offices to accommodate two or more students is not desirable and may conflict with teaching and patient care activities in that students may participate in intimate conversations with patients.

14. Conference/Consultation Room

    A conference/consultation room should be provided on the unit for consultant and medical student use and for small group meetings of 10-12 persons. This room may be used jointly for instructional seminars and, perhaps, therapy programs.

15. Support Areas

    Support areas should include clean and soiled utility rooms, clean and soiled linen holding, a housekeeping aides' closet, recreational equipment storage, and stretcher and wheelchair storage space.

16. Psychological Testing Units

    Psychological testing is administered to most psychiatric patients and many other patients in Veterans Administration hospitals. Space for group administration of various tests should be provided within the nursing tower and, preferably, convenient to psychiatric units. The test may involve small groups of four to ten patients, a psychologist or psychology technician and, perhaps, a student.

17. Nursing Student Carrels

    Study space in the form of carrels should be provided in conjunction with each psychiatric unit for use by nursing students.

18. Nursing Instructor's Office

    Instruction of nursing students is the responsibility of a nursing instructor, independent from the unit staff. This instructor should be provided with office space on or adjacent to the unit.

19. Classroom

    See 5212.2.1

526 NURSING HOME CARE UNIT

526.1 USER NEEDS

These units function in a manner similar to a general medical and surgical unit with the exception that a high percentage of patients are ambulant, the level of sustaining medical care is less and the length of stay is greater.

526.1.1 Objectives

Nursing home care facilities in V.A. hospitals treat patients, who require a substantial level of nursing support, will probably be hospitalized for six months or more and whose activities will be confined primarily to the nursing unit.

The major mission of the nursing home care unit is to restore maximum physical and psychological patient functions.

526.1.2 Operational Relationships

The nursing home care units related to other hospital functions in a non-exacting way; that is, there are no relationships which require specific contiguity to a particular supply and distribution system or other nursing units. Patients leaving the unit for treatment or recreation will be ambulant and able to proceed without escort. Supplies are of non-critical nature and can be distributed through normal hospital procedures. Patient care programs would benefit, however, from a close proximity to outdoor recreational areas.

526.1.3 Characteristics

1. Environment

   The general environment of the unit should be cheerful and open with natural light in social spaces and corridors, if possible. Walking surfaces should provide secure footing. Glare or other disorienting features should be avoided.

2. Organization

Out of bed and group activity and group interaction will be emphasized on the unit. Social spaces therefore should provide the focus for unit organization. Unobtrusive observation of social spaces and corridors by nursing personnel is desirable.

526.1.4 Primary Users

1. Patients

Most patients will be elderly. Many will require the assistance of crutches, wheelchair or walker. Dizziness or loss of balance may occur in certain patients. Others may have irregular eating or sleeping habits. Disorientation and temperamental dispositions are common on the unit. Patients may leave the hospital for short periods to visit family or friends.

The restoration of patient functions involves to a large extent, outpatient activities. Patients are encouraged to minimize the time spent in the bedroom during non-sleeping hours. Treatment on the unit includes physiotherapy, occupational therapy, manual areas therapy, vocational rehabilitation, group counseling, general exercise and training in the activities of daily living. Most therapy programs are conducted with groups of patients: however, treatment is also provided for patients confined to bed. In many cases, patients are encouraged to leave the unit for treatment in general hospital facilities. Therapy programs on the unit may involve a considerable amount of equipment such as looms, typewriters, sewing machines or minor carpentry equipment.

Patient social activities assume great importance in maintaining psychological a physical capability. Activities on the unit may range from quiet reading or conversation to watching television or movies, dancing or playing games such as ping-pong or pool. In many instances, these activities will occur simultaneously. Eating food, both regularly scheduled meals and informal snacks is usually a favorite patient activity. The social interaction that takes place during meals is an important contributor to the patient care process.

Certain patients may benefit from the training in the activities of daily living during meals as well.

2. Physicians

   Physicians will visit the unit periodically to examine patients. However, a permanent staff member may not be assigned to the unit.

3. Residents and Interns

   It is not anticipated that teaching will occur on these units unless a special center for gerontology is established when specific medical specialties in this field develop.

4. Nursing Staff

   Skilled nursing is required to maintain an active rehabilitation program. Nurses will assist in treating chronic medical conditions, helping patients maintain a high level of daily activities and in most therapy programs.

5. Nursing Students

   Student nurses will receive a portion of their training on the nursing home care unit. A maximum of eight students may participate at one time.

6. Maintenance

   See 512.2

7. Building Management

   See 512.3

8. Dietary

   See 525;1;4, 14

9. Visitors

   Visitors to the unit will be common. They will be entertained in patient rooms or in group social spaces.

526.1.5 Trends

The future of nursing home care units in the “nursing tower” is unclear. Currently, most units are being constructed as detached facilities.

As the standard of living increases and medical knowledge expands, the total number of elderly persons will increase, thus expanding need. It is not necessarily true, however, that the required number of V.A. nursing home care beds will expand in proportion.

As knowledge concerning the diseases of old age develops, the nursing home care unit program may expand and the unit itself become a center for intensive diagnosis and treatment. In this event, the relationship with other hospital units may become an important determinant in the location of nursing home care units within the hospital.

526.2 FUNCTIONAL REQUIREMENTS

526.2.1 Functional Requirements

No critical relationships exist. Convenient access to physical and occupational therapy is desirable. Outdoor recreation space adjacent to the unit would contribute to therapy programs.

526.2.2 Space Requirements

1. Patient Rooms

   Bedrooms should respond to patients’ physical and psychological requirements. Furnishing, colors and textures should resemble residential environments. Personal effects such as pictures, flowers, and cards should be encouraged.

   In multi-bedrooms, patients must be able to read, write or conduct other quiet activities without disturbing other patients. The capability of converting the bedroom into a sitting room would conceivably be utilized by many patients.

   Where possible, toilet and bathing facilities should be designed to promote dignity and independence. Private compartments for personal effects in shared bathrooms are desirable.

All furnishings and equipment, including storage units, switches, lavatory fixtures and operable windows must be usable by wheelchair patients. This requires ample space for wheelchair-bed transfer and night storage of wheelchairs.

Due to the increased length of patient stay, additional horizontal and vertical storage space would be desirable. Space will be needed for clothing (patients will be dressed) personal effects, books, writing paper, suitcases, extra blankets, prosthetic devices and soiled clothing and linen. A ventilated space is desirable for the latter.

Bedroom services may include piped oxygen, television, and lighting for reading, examination and social activities. An audio-visual nurse call system is desirable.

2. Dayroom

   Emphasis will be placed on out-of-room activity. Social spaces should encourage participation by providing a pleasant environment plus maximum flexibility to accommodate varied activities. A capability to allocate sub-spaces for different types of activities is desirable. Lighting, surface finishes, and acoustical qualities must be consistent with theses activities.

3. Nurses' Work Spaces

   Work spaces will be similar to those of GM & S unit. Nurses should be able to observe corridors and group spaces. It may be desirable to provide an office or small conference room adjacent to the nurse's station for patient, visitor and staff interviews, for team conferences and for use as a private study work area.

4. Supporting Facilities

   Similar to those on a GM & S unit.

5. Teaching Facilities

   Similar to those on GM & S unit with the exception of facilities for residents, interns and medical students.

527 CLINICAL STUDIES UNIT

527.1 USER NEEDS

A clinical studies unit is a diagnostic functional unit operating under the administrative responsibility of the hospital medical service.

527.1.1 Objective

Intensive studies are carried on here dealing with the psychological and chemical changes in metabolic processed brought about by disease. These studies generally involve the following:

1. Precise control and measurement of the factors which may affect metabolism, e.g., food intake, fluid intake, environmental temperature, humidity, drugs and medications, etc.

2. Measurement and analysis of metabolic “products”, e.g., feces, urine, blood, perspiration, respiration, etc.

3. Measurement of physiologic indicators of metabolic activity, e.g., temperature, blood pressure, weight, rate of circulation, etc.

527.1.2 Operational Relationships

In general the relationship patterns established for the GM & S unit are applicable to the clinical studies unit.

Joint use of laboratory and teaching space can be facilitated by locating the unit adjacent to gastroenterology and hemodialysis unit. Cross consultation between medical specialties in clinical studies unit and gastroenterology is desirable to maintain.

527.1.3 Characteristics

1. Environment

   The environment should be generally similar to a GM & S unit.

2. Organization

In order to conduct these studies with the requisite degree of precision, it is necessary to keep the patients in a separate unit where control over significant variables can be maintained and where supervision is available to insure that patient activities will not invalidate test results.

The study programs carried on in the metabolic unit may require that the patients significantly alter their usual patterns of activity. They may eat or drink only what is given to them; they have to collect all waste products, i.e., feces and urine, rather than disposing of them by flushing the toilet and they have to be available at specific times for various tests, measurements, and collection of samples. Since these requirements may conflict with long established habits, the patients may have to be thoroughly instructed in these requirements, and wherever possible, safeguards should be instituted to insure appropriate action.

The quantity and content of all patient meals may have to be carefully controlled, measured, and recorded. To assure this, these meals are prepared on the unit by specially trained deictic personnel.

Many of the sample analysis and measurement procedures are essentially routine and may be done in a central clinical laboratory; however, some test may be done in a laboratory on the unit.

Various levels of psychological monitoring may be required for any patient in the unit.

527.1.4 Primary Users

1. Patients

The majority of patients in the clinical studies units are ambulant and mostly capable of caring for themselves. They can feed themselves, use toilet facilities, and take care of their general hygiene and toilets requirements, without nursing assistance. They are capable of utilizing out-of-bed entertainment and recreation facilities, e.g., lounge, and card playing facilities, etc. They are also capable of taking their meals out of bed. If there is no conflict with the test being conducted, these patients may be encouraged to utilize their ambulant or self-care abilities as much as possible.

In addition to ambulant patients, there may be non-ambulant, acute patients on a clinical studies unit. These patients require the complete range of diagnostic, therapeutic and supportive care normally accorded acute patients.

It is likely that many of the patients on the clinical studies unit will not understand the nature of the tests being conducted or the importance of precise control and measurement. Others may lack sufficient motivation to assure complete cooperation.

For these reasons, the patients may require considerable instruction and supervision.

Many patients may also be apprehensive about the results of the test, their chance for recovery, and their future activities, etc. and will need to discuss these concerns with interested and qualified personnel.

2. Physicians

The clinical studies unit is generally under the direction of an internist.

The physician or physicians responsible for the clinical studies unit will, with the help of residents, determine and evaluate study programs for specific patients, check on the progress of various studies being conducted, and analyzed the study results. They may also conduct teaching rounds and conferences on the unit for interns and medical students.

In addition to theses activities, the physicians may also be available for consultation on other cases in the hospital and may assume direct responsibility for the care of certain patients on general medical units. They may also work in the outpatient clinics.

Depending on their interests, physicians or residents may be involved in doing some laboratory analysis in the unit.

Patients from other sub-specialty units may come to the unit on a consultative basis or to visit their patients who have been assigned to the unit.

3. Residents and Interns

   Residents in internal medicine may be directly involved in carrying out study programs and analyzing the results. Much of the routine work involved in arranging and managing studies and providing necessary medical care to the patients will be done by these residents.

   Interns are not normally assigned to the clinical studies unit as a normal part of their rotation through the hospital. They may, however, come to the unit during rounds to receive instruction.

4. Nursing Staff

   The nursing staff is responsible for providing the nursing care required by each of the patients; and has the additional responsibility of carrying out programs of observation, measurement, and sample collection. Records must be maintained by the nursing staff detailing precise results of various observations and tests as well as information concerning routine care and patient condition.

   The nursing staff assumes a significant responsibility for the education and supervision of patients. This requires close contact between patients and nurses. Patients should be free to approach the nursing staff to ask questions or seek assistance. The nursing staff, on the other hand, should be able to observe and control patient activities to the extent required by the studies being conducted. The nursing staff should have a thorough understanding of the nature and requirements of the studies being conducted. This may require frequent meetings of the unit staff, discussion of cases with physicians, and observation and assistance of physicians on rounds. Ideally, the clinical studies unit should have a separate, specially trained nursing staff assigned to it.

5. Medical Students

   A significant number of medical students can be expected to accompany doctors on unit rounds.

6. Nursing Students

   Nursing students will also visit the clinical studies unit.

7. Social Work

   A social worker should be available for consultation with patients and their families. This social worker should be aware of the functions of the unit and should assume the position of a recognized member of the unit staff. In most cases, the social worker will not be present on the unit full time.

8. Maintenance Management

   See 512.2

9. Building Management

   See 512.3

10. Dietary

    There will be at least one dietitian who will work full-time on the clinical studies unit. This dietitian will prepare menus for the individual patients, which satisfy the requirements of the tests being conducted. She will also supervise the preparation of meals and measure and record the types and quantities of food consumed by the patients. In the course of these activities, the dietitian may have frequent meetings with physicians and patients and will work closely with the nursing staff.

11. Visitors

    Patients in the clinical studies unit will be free to have visitors provided there is no conflict with the studies being carried on. Care has to be taken to insure that the visitors do not give the patients food or drink which would invalidate the study results.

527.1.5 Trends

1. Teaching

   Currently V.A. hospitals do not provide a comprehensive patient base for adequate training in endocrinology and metabolism. Residents, interns, and medical students do not have an opportunity for contact with a large range of metabolic or endocrine problems due to the small number of women and children patients in V.A. hospitals.

   Future developments may increase the number of such patients in V.A. hospitals, with corresponding effect on clinical studies unit.

2. Medical Care

   As physicians become more familiar with the functions and capabilities of clinical studies units and as knowledge of the relation between metabolic processes and disease is expanded the demand for beds in these units may well increase. In addition, this may result in an increased need for supporting facilities or services, e.g. radiographic and fluoroscopic facilities, constant temperature rooms, or radioisotope lab facilities.

3. Technology

   It is likely that the use of physiological monitoring equipment, including telemetry, will increase in the future. The use of radioisotope in the study of various conditions may also increase.

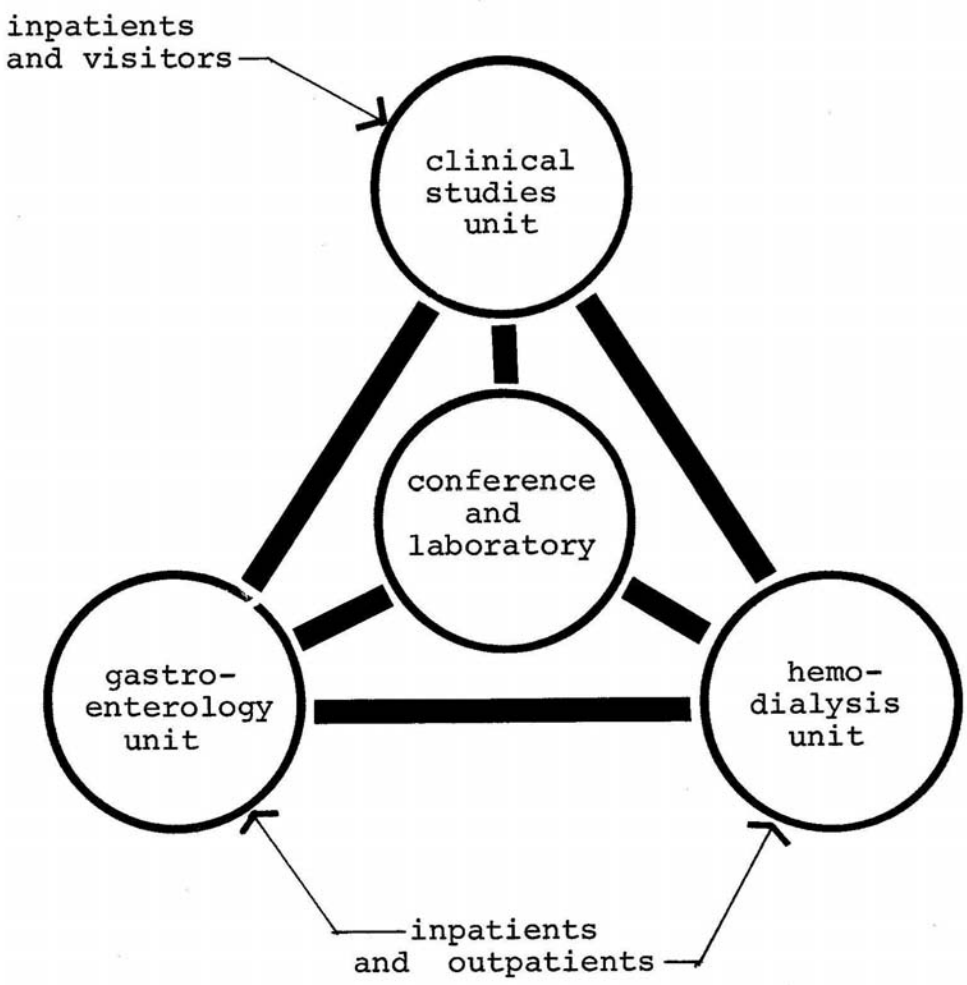
   Computerized monitoring, analysis and record keeping equipment will undoubtedly increase as more sophisticated systems and equipment are developed.

527.2 FUNCTIONAL REQUIREMENTS

527.2.1 Functional Relationships

Figure 520-9 illustrates an optimum relationship between the clinical studies unit and hemodialysis and gastroenterology units.

Figure 520-9. CLINICAL STUDIES UNIT: OPERATIONAL RELATIONSHIPS



527.2.2 SPACE REQUIREMENTS

1. Patients Rooms

   Three basic types of patient rooms may be included in the clinical studies units.

   a. Single–bed rooms to be used for the most strictly controlled studies, i.e. ”balance studies”.

   b. Multi-bed rooms for patients on less demanding study programs.

   c. Single-bed, constant temperature rooms for temperature and perspiration studies. Such rooms are not included in current facilities, but may be a desirable future option.

   Each patient room should be provided with a separate specimen collection toilet to allow for control and to minimize potential errors in specimen collection. A lavatory should be provided in conjunction with this toilet and should be located to encourage handwashing after use of the toilet.

   Connection should be provided at each patient bed station for individual physiological monitoring equipment.

   The size, furnishings, and basic services, e.g., oxygen, vacuum, compressed air, and power for these rooms should be comparable to general nursing unit patient rooms.

2. Patient Shower and Bathing Facilities

   Centralized patient shower and bathing facilities may be provided; however, a separate shower is desirable in conjunction with each patient room to allow greater flexibility in the study of female patients, contagious patients, etc., on the unit.

   All of these facilities should be usable by wheelchair patients.

3. Nurses' Station

   Space and facilities should be provided in the nursing station for a ward clerk and for nurse charting functions. The station should include adequate storage space for patient records and clerical supplies.

   Space should also be allowed to accommodate terminals for patient monitoring equipment and for a possible future computer terminal.

   The nurses' station should be located to allow for easy observation and control of unit entrances and exits and of patient-occupied spaces. These include patient rooms as will as lounge, recreation, dining and circulation spaces.

4. Utility Rooms

   Clean and soiled utility rooms, space for storage of clean and soiled linen, a janitor's closet, and stretcher and wheelchair storage space should be provided.

5. Exam-Treatment Room

   An exam-treatment room, similar to that provided in general nursing units, should be included.

6. Laboratory

   A laboratory should be provided in conjunction with the clinical studies unit. This lab should be equipped with work benches and sinks as required and should have power, water, vacuum, and natural gas service. A fume hood should be provided for handling stool samples. Adequate sample storage includes a freezer and refrigerator as well as shelf space. A small, e.g., 4 channel, autoanalyzer may be included in this laboratory if the number and complexity of tests warrants.

7. Kitchen

   The kitchen in a clinical studies unit may be equipped with "domestic" facilities, e.g., a range, freezer, refrigerator and sink. The kitchen, however, requires more work and storage space (including refrigerated frozen storage) than a normal domestic kitchen.

8. Dayroom

   A dayroom should be provided for patient recreation and relaxation.

   Since most of the patients are ambulant and capable of taking their meals out-of-bed, the dayroom may be utilized for group dining.

9. Offices

   a. Nurse supervisor's or head nurse's office

   b. Dietitians' offices

   c. Physicians' offices

   d. Social worker's office

10. Meeting Room

    A room capable of accommodating groups of from 8 to 10 persons should be included on the unit for use during unit staff meetings, instruction of nursing or medical students, etc.

11. Conference Room

    A large conference room, to accommodate groups of 15 to 25 persons, should be accessible from the unit. This space may be located to facilitate joint use by several units on one floor or adjacent floors.

528 GASTROENTEROLOGY UNIT

528.1 USER NEEDS

The extent of the services offered by the gastroenterology unit will be determined by the V.A. Central Office in conjunction with the staff of the individual facility.

Two basic service patterns are currently being followed.

1. The gastroenterology unit may provide diagnostic and consultative service only. Gastroenterology patients would be assigned to general medical wards.

2. The gastroenterology unit may include diagnostic facilities and a closely related ward for the care of gastroenterology patients.

The following discussion is limited to the first service pattern, that is, the gastroenterology unit as a diagnostic and consultative service. The requirements for gastroenterology patient care areas are essentially the same as those for general medical wards and need not be duplicated. The major distinguishing requirement for a gastroenterology ward is a need for close proximity to gastroenterology diagnostic facilities. These facilities are identical for both types of unit and are discussed in the following narrative.

528.1.1 Objectives

The gastroenterology section in V.A. hospitals provides diagnosis and treatment for diseases of the esophagus, stomach, intestine, and related organs, e.g., liver, gall bladder. The most common gastroenterological diseases encountered are ulcers and colitis.

The diagnostic procedures on the gastroenterology unit fall into four general categories.

1. Sample collection and analysis, e.g., secretary studies, biliary studies, stool analysis, and blood determinations.

2. Direct examination of patients, e.g., endoscopy, sigmoidoscopy, gastroscopy.

3. Fluoroscopic and radiographic examinations of the gastrointestinal system.

4. Measurements of physiologic variables, e.g., pressure differentials (manometry).

528.1.2 Operational Relationships

As indicated previously, a significant number of conditions studied in the clinical studies unit may involve the gastrointestinal system and fall within the field of interest of gastroenterology. For this reason, a close relation between the two units may be desirable. Such a relationship would facilitate interaction between the sub-specialties involved and would allow for joint use of diagnostic, laboratory, teaching and conference facilities.

The relationship to other functional units is generally non-critical. Priority should, however, be given to medical intensive and acute nursing units.

The procedures and equipment involved in the examination and diagnosis of inpatients and outpatients are the same. If appropriate access, waiting, and dressing facilities are provided, one gastroenterology unit may be able to conduct both inpatient and outpatient procedures.

It may be argued that sample analysis and fluoroscopic and radiographic examinations need not be done on the unit, but should be done in the central clinical lab and in radiology. The inclusion of these facilities in teaching hospitals not only allow for rapid diagnosis of emergency cases, but also serve as useful tools for comprehensive training of residents, interns and students. Exclusion from the unit will generate a need for frequent patient and staff travel from the unit to radiology and laboratory.

528.1.3 Characteristics

1. Environment

   The environment should be generally similar to a GM & S unit.

2. Organization

   Organizational factors include an ability for nursing personnel to observe patients continuously while they are on the unit.

528.1.4 Primary Users

1. Patients

   Most of the inpatients examined in the gastroenterology unit will be ambulant, but a few may be brought to the unit from other nursing floors in wheelchairs or on stretchers. Outpatients examined on the unit will generally be ambulant.

   All of the patients will be conscious and capable of following instructions; however, they may be confused or apprehensive and may require constant supervision while on the unit.

   For some procedures, e.g., secretory studies, the patients will be kept on the unit for a period of hours. During this time they may be able to engage in passive diversional activities such as reading or listening to the radio.

2. Physicians

   The gastroenterologist will engage in various diagnostic, consultative, administrative, teaching, and, perhaps, research activities on the unit. These can include, but may not be limited to, the following:

   a. direct examination of patients, e.g., endoscopy, sigmoidoscopy, and gastroscopy;

   b. fluoroscopic examinations;

   c. study of test results and dictation of diagnoses;

   d. consultation with patients;

   e. consultation with physicians from other specialty or sub-specialty areas of the hospital;

   f. performing special laboratory determinations;

   g. supervising and instructing technicians;

   h. consulting with and supervising gastroenterology residents;

i. instructing and demonstrating procedures for interns and medical students;

j. individual study and;

k. research studies.

In addition to these activities, gastroenterologists have responsibilities that involve them in other areas of the hospital. They will assume direct responsibility for the care of some patients on general medical units; consult with physicians in other areas of hospital; work in outpatient clinics; and will be involved in medical staff activities.

3. Residents and Interns

The activities of residents on the gastroenterology unit parallel those of the gastroenterologists. The residents will also be involved in individual study and possibly research. They should be able to carry on these activities without significant interruption of their clinical duties.

In addition to activities on the unit residents will be involved with consultative and patient care activities in other parts of the hospital. They may assume direct responsibility for care of patients in general medical units and may frequently assist the gastroenterologists in the care of their patients. They may also provide consultation to physicians and residents from their sub-specialty areas of medicine.

Assignment to the gastroenterology unit is not a normal part of an internship rotation program; however, interns will be introduced to the functions of the unit during their rotation through the medical service. They may come to the unit singly or in groups for consultation, observation, or for clinical presentations.

4. Nursing Staff

The gastroenterology unit is primarily a diagnostic rather than a patient care unit. For this reason, there will generally be a minimum need for nursing personnel assigned to the unit.

5. Medical Students

   Medical students may receive individual or group instruction on the unit. Provision should be made to accommodate groups of from eight to ten students during this instruction. It may also be desirable to allow groups of four or five medical students to study on the unit.

6. Technical Staff

   The technical staff assigned to the gastroenterology unit are trained to carry out certain measurement, sample collection, and analytical procedures. They will prepare patients for examination and may assist the physicians in medical procedures. In addition, they may observe and control patients on the unit, clean and maintain equipment, order, receive, and store supplies, and record test results. They may also be involved in processing x-rays. The number of technicians required will be determined by the patient load.

   Training for gastroenterology technicians is not currently provided in school. These technicians must, therefore, be trained through work and instruction on the unit. Facilities should be provided on the unit for meetings, discussions, individual instruction, and study as a part of a continuing technician training program.

7. Clerical Staff

   A secretary may be assigned to each gastroenterologist to transcribe diagnoses, handle correspondence, make appointments, etc. In addition, there should be at least one secretary-clerk to handle the general clerical work required for the operation of the unit. In large units or units with significant outpatient responsibilities, this secretary-clerk may also act as a receptionist.

8. Other Ancillary Personnel

   A radiology technician may be assigned to the unit to operate the radiography-fluoroscopy machine and process films. Depending on the patient load, hospital policy, schedule of operation, etc., this technician may be assigned on a full time, part time, or on-call basis.

9. Maintenance

   See 512.2

10. Building Management

    See 512.3

528.1.5 Trends

Increasingly complex and demanding laboratory procedures for gastrointestinal studies will probably be developed in the future; however, the basic methods of extracting samples and examining and treating patients should not change significantly. Future changes to the gastroenterology unit, therefore, may involve basic changes in facilities or services required.

528.2 FUNCTIONAL REQUIREMENTS

528.2.1 Functional Relationships

Figure 520-9 illustrates the optimum organization of clinical studies, hemodialysis and gastroenterology units. Figure 520-10 indicates a future possible relationship to gastroenterology nursing units.

528.2.2 Space Requirements

1. Gastric Studies Room

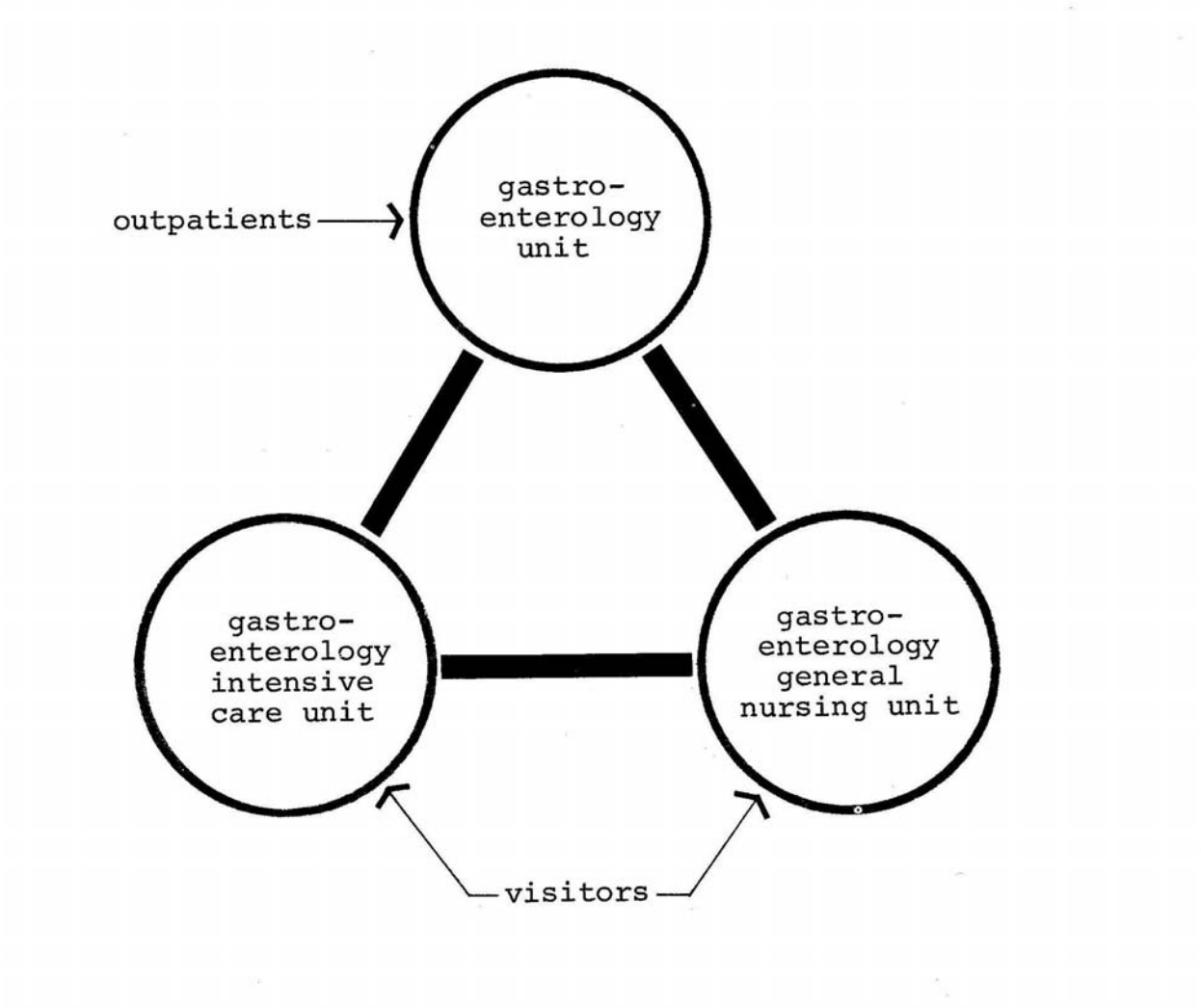
   This room should have space and facilities for the collection of gastric samples from several patients at one time. Required are seating for patients, sample extraction and collection apparatus with connection to vacuum outlets, countertop with space, a sink for handwashing, and storage for necessary supplies and equipment.

   It is necessary for a technician to observe and assist the patients at all times during collection of samples. Allowance should be made for the technician to remain in the room.

2. Manometry Room

   This space may be comparatively small. It must accommodate a cot for the patient to lie on, the manometry equipment, and space for a technician. Manometric studies may not be conducted in all gastroenterology units; therefore, inclusion of space depends on program.

Figure 520-10. GASTROENTEROLOGY UNIT: OPERATIONAL RELATIONSHIPS WITH RELATED NURSING UNITS



3. Examination Room

   All examination rooms on the unit should be equipped for endoscopy, sigmoidoscopy, and gastroscopy. They should include appropriate lighting, examination table, storage for necessary supplies and equipment, countertop work space, handwashing sink, and vacuum outlets. X-ray view boxes, and a small desk or writing surface for the use of the physician should also be included.

4. Radiography-fluoroscopy Room

   Provide a standard radiographic-fluoroscopy faculty with direct access to a patient toilet.

5. Dark Room

   If the frequency of use is sufficient, automatic developing equipment may be provided in this room; however, facilities for manual development should also be included.

6. Laboratory

   A laboratory equipped with work benches, a fume hood, sinks, storage space for reagents, equipment, and supplies, and refrigerated and frozen sample storage is desirable on the gastroenterology unit. As was mentioned previously, this may be shared with the clinical studies unit if proximity permits.

7. Utility Room

   This space is used for cleaning and storage of equipment and supplies. It should be equipped with a sink, countertop work surface, and storage space.

8. Offices

   a. Gastroenterologists' office

   b. Residents' office

   c. Technician's office

9. Conference Room

   A large conference room, to accommodate groups of up to 25 persons, should be accessible from the unit. This space may be located to facilitate joint use by several units on one floor or adjacent floors.

10. Medical Student Study Space

    This may be one room with several study cubicles or carrels and may be shared with other units on the same or adjacent floors.

11. Outpatient Facilities

    If a significant number of outpatients are to be examined on the unit, reception, waiting and dressing spaces should be provided.

529 HEMODIALYSIS UNIT

529.1 USER NEEDS

The hemodialysis unit is a treatment unit under the administrative responsibility of the hospital medical service.

529.1.1 Objectives

This unit provides space and facilities for the treatment of both inpatients and outpatients who have renal insufficiency.

The basic treatment on the unit involves bypassing the patient's kidney by channeling the patient's blood supply through special dialysis equipment which removes the toxins normally removed by the kidneys. These toxins are diffused through special membranes in the dialyzer and absorbed by a dialysate solution, which is then discarded. The processed blood is then returned to the patient's system.

529.1.2 Operational Relationships

Potential joint use of the unit by inpatients and outpatients indicates a need to locate the unit so outpatients and their relatives will not disrupt other inpatient unit activities.

Many patients with renal failure will be severely ill. In units treating this type of patient, adjacency with other intensive care units is desirable. Sharing of equipment, specialty medical consultation and emergency assistance can be encouraged by this proximity.

The interaction between the hemodialysis unit and clinical studies and gastroenterology units has been discussed.

529.1.3 Characteristics

1. Environment

   The unit environment should incorporate the characteristics of an intensive care unit with those of an ambulant patient social area. Certain patients in the unit will be critically ill while, in units with a home training program, other patients will be talking, watching television or engaging in other recreational activities during treatment. Two separate environmental areas or two separate units may be desirable where both patient types are treated. See 528.1.4.1, Patients.

2. Organization

There are two systems of supplying dialysate solution to the individual patient dialyzers:

a. The single patient system in which the dialysate supply unit and the dialyzer are both located at the patient bedside. The supply unit prepares and controls the fluid for the individual dialyzer.

b. The multiple patient system consists of a central dialysate preparation unit, which supplies prepared solution to several bedside control stations and dialyzers.

Space and facilities should be provided for both systems in the hemodialysis unit. Most treatments will utilize the central dialysate supply unit; however, some patients may require special dialysate solutions which could be prepared and supplied from individual bedside units. The inclusion of both systems also allows for emergency coverage at times when the central unit may be out of operation.

Before treatment, the patient and equipment must be prepared and following treatment, the dialyzer must be disconnected, the patients cannula reapplied, and the reassembled prior to its next use.

Due to unpredictable complications or delays the scheduling of treatments will remain somewhat flexible. Normally, the unit will be operated on a twenty-four hour, seven-day a week basis in order to accommodate these delays.

During treatments, the patient's well-being depends on the proper functioning of the equipment. Any breakdown or malfunction may be harmful or dangerous to the patient. For this reason the staff should be constantly aware of equipment function and of the patient's condition. This may be accomplished through monitors built into the equipment and by physiological monitoring of the patient, but provision should also be made for constant visual observation by the nursing staff.

In addition to treatment facilities, allowance may be made for training of patients and their families in the use and care of home dialysis equipment.

529.1.4 Primary Users

1. Patients

   The patients treated in the hemodialysis unit fall into three general categories:

   a. Patients with chronic, irreversible renal insufficiency. These patients will require hemodialysis treatment approximately twice a week for the rest of their lives. They currently have to come to the hospital for treatment; however, many may be candidates for home dialysis programs if these are instituted.

      These patients are generally ambulant, conscious, and comparatively well. Some patients remain in bed during treatment; however, this is not required for all. Many may be more comfortable during dialysis if they can sit in suitable “lounge” chairs. While receiving treatment the patients may read, watch television, converse, write, sleep, or engage in any number of activities, which do not require movement out of bed or away from the dialyzer and control equipment. It may be desirable to treat most of these patients in one space to allow patient socializing and simplify nurse observation.

      Staph infections of implanted shunts are fairly common among these patients. Precautions should be taken to avoid the spread of such infections.

      Many patients will be apprehensive about their general health, family responsibilities, work, etc., and may need to discuss concerns of this nature privately with interested and qualified personnel.

   b. Chronic patients with temporary renal insufficiency due to disease or trauma. These patients may require hemodialysis for a period of days or weeks until their kidneys are sufficiently recovered to function effectively without assistance.

They will be admitted to the hospital and will be brought to the unit periodically from general nursing units. While on the unit, they require the level of nursing care normally accorded general medical or surgical patients.

c. Patients awaiting kidney transplants. These patients will be similar to chronic patients, but may be undergoing immunosuppressive therapy prior to surgery. They may, therefore, require fairly strict isolation during treatments. Physical isolation and normal hand washing and gowning techniques should be sufficient.

2. Physicians

The hemodialysis unit will be directed by physicians experienced in renal pathophysiology. These physicians direct the activities of the nursing and its technical staff as well as performing necessary examinations and treatments, e.g., implanting cannulas, removing clots from shunts, kidney biopsies, etc. While on the unit they may consult with other physicians and residents and they will be involved with individual and group instruction of interns and medical students.

In addition to these activities, these physicians have responsibilities that involve them in other areas of the hospital. They may assume direct responsibility for the care of some patients in general nursing units, consult with physicians in other areas of the hospital, work in outpatient clinics, or be involved in hospital staff activities.

3. Residents and Interns

The activities of residents parallel those of physicians on the hemodialysis unit. They assume many of the same responsibilities for patient examinations and special treatment procedures; however, their work is subject to evaluation and direction by the physicians.

Interns will also be assigned to the unit in certain instances.

4. Nursing Staff

   The hemodialysis unit will have a separate, full-time nursing staff assigned to it. They will assume responsibility for supervision and nursing care of the patients while they are on the unit and should be able to observe all patients and respond quickly to patient requests or emergencies.

5. Medical Students

   Medical students may receive individual or group instruction in the unit. The usual group size will be from eight to ten persons; however, groups of up to 20 may be involved in some sessions, e.g., clinical presentations. Facilities for these larger conferences may be shared with other units on the same or adjacent floors.

6. Technical Staff

   The technical staff will be responsible for the operation of the dialysis equipment. They will prepare the equipment for each treatment, check its operation during treatments, disconnect and remove equipment after treatments, dismantle, clean and reassemble dialyzers, and maintain all equipment in proper working order. They will also prepare the various dialysate solutions.

7. Clerical Staff

   A secretary may be available to each physician and in addition a secretary-clerk may be assigned to handle general clerical work.

8. Maintenance

   See 512.2

9. Building Management

   See 512.3

10. Dietary

    The manner and frequency of patient food delivery will be similar to a general medical and surgical unit. Outpatients treated in the unit will require regular meals or, in some cases, special diets.

529.1.5 Trends

The V.A. may well assume an increasing role in community care. This would undoubtedly bring about an increased demand for hemodialysis facilities in V.A. hospitals.

As more efficient, compact, and economic dialysis equipment is developed there may be an increased dependence on home dialysis. Facilities for training in home dialysis would therefore be indispensable in the hemodialysis unit. On the other hand, long range studies of dependency on dialysis equipment and procedures may tend to place higher value on transplantation, if immunosuppression problems can be managed, and if adequate donor supplies are available.

529.2 FUNCTIONAL REQUIREMENTS

529.2.1 Functional Relationships

Figure 520-9 previously illustrated the optimum organization of hemodialysis, clinical studies and gastroenterology units. In addition, close proximity to medical intensive care units would be desirable.

529.2.2 Space Requirements

1. Patient Room

   Two types of patient rooms may be included on the hemodialysis unit:

   a. Single bed rooms to be used for patients who are critically ill or isolated.

   b. A multiple bed room for other patients.

   Services at each patient bed station should include oxygen, vacuum, compressed air, power and dialysate disposal. Terminals should be provided at all beds for physiological monitoring equipment.

2. Patient Shower and Toilet Facilities

   A separate toilet and lavatory should be provided for each single bed room in addition to a shared toilet and lavatory for each multiple bed room. The need for bathing will occur but not for all patients. One shower is considered adequate for most units.

3. Patients' Dressing Area

   A patient's dressing room containing individual cubicles with chairs and lockers should be provided on the basis of one per bed plus two.

4. Nurses' Station

   This area, located for visual surveillance of the bed areas, will accommodate nurses and, at times, physicians or others. Space and facilities should be provided for nurse charting functions with adequate storage area space for patients' records and supplies. Space should also be allowed to accommodate terminals for patient monitoring equipment and future computer terminal.

5. Equipment Service Area

   The equipment service area will be divided into three sub areas:

   a. the soiled area for receiving, disassembling and cleaning,

   b. a clean area for sterilizing and reassembling,

   c. an area for storing prepared dialysate supply units and analyzers.

6. Dialysate Preparation Area

   The dialysate preparation area should contain the necessary concentrate, dilution tanks, and auxiliary equipment such as pumps, valves, heater, monitor and panel control devices.

7. Examination/Treatment Room

   An examination/treatment room similar to that provided in general nursing units should be provided

8. Biochemistry Laboratory

   The biochemical laboratory should contain facilities for biochemical, hematologic and/ or bacteriologic processing and/or analysis of specimens. This laboratory may be shared with other specialty units such as the clinical studies unit.

9. Kitchen

   A small kitchen for the preparation of snacks and the instruction of patients on special diets should be provided.

10. Offices

    Provide offices for physicians, secretaries, residents and a social worker's office (which may be shared with other units).

11. Storage Area

    Adequate storage should be provided for stand-by equipment and replacement parts.

12. Utility Rooms

    Clean and soiled utility rooms, clean and soiled linen storage, a housekeeping aide's closet, and stretcher and wheelchair storage should be provided.

13. Waiting Room

    A waiting room for patients and patients' families containing easy chairs, an occasional table, and book and magazine racks should be available near the unit.

14. Home Dialysis Training Area

    Space and facilities should be provided for training of patients and their families in the use and care of home dialysis facilities. These facilities are not currently provided but it is indicated that they will be required in the future.

5210 ORGAN TRANSPLANT UNIT

5210.1 USER NEEDS

The organ transplant unit is a newly developed treatment unit operating under the administrative responsibility of the hospital surgical service.

5210.1.1 Objectives

As organ transplant nursing unit serves post- and pre- surgical transplant recipients. Its functions include restoring or maintaining body function sufficiently for the recipient and the donor, post operative recovery care and counseling with the recipient and the relatives. Recipient patients often remain on the unit during their entire stay in the hospital. Donors are not normally cared for on the unit.

5210.1.2 Operational Relationships

Concepts concerning the facilities and organization of organ transplant units are still evolving, as are the technical skills necessary to successfully perform these procedures. Frequent introduction of new techniques, drugs and equipment can be anticipated. Radical reorganization of the unit both internally and as it relates to other hospital facilities is conceivable.

Developing patterns of transplant patient care indicate that individual units may be established for each organ, i.e., heart, kidney and in the future, liver, lung and others, where sufficient patient demand exists. Each unit should be relatively independent with separate equipment, supplies, diagnostic and treatment facilities and staff.

A transplant unit must provide a suitable environment for the entire range of patient illness intensity. In this respect the determinants of a relationship between this unit and other nursing units will be one of efficient utilization of staff, equipment and facilities. Continuity of care may be a factor if patients are to be transported to GM & S units. There is a question as to the value of a close relationship to surgery. Currently certain units have been constructed contiguous to surgery, but need for close relationship is infrequent. It is probable that most future transplant units will be located in close proximity to other intensive and specialty care units.

Table 520-6 indicates the major organ transplant unit operational relationships.

5210.1.3 Characteristics

1. Environment

   The desired environment for the unit will be similar to a GM & S or intensive care unit depending upon the degree of isolation desired and the severity of patient illness in a particular section of the unit. Many pre- and post-operative patients will require intensive nursing. Some patients need only a routine level of observation and care.

2. Organization

   Optimum organization for transplant units has not yet been determined. Several theoretical models currently prevail.

   Patterns of organization depend on the unit size. One model for a larger unit is illustrated in Figure 520-11. This provides separation of pre- and post-operative patients with shared support facilities.

5210.1.4 Primary Users

1. Patient

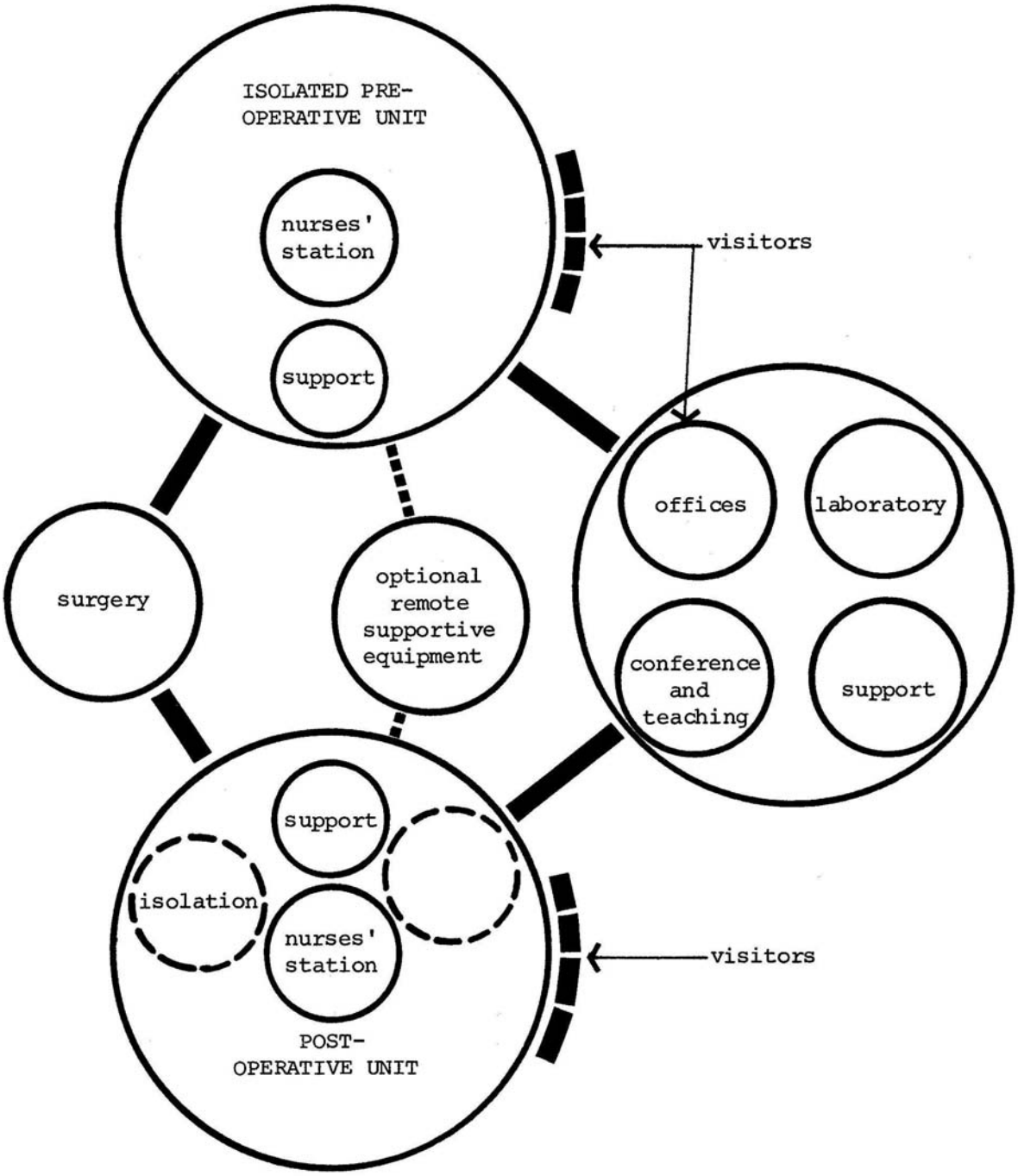
   Prior to entering the unit the patient and his family may have ambivalent feelings about the prospects for survival or well-being offered by transplantation. The patient's hopes will rise and fall during the course of his treatment, thus creating severe emotional strain. This strain may be further increased by having to ask a donor, perhaps a close relative, to give a vital organ. These tensions often lead to irrational behavior from the patient and his family. Frequent counseling and instruction concerning the procedures and risks of a transplant are required to alleviate this stress. Relatives are included in many discussion sessions. They must understand and accept the implications of transplantation, e.g., life long medication and possible rejection.

Table 520-6. MOVEMENT FACTORS: ORGAN TRANSPLANT UNIT

Persons	Non-ambulant patient(stretcher)	Ambulant and wheelchair patient	Physician	Nurse	Technician, etc.	Students	Visitors	Material	Food	Drugs	Specimens	Supplies	Records
Cardio/Pulmon.	C C U	C	M		F M	M							
Diag. Radio.	C C U	C C	M M		M M F	M M							
EEG/EMG	C	C C	M M		M M	M M							
EKG			M		M	M							
ICU Units													
Inhal. Ther.					F								
Nuclear Med.	C	C											
Occup. Ther.													
Other D&T	C U	C C	M		M	M							
Other Nurs.Units	C	C C	F F		F M	F F							F
Outpatient Clinic			F F			F F							
Phys. Ther.					M								
Rad. Ther.	C	C											
Surgery	C U		F			F							
Admin.			M				F F						F
Canteen			F	F		F	F F						
Dietary					F				F C				
Recreation, Etc.													
Supply & Process												F C	
Cent.Teach.Facil.			F	F		F							
Laboratory					M F						F C		
Pharmacy					M F					F			
Research			M			M							

F - High frequency
U - High urgency
C - Special Condition Factor
M - Some movement

Figure 520-11. ORGAN TRANSPLANT UNIT: OPERATIONAL RELATIONSHIPS



A patient entering the unit may be gravely ill and require a considerable period of intensive treatment prior to transplant surgery. Usually immunosuppressive drugs are started 7 to 10 days prior to surgery. During this period the patient is more susceptible to infection and may require protective isolation. Body fluids and other body functions will be measured frequently. Hemodialysis is often required for kidney transplant patients. Computers and other instrumentation will be increasingly used in care of such patients.

After surgery the patient will, in most cases, bypass the recovery room and be transported directly to the nursing unit. The patient room should be relatively pathogen free and isolated from all non-essential traffic. Protective isolation using techniques similar to those in surgery may be required for the first 48 to 72 hours. The surgeon may require the use of laminar air flow room for certain patients. If isolation is desired food and supplies may be wrapped and delivered in sterile utensils.

Intensive nursing is required for the first 48 to 72 hours. Unless complications develop, patients may be transferred to a multi-bed unit after this period. Within three days the patient may begin to walk; however, physiological functions continue to be carefully measured. Dialysis of renal patients may also be continued.

The risk of post-operative infection is high. Patients may develop convulsions, septic shock, psychosis, diabetes, myocardial infarction, pneumonia or other conditions, which require long periods of hospitalization.

The average length of hospital stay may be 30 days. During the later stages of hospitalization, the patient may be ambulant and on occasion leave the hospital for short periods of time.

2. Physicians

Surgeons normally assume responsibility for patient care on an organ transplant unit; however, a diverse number of medical specialties are involved in sustaining a patient both pre-and post-operatively. Consulting physicians require access to the patient, patient chart, nursing personnel and other physicians. Group discussions involving students, residents and other technical persons are common.

Diagnostic and treatment procedures are performed on the unit where possible. Group discussions involving students, residents and other technical persons are common. Diagnostic and treatment procedures are performed on the unit where possible. Results of laboratory tests should be available within four hours. Access to clinical laboratory facilities should therefore be available for them on a 24-hour basis.

3. Nursing Staff

   Continuous patient observation and intensive care will be required for extended periods of time. Psychological pressures are considerable; the rejection of a transplanted organ may have a severe impact on staff morale. The environment should be such that the "intensity" of the unit is diminished. In addition, the staff should have an area for relaxation away from the direct pressures of patient care. Space for change of shift conferences, consultation with physicians and for inservice or student training programs should also be available.

   Nurses' work areas should generally be acoustically isolated to avoid patient disturbance and to provide privacy for confidential conversations.

4. Trainees

   Teaching programs will be similar to those of other intensive care units. Closed circuit television should be used where possible to minimize unnecessary traffic on the unit.

5. Supporting Staff

   Staff activities will be similar to those of other intensive care units.

6. Visitors

   Visitors are an important consideration on a transplant unit. They maintain patient morale and, in the case of relatives, will provide an important component of the required lifelong care.

The patient should be able to see and communicate with visitors at all times during his stay on the unit. Closed circuit television or preferably, direct observation through a glass partition, coupled with an audio system, will be required during periods of isolation. At other times direct contact is desirable; however, visitors should not disturb other patients on the unit.

5210.1.5 Trends

1. Medical Care

   It is probable that the total number of patients in organ transplant units will increase and also that the number of specialized units may increase. Transplantation of a wide variety of organs may be possible in the future.

   Advance in the science of immunology on the other hand, may eventually eliminate the need for isolation facilities or even specialized units.

2. Technology

   The use of equipment for a variety of purposes will undoubtedly increase. The prime design parameter is adaptability: the ability to change components with a minimum of disruption or to totally dismantle and reorganize a unit in an economical manner.

5210.2 FUNCTIONAL REQUIREMENTS

5210.2.1 Functional Relationships

Ideally, each specialty transplant unit would relate to:

1. intensive care beds of the same medical specialty;
2. acute beds of the same medical specialty,
3. other organ transplant units;
4. the hemodialysis unit (renal transplant only) and;
5. surgery

5210.2.2 Space Requirements

1. Patient Rooms

   Patient rooms may consist of isolation rooms and multi-beds rooms. Isolation rooms will be similar to those currently provided for septic cases. A gown, mask and sterile glove techniques may be used. The room and furnishings will be washed down with an antiseptic solution prior to occupancy and frequent cultures will be taken to insure the adequacy of isolation techniques and of mechanical HVC system. Air pressure will be carefully regulated to maintain a positive pressure in the patient room; however, air locks are not required. Dialysis and other machinery should be centralized if possible. Hand washing, lavatory and toilet facilities should be provided within the isolation space.

   Multi-bed rooms should house four patients each. They will be similar to GM & S bed rooms with the exception of leads from the centralized monitoring and supportive equipment to the patient bed. Meals will be served on trays at the patient's bed. Visitors will be allowed to enter the area.

2. Nurses' Work Space

   The nurses' ability to observe patients in all bed areas of the unit should be maximized. This will reassure the patient as well as allow constant observation by staff personnel.

   Three distinct nursing centers may be established, depending on the size of the unit; for pre- operative patients, for isolation and for post-isolation patients. Continuity of care is important for staff morale as well as patient care; therefore, individual nursing centers should relate to one another and allow a free interchange of nurses.

   Other staff facilities such as storage, utility, medications, etc., will be similar to other intensive and intermediate units.

3. Dayroom

   A dayroom for post isolation patients is desirable.

4. Office and Conference Space

   Multi-discipline conferences will be frequent as will teach seminars and lectures. Adequate space available to the unit should be providing for this. Closed circuit television to this area from every patient room should be available. X-ray view boxes, dictation equipment and a small library are also desirable in this area.

   Offices for all full time staff should be adjacent to the unit. Additional space is required for psychological testing of donor and recipient, family counseling, etc.

5211 CARIDIO-PULMONARY UNIT

5211.1 USER NEEDS

The cardio-pulmonary unit is a relatively new diagnostic unit operating under the administrative responsibility of the hospital medical service.

5211.1.1 Objectives

The cardio-pulmonary unit provides the space, facilities and staff required to carry out diagnostic studies of the heart and/or lungs.

A broad range of diagnostic studies may be conducted in a cardio-pulmonary unit, for example:

1. Heart:
    a. Measurement and recording of the electrical currents generated by the heart muscle as it works, e.g., electro-cardiography
    b. Graphic representation and analysis of the sounds produced by the action of the heart, i.e., phonocardiography
    c. Measurement of blood pressure and blood pressure differentials
    d. Fluoroscopic and radiographic visualization of the heart
2. Lungs:
    a. Measurement of lung volume
    b. Measurement of ventilatory function of the lungs
    c. Measurement of the gas exchange function of the lungs
    d. Fluoroscopic and radiographic visualization of the lungs

5211.1.2 Operational Relationships

The cardio-pulmonary unit requires a large investment in equipment and a highly skilled staff. It is probable, therefore that, in most facilities, one will serve both inpatient and outpatients.

Inpatients coming to the unit will generally be ambulant or in wheelchairs. In certain instances, however, critically ill patients will be brought from intensive care units. In addition, certain types of organ transplantation patients will require diagnostic procedures in the unit. Proximity to medical and cardiac care units and organ transplant units would minimize the risk in transferring patients.

Cardio-pulmonary technicians are trained to deal with emergencies that may arise on the unit. These technicians may be assigned to the cardiac emergency team, which will respond to emergencies anywhere in the hospital. Intensive care and cardiac care units are the most likely areas for such emergencies. Close proximity to these units would facilitate emergency care by these technicians.

Medical specialists and certain technical staff consult during surgical procedures. A close relationship between the unit and surgery would maximize staff utilization consultation.

Outpatients should be able to come to the unit with a minimum of inconvenience and without disrupting the activities on other nursing units.

There are significant similarities between the training of cardio-pulmonary technicians and inhalation therapists. Much of the equipment used in cardio-pulmonary and inhalation therapy units has similar operational and maintenance requirements. A close relationship between these two units might facilitate cross utilization of these trained personnel. Such a relationship might also enable a joint use of some equipment.

5211.1.3 Characteristics

1. Environment

   The environment should provide an aseptic and efficient space in which to conduct technical procedures. Patient stay is relatively short but their level of apprehension will, at times, be high.

2. Organization

There are strong clinical reasons for combining facilities for the study of these two organs. A primary disease in either the heart or the lungs will generally lead to a secondary involvement of the other. A thorough diagnosis, therefore involves studies of both the heart and lungs.

Staffing advantages can also be realized through combined facilities. The technical training required for diagnostic procedures of the heart and lungs is similar in many respects. Combined facilities allow for utilization of trained personnel in both areas of study.

In part, the same equipment is used for studies of the heart and lungs. A combined cardio-pulmonary unit, therefore, eliminates the need for duplication of such equipment.

Physiological monitoring may be required during many of the tests.

5211.1.4 Primary Users

1. Patients

As previously stated, both inpatients and outpatients may be examined in the cardiopulmonary unit. Routine heart and lung studies are not particularly hazardous and may be done on an outpatient basis. Studies such as cardiac catheterization and pulmonary angiography, however, require hospitalization due to the fairly high risk of complications during and after these procedures.

Most patients currently examined in V.A. cardio-pulmonary units are inpatients admitted in an acute or semi-acute condition and who are undergoing diagnostic studies to ascertain the extent of disability. Such patients will undoubtedly make up a significant portion of the patient load in cardio- pulmonary units in the future; however, the proportion of outpatients examined should increase with growing emphasis on early diagnosis and preventive care.

Patients coming to the cardio-pulmonary unit may be weak and may tire easily. Provision should therefore be made for patients to be seated while awaiting testing or between multiple tests.

Some patients will have to change clothing prior to examinations. Provision should be made for dressing and secure holding of patient possessions and clothing during examinations.

Patient apprehension may be reduced by encouraging socializing while waiting and by providing reading material. Apprehension may also be minimized if waiting patients cannot see or hear examinations or tests being conducted on other patients.

Many patients examined in the cardio-pulmonary unit have heart conditions. It is possible that some of them may be in danger of cardiac arrest while in the unit.

2. Physicians

Patients may be referred to the cardio-pulmonary unit by many specialist on the hospital staff; however, cardiologist are most directly involved in the operation of the unit. Physicians need not be involved in many routine procedures; however, they conduct complex procedures, e.g., cardiac catheterization or pulmonary angiography.

It is desirable that physicians be readily available to the unit during normal hours of operation both for consultation with residents, interns, and technical staff and to respond quickly to emergencies.

Additional physician activities include patient interviews and examinations, consultation with other physicians, instruction of medical students in groups or individually, group meetings of professional staff or unit personnel, evaluation of test results, dictation and individual study.

3. Residents and Interns

The activities of the residents on the cardio-pulmonary unit parallel those of physicians with the exception that residents will be more routinely involved with unit operations.

The cardio-pulmonary unit is not a normal assignment in an intern's rotation through the services of a hospital. Interns may, however, come to the unit for consultation, group discussion or demonstrations. They may also assist physicians and residents in diagnostic or treatment procedures.

4. Nursing Staff

   Some procedures, conducted on the cardio-pulmonary unit, require nursing assistance, e.g., cardiac catheterization and pulmonary angiography. In addition, many of the patients examined on the unit require nursing care and observation. A full time nursing personnel should be assigned to the unit.

5. Technical Staff

   The technical staff administers routine studies in the unit. They set up testing equipment, prepare patients, instruct, observe, and assist patients during testing, record results, observe and adjust equipment during testing, disconnect equipment after testing, clean and maintain equipment as needed, and do routine laboratory tests, e.g., blood gas analysis. The technical staff also assists the physician during complex procedures. Academic training for cardio-pulmonary technicians is not currently provided, therefore there are usually trained in V.A. cardio-pulmonary units. Training will be through direct involvement with procedures and by seminars, discussions, and demonstrations. These sessions will generally involve a small number of technicians. They may utilize training aids such as x-rays, movies, slides, color T.V., computers, etc.

   The technical staff will be supervised by a head technician. This technician will coordinate technical staff activities, work schedules, and instruct the technical staff as necessary.

6. Medical Students

   Medical students may come to the unit for individual or group instruction or demonstration and, may assist with some of the unit's procedures. Their involvement with the unit will, however, be on a short term basis and they may go elsewhere in the hospital for individual study.

7. Support Staff

   Clerical personnel may be assigned to the unit to maintain unit records, transcribe diagnosis, and provide general secretarial services to physicians and residents.

   If a significant number of outpatients are to be examined on the unit, these clerical personnel may also act as receptionists.

8. Radiology

   X-ray technicians will come to the unit from radiology to assist with cardiac catheterization and pulmonary angiography procedures.

9. Maintenance

   See 512.2

10. Building Management

    See 512.3

5211.1.5 Trends

1. Medical Care

   The incidence of diseases of the heart and lungs has been increasing in the recent past and there is no indication that this increase will not continue in the future. The patients load in cardio-pulmonary units should, therefore, continue to increase.

   As noted earlier, the proportion of outpatients on the unit may increase, with growing emphasis on preventive care.

   A greater patient load may also bring about a demand for special cardio-pulmonary patient care units, specifically, cardio-pulmonary intensive care units and cardio-pulmonary general nursing care units. If developed, these units would ideally be located close to the cardio-pulmonary unit.

2. Technology

   Continued development of physiological monitoring equipment may have significant effects on the cardio-pulmonary unit. More versatile telemetric equipment should simplify testing procedures by eliminating the need for direct attachment between patients and equipment. This would be particularly helpful in procedures such as cardiac catheterization where the amount of monitoring equipment in the room and monitoring leads attached to the patient severely restrict patient and staff mobility during procedures.

   Increased use of computers in relation to patient monitoring and diagnosis is likely on the cardio-pulmonary unit.

   More complex laboratory procedures for heart and lung diagnosis and increased use of radioisotopes are probable in the future. This would imply a closer interaction between cardio-pulmonary units and central clinical laboratory and radioisotopes facilities.

5211.2 FUNCTIONAL REQUIREMENTS

5211.2.1 Functional Relationships

Ideally, the cardio-pulmonary unit would relate to:

1. medical intensive care unit;
2. cardiac intensive care unit;
3. inhalation therapy unit;
4. organ transplant unit;
5. surgery;
6. pulmonary intensive care units and;
7. pulmonary intermediate care units.

5211.2.2 Space Requirements

1. Cardiac Catheterization Laboratory

   This space is used for radiographic and fluoroscopic studies of the heart and lungs. These studies involve the insertion of a catheter into the patients' heart or lungs through the circulatory system, extraction of blood samples and injection of contrast media. Elaborate radiographic and fluoroscopic equipment may be required for these studies, e.g., biplane fluoroscopy and radiography, cinefluoroscopy, image intensifiers, rapid cassette changers, etc. In addition, a thorough range of physiological monitoring equipment is needed to keep track of the patient's condition during procedures and warn of impending emergencies. Equipment to deal with possible emergencies must also be available, e.g., a defibrillator and resuscitator. Exercise equipment and equipment to measure ventilatory function, volume or gas exchange function of the lungs may also be required. The necessary equipment and instruments required for the insertion of catheters, extraction of samples, and injection of contrast media must also be at hand during procedures.

   In addition to the above equipment, there may be as many as 13 or 14 persons present in the cardiac catheterization laboratory during complex procedures.

   The insertion of the catheter is considered a minor surgical procedure, therefore, aseptic precautions usual for minor surgery should be observed.

   Vacuum, oxygen, compressed air, and, optionally, nitrous oxide may be used in the cardiac catheterization laboratory.

   The following spaces may be considered ancillary to the cardiac catheterization laboratory.

   a. Utility room. For cleaning and storage of equipment and supplies needed in the cardiac catheterization lab. This space may also be equipped for flash sterilization of equipment during procedures, depending on overall hospital supply policy. Countertop work space, a sink, and shelving for storage are required.

b. Scrub space. Facilities should be provided for the physician and assistants to scrub before procedures.

c. Shower and gowning facilities. Facilities for the cardiac catheterization team to shower and gown should be provided.

d. Dark room. A dark room should be provided. It would be desirable to install automatic developing equipment to minimize film processing time; however, manual developing equipment may be adequate for a minimal facility.

e. Control room. A control room or both is required for remote operation of the radiographic and fluoroscopic equipment.

f. Monitoring and recording room. To minimize the number of personnel and quantity of equipment in the procedure room, it may be desirable to provide a separate space for the monitoring terminals and recording equipment. If provided, this space would require direct connection to monitor leads in the procedure room. Convenient access and direct observation should be provided between this space and the procedure room.

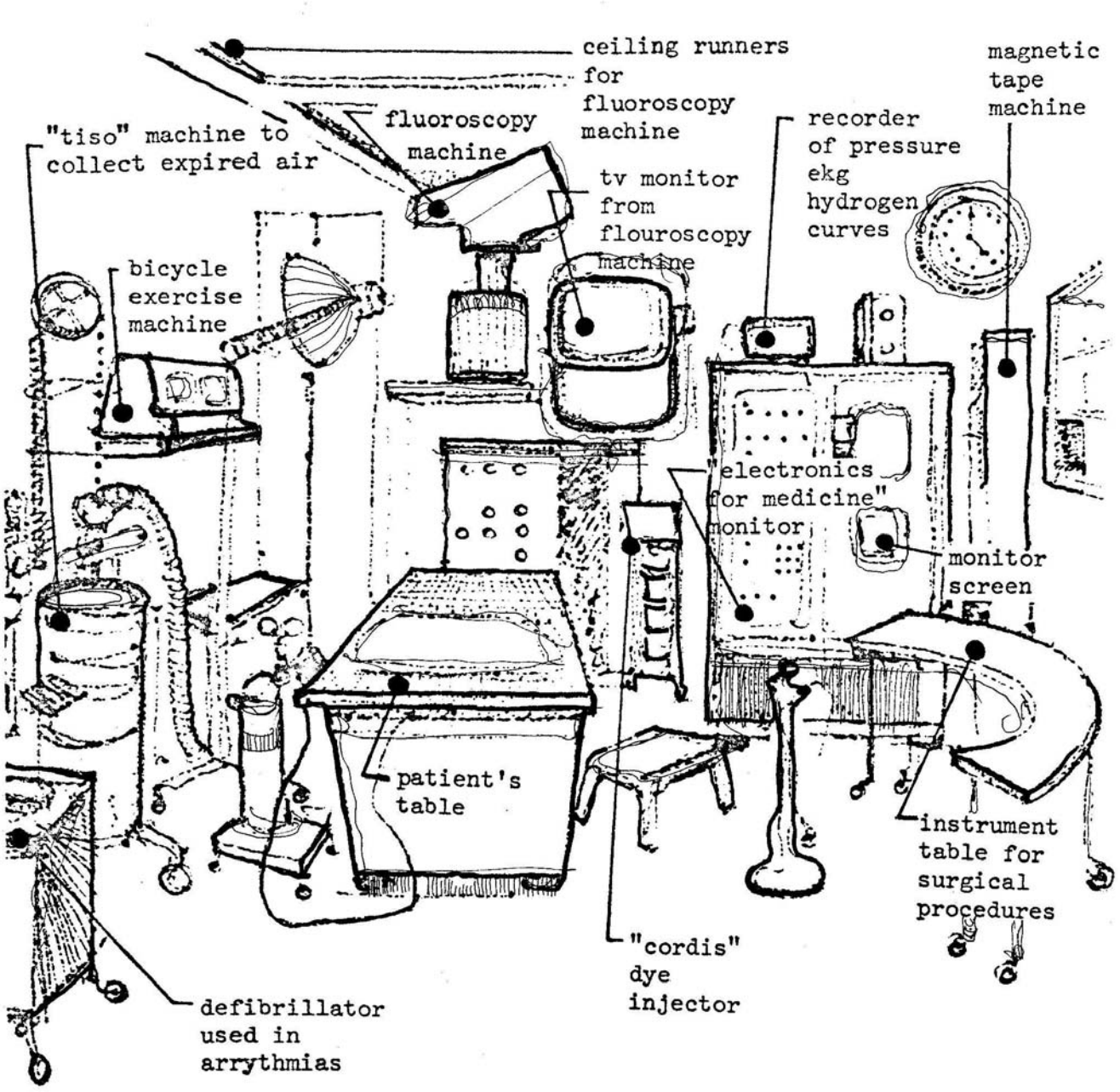
2. Laboratory

A small laboratory should be provided in the cardio-pulmonary unit for blood-gas analyses and routine biochemistry procedures. This lab requires countertop work space, equipment storage, space for special equipment, e.g., blood gas analyzers, vacuum outlets, and a sink with normal service. The lab is used during cardiac catheterization and pulmonary angiography procedures and for analyzing samples collected during pulmonary function determinations. Accuracy in some cardio-pulmonary lab determinations, e.g., blood gas analysis, requires a minimal time lapse between collection and analysis, therefore, this lab should be easily accessible from collection spaces.

3. Utility Room

A utility room may be provided for the cleaning and storage of equipment and supplies, e.g., mouthpieces, tubes, etc. used in pulmonary function and other studies.

Figure 520-12. CARDIAC CATHETERIZATION UNIT: San Francisco General Hospital



The provision of such a room will depend on hospital and unit supply collection, processing, and distribution procedures. The room should be equipped with countertop work surface, storage shelving, and one or more sinks with normal service.

If the relation to the inhalation therapy unit permits, this room may be a joint use facility for both units.

4. Equipment Storage

   Much of the equipment used in cardio-pulmonary units is portable or likely to be available in portable models in the near future. This equipment should be easily moved from storage to the examination and testing spaces. Additional back up equipment or equipment to be used on patient care units for those patients who cannot be brought to the cardio-pulmonary unit may also be stored here.

5. Pulmonary Function Laboratory

   Routine patient examinations and tests are performed in this laboratory to evaluate the functions of the lungs, e.g., measurement of lung volume, gas exchange function, and ventilatory function. Each patient will be tested individually and will be under the direct supervision and observation of a technician.

   If the cardio-pulmonary unit is a combined inpatient and outpatient facility, this lab may have a fairly high outpatient load and should be provided with easy access to outpatient reception and waiting areas on the unit. Convenient access to equipment storage and utility space is also required.

   Oxygen, vacuum, carbon dioxide, and carbon monoxide may be utilized in the various tests conducted in the pulmonary function lab.

   Several patients may be undergoing tests simultaneously in this space. It would be desirable to provide for acoustic and visual separation of these patients. Such separation should not, however, interfere with staff observation during testing or with emergency procedure.

6. Electrocardiographic Laboratory

   This laboratory provides facilities for studies of the function of the heart through external measurement and graphic recording of the electrical impulses generated by the heart as it works, e.g., electrocardiography and vectocardiography. Studies involving measurement and graphic recording of the sounds produced by the working heart also may be conducted in this lab, e.g., phonocardiography.

   These studies may be conducted while the patient is at rest and during or after specifically defined and measured exercise periods. Therefore, in addition to the electrocardiography or phonocardiographic equipment, space and facilities are required for exercise equipment and for the patient to sit or lie down during tests.

   The E.C.G. lab, like the pulmonary function lab, may have a significant outpatient load and should be provided with access to outpatient reception and waiting areas on the unit.

   Several patients may undergo tests simultaneously in the E.C.G. lab. Acoustic and visual separation between theses patients would be desirable but is secondary in importance to adequate staff observation and emergency treatment procedures.

   In some cases it may be desirable to provide electrocardiographic and pulmonary function facilities in one laboratory. This would allow for monitoring of heart function during pulmonary procedures without duplication of E.C.G. facilities. It would allow for joint use of such equipment as treadmill or bicycle exercise machines.

7. Offices

   a. Physicians' Offices. Offices for physicians directly involved with the cardio-pulmonary unit may be required. These offices should allow for a normal range of office activities, including examining x-rays. It is desirable to provide outside exposure for these offices.

   b. Residents Offices. Offices similar to those for physicians may be required for residents on the unit. Due to variability in the number of residents on the unit at any one time, some flexibility may be necessary in the assignment of these offices, e.g., certain offices will accommodate two residents.

c. Head Technician's/Nurse's Office. An office may be required for the use of the head technician and the full-time nurse.

d. Clerical Office. If clerical personnel are assigned to the unit a clerical office should be provided. This office should be closely related to the physicians' and residents' offices, but may also require some proximity to reception and waiting areas.

8. Technician Station

The technicians will require some facility for writing, storing paper and forms, etc. In small cardio-pulmonary labs this may be included in the testing space: however, in larger facilities a separate space may be desirable.

9. Meeting Room

A small meeting room to accommodate ten to twelve persons should be provided on or adjacent to the unit for teaching, consultation, unit staff meetings, etc.

10. Conference Room

A conference room to accommodate groups of up to 30 persons should be reasonably accessible from the unit. This may be shared with other units on the same floor or adjacent floors.

11. Patient Waiting

An area to accommodate waiting patients should be provided on the unit. If the outpatient load is small, a fairly precise schedule of patient examinations may be followed. Inpatients can be brought to the unit at specific times for their examinations; therefore, the need for waiting space is minimized. If, on the other hand, there is a large outpatient load, scheduling is much more flexible and the need for waiting space is greater.

12. Patient Dressing

If outpatients come to the unit, there will be a need for patients to change clothing prior to testing. Specific facilities may be required for this. These should provide adequate privacy and some provision should be made to protect patient clothing and valuables during testing.

5212 TEACHING

5212.1 USER NEEDS

A large proportion of the new V.A. hospitals will be affiliated with university medical schools throughout the country. Educational space requirements may vary considerably according to the program of the individual hospital and affiliated medical school; however, facilities within the following categories will certainly be included:

1. facilities located on a unit and used basically by personnel assigned to that unit;

2. facilities located in close proximity to two or more units and used primarily by personnel from these units, and;

3. central facilities, not associated with specific patient care or diagnostic units, for general use in educational programs.

   The scope of this study is limited to nursing area potions of the hospital; therefore, facilities in the first two of these categories are the prime consideration.

5212.1.1 Primary Users

The following is a list of trainees, classified by hospital activity, who may require educational facilities in nursing areas on or adjacent to nursing units.

1. Medical Service

   a. Resident intern - 2 to 4

   b. Dialysis technician - 15

   c. Pulmonary function technician - 15

   d. Medical student - 6

2. Nursing Service

   a. Basic nursing student - 6

   b. Graduate nurse - 1

c. Intern/resident nurse - 1

d. Practical nurse - 4

e. Nursing assistant - 6

3. Psychiatry

a. Resident/intern - 2

b. Medical student - 1

4. Psychology

a. Psychology student (M.S. or Ph.D.) - 1

5. Social Work Service

a. Social work student - 1

b. Social work assistant - 1

6. Surgical Service

a. Resident/intern - 2 to 4

b. Medical student - 6

5212.2 FUNCTIONAL REQUIREMENTS

Activities of the various trainees may include individual study, individual or group instruction and discussion, observation and/or participation in patient care and diagnostic activities, laboratory work, and/or trainee research. The facilities required for each trainee category depend on the nature of their involvement with these activities. All trainees will be involved in group instruction or discussion and classroom facilities should be provided in conjunction with those units to which trainees may be assigned. The following trainees require additional facilities as noted.

5212.2.1 Space Requirements

1. Residents and Interns. Residents and interns assume a major responsibility for patient care in all of the units under consideration. They should be also provided with offices on the unit and should also have access to laboratory facilities on or adjacent to the unit.

2. Medical Students. Medical students are also involved in patient care and should have access to private facilities for patient examinations and confidential discussions. Spaces such as exam/treatment rooms or consultation rooms should be available to these students for such use. In most cases, offices for medical students are not required and individual study carrels on or adjacent to the unit should be adequate. One exception to this is the psychiatric unit. The medical student on the psychiatric unit may require private office/interview space in which case carrels may not be sufficient. Medical students should also have access to laboratory facilities on or adjacent to units on which they are working.

3. Psychology Students. Each psychology student should be provided with a private office.

4. Nursing Students. Nursing students are trained by nursing instructors not assigned to the unit nursing staff. Office facilities should be provided for these instructors on or adjacent to the units in which they are teaching. The students themselves should have access to study carrels on or adjacent to the unit.

5. Graduate Nurses. Graduate nurses should be provided with study carrels on or adjacent to the units to which they are assigned.

6. Intern/Resident Nurses. Office facilities should be provided for intern/resident nurses.

7. Social Work students and Assistants. Office space should be provided in which social work students and assistants may conduct confidential interviews with patients and their families.

8. Technician Trainees. Technical trainees should have access to study carrels in close proximity to their work areas.

In addition to the spaces mentioned above, some allowance may be required in other areas of the nursing unit to facilitate teaching functions.

9. Patient Room. The patient room becomes an educational facility during ward rounds. There should be sufficient space to allow students and staff to gather around the patient's bed without excessive rearrangement of furniture.

10. Examination/Treatment Room. The examination/treatment room may also serve as a demonstration room where groups of students may observe and assist in patient care and diagnostic activities. As in the patient room, there should be sufficient space to allow a number of students to observe proceeding clearly and in reasonable comfort.

11. Consultation Room. A consultation room may frequently serve as a small classroom or seminar room. Additional consultation facilities, beyond current criteria, may be desirable to facilitate such activities.

5213 RESIDENTS' QUARTERS

5213.1 USERS NEEDS

5213.1.1 Objectives

Residents are "on-call" periodically during their term of service. The on-call period generally does not last more than one night consecutively; however, during this time, the resident is completely responsible for the care of patients in his specialty. Residents' quarters provide an in-hospital base during the on-call period.

5213.1.2 Operational Relationships

The relationship of the residents' quarters to other functional units is not critical. It is desirable, however, to minimize the resident's travel time to nursing units in his specialty.

There are two basic options for providing resident facilities: centralized and decentralized. Centralized facilities group private and communal spaces for all residents in a location quickly accessible, yet separate from the activities of the nursing units. Decentralized facilities puts private spaces close to a particular nursing unit, and provides a group lounge in a separate location.

5213.1.3 Characteristics

1. Environment

   Activities will include reading, quiet and noisy games, sleeping, eating (snacks), conversation, watching television and bathing. Appropriate environments should be provided for these activities

2. Organization

   The organization of the unit will vary depending on whether a centralized or decentralized facility is provided. In either case, the type of unit found in a typical V.A. hospital will generally resemble a hotel in organization.

5213.1.4 Primary Users

V.A. residents may either be male or female. Recently there has been an increase in female residents.

Residents may be called to care for patients at any time. They will often have to sleep at irregular hours during the day or night.

Discussions between residents when relaxing in the unit provide an important element in the learning process. These discussions should therefore be encouraged.

5213.1.5 Trends

The status of residents has greatly increased in the last few years. It is probable that this trend will continue. Salaries and the facilities provided for residents may more closely equal that of staff physicians in the future.

5213.2 FUNCTIONAL REQUIREMENTS

5213.2.1 Functional Relationships

All functional relationships are non-critical in nature. Proximity to nursing units desirable.

5213.2.2 Space Requirements

Options for centralized or decentralized facilities are outlined.

1. Centralized Facilities

    a. Bedroom. A small studio bedroom with a clothes closet and adjacent private bath will be sufficient. Double rooms and gang sanitary facilities are not normally feasible because of the increasing frequency of female residents

    b. Lounge. An area should be provided to allow for T.V. watching, card playing, informal conversation, reading and the like.

    c. Nourishment kitchen. All residents will eat their meals in the hospital dining facilities, but a small kitchen and adjoining eating area for snacks would be desirable.

d. Storage. Separate storage space for linen, general supplies and housekeeping supplies is required.

2. Decentralized Facilities

a. Bedroom. Individual bedrooms and bathing facilities may be provided on each nursing floor.

b. Lounge and nourishment kitchen. These spaces may be provided in centralized location separate from the nursing floors similar to the centralized facilities listed above.

5214 BIOMEDICAL ENGINEERING

Biomedical engineering is a new and rapidly expanding service in V.A. hospitals. It is concerned mainly with the design, development and construction of a wide range of special instruments, including such devices as cardiac pacemakers, artificial kidneys, and medical lasers, and ultrasonic transducers for application in the field of clinical medicine.

The manufacture of such instruments, which may require elaborate equipment, is not compatible with the bed-related patient care functions and, although the nursing units may use much of the instrumentation developed, it is recommended that biomedical engineering be regarded as a central support facility and located outside the general nursing tower.

530 Cost Base

531 GENERAL

531.1 Background

The data in this section have been collected and analyzed during three different phases of the Systems Integration program, each phase having a somewhat different scope.

531.1.1 In the first phase, four hospitals were analyzed for total construction cost and for the individual costs of four of the six subsystems finally included within the scope of the Prototype Design. The hospitals studied were three VA field stations - Atlanta, Washington and Martinez - and one community hospital in Watsonville, California. The relevant subsystems were structure, ceiling, partitions and heating-ventilation-cooling. For the resulting data, see the Phase 1 Research Study Report, Volume 2, Section I.C.

531.1.2 In the second phase, two more VA hospitals - Miami and Memphis - were added, but only the bed care areas of these buildings were analyzed. This data is presented in the Phase 2 Research Study Report, Volume 3, Section 350.

531.1.3 In the third phase, two more subsystems were added - plumbing and electrical subsystems. The analysis was also somewhat more detailed than in the previous phases. It included a breakdown by functional area classification for all subsystems in the support areas of the hospital, except structure, which is broken down by roof, tower floor and base floor. However, only Memphis and Miami were included in this final study. Therefore, the detailed cost breakdowns in this section are for those two hospitals only. A summary of total subsystem costs is given for all six hospitals.

531.2 SIMILARITIES AND DIFFERENCES

All of the hospitals studied have certain similarities. Each consists of tower nursing floors superimposed upon larger floors, which contain the clinical, administrative, and service facilities. The structural concept for each of the buildings is regular bays of concrete or steel framing. Services are principally vertical but vary considerably in the degree of mechanization involved. All are within the southern part of the United States and not subject to very low temperatures.

Only three of the hospitals could be characterized as high rise - those at Miami, Memphis and Atlanta. Of these, the Atlanta hospital has a steel structural frame; the others are concrete. The Washington VA hospital, the Watsonville community hospital and the Martinez VA hospital are four- to five-story concrete frame buildings, all of flat slab (plate) construction.

531.3 COST PARAMETERS

All costs stated in the Cost Base are given in dollars per outside gross square foot (OGSF) of either total building area or functional area, as appropriate. They are based on typical costs prevailing in the San Francisco area at a time when the national ENR Building Cost Index was 960. They include overhead and profit for both general contractors and subcontractors, and thus represent the proportionate part of the general contract paid by the VA for each item.

531.4 BASIC CONSTRUCTION COST

The average total contract for the six hospitals analyzed was $48.60 per OGSF. This figure is used in the Cost and Time Analysis (Section 750), to represent the typical cost of VA hospitals using conventional design and construction.

531.5 SUBSYSTEM COSTS

The six integrated subsystem together, in every instance, represent about 50% of the total construction cost of the buildings. The distribution of costs within them varies considerably with the design approach incorporated. The relative costs of the subsystems for each building are shown on Table 530-1. The scope of each subsystem represented by the data is given in the corresponding subsystem description in Section 300 of the Design Manual.

Table 530-1. SUMMARY OF SUBSYSTEM INSTALLED COSTS

Dollars per outside gross square foot of total building area ($/OGSF) adjusted to an ENR Building Cost Index of 960.

HOSPITAL	STRUC	CEIL	PART	HVC	PLUMB	ELEC	SUB-TOTAL	OTHER	CONTR TOTAL
Atlanta VAH	8.10	1.44	5.95	7.25	(2.15)	(2.11)	27.00	22.50	49.50
Washington VAH	7.58	1.71	6.35	8.24	(2.15)	(2.11)	28.14	23.08	51.22
Martinez VAH	5.86	1.56	6.28	7.61	(2.15)	(2.11)	25.57	22.35	47.92
Watsonville CH	7.33	1.26	5.73	8.62	(2.15)	(2.11)	27.20	24.49	51.69
Miami VAH	6.58	1.47	5.69	4.92	2.20	2.13	22.99	24.35	47.34
Memphis VAH	6.38	1.11	5.26	5.49	2.09	2.08	22.41	21.54	43.95
Average	6.97	1.42	5.88	7.02	2.15	2.11	25.55	23.05	48.60
Percent of total	14.3	2.9	12.1	14.4	4.4	4.3	53	47	100

Note: Plumbing and electrical costs were estimated for Miami and Memphis only. Figures in parentheses are the averages from these two hospitals applied to the other four to provide comparable integrated subsystem totals.

532 DESCRIPTION OF HOSPITALS STUDIED

532.1 STUCTURE

532.1.1 General

There is no use of pre-cast, pre-stressed or post-tensioned construction in the hospitals, although there is a limited use of pre-cast tees for large spans (chapel and auditorium) at Miami and a considerable use of pre-cast and non-structural exterior wall panels at both Miami and Memphis. The highest cost concrete frames occur in the two California hospitals because of the seismic force resisting elements, in spite of the fact that they are rather low buildings.

Establishing a cost for shear walls posed a special problem because it is impossible to tell, from an examination of working drawings, which concrete walls in a particular building were considered by the structural engineer to be acting as shear resisting elements in his calculations. Estimating therefore proceeded on the following assumptions: the structural concrete of any exterior wall which could transfer shear was counted 100% as structure. Any interior concrete walls, which enclosed the same type of spaces as are to be enclosed by the shear walls of the Prototype Design, e.g., stairwells and mechanical rooms, were counted 100% as structure. Interior concrete walls enclosing other types of spaces were assigned 50% to structure and 50% to partitions.

532.1.2 Miami, Florida, VA Hospital

This hospital consists of twelve floors plus basement and pipe basement and a two-story penthouse. The nine nursing floors are in a tower with characteristic bays of 16’10” x 24’10”. Floor heights are 11’8” floor-to-floor. Pan joists span the short dimension of each bay, supported by flat beams of equal depth (12” plus 2-1/2” slab). The structural floor is 1-1/2” below the finished floor, the difference allowing for recessed tile, filled with light-weight concrete. This has the smallest structural bay of any of the hospitals studied and is one of the most economical in structure. The concrete topping, although adding weight and cost to the structure, undoubtedly reduced the cost of labor and formwork required for the many floor recesses.

532.1.3 Memphis, Tennessee, VA Hospital

The Memphis field station is a thirteen-story building, with pipe basement and two-story penthouse. There are ten tower floors, which contain conventional wards, and one special floor for a spinal cord injury clinic. Floor heights are 11'11" floor-to-floor. Bays are 21'8" x 21'8". The structure is basically a waffle (two-way joist) system with typically 10" deep joists and 3" slab. There is no topping slab as at Miami so that recesses are formed by dropping joists and slabs as necessary. The factors which appear to make this system somewhat more costly than the Miami system are the large amount of form surface and the complications of changing floor elevations. Further, the bay sizes are slightly larger.

A two-story group of psychiatric wards in the base of the building is of similar construction to the tower, and the structure of the one-story intensive care unit on the roof above the second floor supports only its own roof and suspended ceiling.

532.1.4 Atlanta, Georgia, VA Hospitals

The Atlanta field station consists of nine floors of wards in a tower above a base composed of two basements and two general floors, with a mechanical floor separating the tower and base. The basic structure is a frame of rolled steel shapes supporting metal decking with concrete infill. Roof framing is similar to the floor framing. Fireproofing of the horizontal steel members is of the sprayed variety; columns and peripheral beams are fireproofed with poured concrete. Structural bay sizes are regular throughout the building and vary from 20' x 24' to 24' x 32'.

This is the only steel frame building in the group investigated. Its relatively high framing costs appears to result from the required fireproofing, particularly the formed concrete around all columns and edge beams (other members are sprayed) and its large bays, the largest in the group in the group of hospitals studied.

532.1.5 Watsonville, California, Community Hospital

The Watsonville hospital, along with all of the remaining examples, utilizes a flat concrete slab (plate). The bays are relatively large for this type of construction; thickness of the slab is 10". This condition, plus the extensive use of bearing shear walls instead of columns, has resulted in a large quantity of concrete per floor with correspondingly high unit cost.

The building was designed with four floors of wards plus mechanical penthouse above a larger one-story base; however, two of the ward floors were not constructed in the first increment.

532.1.6 Washington, D.C., VA Hospital

The field station at Washington, D.C., although very large in area, contains only four stories and a large basement. It is of reinforced concrete flat slab construction with 10" slabs forming the second, third and fourth floors and 12"slabs for the first floor and basement. The pattern of structural bays is fairly regular and in the range of 20' to 24' column spacing.

532.1.7 Martinez, California, VA Hospital

The Martinez field station is of reinforced concrete flat slab construction (9-1/2" slab throughout) with a base composed of a first floor and basement with three ward floors above. The exterior walls are mainly of poured concrete with brick veneer finish. The structural system is very similar to that of Washington, D.C, but has thinner slabs. Bay sizes are in a general pattern of approximately 20' x 24' throughout the building.

532.2 CEILINGS

532.2.1 All of the hospitals have suspended ceilings, generally some form of grid system with acoustic tile. The Miami hospital utilizes a plaster suspended ceiling adjacent to its corridors as a plenum for return and exhaust air; this double ceiling makes Miami's system one of the more expensive, but serves to reduce the cost of ductwork. Martinez and Washington contain a relatively large amount of metal pan acoustic tile. The Watsonville hospital is the only one to utilize gypsum board ceilings in areas where metal lath and plaster are typical of VA hospitals.

532.2.2 The Memphis hospital contained a large amount of metal pan acoustic tile in its original design, but a Central Office deductive change order in 1965 ($40,568) substituted fissured mineral fiber tile, a difference approximating $.25 per gross square foot on the ward floors. It should be noted that at hospitals where splined tile has been installed the system has been

criticized by the maintenance personnel because of the difficulty of access to pipes and mechanical equipment above the ceiling. Generally, splines simply are not replaced where non- recurring maintenance has occurred. Also criticized was the use of lay-in ceilings on psychiatric wards and in bedroom closets.

532.2.3 There was no apparent integration of ceiling and lighting components in any of the hospitals except the normal placing of fixtures within the pattern of a ceiling grid. Ceiling fixtures are in practically all cases surface-mounted.

532.3 Partitions

532.3.1 General

There is very little on variety in the types of partitions. Typically, metal studs with lath and plaster separate rooms, corridors and lobbies, and masonry usually encloses shafts, duct space and stairwells. Finishes are similar, varying from regular weight wall vinyl in corridors of one hospital to heavy wall vinyl in corridors of another.

The Watsonville hospital, an exception, has painted gypsum board in many locations where vinyl-finished plaster is used in the other hospitals. No movable or demountable partitions are used on the ward floors in any of the six-hospitals studied, with the exception of a small amount at Martinez.

532.3.2 Miami, Florida, VA Hospital

The partitions at Miami are typically masonry and metal stud with lath and plaster, finished either in standard or heavy vinyl wall fabric. The bathrooms are finished in ceramic tile and a small amount of cement enamel surfacing occurs in housekeeping aide closets.

Large quantities of masonry partitions and ceramic tile were used at Miami. Masonry was used many times in places where metal studs usually occurred in other hospitals, like plumbing chases and small vertical shafts. Large quantities of ceramic tile are used in the kitchens, toilets, laundry areas, and baths. Door costs are lower than most because this hospital's nursing floors have mostly five-bed rooms, which need less doors per floor.

532.3.3 Memphis, Tennessee, VA Hospital

Memphis, like Miami, has a large quantity of masonry partitions, which is not uncommon for the East. Metal stud with lath and plaster is used throughout. Vinyl wall surfacing is common in all areas of this hospital: heavy wall fabric in public areas like corridors and lobbies, and regular wall fabric in bedrooms, dayrooms, etc. The vinyl wall fabric cost is slightly higher here because smaller rooms are more numerous.

532.3.4 Atlanta, Georgia, VA Hospital

The interior partitions at Atlanta are metal lath and plaster on steel studs and masonry. Atlanta's finishes are similar to the other hospitals, using ceramic tile in baths and related areas, cement enamels surfacing in housekeeping aide closets, etc. The significant difference is that the standard vinyl wall covering is used in both public areas and patient areas. There are more four-foot doors at Atlanta than at the other hospitals. This is because the bedroom sizes are smaller, more one- and two-bed rooms, which call for more doors for a given number of beds.

532.3.5 Watsonville, California, Community Hospital

The Watsonville partitions are unlike the other hospital partitions. They consist mostly of gypsum drywall facing on metal studs. Structural concrete walls are not included in the partition cost base. Finishes are either paint or vinyl wall fabric, mostly painted drywall.

532.3.6 Washington, D.C., VA Hospital

The Washington field station also has basic types of partition: masonry and metal stud. The metal stud partitions are covered with metal lath and plaster and then a vinyl wall fabric. The finishes are similar to those in Memphis, in that a standard weight vinyl is used in bedrooms and dayrooms and heavy vinyl in public areas. Cement enamel surfacing and paint are used in small service rooms throughout each floor.

532.3.7 Martinez, California, VA Hospital

The Martinez partitions are not unlike the partitions in Washington. They consist mostly of metal lath and plaster on steel studs and some masonry. Finishes again consist of standard and heavy vinyl wall covering, ceramic tile, cement enamel surfacing and paint.

532.4 HEATING-VENTILATION-COOLING

532.4.1 General

All of the projects have repeated nursing floors. Memphis, in addition to the tower wards, has two two-story wings of psychiatric wards and an isolated circular intensive care unit, which are on separate systems from the tower wards.

All of the nursing areas except for those at Watsonville utilize induction units in the bedrooms and ducted systems for interior areas. In the Miami VA hospital the induction units are in a ceiling plenum space adjoining the interior corridor; in all of the others they are below the windows. This accounts for the relatively small amount of ductwork and distribution cost in Miami, resulting in the least costly system of all of the hospitals studied. The Watsonville Community Hospital has a system ducted from rooftop fans down the outside walls of the bathrooms and then through reheat coils above the bathroom ceilings to each bedroom. No air is returned. This system results in extensive ductwork and air handing units and produces the highest unit cost.

532.4.2 Miami, Florida, VA Hospital

The Miami nursing areas contain a preponderance of five-bed rooms and are cooled and ventilated by a very simple and compact system of induction units in suspended ceilings adjoining bedroom corridors. Heat has never been required since the hospital was occupied in February 1968 but is available through the two-pipe induction system. Interior spaces are served by ducts from mixing boxes. Exhaust air from bedrooms is circulated through the hung ceiling plenum into the plumbing riser shaft at each bathroom to a fan on the roof. The system requires a very small amount of ductwork and air-handling equipment, but does call for more plaster ceiling than the others. If a need arises for large rooms to be partitioned into smaller rooms, it is unlikely that the system can be adapted.

High-pressure, dual-duct systems with terminal mixing boxes are used typically in all medical areas except for deep therapy and central sterile which are served by low-pressure, single-zone system. The surgical suite is provided with individual room reheat and humidification from a low-pressure, single-zone system. There is another low-pressure, single-zone system for the auditorium and cafeteria, and a similar arrangement with tempered air for the laundry and kitchen.

Air-handling units are either factory assembled or built up on site depending on size and type of system. General areas, P.M. & R., radiology, deep therapy, the cafeteria and the auditorium are supplied with 28 to 58% outside air. All other areas except those with induction units receive 100% outside air.

Scheduled maintenance of induction units takes 20 minutes per unit, quarterly, for the cleaning of filters, coils and grills. In the renal area this occurs weekly.

532.4.3 Memphis, Tennessee, VA Hospital

All areas served by single-duct systems from factory assembled air-handling units. Exhaust is typically 100%, except for the auditorium, and nursing areas, general areas and some medical areas, which have wall or ceiling induction units. Only medical areas have high-pressure systems. The surgical suite and intensive care unit have individual room reheat and humidification. Service areas such as the laundry, shops, kitchen and pool are heated and ventilated, but not cooled.

In the Memphis field station nursing wards, under-window induction units supply the peripheral bedrooms, and interior areas are supplied by ceiling induction units. All units receive warm air, and adjust temperature with chilled water coils.

The two-story psychiatric wards are served by a similar system, with an exceptionally complicated installation for the corridors, which increases the unit cost of the HVC in this area, particularly in the quantity of piping.

The 24-bed intensive care unit does not utilize induction units. It is supplied by a fully ducted system with complex controls. The circular shape of this ward appears to permit economic centralized distribution.

An interesting aspect of the distribution to the tower floors is the vertical stacks, approximately 11'0" x 7'9", at each of the four corners of the tower. The northeast and southwest stacks contain supply ducts and the others contain the exhaust systems. Access to these shafts is very difficult.

Extensive adjustment has been reported in the Memphis system to achieve adequate balance. Operating expenses for the first year appeared excessive, but apparently subsequent adjustments have corrected this situation.

532.4.4 Atlanta, Georgia, VA Hospital

The HVC system for the Atlanta wards is typical for recent VA hospitals. It consists of induction units in peripheral bedrooms and a simple ducted system for interior spaces. Almost all of the individual elements of the system are low or medium in cost, except for the terminals, which are relatively high in cost because of the nature of their integration with the other building components. Recirculation occurs only through the induction units.

532.4.5 Watsonville, California, Community Hospital

The Watsonville hospital has been utilized to illustrate a project which does not conform to VA standards but indicates trends in community hospitals, which might affect future VA planning. It is smaller than most VA hospitals, with a projected capacity of 202 beds. This factor to some degree produces a higher cost but it is not considered to be a major influence.

The Watsonville hospital utilizes 100% fresh air, tempered and controlled by reheat elements at each room. The air-distribution system, as previously explained is related to the patient bathrooms at the exterior walls.

This is the most costly system studied. However, the largest element of cost is in the ductwork which requires little or no maintenance, whereas the cost of terminals is very low, and it is the terminals of induction systems that produce the highest maintenance cost.

532.4.6 Washington, D.C., VA Hospital

Probably because of the height restrictions in Washington, D.C., the planning of this hospital results in very large floors which must contain many activities other than, those directly connected with the treatment of inpatients. A typical floor consists of four T-shaped ward areas stemming from a central core, which contains social and clinical areas not necessarily related exclusively to inpatient care.

532.4.7 Martinez, California, VA Hospital

The Martinez field station is the oldest of the projects reviewed and was planned and constructed before the current policies for air-conditioning were developed. It is a conglomeration of cooled and non-cooled areas on each floor and also has clinical and outpatient facilities located on the ward floors. A typical floor contains 160 beds in peripheral rooms, some of which were permitted to have cooling as well as heating, others of which were not. The original design provided for future cooling of all areas by adding to the central chilling plant. Since its original occupancy, only limited areas have been authorized for cooling, not enough at any one time to take advantage of the provision for the new, larger chiller. The original design attempted to accommodate the interim period between partial and complete air-conditioning by providing a fresh-air duct in addition to the heating and cooling ducts. The induction unit terminals, however, were initially provided with controls, which would accommodate future chilled water in all cases. The result is that the overall system, only partially cooled, is among the more costly installations.

532.5 PLUMBING DISTRIBUTION

The plumbing distribution subsystems in both the Memphis and Miami hospitals have the following characteristics, with exceptions noted:

1. Central drinking chilled water, vacuum, nitrous oxide and oxygen with extensive distribution systems.

2. Soiled and waste, vertical drains down to basement and horizontal collection mains by gravity to sewer. The deep therapy area at Miami is pumped.

3. Central domestic hot water with extensive distribution system.

4. Separate waste handling system for trash chutes and scraps from kitchen, with grinding stations, extractors slurry pumps, pulp containers, etc. Miami has a grease interceptor basin for the kitchen.

5. Laundry served from separate domestic hot water generators and compressed air system. Additional equipment including heat reclaimer, retention pit, etc.

6. Central compressed air for laboratories and medical areas with extensive distribution system.

7. Fire protection, combination wet and dry standpipe system with sprinklers in basement, storage areas and others as required. Equipment includes fire pump, cushion tank and air compressor, and necessary appurtenances.

8. Swimming pool at Memphis served from its own heating system and including filters, hychlorinators, surge tank, pump, etc.

533 COMPONENT COSTS

533.1 STRUCTURE

Table 530-2 lists the costs of the major structural components at Miami and Memphis. Neither of them use shear walls. Cost differences between the tower and base floors below the tower are due to larger columns. Reduced load capacity requirements account for the lower cost of roof construction.

Table 530-2. STRUCTURAL COST BREAKDOWN

Dollars per square foot of framed area (except as indicated) adjusted to ENR Building Cost Index of 960.

	STRUC. CONC.	CONC. TOPPING & FINISH	REBAR	TOTAL
Miami VAH				
Nursing tower floor framing	$3.07	$0.62	$1.75	$5.44
Lower floor typical framing	3.07	0.62	1.75	5.44
Lower floor below tower	3.85	0.62	2.09	6.56
Roof framing	2.94	0.31	1.68	4.93
Aggregate:	5.50 per sq. ft. of structural frame 6.58 per outside gross square foot			
Memphis VAH				
Nursing tower floor framing	$4.21	$0.21	$1.27	$5.69
Lower floor typical framing	3.80	0.21	1.16	5.17
Lower floor below tower	4.45	0.21	1.33	5.99
Roof framing	3.36		0.97	4.33
Aggregate:	5.26 per sq. ft. of structural frame 6.38 per outside gross square foot			

533.2 CEILINGS

Table 530-3 lists the costs of the major types of ceiling. The ceiling costs in the support areas of the two hospitals averages somewhat less per gross square feet of floor area than in the bed-care areas because there are large areas of shop, storage and boiler room uses, which have merely paint on the structure. Miami utilized a significant amount of cement enamel in moist areas.

Table 530-3. CEILING COST BREAKDOWN

Dollars per outside gross square foot adjusted to an ENR Building Cost Index of 960. (All ceilings are suspended except "exposed construction, painted " and "sprayed plaster".)

	SA	SP	CE	SP	MF	EP	Total	$/s.f. CEILING
Miami VAH								
Bed-care areas	1.05	.52	.02		.08	.01	1.68	1.78
Support areas	.73	.39	.13			.01	1.26	1.34
Entire hospital							1.47	1.56
Memphis VAH								
Bed-care areas	1.06	.12	.01			.01	1.20	1.27
Support areas	.82	.18	.01	.01		.04	1.06	1.13
Entire hospital							1.11	1.18

SA Suspended acoustic tile
SP Suspended plaster painted
CE Suspended plaster, cement enamel or vinyl
SP Sprayed plaster, on concrete structure
MF Membrane faced acoustic tile
EP Exposed structure painted

533.3 PARTITIONS

Table 530-4 lists the costs of the major partition components. Tables 530-4a, 4b and 4c break down each of these components into specific types. The types of partitions in the hospital support areas generally do not vary from those in bed-care areas. Miami utilizes a larger proportionate amount of masonry wall as against metal-stud partitions. In the support areas of the building, both hospitals have a small amount of special shielding partitions, but the overall partition cost is less because of large areas with minimum finishes, such as shops, boiler rooms and storage space.

Table 530-4. PARTITIONS COST BREAKDOWN

Dollars per outside gross square foot (except as indicated) adjusted to an ENR Building Cost Index of 960.

	Basic Matr.	Finish	Doors & Misc.	Total	$/sq. ft. of PART.
Miami VAH					
Bed-care areas	2.45	2.30	1.20	5.95	5.16
Support Areas	2.74	1.76	1.01	5.51	4.95
Entire Hospital	2.60	1.99	1.10	5.69	5.04
Memphis VAH					
Bed-care areas	2.61	2.13	1.40	6.14	4.79
Support Areas	2.07	1.52	1.26	4.85	4.55
Entire Hospital	2.24	1.71	1.31	5.26	4.62

TABLE 530-4a. PARTITION COST BREAKDOWN, BASIC MATERIALS

Dollars per outside gross square foot adjusted to an ENR Building Cost Index of 960.

	SP	MC	CC	TOTAL
Miami VAH				
Bed-care areas	1.34	1.11		2.45
Support areas	.67	1.62	.45	2.74
Memphis VAH				
Bed-care areas	1.65	.96		2.61
Support areas	1.36	.60	.11	2.07

SP Steel Studs and Plaster
MC Masonry Core
CC Concrete Core

Table 530-4b. PARTITION COST BREAKDOWN, FINISHES

Dollars per outside gross square foot adjusted to an ENR Building Cost Index of 960.

	SV	HV	CT	CE	P	ST	PF	TOTAL
Miami VAH								
Bed Care Areas	.72	.50	1.03	.04	.01			2.30
Support Areas	.43	.35	.34	.16	.06	.18	.24	1.76
Memphis VAH								
Bed-care Areas	1.02	.46	54	.10	.01			2.13
Support Areas	.50	.44	.28	.22	.08			1.52

SV Standard Weight Vinyl Wall Covering
HV Heavy Duty Vinyl Wall Covering
CT Ceramic Tile
P Paint
ST Structural Facing Tile
PB Plaster on Block

Table 530-4c. PARTITION COST BREAKDOWN, DOORS AND MISCELLANEOUS

Dollars per outside gross square foot adjusted to an ENR Building Cost Index of 960.

	HD	OD	B	TOTAL
Miami VAH				
Bed-care areas	.48(360)	.72(837)		1.20
Support areas	.04(46)	.81(1103)	.16	1.01
Memphis VAH				
Bed-care areas	.51(370)	.89(960)		1.40
Support areas	.29(104)	.79(1654)	.18	1.26

HD Four-foot hospital doors, including frame, finish and hardware
OD Other doors
B Rubber, vinyl and ceramic base
(00) Number of doors

533.4 HEATING-VENTILATING-COOLING

Table 530-5 lists the costs of the major mechanical components, except central plant equipment. The various departments housed in the lower floors include several areas of highly specialized services and in some instances very long runs of piping and ductwork.

Table 530-5. MECHANICAL COST BREAKDOWN

Dollars per outside gross square foot adjusted to an ENR Building Cost Index of 960.

	MECH.* EQUIP.	DUCTS	PIPES	TERM-INALS	CON-TROLS	TOTAL
Miami VAH						
Bed-care areas	.70	1.67	.52	1.08	.39	4.36
Support areas	1.24	3.19	.28	.46	.32	5.49
Entire hospital						4.92
Memphis VAH						
Bed-care areas	.46	1.67	1.40	1.08	.60	5.21
Psychiatric	2.06	2.11	1.73	1.13	.74	7.77
Support areas	1.30	1.96	.74	.64	.48	5.12
Entire hospital						5.49

* “Mechanical equipment” includes equipment installed in mechanical rooms or floors which receive steam, hot water and chilled water supplied from a central boiler and chiller plant. Ducts and heating-cooling piping to the functional areas beyond this point are averaged under the “ducts” and “pipes” columns.

533.5 PLUMBING DISTRIBUTION

Table 530-6 lists the costs of the major plumbing distribution components. Plumbing fixtures are not within the scope of the distribution subsystem, but a cost figure is included for them to allow comparison with more typical estimates.

Table 530-6. PLUMBING COST BREAKDOWN

Dollars per outside gross square foot adjusted to an ENR Building Cost Index of 960.

	EQUIP.	PIPING	MED. GAS.	FIRE PROT.	TOTAL	FIXT.
Miami VAH	.04	1.49	.38	.29	2.20	.60
Memphis VAH	.04	1.37	.50	.18	2.09	.83
Average					2.15	.74

533.6 ELECTRICAL POWER DISTRIBUTION

Table 530-7 lists the costs of the major electrical power distribution components.

Table 530-7. ELECTRICAL COST BREAKDOWN

Dollars per outside gross square foot adjusted to an ENR Building Cost Index of 960.

	EQUIP.	FEEDER DISTRIB.	BRANCH DISTRIB.	TOTAL
Miami VAH	.41	.18	1.54	2.13
Memphis VAH	.38	.19	1.51	2.08
Average				2.11

534 FUNCTIONAL AREA COSTS

534.1 FUNCTIONAL AREA CLASSIFICATION

For purposes of analyzing subsystem cost distribution among the various functional areas in the “base” portion of the hospital, eighteen categories have been established for the field stations at Miami and Memphis.

1. Nursing units (Memphis only)
2. Surgical suite
3. Recovery
4. Radiology
5. Deep therapy
6. Clinical laboratories
7. Research laboratories
8. Animal research
9. Physical medicine and rehabilitation
10. Auditorium
11. General areas (offices, on-call rooms, clinics, social workers, chapel, libraries, recreation, dental, out-patient department, admitting, lockers pharmacy, morgue and medical illustration.)
12. Dietetic services
13. Cafeteria
14. Central sterile
15. Laundry
16. Warehouse, storage and housekeeping
17. Shops
18. Pool (Memphis only)

A category referred to as 0 (zero) covers mechanical rooms, stairways, elevators, etc. The structural subsystem is prorated as a fixed cost over all functional areas.

534.2 SUMMARY TABLES

Tables 530-8 and 530-9 summarize subsystem costs for the major functional areas in the support areas of the Miami and Memphis field stations. Figures 530-1 and 530-2 chart the same information plus indicating the relative size of the areas to which the various costs apply.

534.3 CEILINGS

534.3.1 Figures 530-3 and 530-4 illustrate the proportion of ceiling costs distributed among functional areas at Miami and Memphis. Variations in the unit costs are mostly attributed to type of finish material.

534.3.2 The two hospitals differ to a significant degree only in the shops and laundry, warehouse, storage, and housekeeping areas. At Miami such spaces are generally finished with plaster or suspended acoustic materials, while at Memphis similar spaces are finished with relatively inexpensive paint or spray applied plaster finishes over the exposed structure. Three times as much space at Memphis is so simply and inexpensively finished.

534.3.3 The majority of the ceiling finishes at both Memphis and Miami were found to have similar unit costs when compared directly by functional area. However, the Miami costs tend toward a uniform 10 to 15% higher level than those at Memphis. One reason for this tendency lies in the fact that a higher proportion of cement enamel and suspended plaster ceiling finishes were employed throughout the Miami support areas. There is 2 to 3 times as much suspended plaster and 2 to 10 times as much cement enamel to be found at Miami than at Memphis. There are also substantial quantities of membrane faced acoustical tile at Miami not found at Memphis. The double ceilings which are utilized as plenums in the Miami corridors are further reflected in the higher unit costs.

534.3.4 Even though unit costs for ceiling finishes in similar functional areas may vary as much as 75% between Miami and Memphis, the overall average unit costs differ by no more than 16%.

Table 530-8. FUNCTIONAL AREA COST IN SUPPORT AREAS OF MIAMI VA HOSPITAL

Dollars per outside gross square foot adjusted to an ENR Building Cost Index of 960. Integrated subsystem totals include $6.58 for structure.

TYPE	CEILS.	PART.	HVC	PLUMB.	ELEC.	TOTAL
0	0.12	5.02	-	-	-	10.13
1	(There are no nursing units in the base.)					
2	1.45	5.50	10.06	3.49	4.03	31.11
3	1.34	6.06	6.81	3.52	4.06	28.37
4	1.35	6.33	3.52	2.51	3.03	23.32
5	1.10	19.56	5.65	1.23	2.41	36.53
6	1.58	4.82	7.28	3.53	2.30	26.09
7	1.19	6.19	9.47	3.45	2.32	29.20
8	1.38	6.38	10.48	4.79	2.39	32.00
9	1.68	5.92	4.95	1.79	1.96	22.88
10	1.35	5.18	5.52	1.66	1.70	21.99
11	1.35	6.05	4.37	1.89	2.20	22.44
12	1.17	3.97	7.76	1.82	3.53	24.83
13	1.28	3.56	7.54	1.80	1.92	22.68
14	1.47	5.47	3.94	2.20	2.50	22.16
15	1.27	3.09	9.69	6.91	2.24	29.78
16	1.43	3.88	3.14	1.10	2.20	18.33
17	0.76	4.81	3.89	1.87	2.06	19.97
18	(Miami does not have an indoor pool.)					

Figure 530-1. FUNCTIONAL AREA COSTS IN THE SUPPORT AREAS OF THE MIAMI VA HOSPITAL

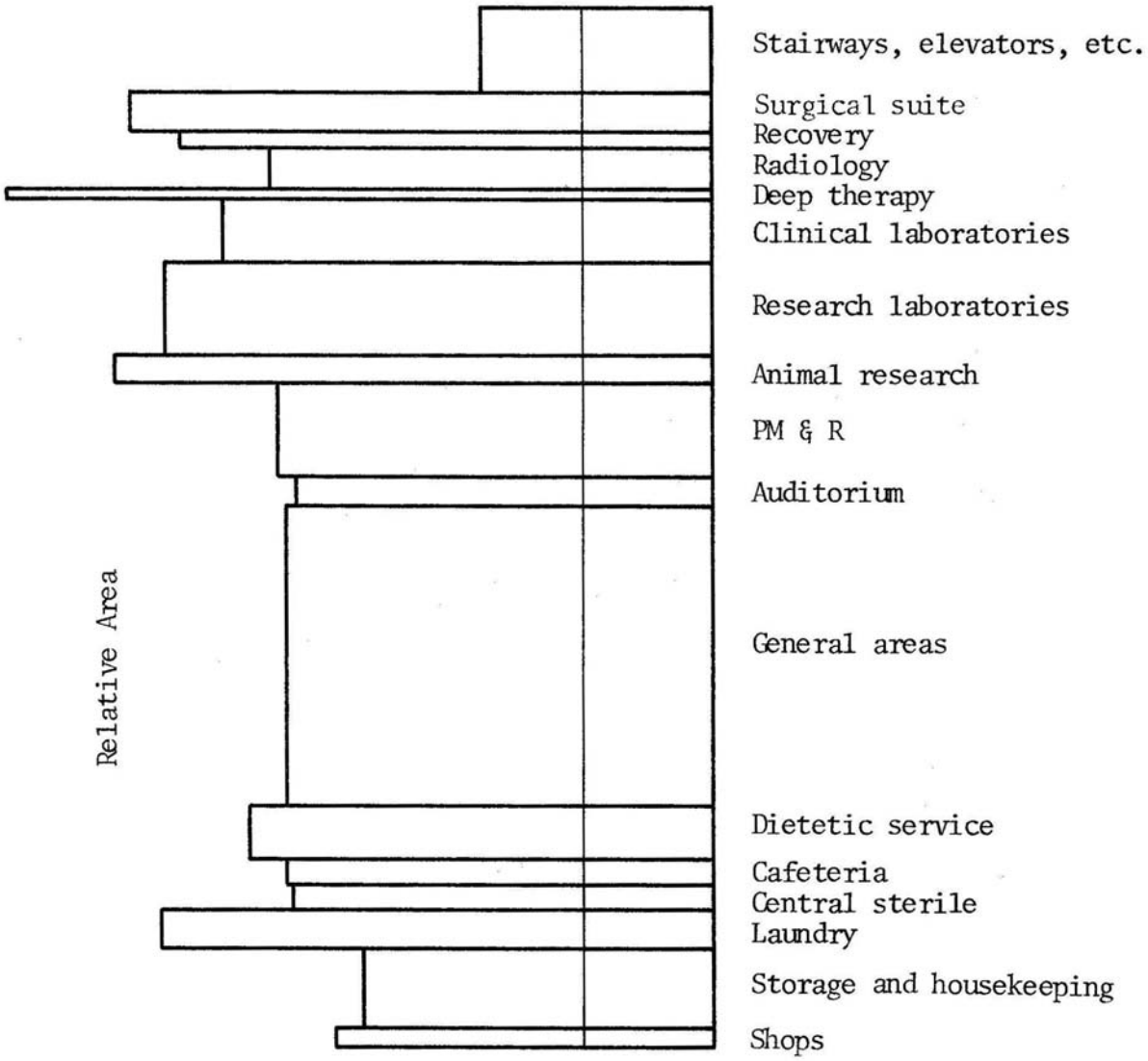


Table 530-9. FUNCTIONAL AREA COSTS IN SUPPORT AREAS OF THE MEMPHIS VA HOSPITAL

Dollars per outside gross square foot adjusted to an ENR Building Cost Index of 960. Integrated subsystem totals include $6.38 for structure.

TYPE	CEIL.	PART.	HVC	PLUMB.	ELEC.	TOTAL
0	0.27	5.79	-	-	-	12.44
1	1.26	6.58	7.76	2.22	2.24	26.44
2	1.30	5.65	7.18	4.27	4.32	29.10
3	1.26	5.20	6.38	3.63	3.68	26.53
4	1.27	7.79	6.22	3.20	4.15	29.01
5	1.30	16.18	4.93	1.10	1.89	31.78
6	1.31	5.80	10.92	3.16	2.68	30.25
7	1.13	6.27	10.41	4.17	2.48	30.84
8	1.18	6.36	5.74	2.46	2.07	24.19
9	1.19	4.18	4.62	1.64	2.03	20.04
10	1.35	5.43	5.03	1.37	1.36	20.92
11	1.23	5.54	4.89	1.67	2.18	23.64
12	1.25	2.80	5.08	2.13	3.47	21.11
13	1.13	3.03	4.70	2.01	1.46	18.71
14	1.32	4.25	8.00	1.23	2.90	24.08
15	0.32	2.28	7.95	8.45	2.12	27.50
16	0.36	2.12	3.73	1.80	1.83	16.22
17	0.23	4.05	3.44	2.37	1.69	18.16
18	1.29	2.43	8.95	5.93	1.85	26.83

Figure 530-2. FUNCTIONAL AREA COSTS IN THE SUPPORT AREAS OF THE MEMPHIS VA HOSPITAL

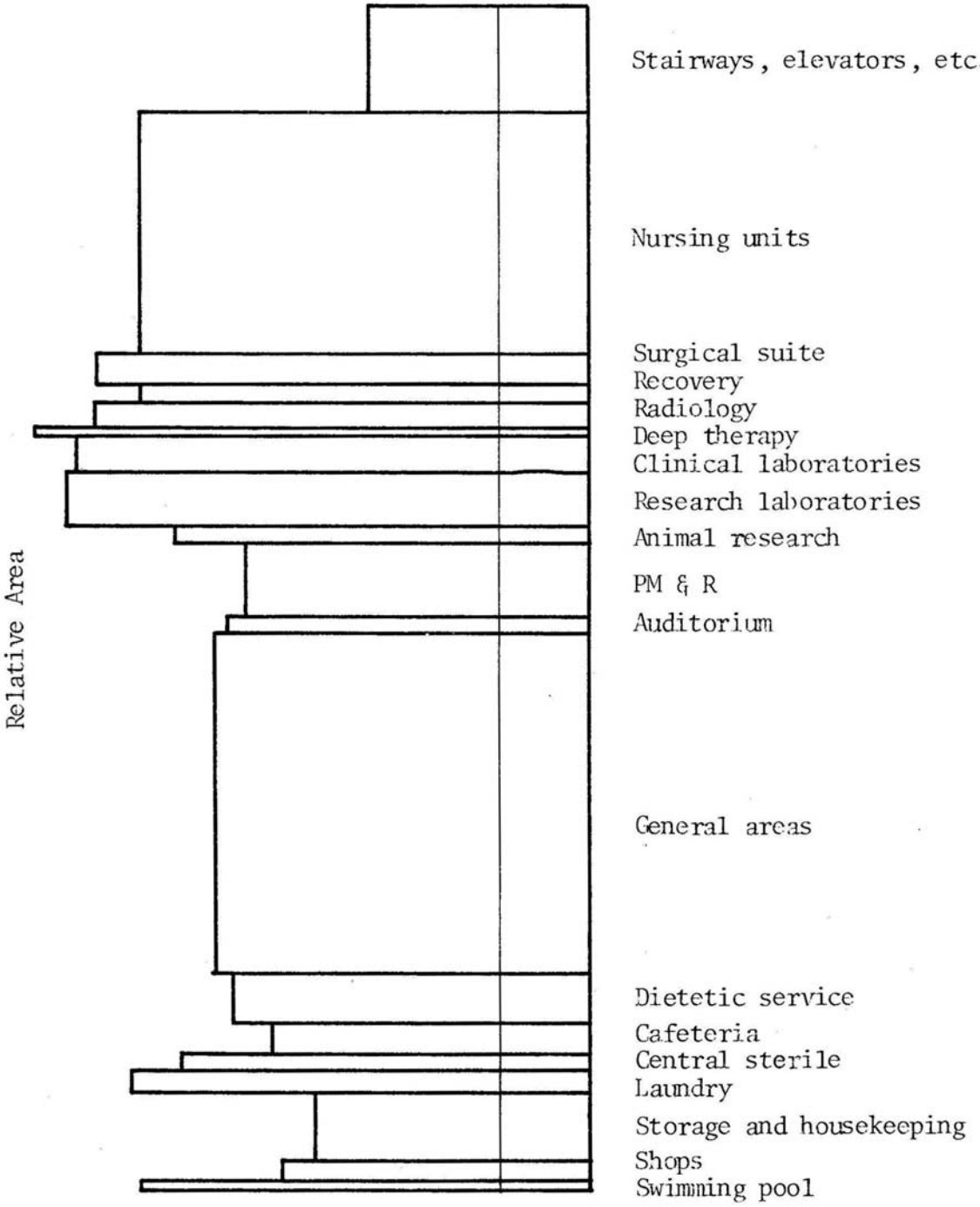


Figure 530-3. CEILING FUNCTIONAL AREA COSTS FOR MIAMI

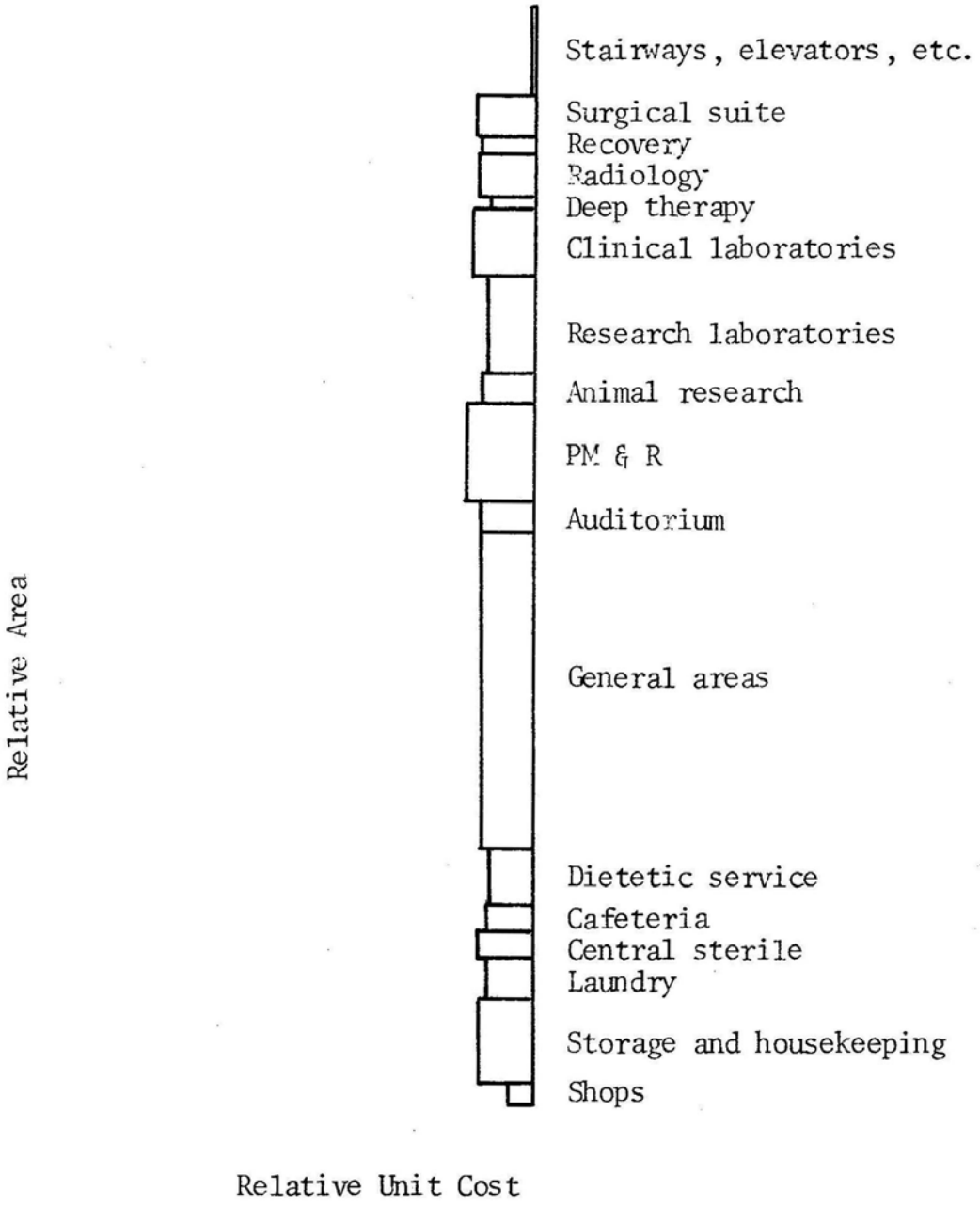


Figure 530-4. CEILING FUNCTIONAL AREA COSTS FOR MEMPHIS

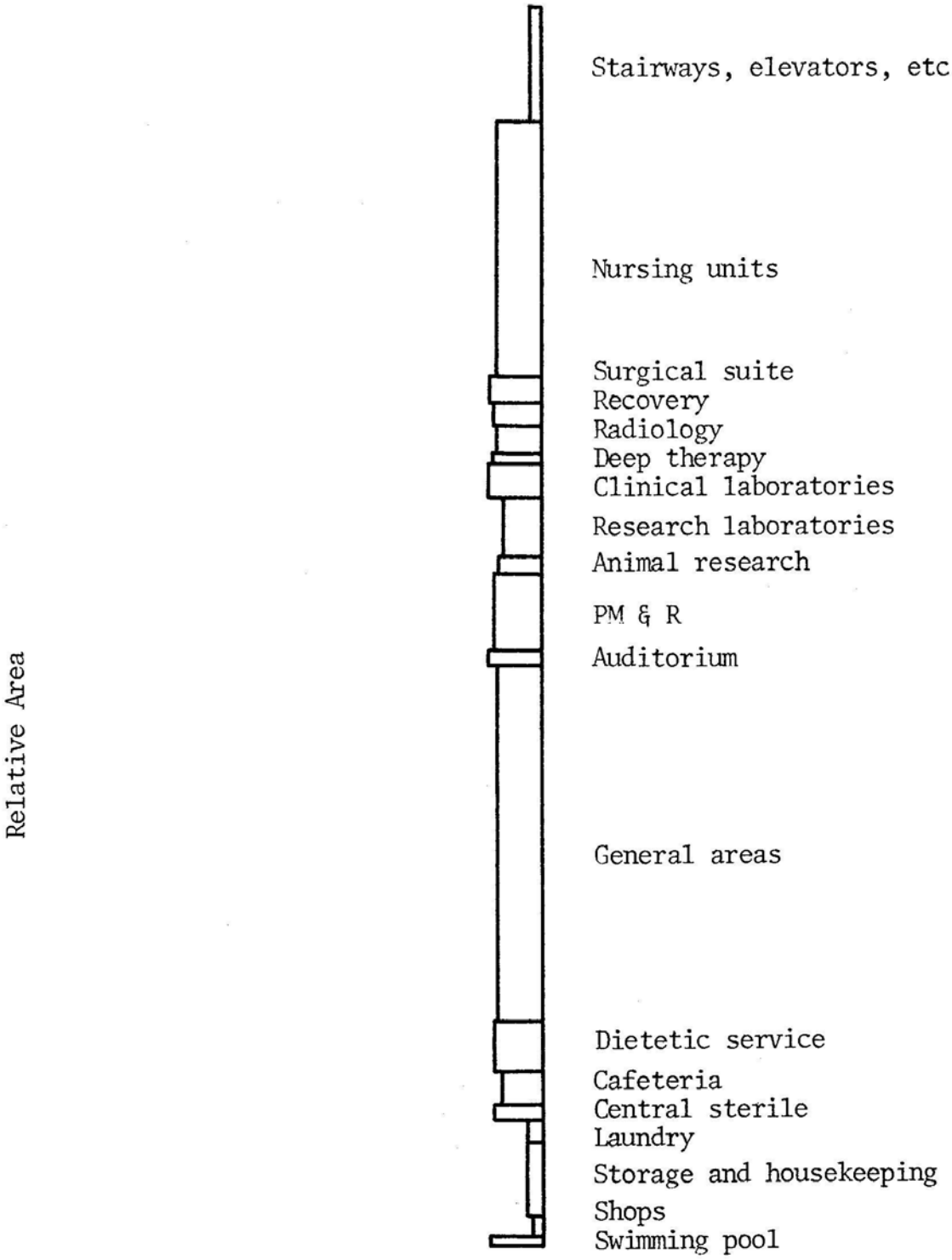


Figure 530-5. PARTITION FUNCTIONAL AREA COSTS FOR MIAMI

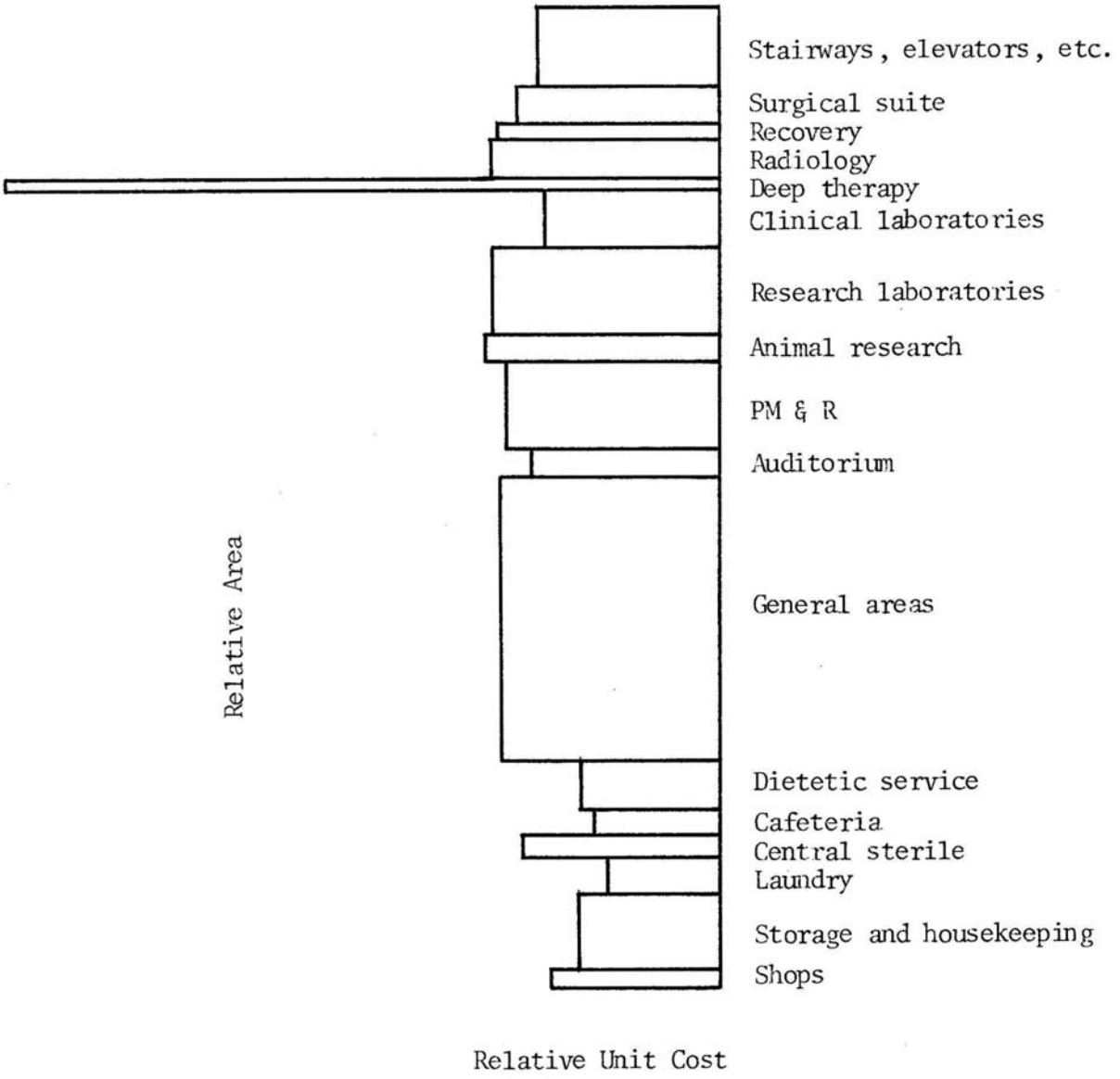
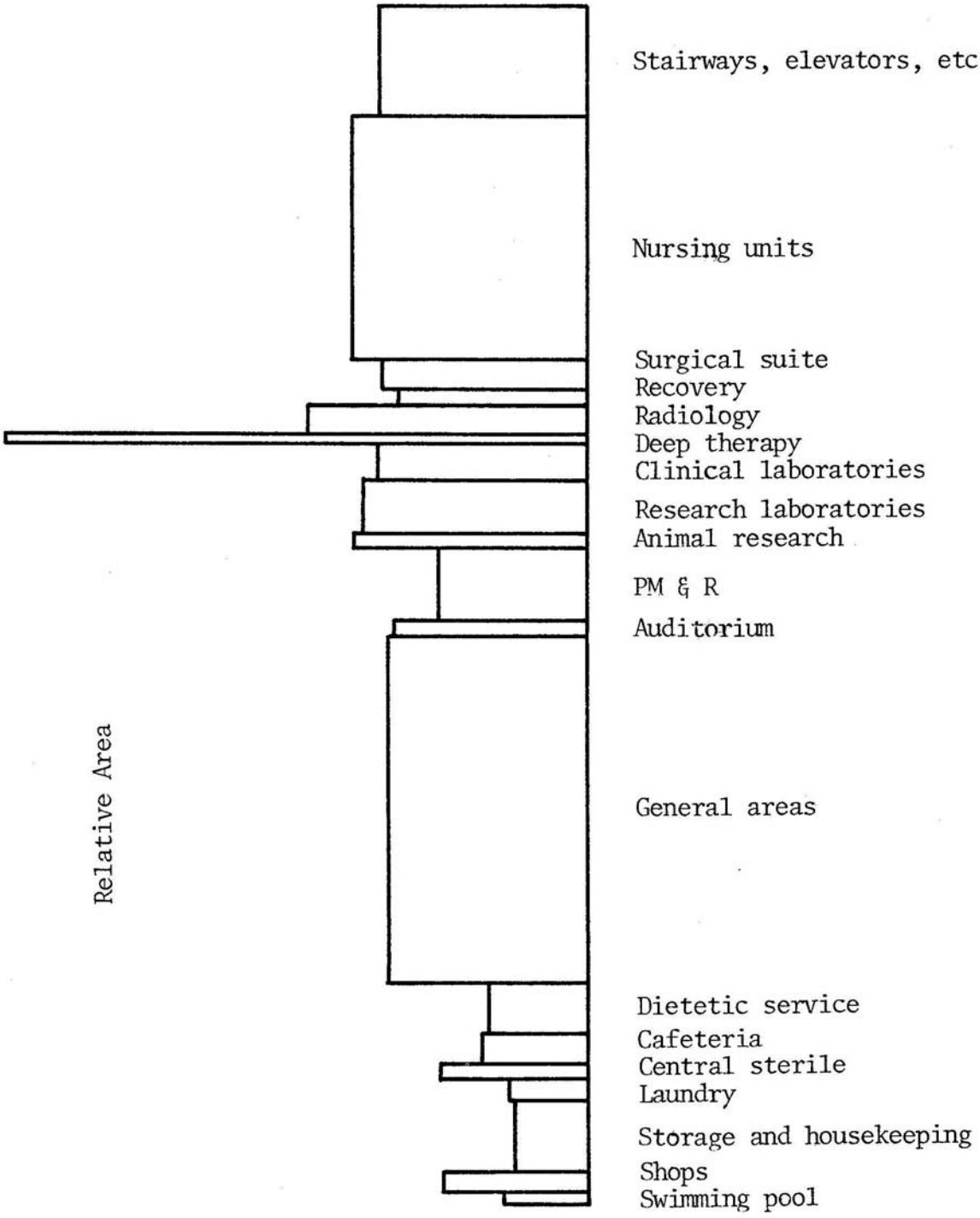


Figure 530-6. PARTITION FUNCTIONAL AREA COSTS FOR MEMPHIS



534.4 PARTITIONS

534.4.1 Figures 530-5 and 530-6 illustrate the proportion of partition costs distributed among functional areas at Miami and Memphis. The principal determinant of the cost per unit of floor area is simply density, i.e., quantity within each functional area. The type of partition and quality of finish are relatively minor factors by comparison, with a few notable exceptions as in radiology and deep therapy. The following discussion of both quantity and quality attempts to explain some of the notable differences.

534.4.2 Partition costs within the areas occupied by laundry, warehouse and storage areas are the very lowest, because there are very few partitions and the finishes consist generally of paint on structural surfaces or partitions.

534.4.3 The partition costs of the mechanical rooms and shops are moderately higher due to the fact that these areas are generally subdivided into smaller spaces, resulting in greater quantities per given area, though the finishes are no better than in the warehouse and storage areas. Equally moderate are the partition costs found in the dietetic, cafeteria, and central sterile areas. In these areas the finishes are more durable, but the density of partitions is low. The costs of prefabricated cold storage boxes are not included in these computations.

534.4.4 Next in order of cost fall the laboratories, general offices and miscellaneous, surgery and recovery areas. The general offices and miscellaneous areas all have moderate requirements for durability of finishes, but are generally subdivided into many small spaces requiring a high density of partitions. The laboratories, surgeries and recovery units have a lower density of partitions with more expensive finishes, resulting in average partition costs approximating those of the general offices and miscellaneous service areas.

534.4.5 The nursing units contained within the base structure at Memphis have average partition costs somewhat higher than those of the laboratories and surgical suites, primarily due to the relatively high partition density coupled with a requirement for equally durable finishes.

534.4.6 The most expensive functional areas within the base structure, in terms of partition costs, are deep therapy and radiology. In radiology at Memphis, the partition cost by unit area is 50% greater than the overall average, primarily due to the high cost of radiation shielding, lead-lined concrete-block partitions surrounding the x-ray apparatus.

534.4.7 In the deep radiation therapy department, the high density concrete radiation shielding walls surrounding the cobalt generator are from 12" to 36" in thickness. The high cost of this shielding when applied to the relatively small floor area occupied by the department, results in unit costs for partitions of 3 times the overall average.

534.4.8 The unit costs for partitions in the Memphis and Miami support areas do not differ to any significant degree. The differences which do exist can generally be attributed to differing densities. The functional spaces in the Miami facility tend to be smaller and more numerous than the comparable spaces in Memphis. While a direct unit cost comparison for partitions by functional area may reveal variations of up to 45%, the overall average unit costs between the two hospitals are within 2%.

534.5 HEATING-VENTILATING-COOLING

534.5.1 Figures 530-7 and 530-8 illustrate the proportion of HVC costs distributed among functional areas at Miami and Memphis. The following discussions of specific high cost features attempts to explain some of the notable differences.

534.5.2 In the surgical suites, a separate emergency HVC system doubled the average unit cost at Miami, and similarly a special mechanical equipment requirement at Memphis increased the unit cost there by an additional $1.87.

534.5.3 A large storage area within the radiology department, which is not fully served, lowered the unit cost at Miami, and conversely, the remoteness of the department at Memphis required extraordinarily long duct runs, raising the unit cost there.

534.5.4 Exhaust systems required by laboratory fume hoods or kitchen exhaust hoods raise the HVC unit costs in both hospitals in those functional areas by as much as $4.40 per square foot.

534.5.5 The unit cost for central sterile at Miami is low due to its close proximity to the mechanical equipment. The same functional area has a high unit cost at Memphis due to the inclusion of $2.72 per square foot for special items of mechanical equipment and appurtenances.

Figure 530-7. HVC FUNCTIONAL AREA COST FOR MIAMI

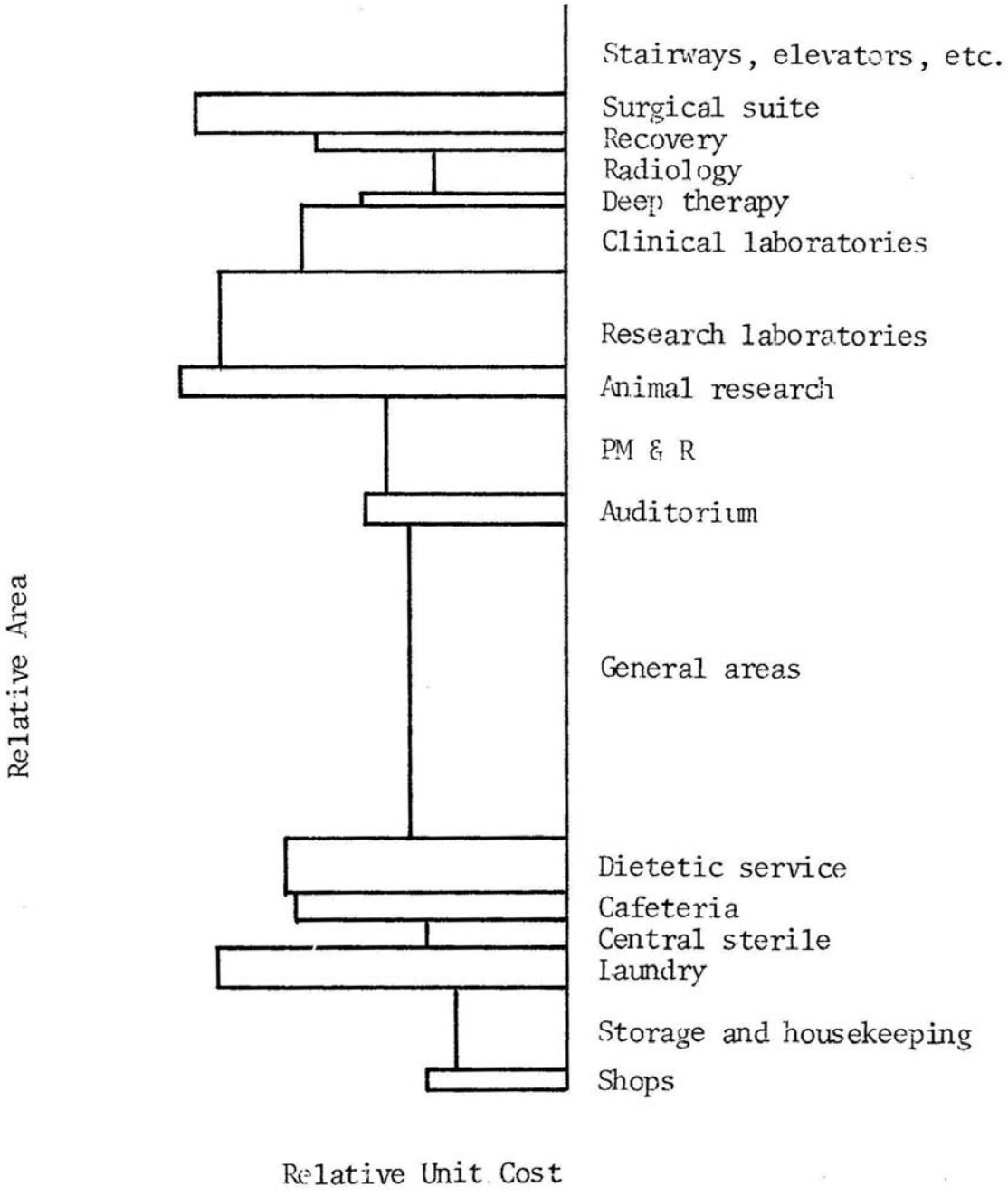
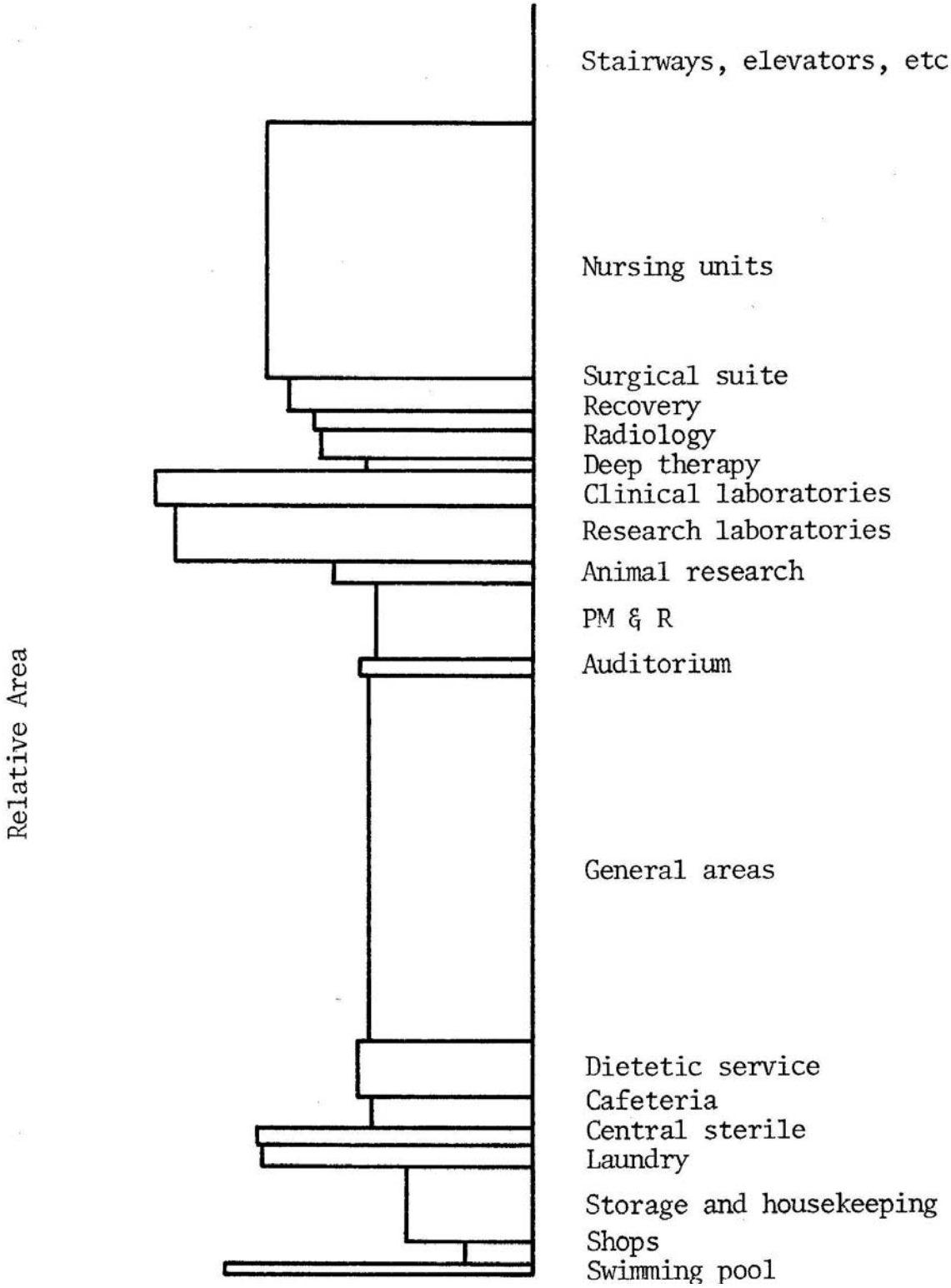


Figure 530-8. HVC FUNCTIONAL AREA COSTS FOR MEMPHIS



534.5.6 Excessive quantities of rectangular high pressure distribution duct caused the average unit cost to double within the animal research laboratories at Miami.

534.5.7 Exhaust hoods included in the dietetic and cafeteria areas at Miami helped to increase the unit costs in those areas by 50 per cent.

534.5.8 The heavy duty industrial requirements imposed on the system by the laundries include special exhaust systems and additional quantities of steam piping, all of which combines to increase the unit costs there by about 60 per cent over the average.

534.5.9 The system requirements imposed by the swimming pool area fond only at Memphis are increased by large capacity steam piping and excessive distribution ductwork due to its remoteness from the fan room.

534.6 PLUMBING DISTRIBUTION

534.6.1 Figures 530-9 and 530-10 illustrate the proportion of plumbing distribution costs among functional areas at Miami and Memphis. Variations in the unit cost between these areas is generally attributable to special requirements in one or more of the four basic plumbing components: equipment, piping, medical gas distribution and fire protection.

534.6.2 The only functional areas that are significantly affected by abnormal equipment costs are the laundries at both hospitals and the swimming pool at Memphis. In each case the costs included for equipment represents approximately one quarter of the total costs.

534.6.3 Piping costs are a major factor in the deep therapy department, dietetic service, central service and laundry facilities. In each case they comprise 60 percent or more of the total. Those areas in which the piping costs represent approximately one half of the total are the nursing units, radiology, laboratories, miscellaneous service areas, and the cafeteria. Those areas in which the piping costs amount to approximately one third of the total include the surgical suites, recovery, physical medicine, and the warehouse and storage areas.

534.6.4 The medical gas piping, which is concentrated in the nursing, recovery, and intensive care units as well as the surgical suites, radiology department, and laboratories, is a high cost factor for those functional areas. These same areas are similarly affected by the costs of special equipment, and special rough plumbing for equipment.

534.6.5 The cost of fire protection throughout both facilities represents a small proportion of the total costs with the exception of cafeterias, warehouse and storage areas, and the shops, all of which are required to have automatic sprinkler systems. The animal research laboratory at Memphis also has a high proportionate cost for this item.

534.6.6 The highest indicated unit costs for plumbing at both Miami and Memphis are found in the laundries. This is due to the special equipment and equipment connections, and the need for large capacity, independent subsystem elements. For example, the laundry facilities include separate hot water generator, compressed air units, heat reclaimers, and water softening apparatus.

Figure 530-9. PLUMBING DISTRIBUTION FUNCTIONAL AREAS COSTS FOR MIAMI

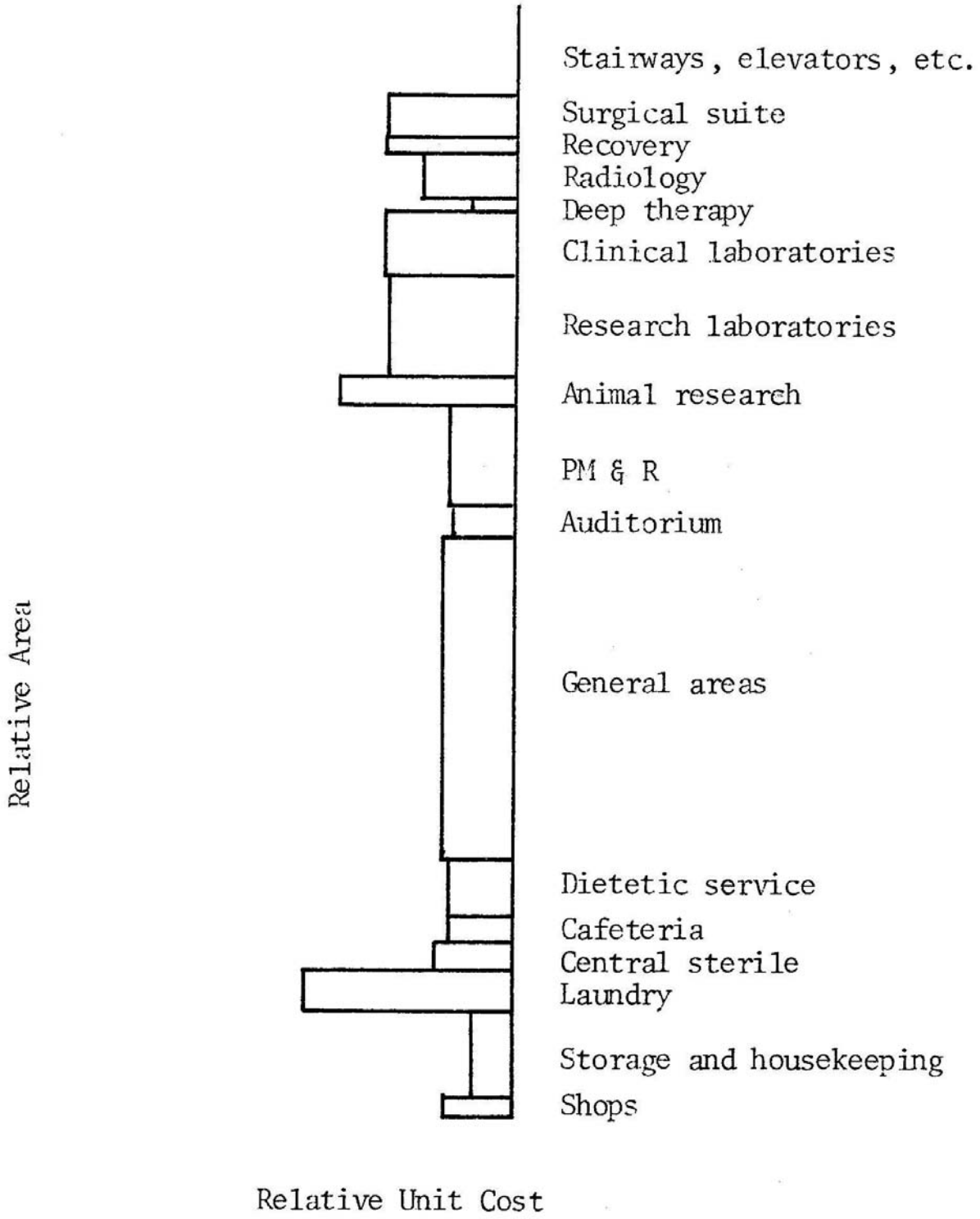
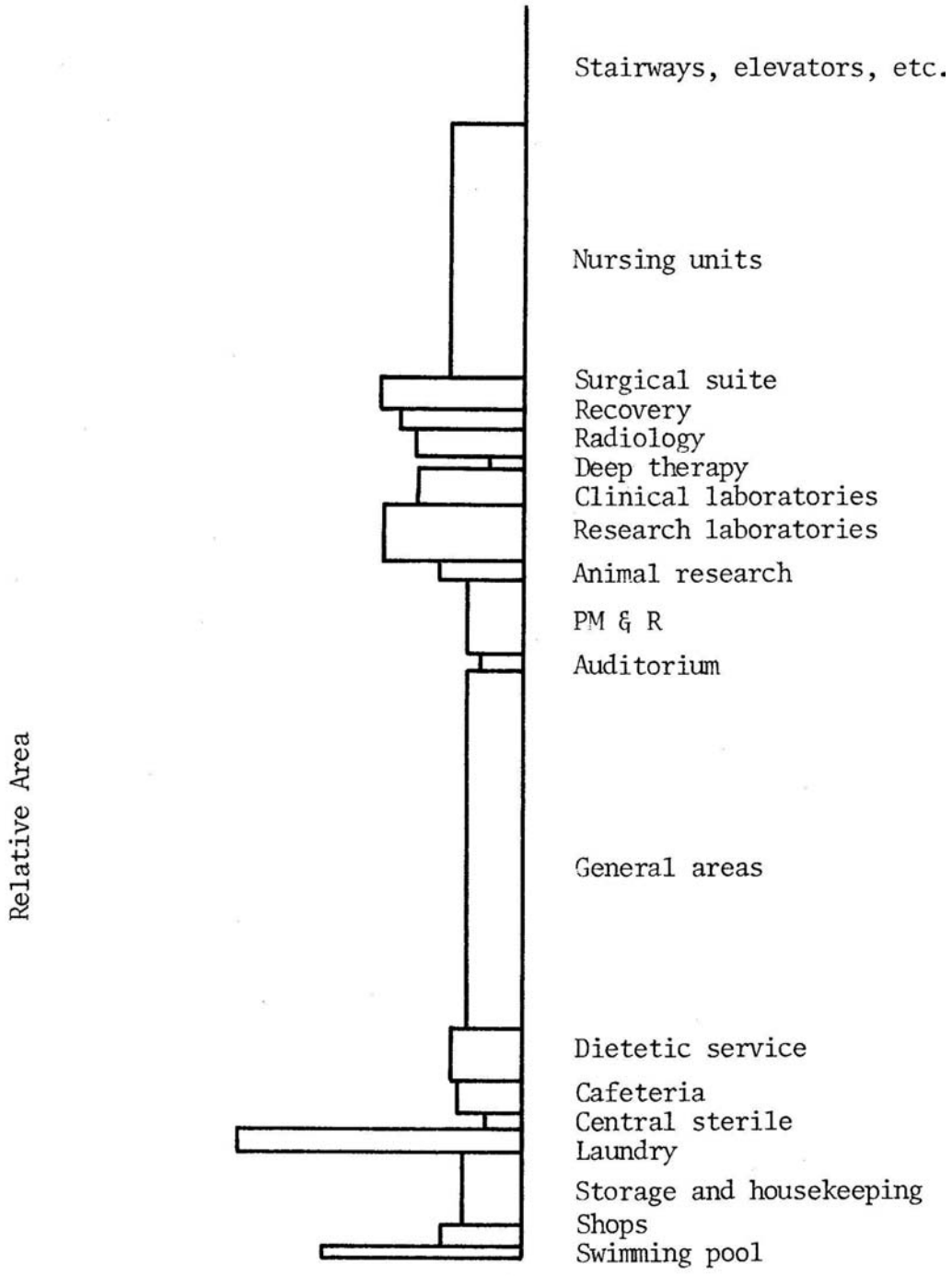


Figure 530-10. PLUMBING DISTRIBUTION FUNCTIONAL AREA COSTS FOR MEMPHIS



The next highest unit costs are found in the swimming pool at Memphis. This also due to the inclusion of special elements such as independent hot water generators, filtration apparatus, automatic chlorinators, pumps and local circulation piping.

534.6.7 Those functional areas in which unit costs fall in the middle range are characterized by heavy proportion of costs in piping and medical gas distribution. Examples of such moderate plumbing costs areas would include the nursing units, radiology, the laboratories, and the physical medicine and rehabilitation department.

534.6.8 The areas with the lowest unit costs are those that have little or no medical gas piping and no abnormal fire protection requirements. Theses low cost areas include deep therapy, the auditorium; dietetic and cafeteria areas, and the central service area. The warehouse, storage, and shop areas also tend toward the low end of the scale in spite of their relatively high fire protection requirements.

534.6.9 Variations between the Miami and Memphis hospitals as high as 50 percent in the case of the animal research departments, where special fire protection was required at Miami. The overall unit costs, however, fall within six percent.

534.7 ELECTRICAL POWER DISTRIBUTION

534.7.1 Figures 530-11 and 530-12 illustrate the proportion of electrical distribution costs among functional areas at Miami and Memphis. Those areas that are relatively small in size or in which the requirement for numbers of outlets or power consumption is large, have the highest cost unit costs. The functional areas with the highest costs include the surgical suites, recovery units, and the radiology areas. Other areas with proportionately high costs are laboratories, dietetic service areas, central service, and the deep therapy units. Other causes of higher unit costs found within certain functional areas are isolated, ungrounded systems and explosion proof devices in the surgical suites, and unusual branch circuit wiring in the recovery units.

534.7.2 Elaborate power or lighting systems such as those found in surgery, recovery, nursing, radiology, deep therapy, laundry, and central sterile have a high proportion of their total cost in equipment. The lowest proportionate costs for equipment are found in the areas occupied by the laboratories, physical medicine, dietetic spaces and cafeteria.

534.7.3 The functional areas which reveal the largest proportion of the total costs devoted to branch circuit distribution are logically those spaces which require large numbers of outlets such as laboratories, nursing areas, surgical suites, radiology, physical medicine, dietetic service and cafeteria, central service, laundry, shops, warehouse, and the pool area at Memphis. In each of these functional areas the cost for branch circuit distribution comprises more than one half the total cost.

534.7.4 The area in which the costs for feeder distribution are a major portion of the total cost are recovery, radiology, and deep therapy areas, the miscellaneous service areas, and the laundries. These proportionally high feeder costs reflect either unusually long runs due to remoteness of the functional area, or large capacity conductors demanded by extraordinary power requirements. The two functional areas with the highest feeder distribution costs include deep therapy and the laundries, both of which have high power consumption requirements.

534.7.5 The overall units costs for electrical distribution subsystems at Miami and Memphis are very close, differing by only five percent. Unit costs by functional area, however, vary by as much as 27 percent.

Figure 530-11. ELECTRICAL POWER DISTRIBUTION FUNCTIONAL AREA COSTS FOR MIAMI

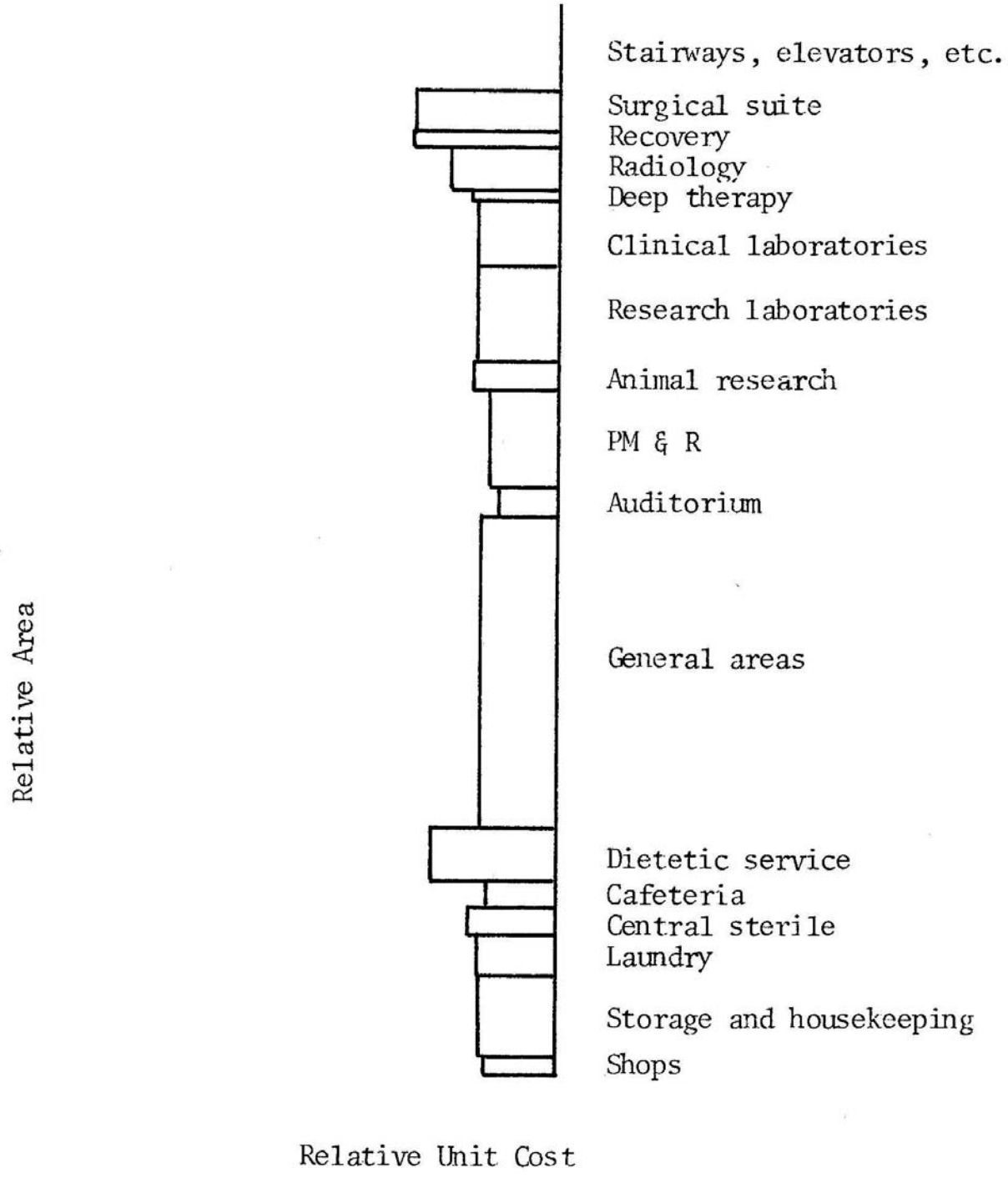
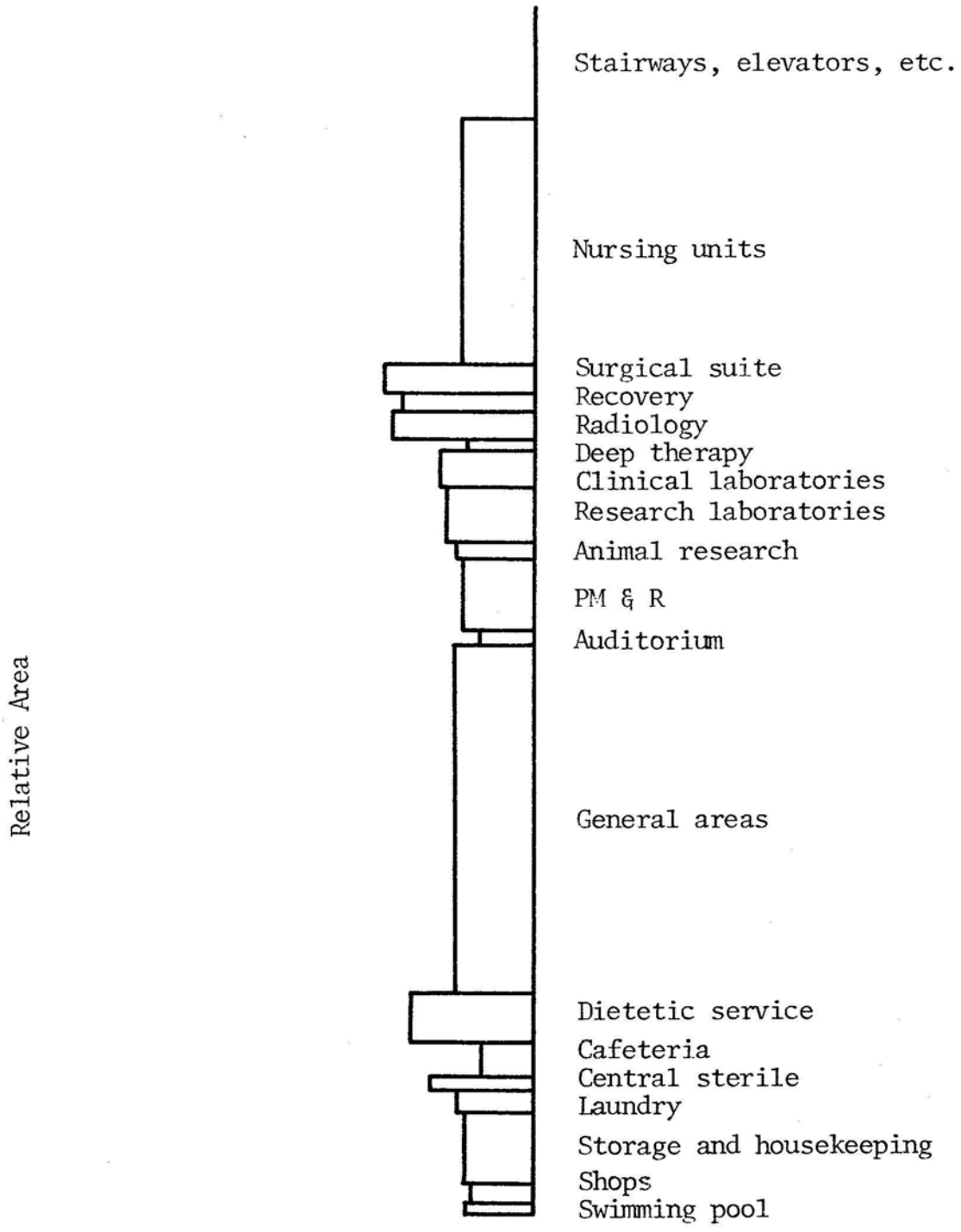


Figure 530-12. ELECTRICAL POWER DISTRIBUTION FUNCTIONAL AREA COSTS FOR MEMPHIS



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540 Building Trade Unions

541 INTRODUCTION

The attitude of building trade unions toward increasing industrialization in the building industry does not form a clear and stable picture. In practice, attitudes differ from trade to trade, local union to local union, and union member to union member. These attitudes may or may not be in concert with union policy at the national level, the attitudes of the National Labor Relations Board, or the courts. Additionally, these many shades of opinion are constantly changing in response to such factors as the availability of jobs in a given area, pressures from public opinion, and the relative strength of the local union.

Because of this varied and changing picture, any attempt to pin down union attitudes over the country as a whole would be impractical and in any case quickly outdated. This discussion, therefore, will concentrate on trends in union attitudes, the factors which influence these attitudes, and ways of determining attitudes at a particular time and place.

In general, the problem of industrialization for the construction trades is parallel to the problem of automation in other industries, and in general the same kinds of responses by labor can be observed in both cases. Resistance to change and fear of the unknown are typical human characteristics. A propaganda cartoon of 1830 shows all the dire consequences to be expected from the introduction of steam power in factories, and even went so far as to recommend that mothers bear no more children since steam power would take away any possibility of jobs for them. (1)

As a background, we will begin with discussions of the concept of industrialization and the general attitudes of labor unions. We will then discuss the position of unions relative to prefabrication in terms of the strategies open to them, their legal position, policies of the national union leadership, recent agreements, and future trends.

542 INDUSTRIALIZATION

542.1 DEGREE OF PREFRABICATION

542.1.1 The construction industry has always been industrialized to some degree. Even in the most conventionally built building today, nearly every item used in construction comes from a factory. The issue at this point is the accelerating rate at which factory-built components are becoming larger and/or more complicated, thereby reducing work required at the site.

542.1.2 Industrialization can range from the making of bricks in a factory, which are assembled at the site, to building whole buildings in a factory and merely hooking them to plumbing and power. This off-site work can be done by manufacturers or subcontractors in their own factories, by general contractor in his shop, or by setting up a “site factory” adjacent to the building. The work can be performed by the union or non-union factory workers of the supplier, members of building trade unions working in a factory, or the contractor’s own men next door to the job site. With so great a range of degrees of prefabrication, sites where it can take place, and union status of participants, it is easy to see how confusion and seemingly arbitrary decisions can arise on the part of all concerned.

542.1.3 The trend toward increased industrialization seems to center on a single set of premises: that work can be done more accurately, more efficiently, and more productively in factory. The factory provides an enclosed, weather-protected environment, with better working conditions, the opportunity to use heavy fixed equipment, and the opportunity for better inspection and control procedures. (2) These advantages, plus the ability to use less highly skilled labor which is presumably less costly, and the elimination of the seasonal nature of construction, make factory production a tempting alternative in many cases. On the other hand, there are several inherent problems in factory fabrication which may often outweigh the advantages. Among these are the costs of setting up the production line, costs of transporting the prefabricated components to the job site, and costs of storing the assemblies until they are needed. Thus, it is not a foregone conclusion that large prefabricated components are better or more economical than site-assembled components. Each case must be weighed by the A/E or construction contractor on its own merits.

542.2 PREFABRICATION AND THE BUILDING SYSTEM PROTOTYPE DESIGN

The issue of whether or not buildings should be more industrialized than they presently are is particularly significant for the VA systems integrations project because the use of standardize “rules” allows a higher degree of prefabrication than usual. For example, in conventional design and construction, trunk ductwork may vary from floor to floor to meet different conditions, whereas corresponding ductwork in a hospital built using the Prototype Design may be identical for all service modules. In the conventional case, prefabrication would probably not be suggested because each area would be different; in the case of the systems building, similar sets of ductwork could be assembled off-site and “plugged in” at the site.

The trend has been toward increased industrialization of building components in response to the increased cost of on-site labor. However, the degree of prefabrication, the location of the prefabricating facility, the status of the participants, and the usefulness of “industrialization” depends on the conditions surrounding each case.

The Prototype Design has been developed to allow whatever degree of prefabrication seems to be indicated by the given conditions, rather than to depend on union acceptance of a particular degree for its success.

543 BASIC CONCERNS

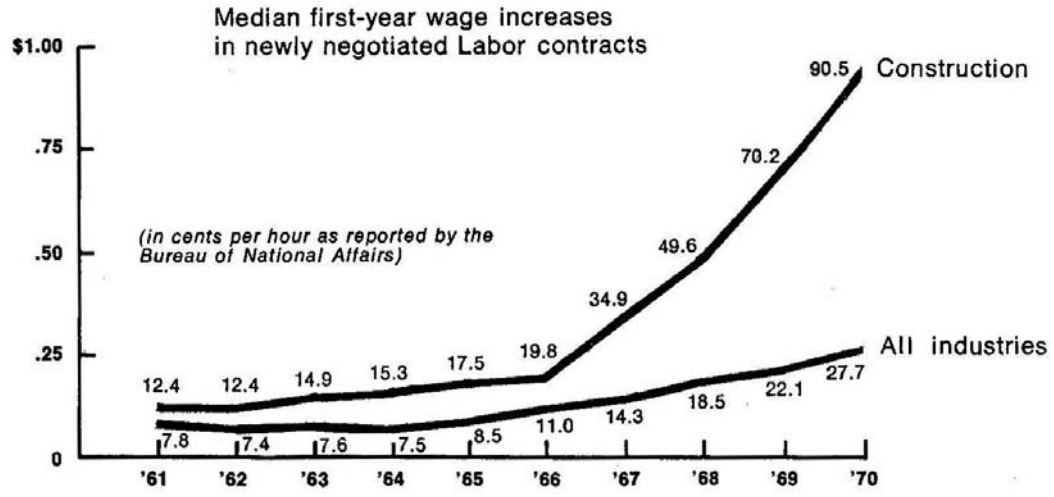
543.1 MEMBERSHIP

The building trade unions in the U.S. are made up of eighteen trades, organized into 10,000 locals, and comprise about three million members. (3) "Total union membership as a percentage of all construction workers in contract construction increased from 68.3% in 1956 to 75.0% in 1966. This is in contrast to the general trend of unionism in the rest of the economy where union strength has actually declined in relative terms . . . .

"In general, it would seem that, judging by wage rate and fringe benefits, the degree of unionization is highly correlated to the size of construction projects. In other words, union strength declines as the type of construction becomes lighter from heavy construction (highest degree of unionization) to . . . . home building (relatively low)." (4)

543.2 WAGES

543.2 .1 Since 1966, wages in construction trades have skyrocketed as compared to wages in other industries as shown by the following chart: (5)



543.2.2 Fortune Magazine states that unskilled workers are getting raises of over $2,000 per year, and that by 1972 a substantial percentage of skilled construction workers will be making around $20,000 per year. (6) While it is a matter of record that many skilled workers make from $8 to $10 per hour, a study of compensation in the building industry by the Bureau of Labor Statistics states:

"Though wages are high, annual earnings are generally low for construction workers. This paradoxical situation has been assumed to exist because work is seasonal, hazardous, and subject to an extensive amount of time lost because of bad weather and industrial strife; also, workers lose time looking for work between short-term jobs."

543.2.3 The study shows that the difference in employment between the most active month and the least active month is more than 600,000 jobs. In addition, more than one-fourth of the industry's total work force earns a majority of its income in another industry and only about half of those who earn all or most of their wages in construction, work during all four quarters of the year. (7)

543.2.4 During 1971, the alarm over the pace of wage increases in the construction industry has caused the President to suspend the Davis-Bacon Act, requiring payment of local prevailing wages (which in practice means union wages) on Federally financed projects, from February 23 to March 29. When the provisions of Davis-Bacon were reinstated, the formation of the Construction Industry Stabilization Committee was announced. This Committee reviews and approves or disapproves proposed wage settlements in the construction industry. While early efforts of this Committee were ineffective (painters in Little Rock, Arkansas were granted a 36% increase spread over three years), later efforts have held settlements to about 7% per year. (8)

543.2.5 One reason for the ability of labor unions to command such large increases is their ability to control the availability of labor through their apprentice training and hiring hall practices. In fact, the shortage of labor is the second greatest factor (after weather) causing job delays. (9)

543.3 JOB SECURITY

543.3.1 Perhaps as great a goal for the unions as high wages is full employment and increased job security. This goal has two spin-offs which influence union attitudes toward industrialization -- worries about their skills becoming obsolete, and worries those other trades will take over their work.

543.3.2 The fears about security on the part of the unions find expression in different ways. Perhaps the most important is the emphasis that the unions now put on contract provisions dealing with job security. Increasingly, unions are negotiating contracts providing substantial payments for past service in the form of separation pay to employees whose jobs are eliminated. Greater emphasis is being placed on improvements in private pension plans that permit earlier retirement, with increased pension benefits over and above payments provided by the Federal Social Security Act. These plans increasingly provide that the benefits accumulated over a number of years of service will not be lost if the employee leaves the company prior to the age of retirement. (11)

543.3.3 While all union members want job security, there is some confusion about how best to achieve it. In many cases, increased automation has led to an increase in jobs. In addition, many union members believe, and this is echoed in their national policies, that the technological advance will continue and they must move with it.

543.3.4 "American labor reacts positively and with vigor to an industrial society and encourages major technological advances. It realizes that it is only through technology devoted to the purposes of man that the production of goods can reach levels high enough for man to live with decency. While recognizing theses goals of industrialism, labor's acceptance of technology drives -- though sincere and hopeful -- remains tentative and confused." (12)

543.3.5 The picture of union desire for security as related to technological change seems to boil down to this: unions realize that change will continue to take place, and want to be on the bandwagon, but individual union members are afraid that they will be the one replaced by a machine. This view is supported by a study of local unions by Leonard Sayles and George Strauss:

". . . automation is a creeping phenomenon and one about which it is difficult to formulate a clear union policy or to arouse clear membership support. Normally it affects only a few workers at a time. The strong and understandable desire of individual workers to hold on to what they have encourages a certain amount of selfishness and makes unity behind job protection measures difficult to achieve. One steward explained: The members are divided on the basis of seniority.

The high seniority men are sitting pretty and don't pay much attention to the fact that men with lesser seniority are being laid off. They seem to say 'it is not happening to me' and they close their eyes to what is happening." (13)

543.3.6 The second element of the job security goal of unions, fear that others will take over some of their work, is expressed in the jurisdictional dispute. This occurs when there is a disagreement about which trade is responsible for a portion of the work, such as whether carpenters or plasterer should install drywall. In the event that jurisdictional disputes cannot be settled by the parties involved, they may be presented to the National Joint Board for the Settlement of Jurisdictional Disputes. (14) The introduction of industrialized building technology tends to increase the number of these disputes.

544 ATTITUDES TOWARD PREFABRICATION

As can be imagined from the foregoing discussions of industrialization and labor union goals in general, the attitudes of unions toward industrialization in the building trades are quite varied.

544.1 UNION STRATEGIES

"Unions faced with technological change may adopt one of three strategies: (1) the policy of obstruction; (2) the policy of competition; (3) the policy of control. The strategy adopted will not necessarily be a national one. A local with many unemployed members may attempt a policy of competition or obstruction, while a local which enjoys a tight labor market may actually welcome changes which raise the marginal product of its members. Haber and Levinson found evidence of all three strategies: bricklayers, for example, concerned with the rise in the use of brick substitutes, approved the use of a new, larger-sized brick (policy of competition). Lathers and plasterers use both direct and indirect methods of competition in their effort to prevent the use of drywall, which completely substitutes for the services of their crafts. While working to reduce the desirability of drywall through building codes and publicity campaigns, the unions have accepted and encouraged the use of the plaster gun. Carpenters have generally followed a policy of control and have not objected to the use of small power tools provided they are operated by union members. A case of obstruction may be found in the painters' restrictions on the use of the spray gun, although they have only rarely resorted to outright prohibition. " (15)

544.2 LEGAL INFLUENCES

544.2.1 The legal influence on union reaction to prefabrication is somewhat confusing. In most industries, "hot cargo" agreements, those which force and employer not to do business with a particular outside firm, such as might be used to keep a contractor from using prefabricated items, constitute an illegal secondary boycott.

544.2.2 "Prior to the amendment of the NLRA by the Labor-Management Reporting and Disclosure Act of 1959, the statutory secondary-boycott prohibitions applied only 'forcing or requiring' one person to stop doing business with another person. Hence, an employer might, if he chose, voluntarily agree with a union not to deal with

certain persons, although a union could not lawfully attempt to enforce such an agreement by strike action. Now, Section 8(e),

added to the NLRA by the 1959 amendments, forbids the mere execution of such 'hot cargo' agreements and makes it an unfair labor practice for an employer and a union to enter into such an agreement." (16)

544.2.3 However: "A proviso to Section (e) exempts from that section's provisions agreements between unions and employers in the construction industry relating to the contracting or subcontracting of work to be done at the site of the construction, alteration, painting, or repair of a building, structure, or other work. The exemption does not extend to 'hot cargo' agreements concerning supplies or other products or materials produced or manufactured elsewhere and delivered to construction sites.

544.2.4 "Reversing an earlier policy, the NLRB now holds that picketing or other coercion to obtain a hot cargo pact in the construction industry is lawful. Some Federal courts support this policy, but most courts disagree. Also reconsidering an earlier decision, the Board holds that picketing to "reaffirm" a hot cargo contract prohibiting subcontracting to nonunion firms is lawful; however, picketing to enforce the contract against specific nonunion firms would be unlawful, the Board said. A Federal appeals court ruled that a subcontracting clause is primary, and lawful, if it affects the labor relations of a general contractor and protects his employees only; if it aims to regulate working conditions of a subcontractor's employees or sanctions a boycott against a subcontractor, then the construction industry's hot cargo exemption would not permit enforcement of the clause through picketing." (17)

544.2.5 This would seem to suggest that unions could legally force contractors to deal only with union-approved subcontractors for all work on the building site itself, but could not boycott products manufactured elsewhere. The way such a law works in practice, however, can be seen in the following reviews of two recent court decisions. Both of these cases revolve around the NLRB's right-of-control test.

544.2.6 Under this test, if the owner, architect or engineer specifies the product, then the contractor has no control over its use. In the absence of such control, union refusal to handle the product cannot be a primary dispute between the union and the contractor over preservation of on-site jobs and must, instead, be an illegal product or secondary boycott.

544.2.7 "Boycotts of prefabricated building parts are commonly provided for in collective bargaining agreements in the construction industry as a mean of work preservation, and they are not unlawful. But are they statutorily protected also in situations where the reassembled parts are specifically required by the job contract? A Federal court of appeals has said they are.

544.2.8 "A contractor, whose agreement with a plumbers' union provided that installation of all pipe two inches and under would be done by employees on the job site, won a bid for a construction job specifying that certain heating and cooling equipment be preassembled in the factory. Such equipment involved the use of pipes described in the union agreement.

544.2.9 "The union ordered the workers not to handle the equipment, and the work did not progress. The contractor claimed that the provisions of his job contract placed the situation beyond his control and that the union was actually in dispute with the party – a hospital – for which the job was being done, since that party alone could change the specifications.

544.10 "In adjudicating the case, the NLRB upheld the contractor by applying its 'right to control' (more precisely, power to control) test for determining of secondary boycott activities." (18)

544.2.11 However, this was not how the court of appeals viewed the situation. In short and simple language, the court in effect said that the contractor had no business signing a job contract which called for prefabricated parts when he knew that his union contract barred the use of such parts.

544.2.12 The court expressed dissatisfaction with the NLRB's "right to control" test and said, "We believe that (the) test must be abandoned", citing similar conclusions of commentators and all the other Federal appellate courts. (19)

544.2.13 A later court decision on another hospital project had a similar result: "The U.S. Court of Appeals for the District of Columbia has, for the second time, told the National Labor Relations Board (NLRB) to abandon the right-of-control test it uses in determining whether union refusal to handle prefabricated products is legitimate work preservation or illegal secondary boycott activity.

544.2.14 The case stemmed from carpenter's refusal to install premachined doors on a Decatur, Illinois hospital project. The doors were specified by the architect. The contractor, having no control over their use, was a neutral in the dispute, and the union's objective was to force the contractor to quit doing business with the hospital and the hospital to quit doing business with the door manufacturer, the NLRB ruled." (20)

544.2.15 Again the court disagreed:

It "called the test narrow, mechanical, mistaken and artificial. 'The legal effect of the board's test is to allow an employer to bind his own hands and thereby immunize himself from union pressure occasioned by his employees' loss of work. In one act, the employer helps to create a labor conflict and simultaneously washes his hands of it. The result goes far beyond the purposes of prohibiting secondary union activity: to limit the arena of economic conflict, to protect uninvolved, truly neutral parties from becoming involved in labor disputes not their own." (21)

544.2.16 The NLRB has indicated in a subsequent decision, however, that it will continue to use the right-of-control test except in those cases where the courts specifically order it not to do so.

544.3 NATIONAL UNION POLICY

544.3.1 Union policy toward prefabrication, expressed at the national level, is quite positive. Almost without exception, national union leaders express cooperation with attempts to industrialize. Some trades see increasing prefabrication as being clearly in their interest. Hunter P. Wharton, President of the International Union of Operating Engineers, is, enthusiastic: ". . . speaking for the Operating Engineers Union, the expanded work opportunities for hoisting engineers in the assembly of modules and large prefabricated sections [is an area of promise]." (22)

544.3.2 Similar attitudes are expressed by William Sidell, Vice President of the United Brotherhood of Carpenters and Joiners of America:

"The Brotherhood of Carpenters stands ready to meet our responsibility to our industry and to the society in which we live. It is on this basis that shortly after World War II we took what I believe was a realistic position when we determined that industrial approaches were inevitable for the construction industry, particularly in the housing field. So we decided not to fight their advancement, but rather to get involved and make our contribution to this industry." (23)

544.4 RECENT AGREEMENTS

544.4.1 In spite of the confusion of the law and the wide range of views taken by local unions, the picture is not necessarily unfavorable to prefabrication. In a sense, we have been talking about the unusual cases; in the majority of cases, unions are accepting more and more prefabrication and moving to insure that they are included. Some examples of current agreements which pave the way for increasing prefabrication are the following:

1. The Laborer's International Union of North America now claims contracts with 80% of the systems building firms in the U.S. engaged in factory-built housing production. (24)

2. "Tri-trades" agreements between Electrical Workers, Carpenters and Plumbers, and several housing system producers, that extend craft union benefits to factory workers and provide for interchangeability of work among the three crafts, lessening the likelihood of jurisdictional disputes. (25)

3. A labor agreement paying plumbers the same rate for in-factory work as for on-site construction in the making of prefabricated "plumbing walls." While per hour labor costs are the same, the chief savings come from uniform design, factory assembly, less chance for pilferage on site, and greater predictability of cost for the contractor. (26)

544.4.2 On the other hand, after signing an agreement with the United Association of Plumbers and Pipefitters, providing that if prefabricated plumbing walls manufactured by U.A. members they would be accepted on the job site, one manufacturer found that problems still arose with local unions.

One local would agree to install prefabricated plumbing walls only if they were manufactured within the jurisdiction of the local union. In this case, the local union did not want their jobs taken away by plumbers elsewhere, union or not.

544.4.3 This case seems to summarize the present situation. National unions and many union members are willing to go along with prefabrication; however, problems can easily crop up in dealing with local unions.

544.5 FUTURE TRENDS

A glimpse into the future may be provided by certain Construction Industry Collective Bargaining Commission recommendations, which former Secretary of Labor George Schultz planned to push for implementation. The new commission has called for an end to rank-and-file ratification of contracts by union workers, recommending instead that national unions and contractor associations be empowered to approve action of their local subordinate. Wage rates will be adjusted to local variations, however. Variation of work rules and wage rates by locality, and the need for local ratification of union agreements, have been a constraint to the prefabrication of components for national or international markets.

545 DETERMINING LOCAL UNION REACTION TO PROPOSED PREFABRICATION

As we have shown, there is no single national attitude on the part of the unions strong enough to guarantee acceptability or non-acceptability of a proposed case of prefabrication at the local level. How then does one determine the acceptability of a certain sort of prefabrication in a given area at a given time?

Several sources of information about local conditions are available. If the item in question is already on the market, the manufacturer may be able to provide valuable information if he has had experience in this area. It is clearly to the manufacturer's benefit if he can get his product accepted and he may be willing to do most of the work. One should be careful, however, because the manufacturer's experience in one part of the country does not necessarily mean conditions will be similar elsewhere.

A survey of local contractors may yield information about precedents in the area, and the local office of the Association of General Contractors may be helpful.

Naturally, one would thoroughly check local codes and, if possible, existing labor contracts for the various trades. If there is any uncertainty at this point, one should go to the Building Construction Trades Council, with an introduction from one of the unions involved. The Construction Trades Council will help determine which trades are involved and what their attitudes may be. It is important to deal with the crafts involved before a decision is made, and one should develop as strong a case as possible, for example, insuring that there will be a project built.

546 CONCLUSIONS

1. Despite the variations in local attitudes and the lack of agreement in the courts toward unions' right to control the degree of prefabrication on construction projects, the total picture seems to be encouraging. National union policies indicate that the leadership understands that prefabrication will almost inevitably increase, and that unions must find ways to work within this trend. It is clear to these national officials and many union members that they can at best only temporarily hold back industrialization by policies of obstruction.

2. At present, however, a great deal of power rests with the local unions, who are primarily concerned with their own job security rather than national trends. This is likely to be a continuing, though diminishing problem, and one, which may crop up at any place or time. Thus, while the trend is favorable, it should not be taken for granted that it applies in any specific case.

3. It seems likely that building trade unions will attempt to extend their jurisdiction into factories making prefabricated components. Union labels will identify work done in factories by union employees, making it acceptable to job site craftsmen.

4. Because of year-round employment and controlled working conditions, factory wages for workers will run about 80% of that of on-site construction wages, except where agreements require the same benefits for craftsmen either on or off the site. Factory workers will generally be less skilled, so unless other production efficiencies are inherent in the factory fabrication, lower wage rates will not in themselves significantly reduce costs.

5. Bargaining will increasingly be done at a larger scale, with large manufactures instead of small contractors, and national union groups instead of local entities.

6. Establishment of intertrade work rules for labor, so that one tradesman can overlap into the area of another, appears to be acceptable for factory fabrication labor agreements.

7. Elimination of the need for local ratification of labor agreements would open the way for national agreements on the use of prefabricated components in national and interregional markets by establishing one consistent set of work rules through the nation.

8. Based on recent evidence, the building trade unions are beginning to show more willingness to see factory fabrication as the way of the future, and are moving to insure that their members are included.

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20. Engineering News Record, April 29, 1971, p.44.

21. Ibid, p.44.

22. HUD Challenge, March 1971, p.7.

23. Ibid, p.8.

24. Engineering News Record, June 17, 1971, p.3.

25. HUD Challenge, March 1971, p.7.

26. Engineering News Record, June 24, 1971, p.13.

550 Laws and Regulations

551 CODES

551.1 The Building System Prototype Design has been developed in complete compliance with the NFPA National Fire Codes, The Uniform Building Code, the National Building Code, and the National Plumbing Code. It is the intent of the design Manual that all detailed system and building designs developed from the Prototype Design maintain this compliance unless specifically determined otherwise by appropriate authority.

551.2 Codes differ from each other many items, and are all subject to variable interpretation and modification. From the point of view of the building system, which must have nationwide applicability over a reasonable period of time, the spirit is more important than the letter. Regardless of how a particular regulation may be interpreted, the overall objective is a safe, functional building that provides an environment appropriate to its programmed activities. No point in the description of the Prototype Design should be construed as a release from this general responsibility.

551.3 A chief difficulty in the application of codes to the design of buildings in general, and systems building in particular, is that they tend to be reactive rather than anticipatory. That is, they may scrupulously regulate traditional modes of construction, but they can become confusing or misleading, or simply fail to provide guidance, when new modes are introduced.

551.4 This problem has become quite apparent in regard to the increasing use of “adaptable” building components and “interstitial” space. The issue is not that these relatively new concepts violate the codes in some way, but simply that the codes do not refer to them at all. Under these circumstances, a safe building cannot be produced solely on the basis of a “correct” interpretation. The A/E and the authorities having jurisdiction must take the systems approach to an overall fire safety “strategy” for each individual project in accordance with its unique characteristics of program, site, building configuration, etc.

551.5 When this approach is taken, the Prototype Design provides the opportunity for certain innovations. The organization of the building into mechanically independent service modules which coincide with fire sections and which concentrate all vertical shafts in special bays at the

perimeter, suggest a more positive use of the HVC system during a fire than is possible with more conventional arrangements. For example, it may not be necessary to shut down return air throughout the building, but only in the area of escape. Adjacent areas of refuge might be automatically pressurized to prevent spread of smoke, while the exhaust rate within the affected module is boosted. These special modes are not required by the Prototype Design, they are merely provided as alternatives when a particular strategy is being developed.

552 FEDERAL PROCUREMENT REGULATIONS

The following sections have been selected and reviewed because they are applicable to the system.

552.1 Use of Federal Specifications; Para 1-1.305.5 requires the use of Federal, or Interim Federal Specifications when available for material, equipment or service specified in Federal construction. Para 1-1.350-3 stipulates the conditions for deviating from these specifications. Federal Specifications have been reviewed and no deviations are apparent.

552.2 Use of Federal Standards: Para 1-1.306-1 requires the use of Federal Standards by all executive agencies. Remarks above concerning Federal Specifications also apply here.

552.3 Formal Advertising: Para 1-18.102.1 permits exceptions to the requirements for formal advertising in the case of experimental construction. It is not now anticipated that any exception would be necessary for the proposed demonstration hospital.

552.4 Construction Specifications: Para 1-18.107 states that the technical provisions of construction specifications will be appropriate for competitive bidding, and will be sufficient for completion of construction without additional specifications. This may be in conflict with certain forms of construction management, and/or with some types of product development program.

552.5 Type of Contracts: Paras 1-18.111, 1-18.201, 1-18.306, 1-18.307 and 8-18.111 discuss the use of firm fixed-price and cost-reimbursement type contracts. The latter type, combinations of the two types, and negotiated contracts of either type are permitted only under special conditions. This could present some constraint to the use of a construction manager.

553 VA MANUAL M-7

553.1 Manual M-7, titled “Planning Criteria for Medical Facilities”, is prepared by the Veterans Administration, Department of Medicine and Surgery. It is the general space criteria for all VA hospital planning and is in conformance with Bureau of the Budget policy (Circular A-57)

553.2 Manual M-7 represents a complication of extensive investigation and the collected judgment of many persons within the VA. It is periodically re-evaluated and revised to respond to changing medical technology and data gathered from various VA field stations.

553.3 It is the intent of the Prototype Design to conform to the criteria expressed in Manual M-7 as well as those changes currently under study. It is essential, however, that the building system allow a range of options, which will accommodate future changes in planning criteria. Therefore, current VA planning criteria, such as M-7, represent only one option within the system. (See Section 634 for recommendations concerning a review of M-7.)

554 VA CONSTRUCTION STANDARDS

554.1 SUBSYSTEM CHECKLIST

The following checklist indicates which VA Construction Standards are applicable to each subsystem.

554.1.1 Structure

Tolerances	4-1
Prestressed concrete	4-2
Anchors for masonry	6-3
Steel frame design	12-1
Floor slab surfaces	CD-15
Details regarding handicapped	CD-28
Standards and codes	CD-30
Roof structures	CD-38
Fire protection	FPS-12, FPS-16

554.1.2 Ceiling

Cubicle curtain tracks	15-1
Medical gas outlets	311-1
Supply conveyor enclosures	860-1
Standards and codes	CD-30
Ceiling heights	CD-34
Flame spread and smoke development	FPS-6
Exits and exitways	FPS-9
Fire sections and partitions	FPS-11
Fire protection	FPS -12, FPS-16

554.1.3 Partitions

Corner protective guards	14-2
Metal door bucks	24-1
Vinyl wall coverings	35-1
Ceramic tile	42-1
Automatic door control	54A-1
Medical gas outlets	311-1
Electric receptacles	801-3
Supply conveyor enclosures	860-1
Dwarf partitions	CD-14
Doors	CD-21
Razor blade receptacles	CD-25
Details regarding handicapped	CD-28
Standards and codes	CD-30

Electrostatic shielding	CD-33
Ceiling heights	CD-34
Fire apparatus cabinets	FPS-3
Flame spread and smoke development	FPS-6
Exits and exitways	FPS-10
Fire doors	FPS-10
Fire partitions	FPS-11
Fire protection	FPS-12, FPS-16
Laundry chutes	FPS-14
Trash chutes	FPS-18

554.1.4 Heating-Ventilating-Cooling

Refrigeration equipment	651-1
Condensate return piping	683-1
Location of ducts	CD-3
Standards and codes	CD-30
Pipe labels	CD-32
Roof-mounted equipment	CD-38
Fire protection	FPS-12, FPS-17

554.1.5 Plumbing Distribution

Plumbing standards	301-1, 301-2, 301-3, 301-5, 301-6, 301-7
Downspouts	CD-2
Location of piping	CD-3
Details regarding handicapped	CD-28
Standards and codes	CD-30
Pipe labels	CD-32
Automatic sprinkler protection	FPS-5, FPS-9
Standpipes	FPS-7
Fire protection	FPS-12

554.1.6 Electrical Power Distribution

Electrical system	800-1
Location of conduits	CD-3
Details regarding handicapped	CD-28
Standards and codes	CD-30
Fire protection	FPS-12
Essential hospital electrical service	FPS-15

554.1.7 Non-System Items

Thermal insulation of exterior wall	31-1
Roof isolation	31-2
Ceramic title	42-1
Pneumatic tube systems	307-1
Water softening	406-1
Dietetic equipment	502-1, 502-2
Refrigeration equipment for HVC	651-1
Central plant	700-1, 700-2
Alarm system	801-7
Remote dictating system	806-1
Antenna system	813-1
Entertainment system	814-1
Elevators	850-1
Dumbwaiters	850-2
Laundry equipment, women's psychiatric ward	CD-12
Window curtains	CD-24
Details regarding handicapped	CD-28
Roof decks	CD-29,
Standards and codes	CD-30, FPS-12
Curtain walls	CD-31
Electrostatic shielding	CD-33
Windows	CD-35
Roof structures	CD-38
Dietetic equipment exhaust	FPS-4
Cooling towers	FPS-13
Laundry chutes	FPS-14
Fire protection	FPS-12, FPS-16
Trash chutes	FPS-18
Fire alarm systems	FPS-19

554.2 DISCREPANCIES

554.2.1 Construction Standard 4-2 implies that prestressed concrete construction should not be used in seismic areas. If applied within the system rules for the Prototype Design, there is no engineering reason why prestressing should be used anywhere in the country. Prestressed concrete may in fact be expected to usually provide the most economical detailed design solution.

554.2.2 CD-15 implies that concrete floors slabs must either be monolithic or have a toping slab of 1-1/2 inches. The Prototype Design calls for a three-inch topping slab to simplify and expedite original construction and particularly to facilitate adaptability in relocation of items requiring depressions.

554.2.3 24-1 requires certain door bucks to extend through the ceiling to the slab above. The Prototype Design specifies that no such frames may penetrate the ceiling, i.e., they must receive all necessary structural support from the ceiling itself. This is done to simplify door installation and relocation, and to minimize obstruction in the service zone.

554.2.4 CD-25 requires used razor blade receptacles to be recessed within partitions. The Prototypes Design calls for all such items to be surface mounted, in this case integrated into a lavatory console. The purpose is to protect the acoustic properties of partitions and to facilitate relocation of service elements.

554.2.5 CD-34 permits ceiling heights under nine feet in certain areas. The Prototype Design specifies a uniform ceiling height throughout, and nine feet is recommended in bed-care areas. The same Construction Standard also requires a minimum height of ten feet in laboratories, presumably for fume hood clearance. If an entire floor, or a large area such as a fire section, were to be assigned mainly as laboratory space, a uniform height of ten feet could be established by increasing floor-to-floor height by one foot. For small laboratories, however, conformity to the nine-foot height should be workable.

554.2.6 FPS-3 requires that fire apparatus cabinets in patient areas be recessed into partitions. Although this can be done within the Prototype Design, it is discouraged except where really necessary, for the reasons started in 554.2.4 above.

554.2.7 FPS-11 requires all corridor partitions to be full height and fitted to the floor slab above. The Prototype Design calls for these partitions to stop the ceiling. None of the building codes used by the VA (NFPA Life Safety Code, NBC and UBC) require the extension of corridor partitions beyond the ceiling. FPS-11 itself allows one-hour smoke barriers to stop at the ceiling provided the ceiling is rated at one hour and is “impermeable” to smoke and fumes. The assumption made for the Prototype Design is that if the ceiling provides one-hour separation, then corridors are adequately protected by one-hour partitions that stop at the ceiling.

In any case, the detailed characteristics of the ceiling and partitions must be developed as part of an overall fire safety “strategy” as discussed in Section 551.4 above.

555 VA MASTER CONSTRUCTION SPECIFICATIONS

555.1 SUBSYSTEM CHECKLIST

The following checklist indicates which VA Master Construction Specifications are applicable to each subsystem.

555.1.1 Structure

Concrete	4
Roofing slabs, precast concrete	7
Caulking and sealant	8
Steel decking	11
Structural steel	12
Sprayed-on fireproofing	12A
Painting	56
X-ray construction	64

555.1.2 Ceiling

Concrete	4
Roofing slabs, precast concrete	7
Caulking and sealants	8
Steel decking	11
Structural steel	12
Gypsum roof decks	13
Miscellaneous metal work	14
Miscellaneous building specialties	15
Lathing and plastering	28
Drywall construction	33
Acoustical treatment	34
Painting	56
Electromagnetic shielding	58
X-ray construction	64

555.1.3 Partitions

Caulking and sealants	8
Miscellaneous metal work	14
Miscellaneous building specialties	15
Hollow steel doors and frames	24, 24A
Various partitions	27A, 27B
Lathing and plastering	28
Carpentry and millwork	30
Dry wall construction	33

Acoustical treatment	34
Wall coverings	35
Glazed wall surfacing	35A
Ceramic tile	42
Builders' hardware	54
Automatic door operators	54A
Painting	56
Electromagnetic shielding	58
X-ray construction	64

555.1.4 Heating-Ventilating-Cooling

Miscellaneous building specialties	15
Painting	56
Air conditioning	600
Air-handling units	601
Unitary air-conditioning equipment	604
Exhaust systems	622
Air ducts and devices	681
Piping systems (HVC)	683
Automatic control systems	688
Thermal insulation (HVC)	692
Vibration bases and equipment	695
Testing and balancing	699

555.1.5 Plumbing Distribution

Painting	56
Hydro-pneumatics	300
Interior plumbing	301
Plumbing fixtures	302
Oxygen system	311
Nitrous oxide system	312
Central suction system	313
Compressed air system	317
Fire protection system	321

555.1.6 Electrical Power Distribution

Painting	56
Basic electrical requirements	800
Electrical circuits	801
Electrical power and control equipment	802
Lighting systems, indoor	803
Electrical power system, auxiliary	804
Electrical power systems, isolated	805

555.2 DISCREPANCIES

555.2.1 Section 33, Drywall Construction, refers to partitions extending above suspended ceilings contrary to system rules.

555.2.2 Section 33 also describes suspended ceilings which would not meet the subsystem performance requirements. Since there are a number of different ways that a ceiling could be detailed within the limits set by the Prototype Design, appropriate specifications cannot be written until the specific design has been developed for an actual building project.

555.2.3 There are currently no Master Specifications for prestressed or precast structural concrete, and these are both generic design options within the Prototype Design.

555.2.4 The use of phased bidding and/or construction management may require special bid forms, etc. The following documents could be affected:

Bid Form	BF
Invitation for Bids	IFB
Instructions to Bidders	IBF
General Provisions	GPF
General Requirements (over $10,000)	GR
General Conditions	G
Samples and Shop drawings	S

No changes are necessary to the above documents if the system is used without bidding change or construction management.

556 VA STANDARD DETAILS

556.1 SUBSYSTEM CHECKLIST

The following checklist indicates which VA Standard Details are applicable to each subsystem.

556.1.1 Structure

Floor slab depressions	1B
Stair details	10a to 10F
Showers	13, 13A
Lead lining in X-ray rooms	24
Lead sleeve for vertical pipes passing through lead lined floor	24J
Elevators	29 to 29G
Expansion joint cover plates	30
Seal strip details	31
Ceiling support for X-ray tube stand	36
Letter box and mail chute	38
Therapeutic pool details	47

556.1.2 Ceilings

Schedules of interior finishes	2
Operating and EEG room details, shielding	23, 23A
Lead lining in X-ray rooms	24

556.1.3 Partitions

Schedule of interior finishes	2
Base, wainscot and wall finish details	3
Ceramic tile trim shapes	3A
Partition coursing details, exposed concrete masonry units	3B
Partition framing details, metal stud and plaster	3C
Corner guard details, interior	5
Door schedule	7
Doors to patients' bedrooms	7A
Door details	7B
Frames for interior doors	8
Frames for manually operated sliding doors	8A
Frames for automatic sliding doors	8B
Observation windows	11

Toilet stalls, urinal screens and dressing booths	12
Showers	13, 13A
Grab bars	14 to 14B
Razor blade receptacle	16
Ceramic tile panels	17
Corridor wall railing	19
Seats in shower stalls and dressing booths	20, 20A
Chalkboards and bulletin boards	21
Operating rooms and EEG room details, shielding	23 to 23B
Lead lining in X-ray rooms, etc.	24 to 24G
Cassette transfer cabinet	24H
Bed wall outlets	26 to 26H
Elevators	29 to 29G
Post office details	46
Vanity	53
Shelving	60 to 60H
Pass window details	62
Racks	64B, 64C
Cabinets	70 to 70N
Kitchen cabinets	71 to 71E
Counters	72, 72A
Thru-wall counter	72K

556.1.4 Heating-Ventilating-Cooling

Louver details	9
Operating and EEG room details, shielding	23A
Cabinets, nurse server	70

556.1.5 Plumbing Distribution

Plumbing fixtures	4 to 4C
Toilet stalls, urinal screens and dressing booths	12
Showers	13, 13A
Mirror and lavatory elevations	15
Oral surgery room or dental treatment alcove	22
Dental X-ray room or dental X-ray and examination room	22A
Operating and EEG room details, shielding	23, 23B
Lead sleeve for vertical pipes passing thru lead lined floor	24J
Bed wall outlets	26 to 26H
Benches	52

Vanity	53
Cabinets	70B, 70C
Kitchen cabinets	71 to 71E
Counters	72B
Kitchen table with sink	73B
Soiled dish table	73C
Kitchen sink	73D
Sinks, free standing	73E

556.1.6 Electrical Power Distribution

Bed wall outlets	26 to 26H
Benches	52
Vanity	53
Cabinets	70B, 70C
Kitchen cabinets	71 to 71E
Counter	72B

556.2 DISCREPANCIES

556.2.1 Detail 1B indicates requirements for slab depressions up to four inches in depth in ward areas whereas the system rules call for no depressions in the structural slab and provide a tree-inch topping which is sufficient for shower stalls, etc., given appropriate modification of curb details. If in a particular case deeper depressions are really indispensable, either a thicker topping slab may be used or the structural slab may in fact be dropped. In either case structural cost is increased, and with the latter solution adaptability is reduced.

556.2.2 Details 8 and 8B show door frames penetrating the ceiling. See 554.2.3 above.

556.2.3 Detail 15 indicates lavatory plumbing enclosed in partitions. The Prototype Design calls for services to be contained in surface mounted containers. See 544.2.4 above.

556.2.4 Details 26A to H show bed wall outlets flush mounted. Comment on Detail 15 above applies.

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