T I T L E P A G E

PLATEAU HOSPITAL JOS

(A REDEVELOPMENT SCHEME - Towards an effective implementation of the Programme - Health for all by the year 2000)

BY

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D E C L A R A T I O N

I hereby declare that this Thesis has been written by me and that it is a record of my own research work. It has not been presented in any previous application for a higher degree.

All quotations are indicated and the sources of information are specifically acknowledge by means of references.

D E D I C A T I O N

Dedicated to:

1. My late Daddy and Mummy
2. My wife Regina for immense love and concern.
3. My two sons Masters Mang and Dalyop for missing my love and company all this while.
4. All those that are patient, perseverant, dedicated and God fearing.

C E R T I F I C A T I O N

This thesis entitled Plateau Hospital Jos (A redevelopment Scheme - towards an effective implementation of the programme - Health for all by year 200) by Dalyop Bot Chuhwak (Lo-Jick) meets the regulations governing the award of the degree of Master of Science (Architecture) of Ahmadu Bello University, and is approved for its contribution to knowledge and literary presentation.

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A C K N O W L E D G E M E N T

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May God in his magnificient love richly bless, reward and help everyone of us and those not mention because of lack of space Amen.

DALYOP BOT CHUWAK

A B S T R A C T

It is said "Health is wealth and a healthy nation is a wealthy nation". Effective and efficient health care delivery system is of paramount importance in any part of the world, thus the huge investment on Health Care Delivery Programmes, struggles for food, shelter and above all, Health.

Health care is as old as Man himself and ever then, so much had and is still being done to improve on the Health Care Delivery System the world over. Significantly enough, society's needs are influenced by many a factor, knowledge (in terms of technology) inclusive and population growth rate are said to be over-riding.

Many hospitals today are not well equiped to cope with the teaming populace intended for and have failed in the adaptability of modern trends or requirements in hospitals. This is use most of these hospitals were built during the colonial era when there were no proper studies, research carried out and the lack of foresight into the forecast of the future.

Plateau Hospital Jos was built around 1923 by the white tin miners and was known as British European Hospital, It is was exclusively for the whites and the black labourers attended theirs at Barakin Ladi.

Today it is the only Government Hospital in Jos the State Capital and environs. It only caters for the State civil servants on Grade Levels 0'7 and above. It charges a token fee for the services rendered and for private patients pay twice ! as much. !

A redevelopment scheme (modernisation in this context is any programme whereby extensive alterations and/or renovations I in an existing plant are undertaken. Such alterations and

renovations may occur for a number of reasons, including those related to: changes resulting from additions, roles and programme changes, functional obsolescence and physical obsolescence.

GOALS AND OBJECTIVES

1. To redevelop the hospital that will enhance proper coordination of the various departments.
2. To revelop the hospital that can easily be expanded to meet the future needs of the populace.
3. To provide a possible solution to the proplem of over-congestion and over-crowding in the hospital (by creating more space).
4. To provide a much more comprehensive circulation pattern which is very important in a hospital.
5. To provide adequate health care facilities using the most up to date scientific equipment.

Consideration would be adequately given to population (growth rate) in the replanning process.

RESEARCH METHODOLOGY

1. Interviews with Hospital Management Board, the Ministry of Health, Hospital staff and patients.
2. Visiting the various departments with a view to appraising their fitness in serving the functions for which they were meant.

SCOPE AND LIMITATIONS

The main sections in the hospital ares

(a) Out-patient
(b) In-patient

The v rious departments of the above includes

1. Medicine
2. Surgery
3. Orthopaedic
U. Obstetrics and Gynaecology
5) Radiology
6. Pathology
7. Psychiatric
8. Ear, Nose and throat (E.N.T.)

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INTRODUCTION

People once thought that man's basic needs are food, clothing and shelter. For a large part of the world's population, the satisfaction of these needs even on subsistence level is still a desperate problem. Societies are advancing, man is now asking for more than the bare necessities of life, he is asking for enrichment and fulfilment. These can be supplied only by means of an extremely complex social and industrial organisation. Man has a strong need for a physically and psychologically harmonious environment, but he has subordinated this need to the pursuit of other goals until it no longer occurs to him to question the lack of harmony in his surroundings. But whatever the stage of development of a society, adequate health care is today considered the right of every individual. If it were desirable for no other reason, good health care plays an important role in stimulating economic development. When suffering is reduced and the possibility of a longer and richer life unfolds, people face their future with more optimism and confidence. They become more capable of improving their condition and other productivity rises. Thus health care is achieved through hospitals. These are social institutions utilising a complex combinations of different scientific equipment and functions manned by a team of trained medical, paramedical and non-medical personnels,. It is the duty of the architect to plan, replan and design a hospital complex that utilises effectively the talents and time of the employees and provide an efficient and save services to the patient. The design of the hospital is so complex that the architect needs the assistance of some hospital staff to undertake such a design i.e. who provide service to the patient.

It is the duty of the architect to plan or replan (as the case may be) a hospital complex designed so that it utilizes effectively the condi-

tions under which human beings can work together at their best in the service of their human beings who need help; that it may be urgent that the complex and technically sophisticated hospital environment be physically arranged to diminish the fragmentation of hyper-specialised profession in a hyper-specialised world. The architect needs to remember that people move on two legs and are not mechanical devices; that the most direct, the most meaningful and most effective way for people to talk to each other is face to face; that to conserve talent and energy may be preferable to building preconceived forms and devise mechanical safety in an attempt to correct ill conceived forms.

Hospitals, as they are today, are classified into categories according to the level of sophistication of services they rendered.

1. TEACHING HOSPITALS:

Teaching hospitals are the most sophisticated in the hospital categories and they provide for training of undergraduate and post-Graduate medical students and invariably contain significant research facilities. In these hospitals, number of beds does not indicate level of sophistication.

2. SPECIALIST HOSPITALS:

These are hospitals that deal with one category of patient only, that is, patient with a particular type of ailment e.g. mental illness, mental retardation and geriatrics. A small groups of these specialist hospital (British ones mainly in London) are among the leading centres of Post-Graduate teaching and research in their speciality. New General Hospitals today usually include all such specialties, and make unlikely that many new specialist hospitals will be required.

By far the greatest volume of hospital work undertaken in these existing specialist establishments is in the field of mental illness,

mental retardation (Aro Mental House) in Ibadan Nigeria), and geriatrics: Many of these "patients" are primarily receiving sheltered communual living conditions rather than acute medical or nursing care. Specialist Hospitals are rarely bedded (about 50 - 150 beds) due to limitations of services offered.

3. GENERAL HOSPITALS:

This third category of hospitals caters for all patients with various illnesses. These hospitals referred to as General Hospitals because they are large enough to provide medical services for all (but the more esoteric) specialist services. They sometimes refer patients for completion of treatment to Specialist Hospitals. The sizes of General Hospitals are measured in terms of beds, ranging from about 200 to well over 1,000 beds. And they in turn demand a large catchment population. The majority of new General Hospitals are planned with between 500 and 800 beds although the current nucleus hospitals are planned as viable first phases of 200 to 300 beds.

This is the category that this Thesis is concerned with.

4. COMMUNITY HOSPITALS:

This is the last category of hospitals. It is also referred to as Health Centres and are smaller hospitals of 50 to 150 beds. These hospitals are intended to be staffed by Local Government or sometimes the State Governments and requiring less intensity of medical, nursing and technical services. They provide for patients transferred from the village Dispensaries for medical cases where home circumstances prevent domiciliary care and for some longer-stay geriatric patients. A few also include maternity units.

BRIEF HISTORY OF HOSPITAL DEVELOPMENT THROUGH THE AGES:

The study of man from his beginnings shows that the desire for a

healthy body and mind ranks high among the fundamental instincts, along with the desire for food and warmth, shelter and protection. To serve man's basic urge, the hospital, shaped by various aspects of life and culture, has developed over the centuries a significant place and form in human society the determinants of which have changed as various aspects of life and culture become dominant.

In early times medicine and healing were linked with gods as such hospital forms as existed closely resembled the forms of the temple. Later in classical antiquity, the rational processes of thought were reflected in the plan form which eventually achieved a character of its own; now order and clarity become evident; clear patterns circulations were delineated and attention was paid to functional groupings. During the medieval christian period this clarity was lost, together with classical logic, and hospitals buildings again became undistinguishable from general medieval architectural forms. This time concepts rational planning and logical sequences of function disappeared. This continued in northern Europe as exemplied by the chas of the old Hotel Diev in Paris, but in Italy Renaissance brought back a certain rational clarity to the plan form. The Ospedale Maggiore di Milano demonstrates orderliness and careful attention to circulation and function, but still the altar remains the focal point.

Not until the late 18th and early 19th centuries was the problem of hospital planning treated on a functional and scientific basis. Then the "pavilion type plan evolved, segregating patients into small groups and ensuring natural light and ventilation. This scientific basis was broadened in the latter part of the 19th century by discoveries in medicine and bacteriology, while the functional requirements could be satisfied through the broader spectrom permitted by achievements in

construction and mechanical services. Once more there was orderliness and clarity in the plan; patterns of ciruculation were delineated, functional groupings assembled and a greater respect f shown for human dignity.

EARLY TIME:

Archeologically there was a surprising degree of medical knowledge in very early periods. Trephenining (boring a hole in the skulls to remove pressure on the brain) was widely and successfully practised in Neohthic times; plastic surgery was k known in India in ancient Hindu societies. (This art was developed to cover up amputation of the nose being the contemporary punishment for adultery). As early as the 3rd Century B.C.E (Before the Christian Era) there was appreciation of the need for area-wide planning of medical facilities as indicated by the royal commands of Ashok of India in 226 BCE and Dutthagamini of Ceylon in 137 BCE which decreed that this should be done.

The presence of medicine men in primitive societies as a result of the comprehension of pain by primitive man brought by his own actions, or those of others but inward pain had no viable cavse and was thought to be cavsed by a supernatural force (a displeased god or an evil spirit). These primitive men form a link between the people and the gods, and secondly claim the powers of healing and of exercising evil spiril. Although the people of the Mediterranean basin became more civilised, the primitive pattern of the religion/medicine link persisted - the worship of special deities existing as early as 4000 BCE. These deities "specialised" as they were, in health

care. Shrines were erected to these gods and cults arose around them. Imhotep, the Egyptian, who was both architect and physician to King Zoser of 3rd Dynasty (C.3000 BCE) was later deified and temples were erected in which to worshop him later, in Graeco Latin World, Hygieia, Aesculapins, and Saturn are famous healders frequently mentioned in classical text. The temples enshrining these gods became centres for healing albeit in a rudimentary manner, with the priests as "medical consultants." Fig.1

GREECE:

By the 6th Century BCE medical schools were established at Cos and Cinidos and in 4th Century BCE the Hypocratic collection of medical writings was being compiled. The temples of Aesculapins and the other deities proliferated. The sites chosen were usually alongside mineral waters or warm healing springs and were places of peaceful tranquil landscape selected with that sensitivity to the genuis loci peculiar to the pagans - a sensitivity lost by the later Christian builders. Adjacent to the temple were gymnasia and rooms for patients. The most famous are the temples at Epidaurus, Athens and Perganon.

In addition to the temples there were "lateria" or medical clinics, in which Greek Physicians who were free citizens held consultations and treated their private patients FIG.2. The Greeks demonstrated a concept of enlightened medical care unequalled even today in many areas of the world.

ROME:

The Hellemzation of Rome during the time of the Republic produced similar institutions: these were temples to Aesculapivs and latoc'a for private physicians and then more wealthy patrician

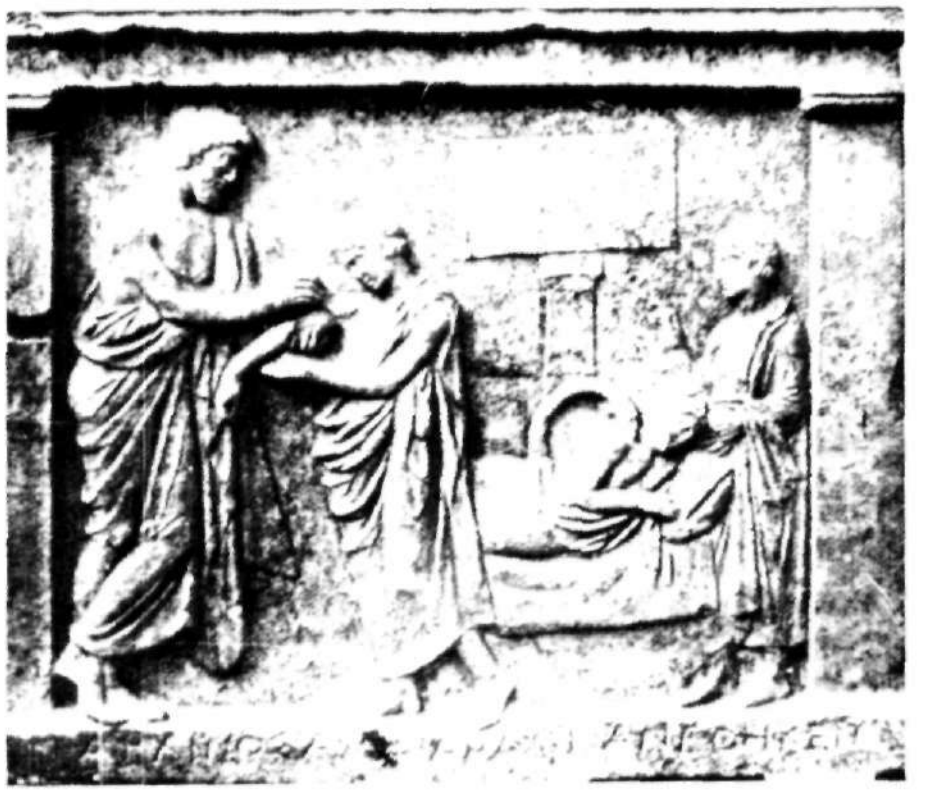


Figure H-1 The priest Medical consultant of classical Greece.

Figure H-2 *Greco-Roman Iatreia.*

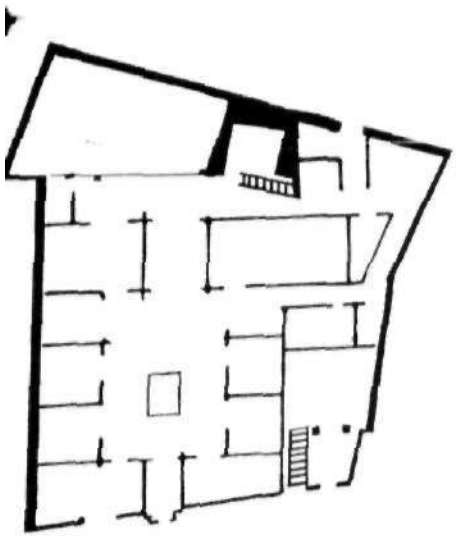


Figure H-3 *Romano-Christian Xenodochium at Ostia, Italy.*

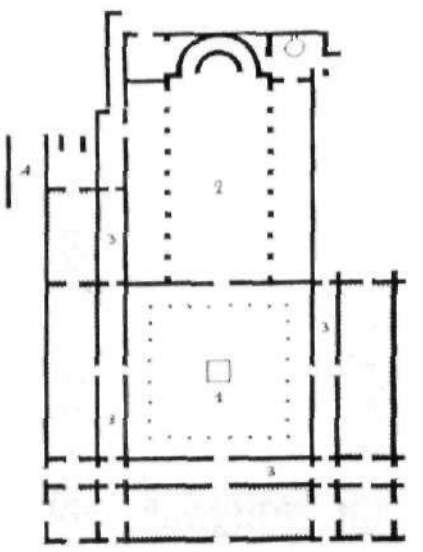
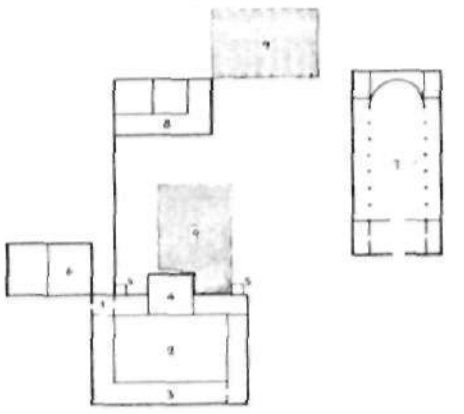


Figure H-4 Sixth Century Xenodochium at Turmanin Syria.



patients. In Rome the temple of Aesculapivs was on a small island in the Tiber, located there as a result of a divine portent. It was the customary practice for cruels slave-owners to dispatch their sick, worn out and dying slaves to this island and leave them there. The Emperor Clandivs, C.E 41 - 54 (Christian = CE), appalled by this vicious practice decreed that all slaves who recovered were henceforth free men. As a result the temple developed into an infirmary for the sick poor, hence a forerunner in society of the hospital as it is known today. Infirmaries were termed "Valetudinaria" and owners of large agricultural estates made similar provision for their slaves who became sick.

As the Roman armies advanced and colonized in the time of the empire, sick and wounded soldiers were sent home, but as the frontiers extended this became unpracticable, and "Valetudinaria" were set up at strategic point. Remains of military "valetudinaria" were uncovered at Carmutum on the Dambe near Venna, and Novaesivim on the Rhine near Dusseldorf. Civil "valetudinaria were set up for the use of imperial civil servants and their families stationed in provincial capitals. This phenomenon in Roman Society and in the structure of the city was the direct ancestor of the hospital in medieval times and of the hospital of today.

The "Valetudinaria" took the form of a porticoed court on to which opened rooms for the sick, and as such a distinct architectural form was beginning to emerge.

CHRISTIANITY:

As Christianity strengthened in the minds of men concepts of clarity and care for the poor and sick asserted themselves in the community. The Roman Empire in the East was more active in the

founding of such charitable institutions,

An example of early area-wide planning was the edict of the Council of Nicea in 325 C.E which decreed that each town should have a separate place called an "Xenodochvim" for sick and ill travellers. Many Xendochia were founded by early fathers. One such, founded by St. Basil near Caesarea and called "Basiliade" in his honour and constructed between 369 and 372. It had pavilious for the sick, a hospice for pilgrims and travellers, an infirmary, a leper hospital and workshops for rehabilitating the disabled and unemployed. St. John of Christendom also in 398 built a similar institution at Byzantium, and by St. Isidose who, in the time of Pope Zachary planned a hospital at Alexandra in Egypt.

Romano - Christian Xenochium believed to have been built in 398 CE excavated at Ostia in 1875. Founded by Panamachivs, a Roman Senator and correspondent with St Jerome Fig.3. The form is obviously Basilican in concept there is a definite sense or organization in the separate patient rooms around the portcoed courtyard. The huking corridors are a clear expression of the pattern of circulation, while the inner courtyard, in addition to articulating the plan, creating a pleasing internal space flanked by the basilica to one side and the patient rooms on the other three sides.

The hospital of Turmanin in central Syria Fig.4 was built in the 6th Century for the early pilgrims to the Holy Sepulchre and later used to serve the sick and wounded from the crusades - a mobile asymmetrical layout. The basilica was no longer the dominant element. The architects solved the functional problem in a graceful architectural expression. Their achievement was

not until the 19th Century equalled. In Europe the first hospital was in France, founded in Arles in the 5th Century, followed by the Hotel Diev in Lyons in 542 then those of Rheims, Bordeavx and Chalon.

One of the most significant hospital buildings of the early Romano - Christian medieval period was that of the Abbey at St Gallen, in Swizerland. FIG.5 described in documents and plans in 820 CE. The architects have brilliantly solved not only the problem of multi-functional complex but set up a form that could be supplemented at different times according to need and financial means. The plan demonstrates an orderliness and respect for functional groupings, each of which are expressed with clarity. The sub-complex of this hospital shows higher degreee of organisation in that there are separate buildings for surgery and patient care and the gravely ill are separately accommodated away from the bedridden and the ambulant. And distinctly different from other hospitals, regards is paid to fresh air, open spaces and sanitation, and the need to contain sick patients in small groups.

From this period until the time of Reformation, the Christian church dominated the hospital both in its form and operation. There was now little difference between the form of the Gothic church and that of the hospital. Classical examples of this period are L'Hotel Dieve de Beaune (1443) and the hospital of the Knights of St. John at Rhodes (1309).

Often the hospital was founded by either a noble patron era guld. St. Batholomew hospital London (1123) founded by Rahere the court of Henry I. L' Hotel Diev at Beaune by Rohin, Chancellor to Louis XI.

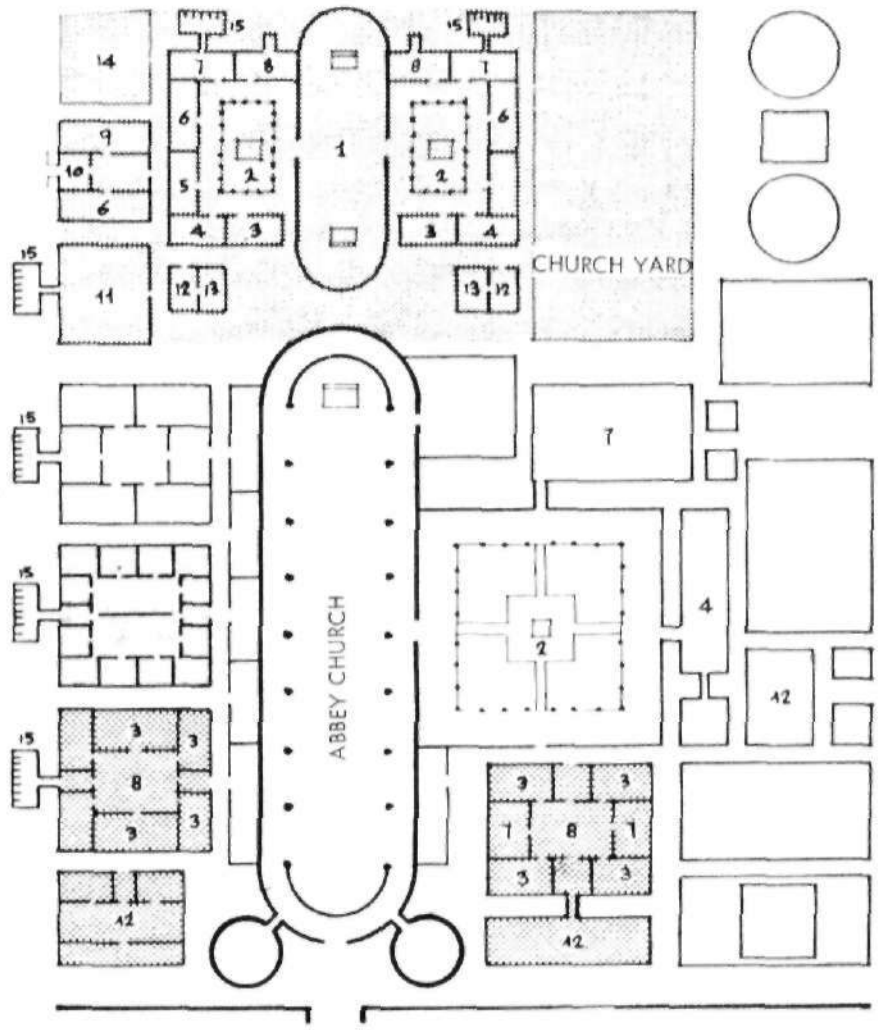


Figure H-5 Abbey at St. Gallen, Switze

Alas, the medical treatment during this period lacked the scientific and pragmatic basis of the Greeks and the plans lacked the functional basis of the late Roman and Romano - Christian plans, together with their concepts of hygiene and sanitation.

THE RENAISSANCE:

The logic of classical Greek and Roman thought which the Renaissance re-established was reflected in the plan form of the hospitals built in Italy in the 15th Century. The most notable examples were Brunelleschi's Ospedale Innocenti, Florence, 1419; Ospedale della Scala, Sienna, 1440; and Ospedale Maggiori di Milano designed by Filareti (FIG.6) in 1456 and partially completed in 1465. The last of these founded by Duke Francesco Sforza, was another instance of Renaissance lords founding institutions to embellish their names. Fillareti's design reflects the rational mind of the Renaissance man. This plan recalls to a degree the clarity of form and pattern of circulation of the Xenodochium at Ostia. The building is more a monument to Duke Sforza and to God than an efficiently organised hospital.

L' HOTEL DIEV, PARIS

The newly discovered rationalism of the Italian Renaissance did not extend to norther Europe where the chaos of the city hospital from medieval times until the 18th century is exemplyfied by the Hotel Diev in Paris (FIG.7 and 7a). Was built originally in 829 it grew with the city. The site was adjoining Notre Dane and constricted but there was enough and adjacent to the seine for expansion during the 13th, 15th and 16th centuries. By the 17th century some 5000 patients were housed in large halls in chaotic conditions, often several patients to a bed with no attention to

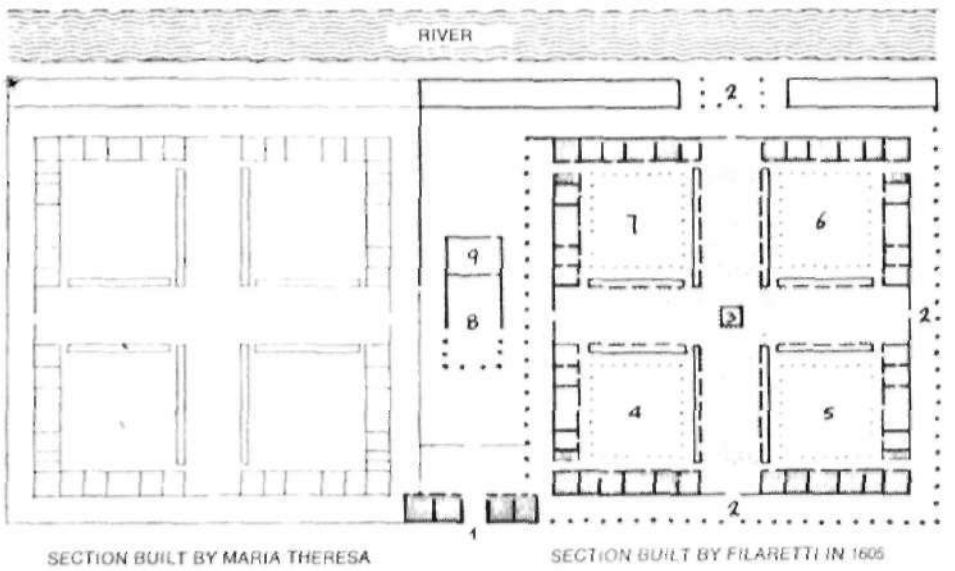


Figure H-6 Ospedale Maggiore, Milan, Italy.

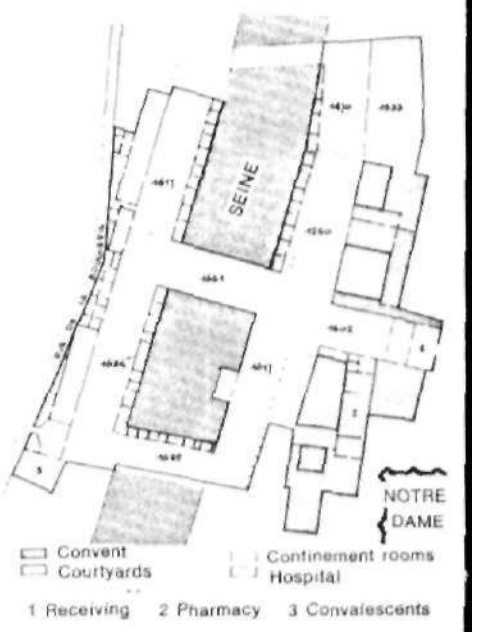


Figure H-7 Hotel Dieu, Paris, France, site pla



Figure H-7a Hotel Dieu, Paris, France, patient ward.

hygiene, sanitation or ventilation.

In 1758 Poyet, a successful prison designeer proposed an enormous hospital accommodating 5000 beds to be built in the form of cartwheel. The location of the chapel at the central point of this hospital and the scheme of this project was rejected. The problems of the hotel Diev were then taken up by the Academy of Sciences. It would appear that the members were influenced in their deliberations by the Royal Hospital at Stonehouse near Plymouth, England (FIGS.8, 8a). Now for the first time since the building of St. Gallen we see again in the Rovehead hospital an orderly arrangement of the elements of the plan, with separation of functions and a clear pattern of circulation. The principles it established - limitation of toal number of beds, small groups of patients in small rooms, a pavilion concept avoiding a large building mass, coupled with adequate light and fresh air - determined the form of hospital building throughout the 19th Century.

Poyet was the first to implement the Academy's instructions despite the earlier rejection as shown in submission (1788) FIG.9) and was put to an end by the French Revolution the following year His submission was similar to Rovehead's hospital at Plymouth. Subsequently his example was followed at the Lariboisiere Hospital in Paris, (FIG.10) the new Hotel Diev, Johns Hopkins at Baltimore, the Westend Krankenhavs in Berlin and many others in Europe, U.S and elsewhere in the 19th century.

THEORIES OF MIASMA:

The philosophy of natural light and fresh air dominated plan form of the early 19th century. This philosophy was later given rational expression, albeit mistakenly, by the theory of "Miasma". In the 1850's and 60's the spread of infection was

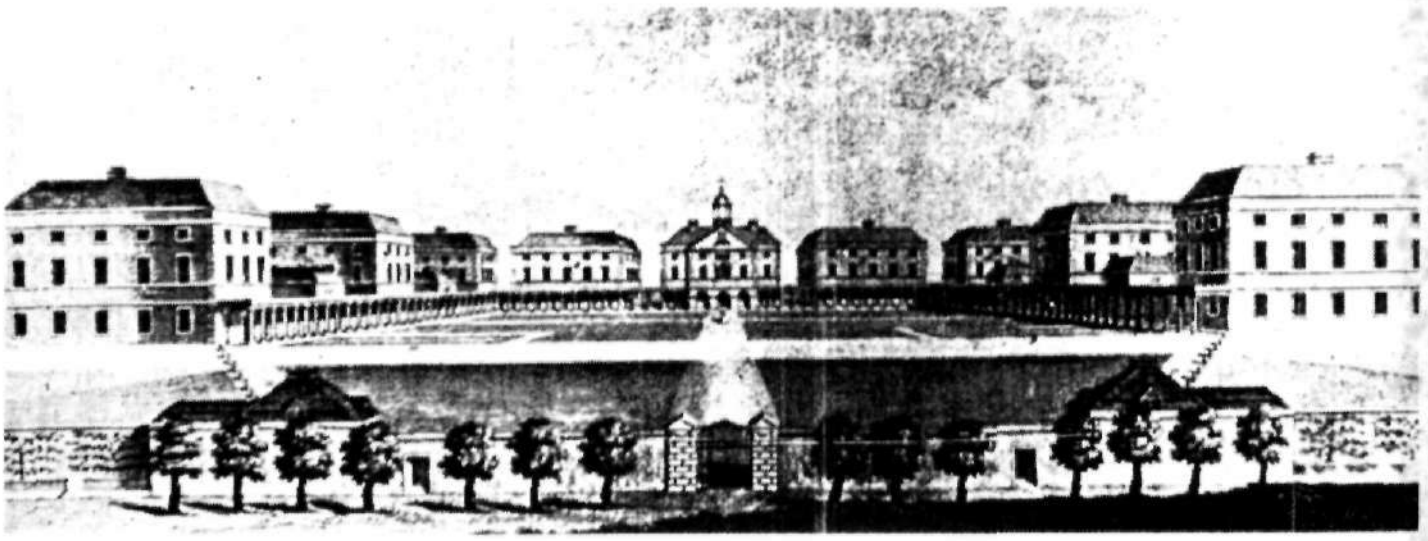


Figure H-8 Royal Hospital, Stonehouse, nr. Plymouth, England, contemporary engraving.

Figure H-8a Royal Hospital, Stonehouse, nr. Plymouth, England, site plan.

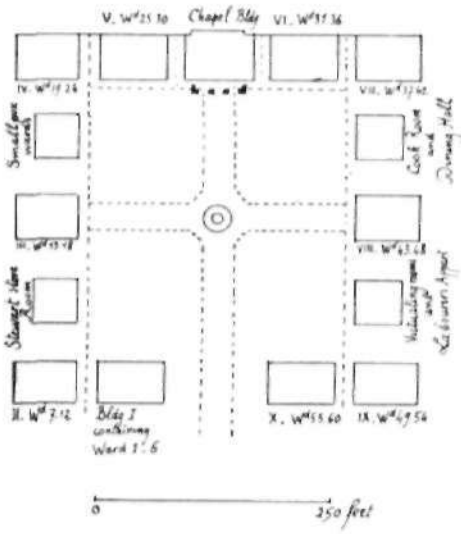


Figure H-9 Poyet's submission to the Academy 1788.

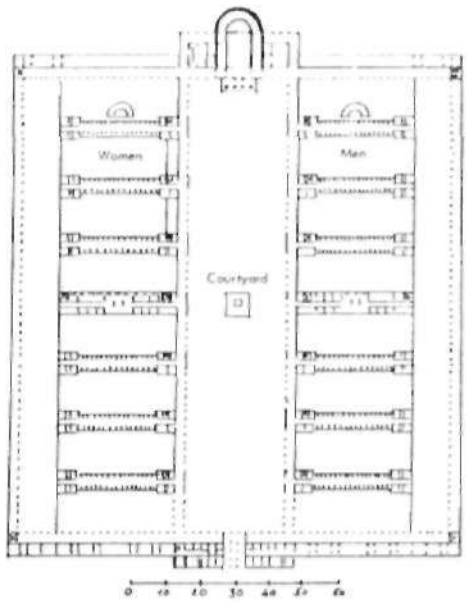
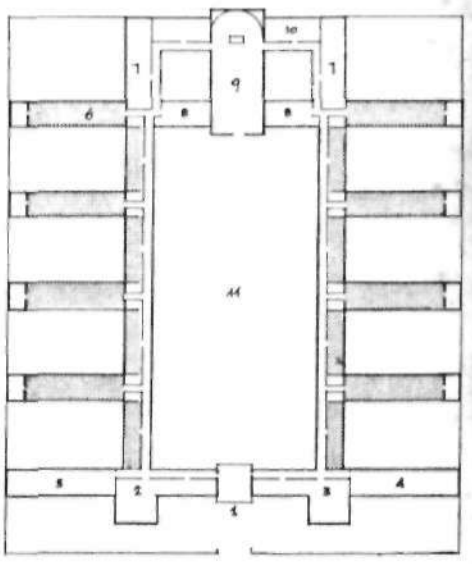


Figure H-10 Lariboisiere Hospital, Paris, France, 1875.



Patient Rooms

1 Entrance
2 Administrator
3 Out patients
4 Pharmacy
5 Kitchen and Services
6 Maternity
7 Surgery
8 Physicians quarters
9 Chapel
10 Mortuary
11 Courtyard

attributed to gases or miasmas generated by organic filth. Hence great attention was paid to ventilating syleins, the distance between buildings and the location of patients toilets. FIG.11 and 11a St. Eloi and Montpelier, France designed by the French architect Tollet, is a classic example of the mid 19th century thinking.

Florence Nightingale in her "Notes on Hospital" in 1859 question the miasma theory. She suggested that the defects of existing hospitals lay mainly in their inadequate standards of natural light, ventilation, space, and the crowding together into one building of a great number of the sick. Shee took as an example the then new Lariboisiere Hospital in Paris with t its pavilion plan and laid down precise dimensions and areas for what has become known as the "Nightingale Ward." This was a long narrow rooms with beds against each wall, tall windows ensuring sunlight and good cross ventilation. The sanitary facilities are at the far end ventilated on three sides; kitchen and linen room at the corridor end. The Nursing Sister is so positioned that from her desk she can supervise both staff and some 40 patients. For nearly seventy years this was the accepted plan for a hospital ward. FIG.12. Florence Nightingale also noted that bad nursing situation is brought about by nurses themselves but by bad sanitation, bad architecture and bad administrative arrangements. Her rule of Nursing is to keep the air within as pure as the air without. She also brought the idea that the most sick patient in any ward should be placed in the bed nearest the nurses' station and the convalescent patient be placed further away from the nurses (nursing station). This gave rise to what is now known as progressive patient care in hospitals.

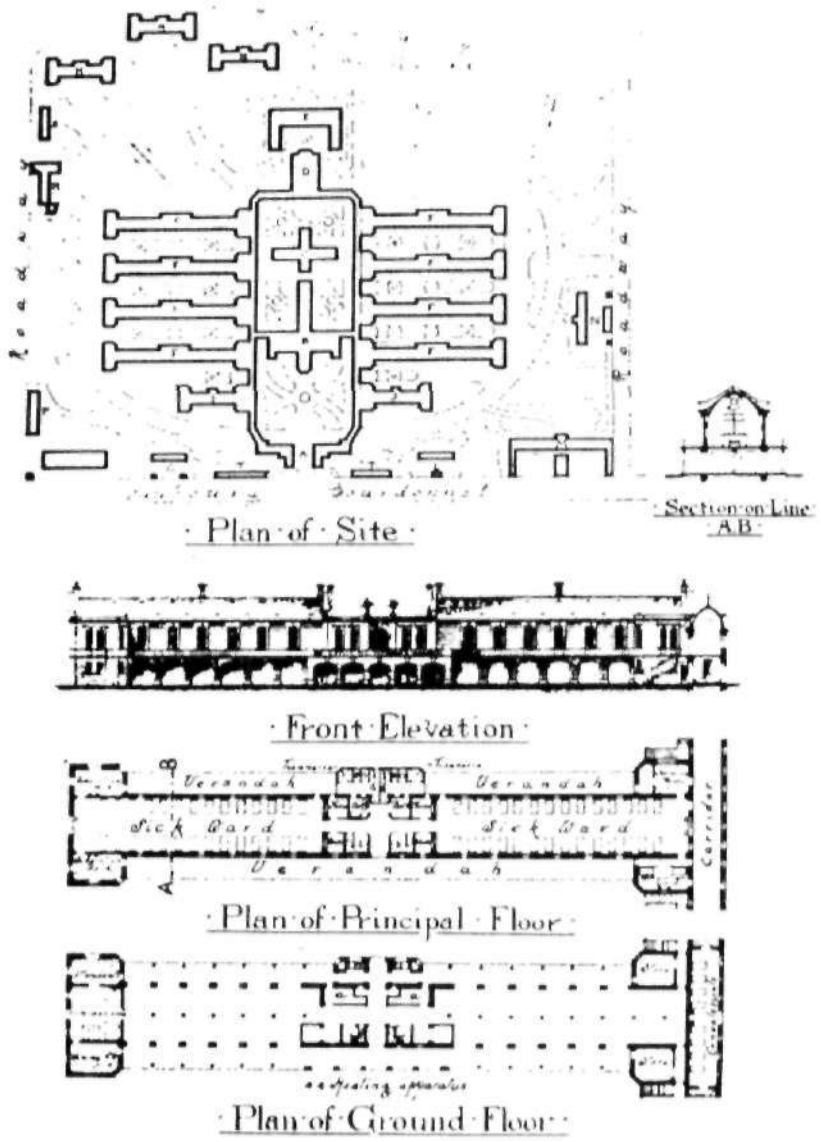


Figure H-11 St. Eloi, Montpelier, France. Plans and elevations.

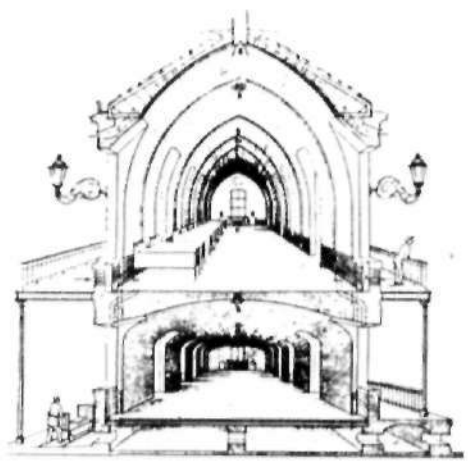


Figure H-11a St. Eloi, Montepelier, France. Section.

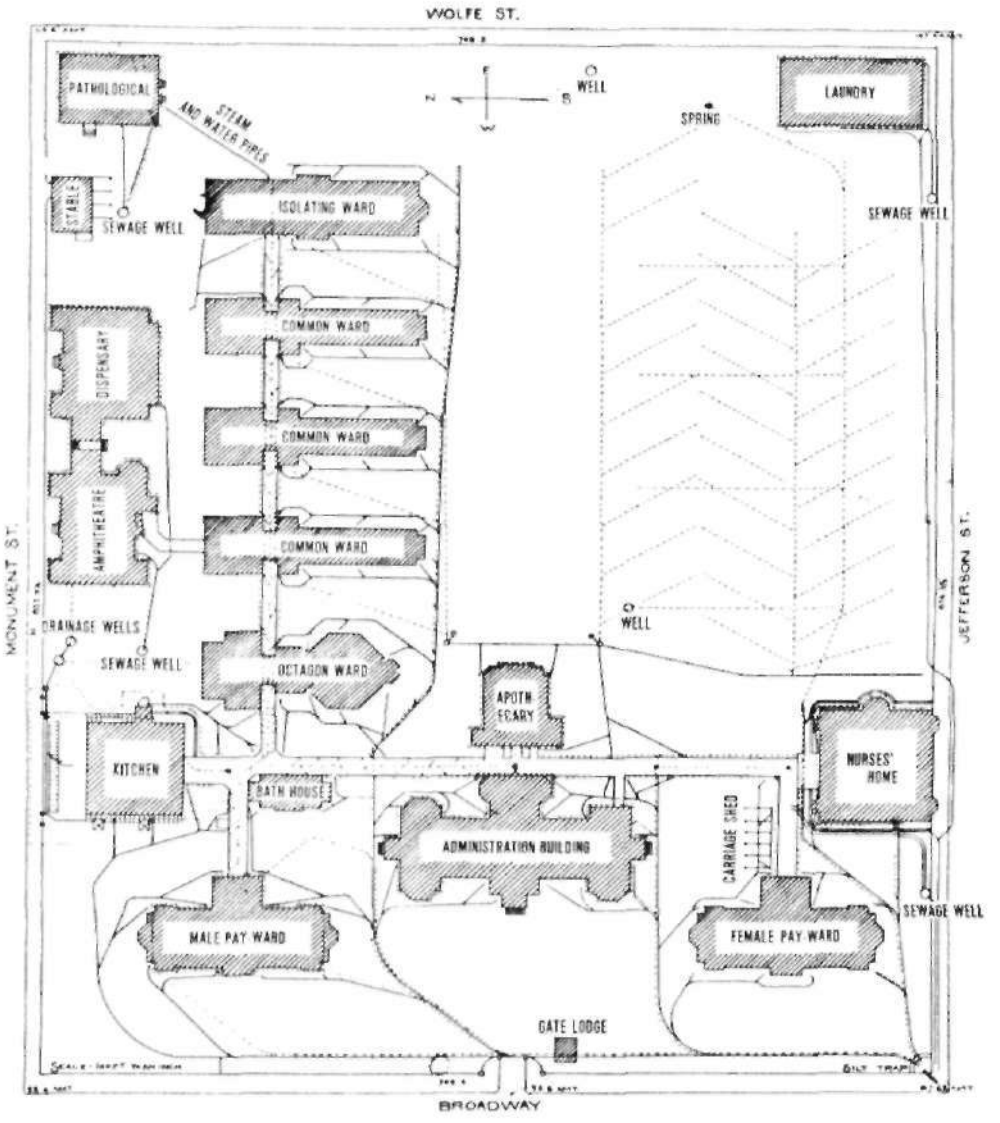


Figure H-12 Johns Hopkins, Baltimore, Maryland.

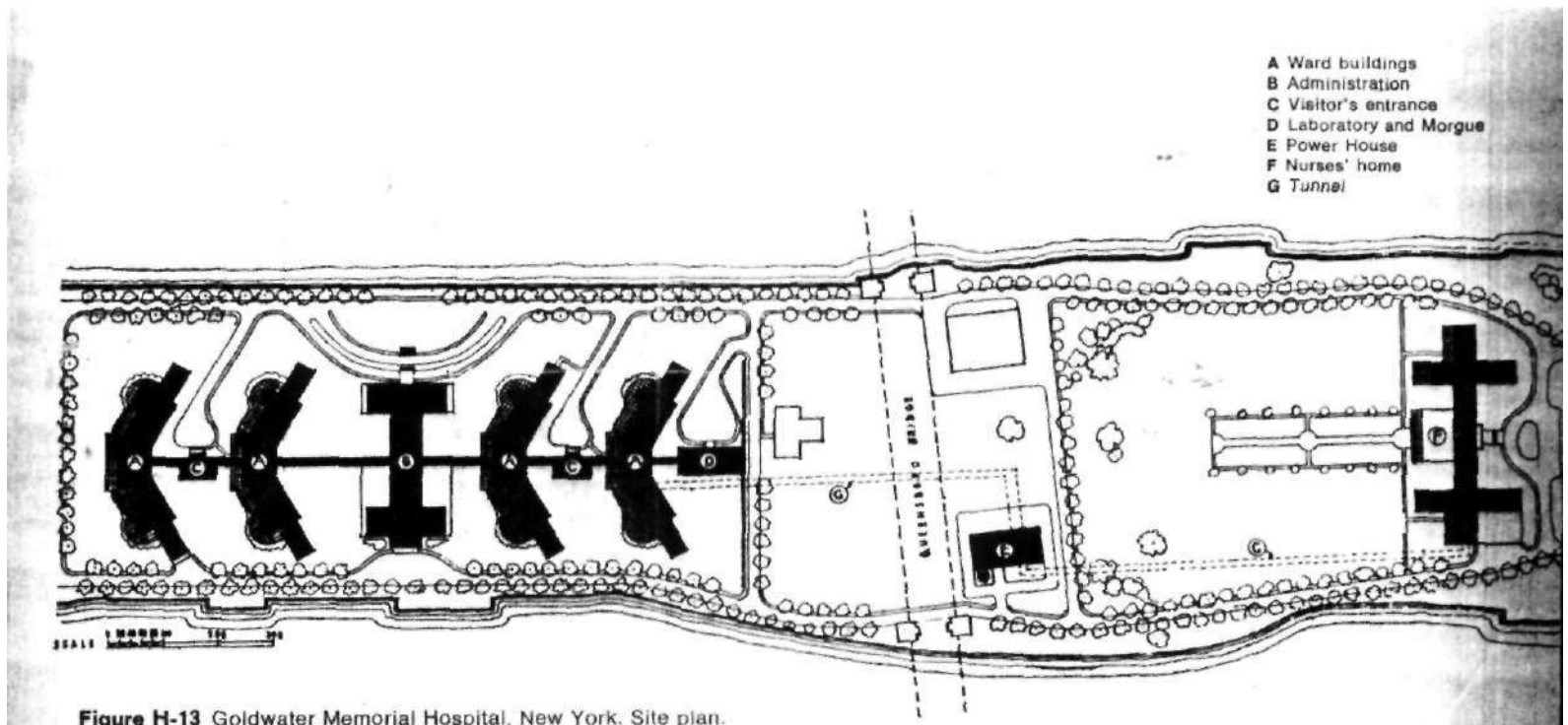


Figure H-13 Goldwater Memorial Hospital, New York. Site plan.
Planned under the direction of Isadore Rosenfield, Senior Architect, Dept. of Hospitals, City of New York.

SCIENTIFIC DISCOVERIES:

By now the discoveries of the great 19th century scientists and physicians were changing the prevailing attitudes to hospital planning. New scientific techniques for diagnosis and therapy were being developed. Prominent ideas and scientific discoveries that revolutionised hospital planning include:

(i) The discovery of anaesthesia

(ii) The discovery of how diseases spread

(iii) The discovery of X-ray

(iv) The understanding of the principle asepsis and

(v) The introduction of steam sterilization.

The use of X-ray necessitated large and elaborate equipment which the average practitioner could not afford to install individually. It then became necessary to build big hospitals where such equipment can be kept for the use of all. These discoveries of new dragnostic and therapentic methods necessitated building new hospital departments capable of accommodating their apparatus and a conducive room climate for undertaking the new dragnostic and therapentic procedures.

CHAPTER ONE

1. HOSPITAL MODERNISATION (REDEVELOPMENT)

Hospital modernization is of increasing urgency - and too long neglected - is the need for modernization of existing facilities. This need is especially urgent in urban areas, and particularly so in the central city areas of the sprawling super-cities where even some of the most famous hospitals have to function in physical plants that are uneconomical to operate and that impede the practice of the best moder medicine. Yet these hospitals p provide specialised services, set standards of quality care, conduct research, apply the latest advances in medical science, and train future health specialists. Facilities can be out of date though not specifically harzardous and a detailed evaluation of hospitals are made, under which beds are declared "non-conforming, if buildings, nursing units, or medical and ancillary services do not meet given standards.

Hospital buildings, because of they are complex tend to become obsolete sooner than many other typres of buildings. Physical obsolescence of hospitals is caused by deterioration of the structure, including materials and furnishes and by deterioration of over-taxing the mechanical and electrical plants. If maintenance has been poor, physical obsolescence is enhanced and accelerated. Functional obsolescence on the other hand is as a result of changes in (a) medical concepts and practices (b) the use and organisation of hospital departments (c) the neighbourhood served by the hospital (e.g. the change from residential to commercial or industrial).

1.1 PHYSICAL OBSOLESCENCE

Any existing plant, however, well cared for will probably lack many physical features that are considered essential in present-day hospitals. These are physical plant problems and deficiencies which detract from efficient building operations, physical plant characteristics which do not conform to current minimum standards and codes, or otherwise detract from the safety and comfort of building inhabitants, the degreees of obsolescence for various areas of the the plant, and plant serviceability in meeting the hospital's future programmatic objectives. Column locations, window arrangement, corridor width and similar physical characteristics of existing buildings may preclude an ideal arrangement of space for the needs of a hospital today.

1.2 FUNCTIONAL OBSOLESCENCE

While physical obsolescence is concerned precisely desirable physical characteristics of the hospital plant, the functional obsolescence is concerned with functional features, that is, factors which affect the facility's ability to serve as an efficient workshop for personnel and a supportive environment for both personnel and patients, that is, the physical side is concerned with the building and its habiliments are made of and the functional she considers how they are or can be used. Functional obsolescence purports to some degree the plant's adaptability to present and expected future functions, the operational efficiencies allowed or inefficiencies caused, and comfort or discomfort of building inhabitants, related to the environment afforded. Its emphasis is on people and processes rather than physical mechanisms. Unfortunately, a hospital that has had excellent maintenance and has deteriorated only slightly can still be functionally obsolete. Drastic changes in hospital use are forcing

radical changes in the organisation of some departments. Most hospitals find it difficult, if not impossible, to fit the additional services that have become their responsibility are usually necessary for the increased functions.

The architect should undertake a detailed study to define functional problems which detract from operational efficiency, patience care and convenience of building inhabitants; evaluate traffic flows and physical relationships; determine the space insufficiencies in terms of current requirements; study need for modernisation, alterations and expansion, based upon role feasibility survey findings; and make recommendations as to alternative future uses of the structure as a whole, plus various departmental areas, that is, making a detailed feasibility survey which will provide the detailed information that will be required so as to know how to undertake the redevelopment process.

1.3 ARCHITECTURAL LAYOUT

Architectural feasibility survey, having undertaken should define exactly how the facility can be modernized to carry out the programme that has been developed. Existing departments and spaces in the hospital should be carefully studied to facilitate the proper functional arrangement of the expected remodelling. Original drawings of the existing plant, if available, will be a very important source of architectural evaluation. If however, these drawings are not available, it will be necessary for the architect to measure the building and draw as - is plans showing only essentials thus enabling the preparation of an architectural layout of the existing buildings.

Usually gross flow areas are inadequate, that is, the square metre (m^2) area of the existing space is inadequate and considerable

space must have to be added. Consequently, areas such as X-rary laboratories and surgery should be housed in a new wing. This permits the architect to design a better functional arrangement for these areas and also helps in the matter of scheduling the construction so that the existing facilities in the hospital can be used while the new wing is under construction. Alternatively, temporary structures should be erected where alowable, if existing structure must have to be demolished to provide space for erecting the new structure.

1.4 SALVAGE OF EXISTING BUILDINGS

There has been mention of obsolescence, five, and safety limitations, structural conditions, and mechanical and electrical conditions as reasons for replacing existing buildings with new ones. Rarely are these conditions so extreme as to present a dear-cut issue, and usually there must be a balancing of residual value against the advantages and additional cost of new buildings.

The use of schematic studies of Schematic plans showing all existing buildings continued in use. More detailed studies should be made to show the adaptability of present buildings to the future uses comtemplated. Two alternatives appear for existing space, either to continue it in its present use or to convert it to other use. The most economical plan changes the use of existing spaces to other less demanding functions, as, for example, from central sterile supply to storage, or from emergency use to offices. Thus the more expensive departments are modernized by moving them into new quarters, while the departments with less exacting requirements are housed in modernized quarters calling for a minimum change. Where a department is to be shifted, the new

space is built first, then the department is moved into it, then the space thus vacated is remodelled for its new use, and so on, involving only one more for each department. But in a case where no shift is involved, the department must either be moved into temporary quarters while modernization of its entire space is undertaken, or else the modernization must be done a few rooms at a time at much greater cost in time and inconvenience. The advantages and disadvantages of salvage versus replacement must be evaluated objectively and with caution.

Thus the process finally involves at least four separate but related steps.

(1) Determine the adequacy of existing space in all departments for serving the present number of hospital beds and appraise the physical condition of existing buildings for continued use.

(2) Calculate the additional space required to make up present deficiencies thus related and replace space in old buildings which the appraisal indicates should no longer be kept in use.

(3) Calculate the additional space needed in all departments to care for the proposed additional hospital beds.

(4) Calculate the additional space for some supporting departments which may be justified, for example stores, kitchen, laundry etc.

It is the due responsibility of the hospital planner and designer to consider the safety and comfort of the patient for whom the hospital is planned for. The various departments and pattern of circulation should be assembled in a such a way

as to reduce the spread of infection and promote an effective nursing care.

1.5 HOSPITAL SIZE

In a General Hospital, the number of beds determines t its size and the provision of other supporting services to an extent Because it is clear that bed count is no measure of the adequacy of the supporting services or facilities, and, as institutions take up broader responsibilities for maintaining the health of the population as a whole, the ratio of beds to population becomes increasingly, undependable scale because it does not tell anything about the supply of the diagnostic and treatment facilities that serve the occupants of the beds, or about facilities for prevention or rehabilitation or for treating the ambulant patient or for exploring the frontiers of medicine - all of which facilities are today inrapidly increasing demand in porportion to the number of bed.

Nevertheless, crude as they are, yardsticks like beds/1000 are useful in sketching general orders of magnitude. In actual planning, they have their use for checking whether the results of more refined methods of estimating needs (usually projections of utilization experience) are realistic and at the same time, adequate to the social purposes that underlie medical planning.

The American Commission on hospital care, devised a method of calculating bed needs from utilization. The commission used a bed-death ratio based on the relationship between the predictability of death rate and an estimation of the proportion of deaths that will occur in the hospital. The commonest rations ranged from 4.5 to 5.0 beds per 1000 inhabitants.

Generally, bed needs vary as a result of community differences such as age distribution, marital status, sex distribution, degree of urbanisation, etc. Some countries, with the above factors taken into consideration, established standards with which hospital planning is done. In Egypt, the government had in 1965, made 3 beds/1000 of its population as its standard planning guide. America uses 10 beds/1000, Switzerland 13.6 beds/1000 while Nigeria has recently recommended 5 beds/1000 population for its current development period. The Nigerian Medical Association, after considering the local problems of very low technology and medical personnel, as well as people's response and awareness to medical care, recommends the use of 2 beds/1000 population and 3 beds/1000 population in urban areas.

The World Health Organisation (W.H.O) recommends the following bed distribution in hospitals:

Medical	21%
Surgical	33%
Obstetric	19%
Paediatric	15%
Others	9%
Total	100%

1.6 CIRCULATION

This is a very important factor in the set - up of a hospital complex. There are two basic typres of traffic existing in a hospital:

(a) Internal (pedestrian) - routes of internal pedestrian traffic by type (inpatient, outpatient, visitor, per-

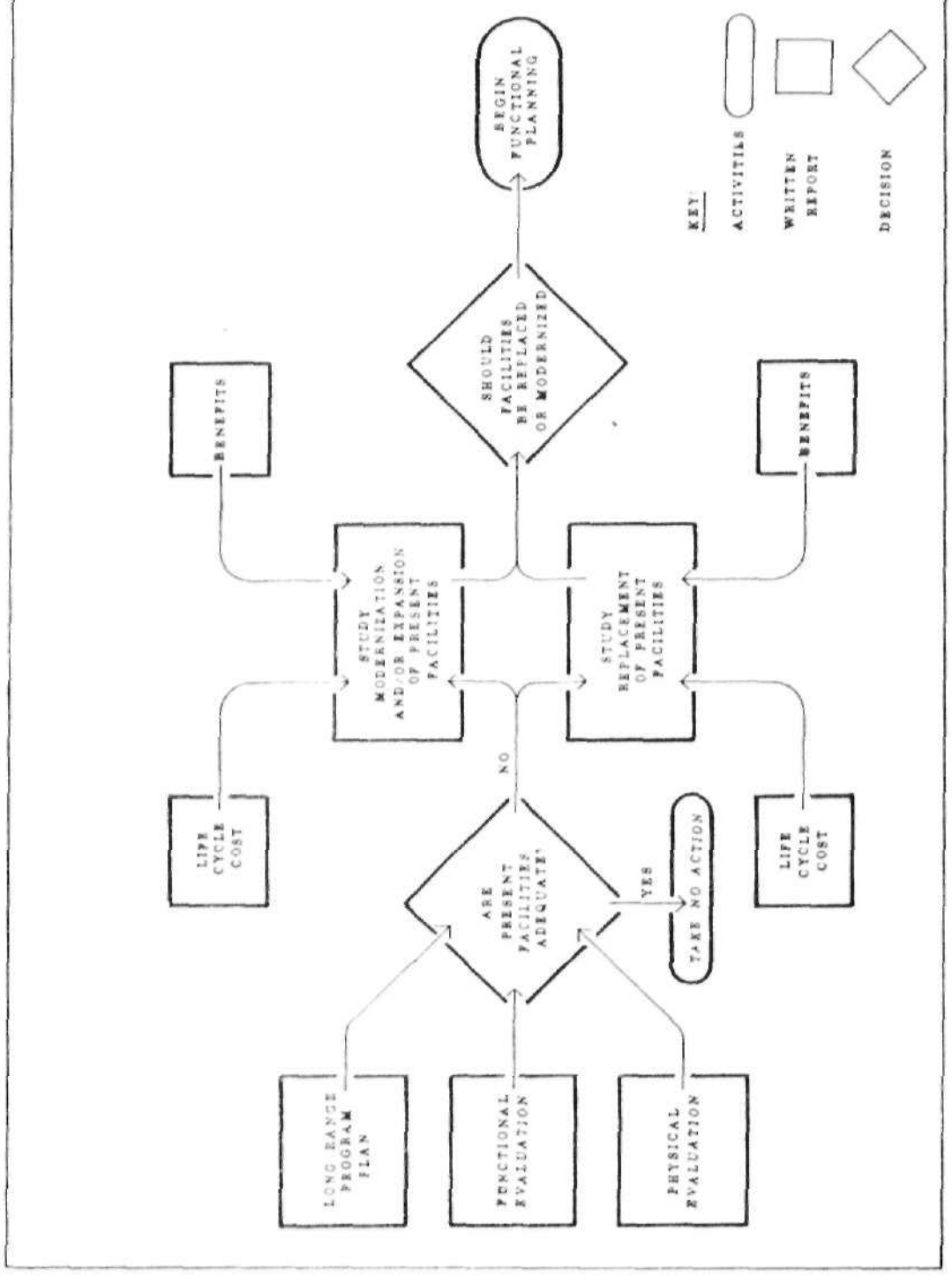
sonnel physician, student, and others) are methodically traced and evaluated in terms of adopted criteria (i.e. directness, degrees of separation, distances, etc,) Supply traffic, both clean and soiled, including trash, is traced to note deviations from ideal separations and also to note route efficiency.

(b) Vehicular circulations - vehicular traffic on the site is evaluated in terms of convenience to patrons and basic rationality. Any passage should involve crossing the paths of as few people as possible because passers-by are a source of possible cross-infection in the hospital.

> "Separate all departments, yet keep them all close together, separate types of traffic, yet save steps for everybody; that is all there is to hospital planning"

Separate entrances could be provided so that separation of traffic is achieved starting from without to within. Example is separation of patient entrance from Emergency and Maternity, and also separating services entrance from the rest. Within the hospital outpatients' traffic should be separated from inpatients.

Decision model for considering modernization and expansion projects



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3. Hospital Architecture and Beyond by Isadore Rosenfield.

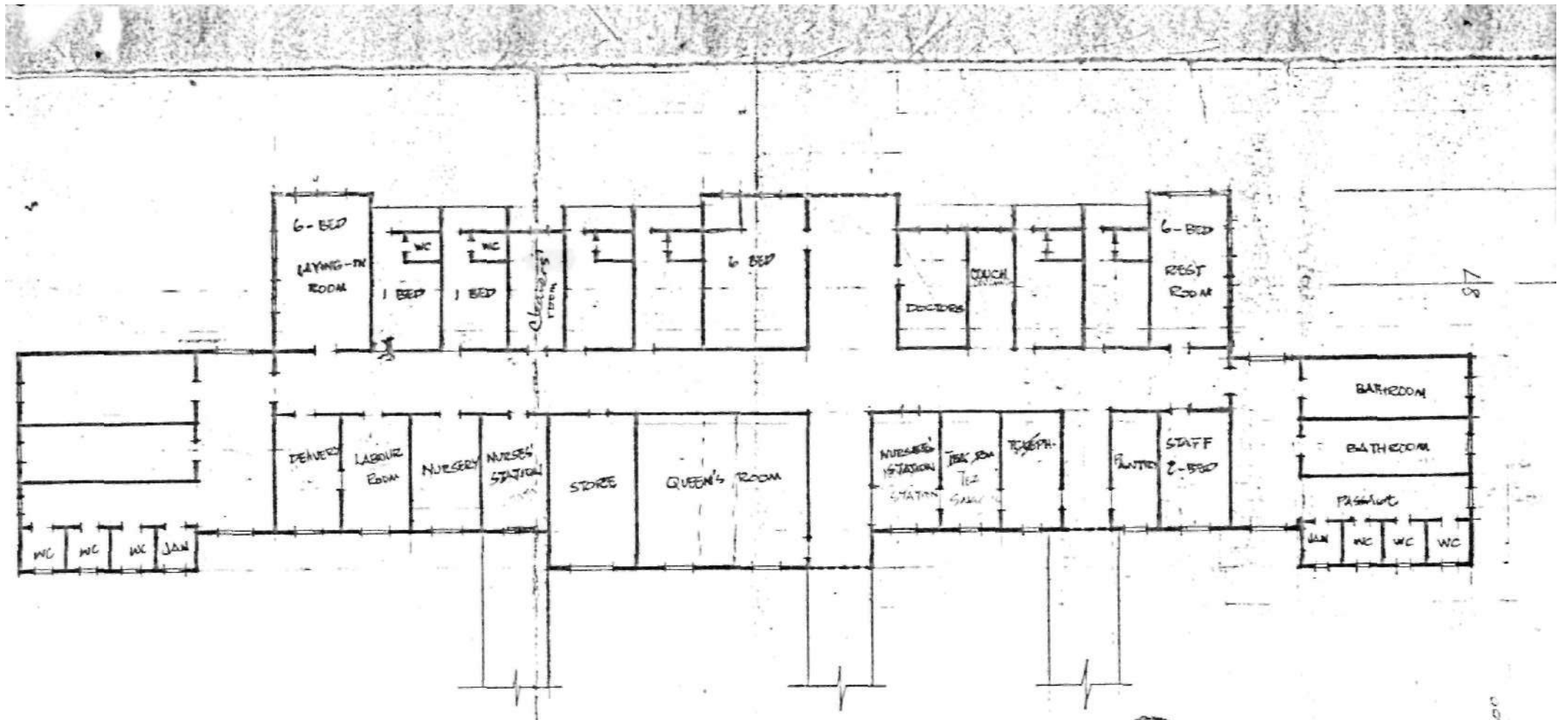
4. General Hospital Bauchi (A redevelopment Scheme) - unpublished M.Sc (Architecture). Thesis by S.K. Mohammed, A.B.U. Zaria, 1985.

CHAPTER TWO:

2.0 ANALYSIS OF EXISTING SITUATION:

Health care in Jos is not provided free of charge by the Government. This Government Hospital (Plateau Hospital) is strictly for public officers of the State Civil Service and charges for every service rendered but on a subsidise rate. Only officers on Grade Levels 07 and above attend this hospital and if admitted, ₦9.00 is charged per bed per night and for private sector or private patients it is ₦15.00 per bed per night. In this context private patients are those in the civil service on levels 01 to 06 and the down-trodden masses. In the Tin City, medical services other than from Private Hospitals and Clinic, and the Teaching Hospital (JUTH), are provided solely by the only General Hospital. This hospital was was built in 1923 by the White Tin Miners and was a Cottage Hospital in the then Plateau Province.

After the transformation of Plateau Province into Benue-Plateau State, the Cottage Hospital still served the Commissioners, Permanent Secretaries and Officer on levels 12 and above. After the transformation of Benue-Plateau State into Plateau State and taking over of General Hospital Jos, the only source of medical services by the Government of Plateau State is the Plateau Hospital Jos. So due to demands by the growing population and provision of other added services, expansions have been haphazardly carried out and reassignment of functions encountered. In its present state, many structures are either obsolete completely or grossly inadequate in meeting the desired service.



D WARDS

2

7 1-b = 8
3 6 = 18
1 4 = 4

SAMPLE ANNUAL LABORATORY REPORT (1985)

GROUP	PARASITOLOGY		Biochemistry	MICROBIOLOGY		Full blood Counts	HAEMATOLOGY			BLOOD BANK			Pregnancy tests	Immunology	Histopathology	Post-Mortum Examination	
	Urine	Stool		Culture Sensitivity	Ziehl Nelson Stain		Antenatal tests	Semen analysis	Sickle Cell tests	Grouping	Cross-match PC	Bleeding of donors					
OUT-PATIENTS	1,755	1,492		338		2,705		80	972	405	--	--	390				
IN-PATIENTS	540	495		106		1,750		--	591	144	144	144	18				
TOTAL	2,295	1,987		444		4,455		80	1,663	405	144	144	408				

TOTAL TESTS = 12025

= 46.25 tests per day
(260 Working days)

Table 2.3

The present bed population is 87 and divided by services thus:-

1. Maternity Ward: 27

   - This ward admits mostly delivery and obstetrics and Gynaecology cases. No specific number of beds allocated to this ward.

2. Ward I: 30

   - This ward takes care of female and paediatric cases. All medical and surgical cases for both female and Paediatric cases are catered for.

3. Ward II; 30

   - This ward admits only male patients of both medical and surgical cases.

NOTE: (a) No specific number of beds are allocated for specialities.

(b) Psychiatric cases are not treated in Plateau Hospital.

SOURCE: Physical survey by the author.

2.1 PATIENT CARE UNITS

In this hospital there are five types of patient care units. The three sum up to three wards comprising medical, surgical, maternity and paediatric cases.

FIG.2.1 shows the plan of the oldest ward type (maternity ward) which was the ward type originally built for the hospital. This comprises mainly single rooms with their baths and toilets with a small verandah for patients to relax rather than confined

to a bed. The main drawback of the ward is its locations. It is located just opposite the out-patient department which is a public area and a very noisy and busy one for that matters. Patients, personnel and visitors pass through this ward to other wards thus rendering it a noisy and rowdy area which is improper since nursing untis are considered private and are for the exclusive use of their occupants other than the staff and visitors. Labour - delivery suite is inadequate and no threatre provided for caesarian sections and other complications arising from child birth.

Nursing stations are provided in this ward as well as a nursery. Walking distance to toilets fairly short since there are two sets of toilets. There are no toilets for the nurses and doctors as well as changing rooms. The disadvantages of this ward type outwighed the advantages hence it is unfit for a maternity ward rather it should assume its paediatric function.

FIG 2.2 shows the plan for the second type of ward built when the need for expansion arose. This ward is relatively new and contain more facilities than are provided in the Nightingale type of ward and the one discussed above. Here the ward is subdivided into smaller wards each capable of accommodating 2 beds in a private way since the subdivisions are bounded all on four sides leaving no side open. In terms of privacy it does compare with the one above to an extent.

No single rooms are provided here for cases needing isolation, the effectiveness of the isolation is not achieved because of the absence of single rooms. The main drawback of this

ward is that it acts as a thorough fare to other wards.

Ward II has the same plan as Ward I and therefore same facilities provided and therefore same problems as discussed above. However, these two wards are to be retained in the redevelopment scheme.

2.2 ADJUNCT DIAGNOSTIC AND TREATMENT FACILITIES

2.2.1 The Out-patient department (O.P.D.)

The Out-patient department is situated in the front part of the hospital complex. This gives it a good location which is easily accessible to both pedestrian and vehicular traffics. Considering the nature of growth of this hospital, the O.P.D. has been extended in west end to provide for ante-natal clinics.

The most important constituent of an out-patient department are the consulting and examination rooms. These are, however, very insufficient and inadequate in this General Hospital. For an estimated population of 304,362 (1986) of Jos-Bukuru and annual attendance approximately 28,680 (sample), the number of consulting rooms available is just six (6), with only one (1) examination room. This completely out of proportion considering the tremendous out-patient attendance.

The next most important aspect in an out-patient department is space (s) for waiting prior to consultation. This is practically absent except for the new paediatrics and surgical consulting rooms. This has led to utilizing the corridor as waitinf area since consulting rooms open onto the corridors which has led to heavy traffic in the corridor and this has inhibited the circulation to the wards. There are only four

toilets for the whole O.P.D and grossly inadequate. No toilets for the staff: FIG 2.3 shows the plan of the O.P.D.

General Out-patient annual report (Sample)

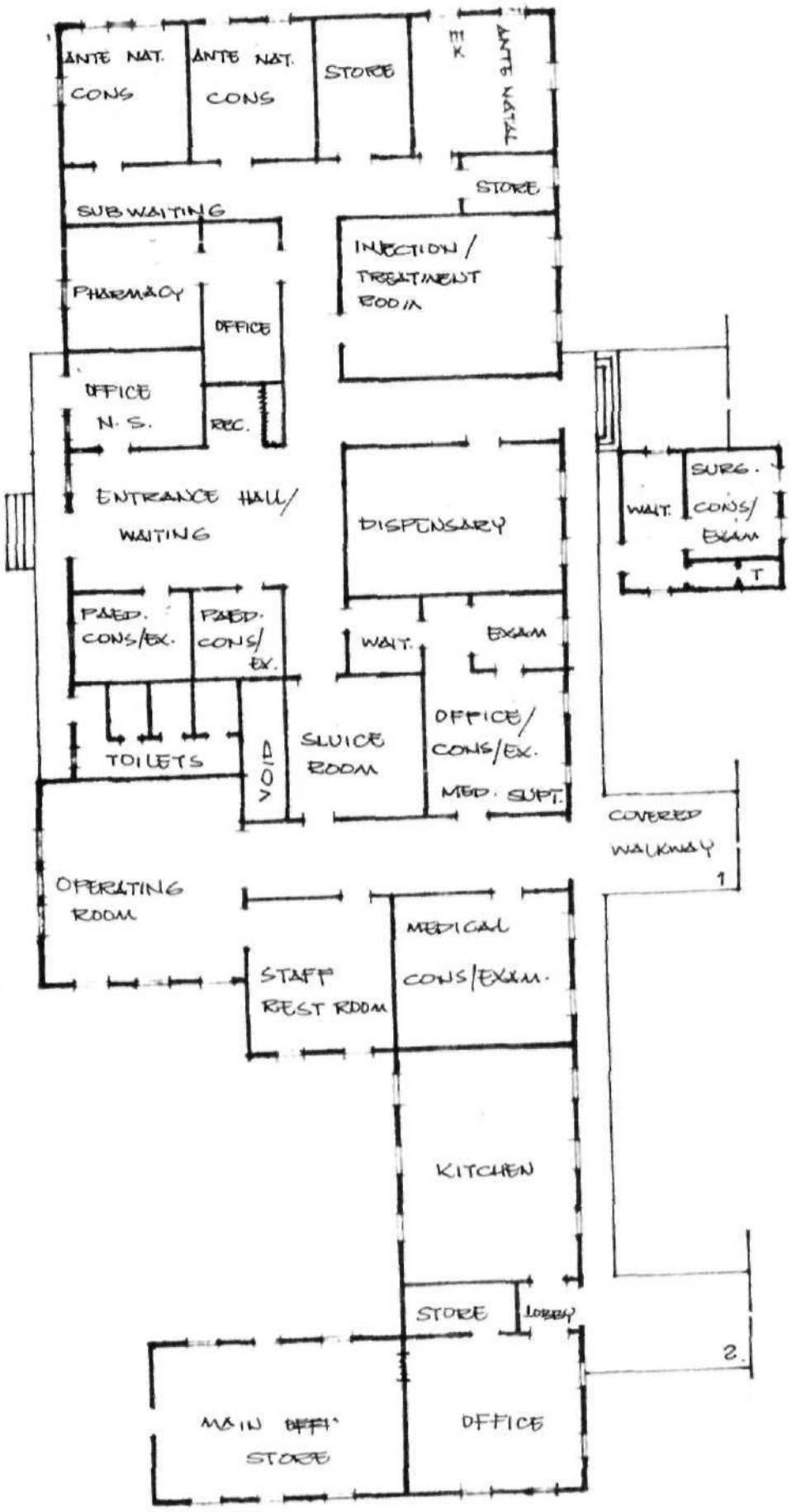
Department	Male	Female	Paediatric	Total
1. Medical (MOPP)	5924	8023	14045	27992
2. Gynaecology		688	--	683
Total	5924	8711	14045	28680
Percentage Total	20.7	30.4	48.9	100%

2.2.2. The Pathology department

This department consists of the busiest and often the largest of the adjunct facilities - the laboratory, where numerous tests furnish aids to diagnosis. It contains the main laboratory, Haematology, sterilization and media rooms. The haematology department is concerned with the count of red and white corpuscles and with blood chemistry. There is no provision for a blood bank.

The staff (mainly laboratory technologists) are not provided with locker rooms where they will change from street clothes to laboratory coats. Toilets for patients are not provided and only one for the workers. There are no specimen toilets so a patient must have to take urine or stool specimen from home when required for investigation. This is quite inconvenience.

Waiting area is too small (2.2m x 1.2m) so patient can not wait within the department but outside at the verandah.


ANTE NAT. CONS
ANTE NAT. CONS
STORE
EX
ANTE NATAL
STORE
SUB WAITING
INJECTION / TREATMENT ROOM
PHARMACY
OFFICE
OFFICE N.S.
REC.
ENTRANCE HALL/ WAITING
DISPENSARY
SURG.
WAIT.
CONS/ EXAM
T
PAED. CONS/EX.
PAED. CONS/ EX.
WAIT.
EXAM
TOILETS
VOID
SLUICE ROOM
OFFICE/ CONS/EX.
MED. SUPT.
COVERED WALKWAY
1
OPERATING ROOM
MEDICAL CONS/EXAM.
STAFF REST ROOM
KITCHEN
STORE
LOBBY
2.
MAIN DEPT. STORE
OFFICE

The pathology department cannot be said to be complete since essential activities such as ECG; EEG; and B.M.R are not carried out.

Circulation space is quite adequate but no primary for the man laboratory as it is open directly onto the corridor/verandah which is filled up with patients awaiting consultation.

Sample annual laboratory report:

Table 2.3.

The existing facilities as shown in fig.2 are grossly inadeaute for a pathology department.

2.2.3 The Pharmacy:

This, an important and at times indispensible adjunct to the doctor's care of the patient is found in the prescription pharmacy. Here are compounded, dispensed, and occasionally manufactured the drugs prescribed by the physician.

The pharmacy is attached to the ante-natal clinics and amidst consulting rooms, thus rendering it also a very busy area. The department is inadequate because it has only three small rooms. These three rooms are the store, dispensing and compounding sections and office. The compounding can not be carried out under high aseptic conditions since it is not separated from the dispensing area. There is no store for inflammables and narcotics. The main storage for most drugs are about 2km from the hospital (Pharmacy Central Store along Murtala Mohammed Way). This adds more to the difficulty of compounding since materials are not readily available. There is also no provision for waiting area not to mention even toilets (even for the staff). Both males and females are issued drugs from the same room which makes the

place disorganized since there is high turn of patients.

FIG 2.4 shows the pharmacy.

2.2.4 The Surgical Suite:

The surgical suite is situated in the O.P.D adjacent to the consulting room (medical). It contains only one operating room for both minor and major surgical cases. This umber is, indeed, too low for a hospital of this size since all types of operations are performed here.

The suite was originally not provided with locker facilities and because lockers are indispensable, the waiting room has been transformed to serve that purpose. There are no changing rooms provided. Sterilizing is wholly carried out in the scrub room as well as sluice. Also the scrub room is the changing room. There is no central sterilizing supplies department. Even then there is no provision for sterile store hence parts of operating room is used for storage of such goods. There is no anaesthesia room, anaesthesia room nor post-anaesthesia recovery room so patients are wheeled directly to the nursing units where they recover after an operation. No toilet is provided.

Sample annual surgical report:

Type of operation	Minor operation	Major operation	General Surgical
Number	297	509	458

Total = 1262 operations

Table 2.4

Table 2.1 Delivery sample annual report.

It could thus be seen that the facilities are generally inadequate and scrup up room is now used as sterilizing, slice and changing room. Fig 2.5 shows the surgical suite.

2.2.5 Radiology department:

The radiology or X-ray department was only introduced this year 1986 and is yet operational. It has taken over the isolation unit of the hospital which used to be the laboratory. The department comprises two X-ray rooms with only one changing cubicle (for both males and females). The department functions as a diagnostic facility and no therapy is carried out. Fluoroscopy is not performed not to mention radio-isotopy.

Generally, the unit is inadequately equipped as is the case with most of the facilities.

Fig 2.6 shows plan of X-ray department.

2.2.6 Emergency unit. Everything is done in the out-patient department.

2.3 Ancillary Facilities

2.3.1 Kitchen

The existing kitchen is situated at the east end of the O.P.D sharing walls with the central store. The kitchen uses centralized tray service in distributing food to the in-patients. After the food has been eaten, the plates are collected back and transported by carts to the kitchen for washing.

The kitchen utilizes wood as fuel thus a high degree of asepsis cannot be maintained. The food is cooked and served within the same compartment since there is no provision for distribution room.

The dishes are kept in shelves and lockers in the kitchen. No provision for storage of carts so they are kept in the kitchen. No dry and cold stores provided so both dry and cold foods are kept in the food store for day storage. The main storage is in the General store.

The kitchen is thus ill-equipped and lacks supporting compartments to enable it discharge its duty effectively.

See fig 2.7.

2.3.2 Laundry

The laundry is attached to the administration. It caters for all laundry services needed by the hospital departments.

Washing is done manually and after washing the materials are dried outside. There is provision adjacent to the ironing room for drying half dried materials in case of rain or bad weather.

The whole laundry comprises three elements, that is, the washing area, the ironing area, and a fairly large storage and drying room. After ironing, the clothes are kept within the ironing compartment until they are collected by the appropriate section of the hospital since no storage space provided for that and there is no central sterilizing department where clothes would have been taken to.

Considering the nature and the number of patients and departments the laundry is serving, there is a need for a modern laundry which utilizes machines for thw whole laundering process.

2.3.3 General Stores

The General (Central Supplies Store) store is situated alongside the kitcheh - Out patient department complex forming

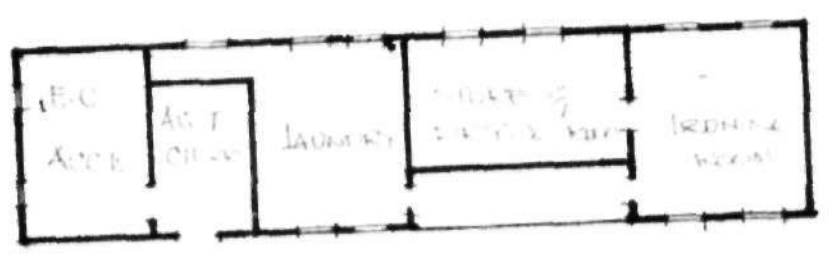


Table 2.1

DELIVERY ANNUAL SAMPLE REPORT (1985)

TYPE OF DELIVERY	NORMAL DELIVERY	CAESARIAN SECTION (C/S)	BORN BEFORE ARRIVAL (BBA)	FORCEPS	BREECH	SINGLES	TWINS	MALES	FEMALES	STILL BIRTHS	PREMATURE	TOTAL LIVE BIRTHS	TOTAL DELIVERY
NUMBER	652	41	NO RECORD AVAILABLE	2		-	9 PAIRS	SEXES NOT INDICATED		12	—	721	725

the service department. The General store is a block attached to the kitchen - O.P.D building which is compartmentalized but houses different items. These include food items (both perishable and non-perishable), stationeries and printed forms for use by hospital staff, linen and bedcloths, instruments for use by the surgical suite, and all those sections of the hospital requiring their use.

The main problem with the General stores is that it is too small ($40m^2$). Considering the services this store renders, there is the need for a bigger store with offices for supervisor clerks and helpers.

2.3.4 Maintenance shop

No maintenance shop in the hospital. Repairs are done by staff from the Ministry of Works, Housing and Transport. There is a big need for a maintenance shop for this hospital.

2.4 Site Situation and access:

The hospital site is in the southern part of the town. It is approached through a road which leads to state civil service secretariat and from the Governor's Office (former House of Assembly). The road does not require manouvres before reaching the main entrance to the hospital complex.

There are other roads running at the north and south boundaries. The road at the northern boundary is tarred and leads to Dogon Dutse whereas the road at the southern boundary is untarred and leads to Hillcrest, Doctors' quarters and Dogon Karfe. There is an untarred road cutting almost in the middle of the site and joins the road at norther boundary. This particular road is not frequently used.

The main problem of the site is the mean of access. It is approached directly by the semi busy road to the Military Governor's Office, to main banks and other important busy places of the township.

There is no defined parking lot for this hospital. The staff, visitors, patients and service parkings are not segregated so that cars are parked haphazardly around the hospital especially by the out-patient department.

If the new entrance is situated along the norther boundary, proper parking for the public can be provided. Another advantage of relocating the entrance by the northern boundary road, is that easy vehicular road to the complex will be achieved.

FIG 2.8 shows the existing site and its means of access.

CHAPTER THREE

3. THE PATIENT CARE UNITS:

The patient care units are the place where the patient admitted is accommodated from time of admission to the time of discharge. This is considered most primary or most important in the General Hospital, followed by adjunct diagnostic and treatment facilities. The General Hospital patient care units are categorized by services into:-

- Medical nursing unit
- Surgical Nursing Unit
- Obstetrical Nursing unit
- Paediatric Nursing unit.

In case of the General Hospital in question, for which this thesis is concerned, no psychiatric unit exists and the units are not defined though they exist.

3.1 Plan Shape

The distance from the remote bed in the unit to the Nurses' Station for observability and travel is considered the important

> "Keep walking distance as possible for nurses and ambulant patients.
> Maximum distance from bed to WC 12m and from nurses' working room (nurses' station to the farthest be approximately 20m."[1]

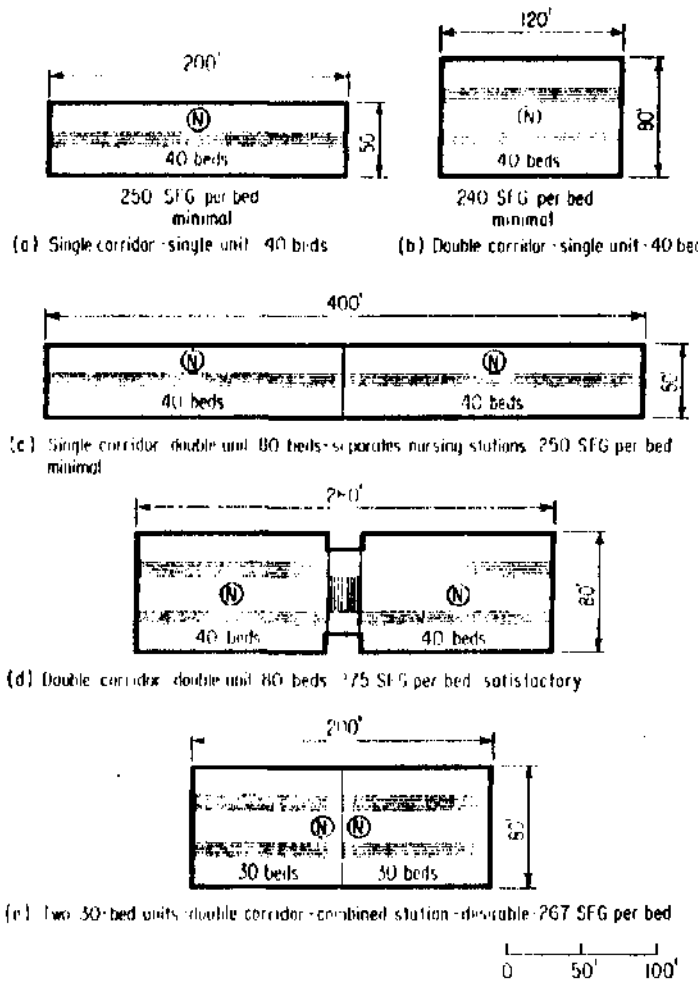
Various forms have been tried and each shape with its own advantages and disadvantages.

FIG 3.1 - 5 shows some of the various forms.

Nursing Units Distribution by service.

3.2 Medical Nursing Units:

The medical nursing unit is where patients with medical cases



(a) Single corridor - single unit - 40 beds

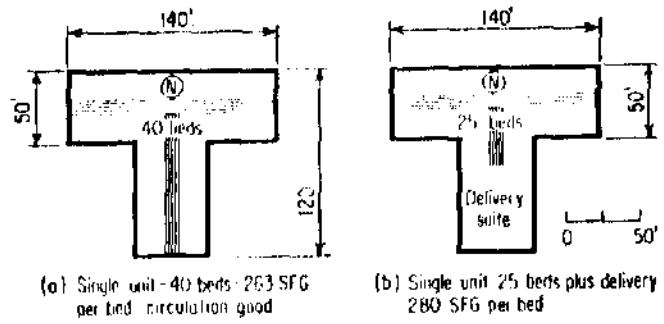
(b) Double corridor - single unit - 40 beds

(c) Single corridor - double unit 80 beds - separates nursing stations 250 SFG per bed minimal

(d) Double corridor - double unit 80 beds 275 SFG per bed satisfactory

(e) Two 30-bed units - double corridor - combined station - desirable 267 SFG per bed

Fig. 3 The rectangular plan.



(a) Single unit - 40 beds - 263 SFG per bed circulation good

(b) Single unit 25 beds plus delivery 280 SFG per bed

Fig. 3.6. The T-shaped plan.

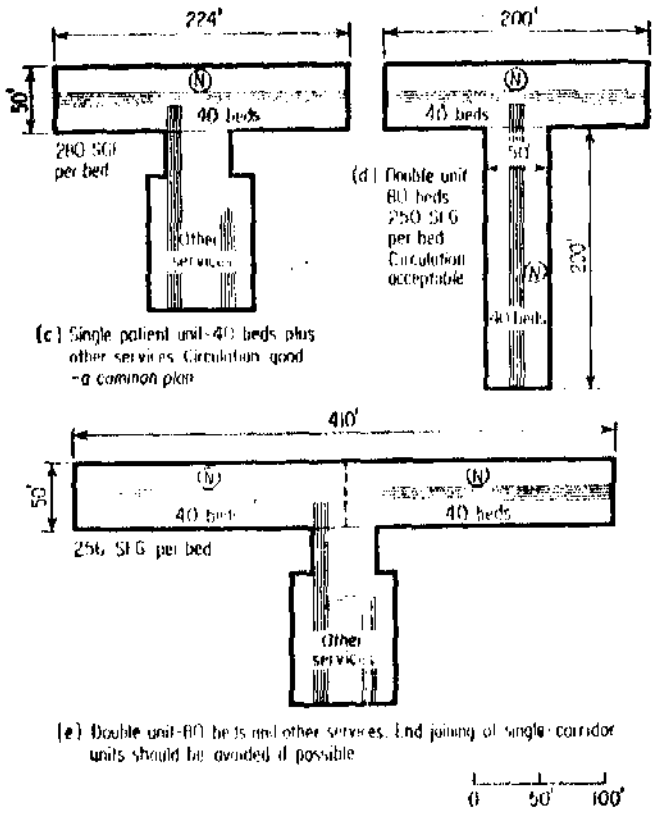


Fig. 3.7. T plan variations.

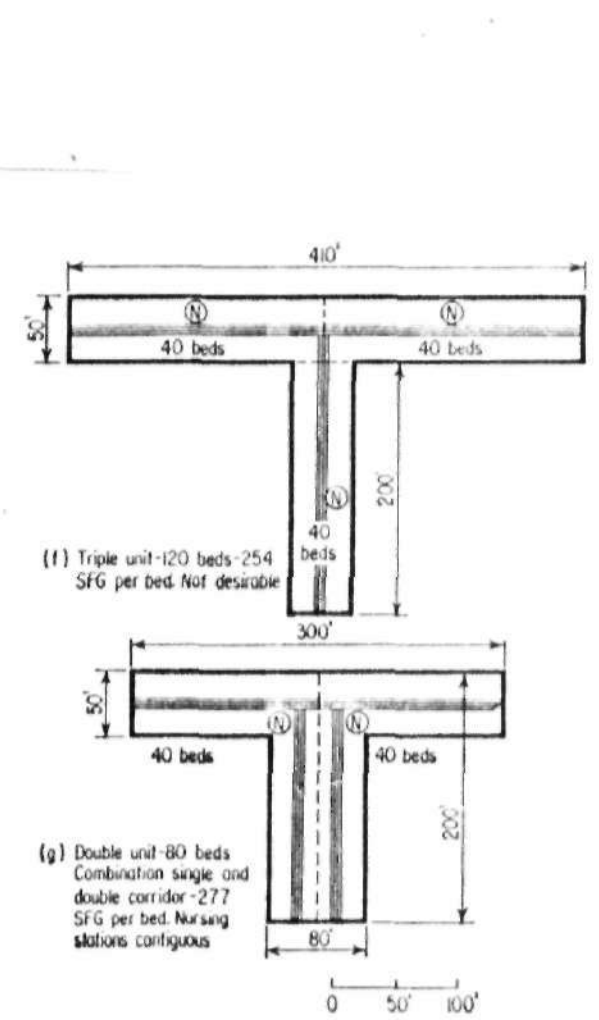


Fig. 3.8. T-plan variations.

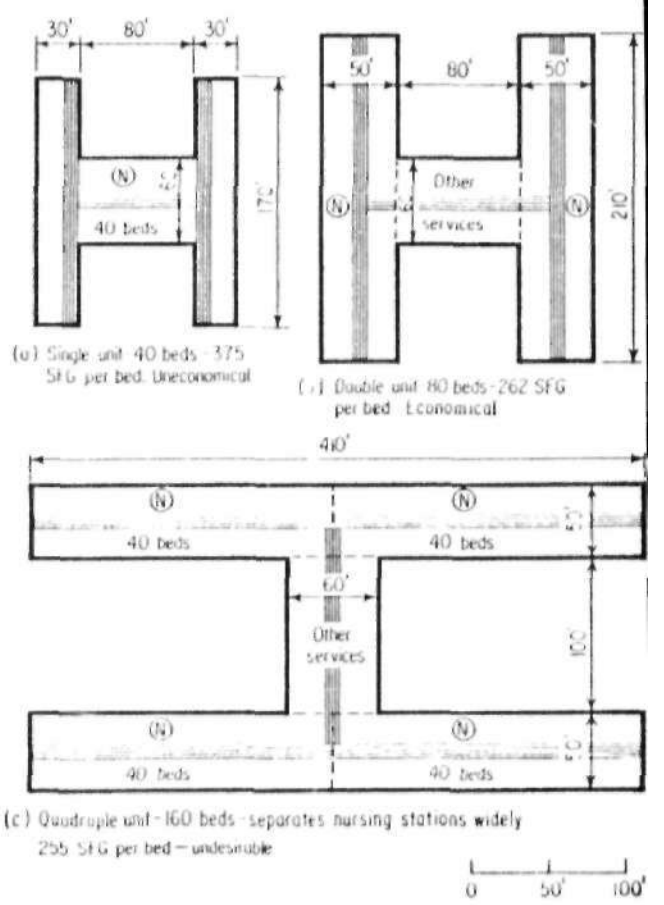


Fig. 3.5. The H plan. Combines rectangular units.

are accommodated. These include cardiology, dermatology, dehydratio, pulmonary metabolism etc. A patient being treated in this unit use the diagnostic aids of laboratory, X-ray and therapentic aids of physical and occupational medicine more often than patients in other units. The patient is often admitted without a complete knowledge of his disease. Thus the location of this unit close to the diagnostic and therapentic facilities is very important in order to reduce the distance of travel for both staff and patients.

The patients here have a longer stay in the hospital because of the time required for tests or medical examinations. Besides the normal nursing beds there is a need for two or more single rooms each with separate toilet to be used as isolation.

3.3. Surgical Nursing Unit:

In this unit the case is different because the patient is diagnosed before admission. The nature of the disease or infirmity is established, thus treatment can commence immediately after admission.

Here the diagnosis establishes the functional disorder as, for example, a broken bone; a severed, torn, or cut muscle, ligament, tendon or skin; an abnormal growth; a displaced or swollen nerve; a displaced organ; paralysis; or some other functional disability. There may be required the same of laboratory and X-ray tests as in medicine, but generally a surgical operation is indicated fairly soon after admission and the post-operative time is kept as short as possible.

The unit has a strong relationship with the surgical suite, emergency unit, central sterile supplies and the diagnostic and

treatment facilities. Besides the basic supporting service room, this unit requires a surgical treatment room (post-operative treatment) and a storage space for orthopaedic grames.

3.4 Maternity/Obsetrics Nursing Unit

This unit accommodates pre-natal women, mothers and their new born babies.

This unit is most related to obstetrical delivery and surgical operating suites. In the maternity unit there is also a provision of nursery which caters from infants who are diseased, those whose mothers are not well enough to return home and those that are premature (those with low birth weight of 2.5kg or less - regardless of the term).

> "Because it is one of the areas in the hospital where patients are most vulnerable to infection, the nursery should be planned to provide the best means for the care, safety, and welfare of the infants."[2]
>
> .....certain basic recommendations for planning nurseries for full term and premature infants have been developed, based on clinical experience and study. These include limiting the number of infants in each nursery, wide spacing of bassinets by cubicle partition, promoting the use of aseptic techniques and individual care by providing among other things, ample space and hand washing facilities; limiting the number of bassinets served by one nurses' station; separating facilities for premature infants and for observing infants suspected of having infections conditions.[3].....

3.4.1 Nursery

There are two types of nursery layouts:-

(a) Centralized nursery

(b) Decentralized nursery.

Centralized Nursery:

All infants are accommodated centrally away from their mothers in this nursery. The infants may be taken to their mothers from time

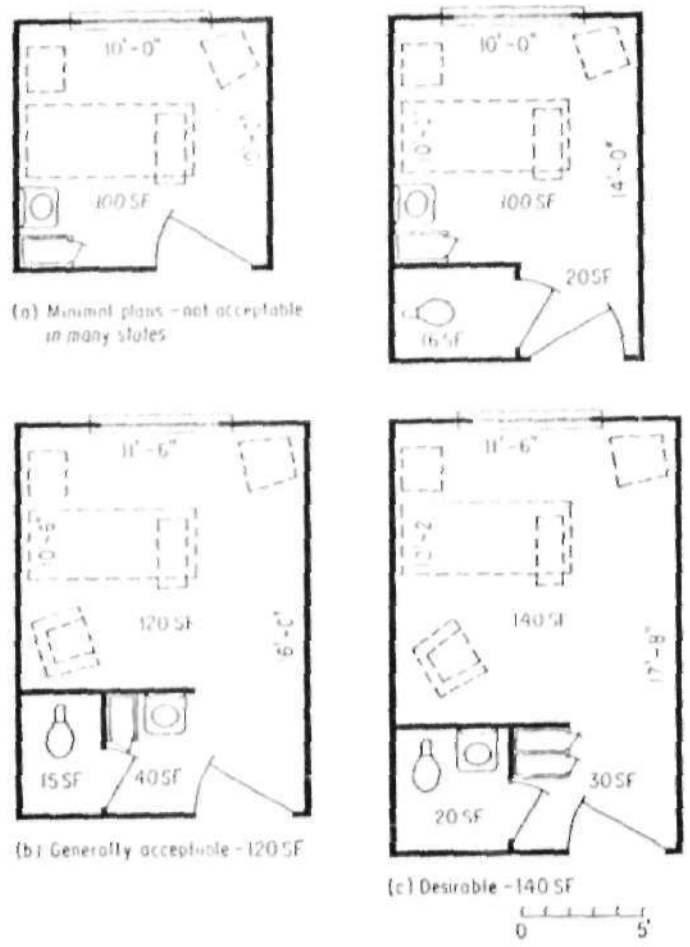


Fig. 3 $\frac{3}{8}$". Studies in size of single room.

- small examination room for doctor; and
- small workroom adjoining the examining room accessible for the nursery.

FIG 3.7 shows different arrangements for rooming - in.

3.5 The Paediatric Nursing Unit:

This unit caters basically for both medical and surgical cases of children within the ages of 0 to 14 years. The usual subdivision of beds is 20% bassinets, 40% and cribs should be designed to house adult beds alternatively. The problem of housing the parents in the nights should be considered since the sick children require the presence of their parents.

3.5.1 Planning Principles:

(a) The paediatric nursing unit should not be as large as an adult unit since cribs and bassinets out-number adult - sized beds.

(b) Beds should be partition to discourage spread of infectious diseases.

(c) All partitions should be glazed.

(d) A play room and an outdoor play terrace should be provided. These are important for convalescing children.

3.5.2 Location

The location of this unit should be in an area away from possible sources of infection considering the nature of children.

This paediatric nursing unit, being medical and surgical nursing unit for children, requires the services of all the adjunct diagnostic and therapentic facilities, and supporting services of the central sterile supplies, General Stores, pharmacy, kitchen and laundry.

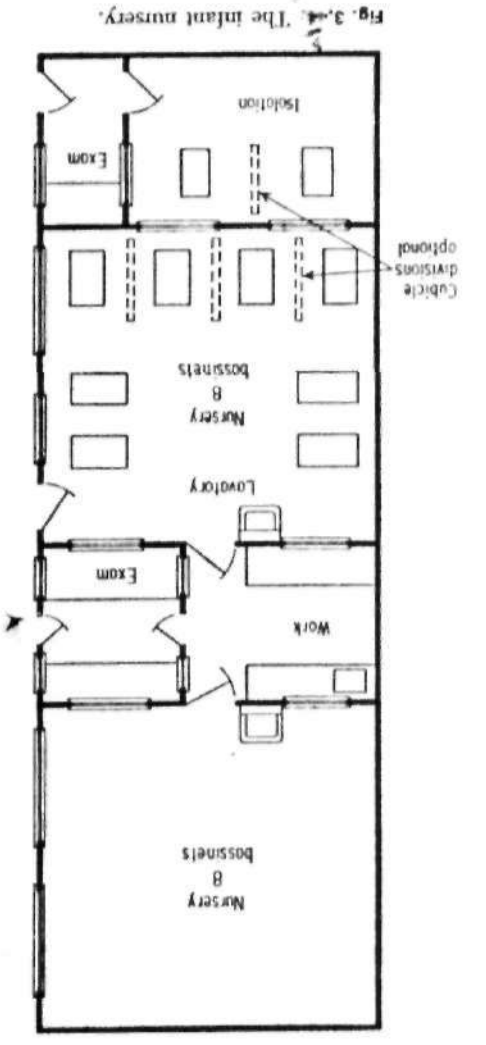


Fig. 3.44. The infant nursery.

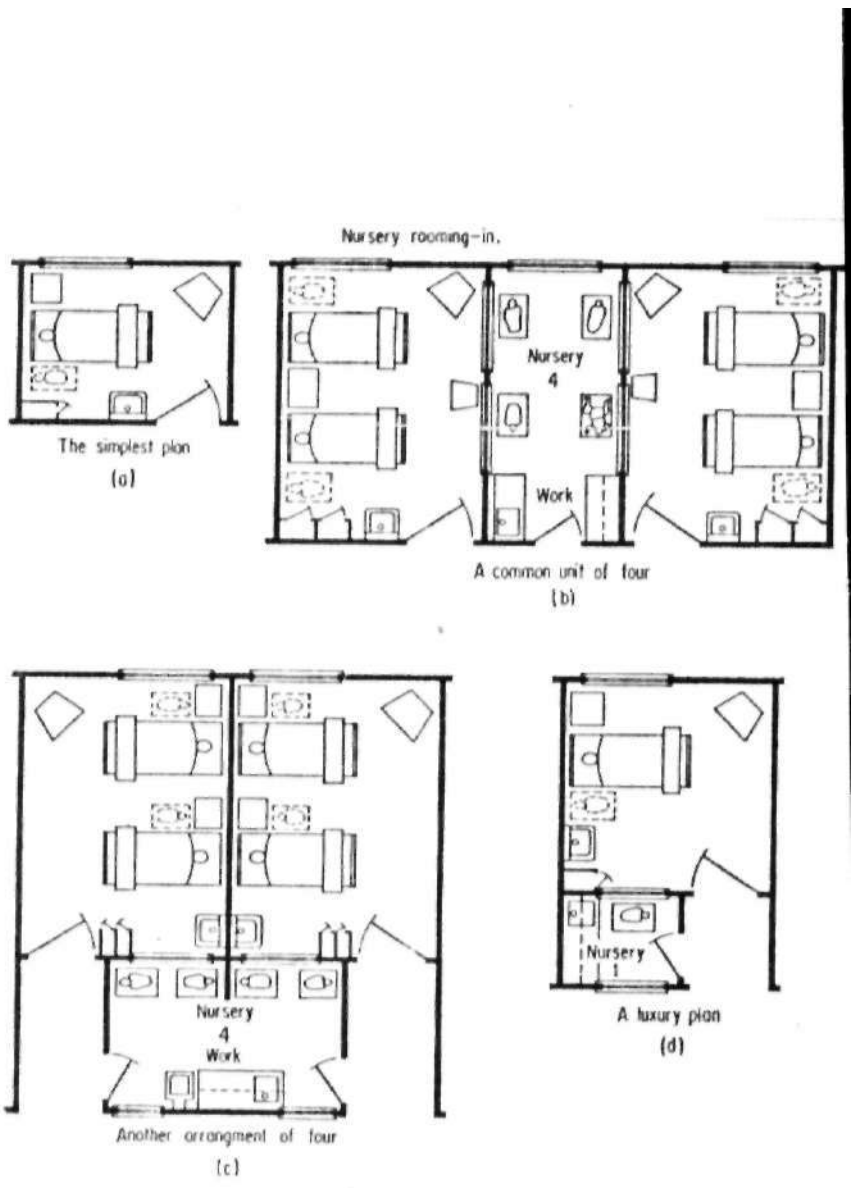


Fig. 3.45. Rooming-in nursery.

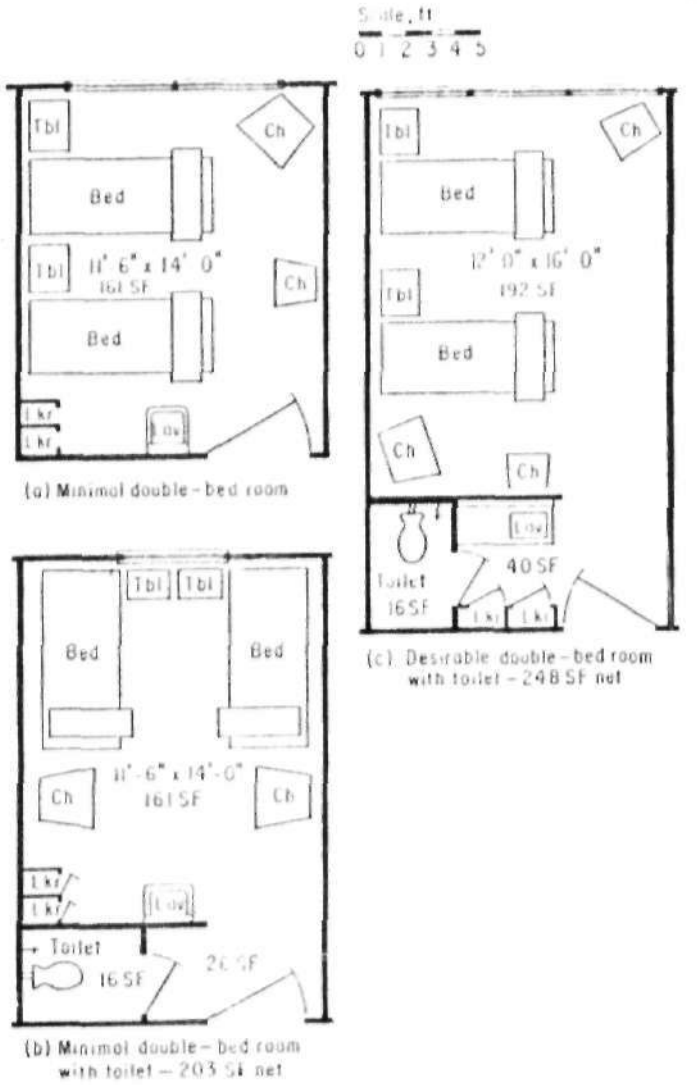


Fig. 3.21. The size of a double room.

3.6 Psychiatric Nursing Unit

The psychiatric nursing unit caters for mentally ill or retarded patients. Mental illness may be caused by psychological or physiological processes or both. The less severe forms are referred to as neuroses, the more severe as psychoses. Treatment can bring about complete or partial recovery. Mental retardation (referred now in Britain as mental handicap, or formerly, as mental subnormality) is a state, generally from birth of low or very low intelligence. Some forms are preventible (i.e by improved ante-natal and obstetric care), but it is not "curable." A similar condition may result from brain damage following an accident.

The psychiatric nursing unit is often smaller than is found in medicine and surgery (perhaps 25 to 35 beds against 35 to 45). In general, psychiatric patients are long term and ambulatory, though these may be occasional patients who are suffering from physical ailments as well as mental. Only a few require security confinement.

The psychiatric nursing unit is categorized into 3 sections:

3.6.1 Open section:

This is occupied by patients requiring no restraint other than confinement to the hospital or to the patient care until as may be instructed by the doctor. This section has the greatest number of beds, 50 to 60 percent. This is called open section and in it the patients will occupy rooms fitted like a hotel room and will have the freedom of their section, including access to dinning room and lounge, They may be take to physical

or occupational therapy or these services may be brought to them in part.

3.6.2 Quiet section

This is the second largest group, 20 to 30 per cent of the total may be housed in a quiet section which allows complete freedom within it and which in its room fitting resembles the open section. It can be closed for confinement if necessary and should have its own utility room and work desk. All rooms in the quiet section are single and require some attention to security devices in the design of light fixtures, hardware, and plumbing.

3.6.3 Disturbed section

This is the final category, representing 15 to 20 per cent of the total beds, consists of single rooms for secluding the patients. These seclusion rooms should be free of all protrusions and loose elements, the materials resistant to damage, the windows fully screened and locked, and the toilet facilities opening off a vestibule separation from the patients room by an inner door and from the corridor by an outer door. They are the direction of the nursing station in the open station.

3.7 Nursing Unit Elements

3.7.1 The patient bedroom

No space in the hospital is more important than the patients' room in its lasting impression. It forms the centre of his life at a time when his condition exaggerates the effect of every detail of environment. For most patients the room becomes a reception space for visitors, a dining room, a library a television room, a telephone booth, and even a bathroom for all patients it becomes the one fixed reference place away from

home. There is no multipurpose space in the hospital more demanding in its design requirements than the patient room.

Factors that affect the room design include among other, comfort and privacy, nursing aids, and desired character of environment.

One - bed room is the most ideal in terms of privacy, isolation or flexibility. Only a patient to a room and this can disregard age or sex. Patients needing isolation can be conveniently accommodated in a single bed room. Other commonly used bedrooms are two - bed, three - bed, four - bed, and six - bed rooms. Each of these beds, has its own short comings on the above factors of choice and the social factor of choosing a living partner. The four-bed room is a better social unit since each patient has its own corner especially when the door is placed centrally. The room depth of the four-bed room allows sufficient natural light to reach the most remote bed from the window wall.

3.7.2 Beds Layout

Nightingale's open ward layout

In this open ward, the wards were design to accommodate 30 - 40 patients, with the beds so arranged that the head of the patient is against the external window wall, that is, the bed is perpendicular to the external wall.

- It has the following advantages:
  - ample visibility of the patients
  - Cross ventilation
  - low cost of construction and maintenance.

  It also has the following disadvantages:

- lack of privacy

- Danger of cross infection

- Difficulty in controlling climatic conditions

  to suit all patients.

> .....There is also another form of lack of privacy that is important. It is impossible to take a good medical history from a patient in the next bed in an open ward. He is aware that the patient on the next bed, with his nose buried i in his book, has his ears tuned in to all that is said.....[5]

Rigs Ward layout:

Most of the difficulties of the Nightingale's ward are overcome by the rigs ward. It is named after Rig's Hospital of Copenhagen, Denmark, where it originated.

The beds in this case are arranged such that the heads of the patients are against the partition walls, subdividing the open ward into bays. See FIG 3.8

Time saver standards for building types gives bed room sizes as follows:

1. Single-bed room - 10.87 - 15m^2
2. Two-bed room - 14.59 - 19.51m^2
3. Four-bed room - 28.61 - 37.25m^2

Major differences are found in depths from inside of external wall to room side of corridor partition:

- Single-bed room - 4.420m
- Two-bedroom - 4.572m
- Four-bed room - 6.604m

The width of single and double rooms is 3.5m maximum or less depending upon furniture required.[6]

3.7.3 Nurses' Station

The nurses' station is in most designs the organisational

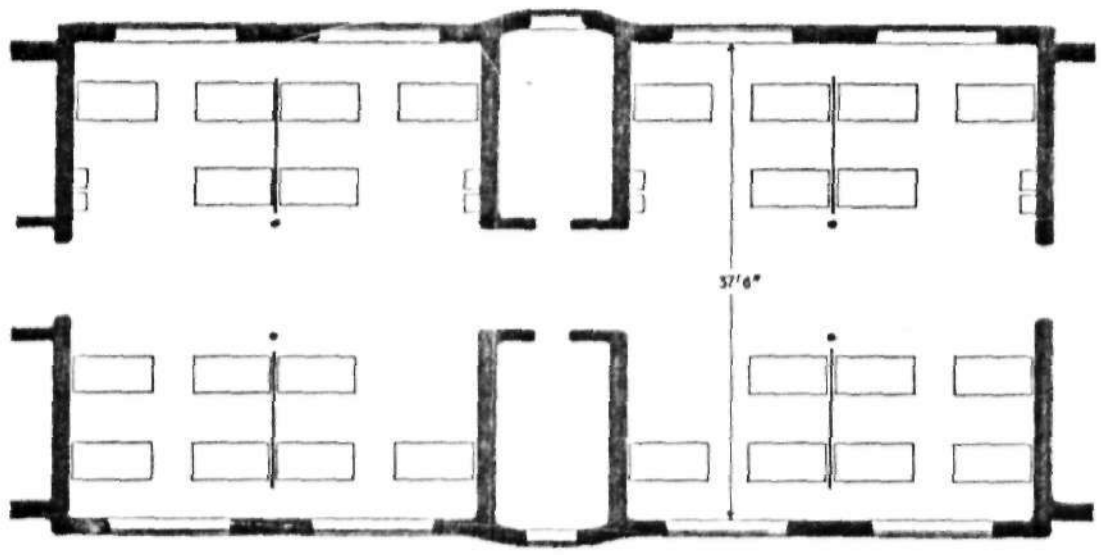


Fig. 75. Plan of a partitioned ward, with beds parallel to the windows, in the Rigs Hospital, Copenhagen (1910)

hub of the nursing unit. It is the working and control centre of the unit, and, in addition to its medical functions, the Nurses' station controls the movement of visitors and handles all patient's correspondences while in the unit. Furthermore, it is the most important place at which the nurse-call system registers, where all paper-work is done, and where all staff report at changes of shift. The station should be centrally located near the main entrance for control of all public movement into the unit.

Facilities in the Nurses' station include:

1. Medical records and drug trolleys
2. Control desk
3. Drug storage (including refrigerator and controlled drugs cupboard)
4. Charting desk
5. Nurse's lockers and toilets.

3.7.4 Medication Room

This is considered as an integral part of the Nurses' station because of the frequent use by nurses. It can be a small alcove with shelves for keeping medication and counter for preparation of all medicines before they taken to the patient's room.

3.7.5 Examination and Treatment room

This is considered to be of great importance in the nursing unit. The need for an examination and t room arises because there is a need to reduce the risk of cross-infection, if most treatment procedures are done, not in the open ward where the danger of scattering bacteria is unavoidable, but in the more

strictly controlled conditions of a special room. Also the patient, and whoever treats him, will benefit from the more convenient facilities and the privacy, and other patients in the ward need not be disturbed or distressed. Therefore, procedures that cannot be done in the patient's bed room such as surgical dressings etc., are done here. The doors should be high and wide and the room size should not be less than $17m^2$.

3.7.6 Sister's Office

This office is for the head nurse attached to the nursing unit. Her functions is to supervise all nursing activities and the unit in general. The office could also be used for small group conferences between the staff members.

3.7.7 Utility room

This is usually divided into clear and soiled areas. All bulky wastes toilet are disposed here soiled or dirty linen and rubbish carts are stored here before taken out of the unit. On the clean side are the storage carts or shelves for clean linen or other clean supplies except drugs and food.

3.7.8 Toilets and bathrooms

Each isolation or intensive care room should have a toilet, wash hand basin and shower for aseptic reasons. The United States Public Health Service (USPHS) recommends as a minimum, one toilet for each four patients and four shower for each patient care unit.

3.7.9 Floor Kitchen or pantry

A small kitchen (kitchennette) or pantry is provided for handling the patients' food service. Food comes from the central kitchen and distributed to the patients. The kitchen in the ward does not differ greatly from that from an up-to-date kitchen in

a private house.

3.7.10 Test room

It is used for carrying out minor investigations like urine or blood test. If tests, however, are exclusively carried out in the laboratory, then the room can be used as specimens collection room.

3.7.11 The Day room

This is a provision for convalescent patients who would like to ward off boredom. It is also used for receiving visitors by the convalescent patients. The day space is usually placed away from bed-area and opposite ancillary rooms in order to increase the patients' sense of being convalescent and once more among active people. In some hospitals like Musgrave Park the day room has been modified so that it can be used for arranging flowers for the ward. It is close-carpeted to make it both pleasant and quiet. Space required is at the rate of $0.75m^2$ per patient.

3.7.12 The Interview Room

This adjoins the sister's office and serves the whole unit. In addition to its primary use for private talks, the interview-room is also designed to accommodate the relatives of dangerously ill patients who wish to spend the night near at hand.

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CHAPTER FOUR

4.0 ADJUNCT DIAGNOTIC AND TREATMENT FACILITIES

The adjunct diagnotic and treatment facilities render secondary services in that they aid the physician in diagnosis and treatment, are given only upon his prescription, or perhaps continuely as a standing order, and are interested by him with the aid of the specialist involved.

The doctors who direct these adjunct services advise the patients' doctor and not generally the patient himself. The adjunct diagnostic and treatment facilities include radiology, clinical laboratories, physical medicine and pharmacy, and often medical social service and medical illustration. Supplementary dianostic and treatment aids such as electrocardiography (EKG), basal metabolism (BMR) and electroencephalogoaphy (EEG) and are usually grouped with the laboratories or radiology.

These adjunct facilities should be accessible to both bed patients and ambulant patients. This is particularly important for radiology, which serves the emergency.

4.1 THE CLINICAL LABORATORIES

Busiest and often the largest of the adjunct facilities is the laboratory, where numerous tests furnish aids to diagnosis. Its tests are generally subdivided as follows:

1. Chemistry
2. Bacteriology
3. Serology
4. Haematology
5. Parasitology
6. Histology
7. Pathology
8. Virology
9. BMR, EKG, EEG

i. Chemistry

Chemical analyses are made of samples of blood, urine, sputum, faeces, muscosa, and other body elements. These tests require an organic chemistry laboratory with a considerable amount of equipment, including sinks, a fume hood, and a centrifuge. Counters are 91.4 cm high.

ii. Bacteriology

The bacteriological work is almost wholly microscopic, which can be done sitting at 75cm high counter. For these most be space for preparation for culture media.

iii. Serology

This involves both microscopic and chemical investigation of blood serum.

iv. Haematology

This is concerned with the coun of red and while corpuscles and with blood chemistry.

v. Parasitology

Parasitology studies parasites commonly found in tropical diseases. It uses chemistry and microscopy largely on specimens of faeces.

vi. Histology

This is the microscopic examination of the cellular pattern of diseased specimens, usually done with smears on glass slides or paperthin sections cut from frozen specimens.

vii. Virology

It is concerned with disease caused by a virus.

ix. BMR, ECG, EEG

Incidental tests in the laboratory may include determining the BMR, essentially a volumetoic test of inhalation and exhalation measuring the patient's metabolsim; ECG, measuring resistance to a slight electric current which reveals patterns of heart behaviour, and EEG, a measurement of the electrical emanations from the brain which indicates areas of imbalance or malfunction. The first two tests are simple and can be done at the bedside if desired, as the machines are easily portable. EEG requires the insertion of electrodes into the skill and sensitive instruments for measuring the microscopic currents. This must be done in a special room adequately screened from outside electrical interference.

A blood bank is usually provided in a large General Hospital. This unit requires a space for receiving blood donors and two or three treatment beds. A space is also needed for blood storage and study.

NOTE:

Counter heights for all standing work, as in Chemistry, are 91.4cm and for sitting work, as in microscopy, 75cm.

4.2. Radiology

This departments with the clinical laboratories as a prime diagnostic and also offers radiation therapy. It, too, serves patients only upon prescription by the attending physician.

The radiologist like the pathologist, counsels the attending physician on the interpretation of the diagnostic films and on therapy. The department serves both bed and ambulant patients; sometim s the latter exceed the former in number. Because patients generally come to this department, it should be readily accessible to both hospital and ambulant patients.

This department should be planned to permit expansion without extensive remodelling or relocation of the established portions since it requires a relatively large floor space and costly equipment permanently fixed in place.

4.2.1 Function

The essential function of the diagnostic portion is to take shadow pictures of vital parts of the human body. The penetrating x-ray casts shadows on a photographic film, showing the outtime of the bones and other deuse elements. Outlines of organs become visible and identifiable, thus revealing abnormalities. Sometimes a barium fluid, opaque to the x-ray, is fed into the gastromtestinal system to sharpen the outlines of the containing parts. Because the quality of the shadow picture varies with the intensity of the ray, with its relative freedom from other interfering parts, and with the thickness of the body part being pictured, some variation in power of tube and complexity of machine is found necessary.

In addition to exposing filmé for a permanent record, there is a wide use of the fluoroscopic screen which glows under the x-ray and, when substituted

for the film holder, permits the radiologist to view the same shadow picture, though less sharp, as will be recorued on the film. In this case, the radiologist, wearing protective glasses and in an absolutely dark room, examines the shadow pattern on the screen and moves the patient about until a meaningful picture is evident. He then slips a film in front of the fluooscopic screen and takes the picture. This process may be repeated several times for different positions or for different degrees of penetration by the barium fluid.

Duplication of accommodation may be done away with because these exist equipment serving the dual function of radiography and fluoroscopy.

Diagnosis can also be done by means of a radioisotopic process to measure the gross functional status of certain organs (scales) and to provide a different kind of diagnostic information (scanner).

The curative treatment (therapy) section is usually integrated with the diagnostic unit for use of common facilities and better utilization of staff. Otherwise, it can be an independent unit.

The therapy section is divided into two elements:

1. Deep therapy room where patients are exposed to treatment by means of high voltage x-ray or radiocrotopic cobalt - 60 machines.

2. Superficial therapy room where patients needing less intensity of radioactive radiation are treated.

4.2.2. Planning Cousideration:

The radiology department has inderdepartmental relationship with the following:

- Out-Patient Department
- Emergency
- Surgery
- Laboratories
- Nursing units

Design elements of the diagnostic units

1. Reception and administration
2. Changing and preparation
3. Radio-Diagnostic room
4. Film Processing and viewing
5. Staff facilities
6. Storage facilities

1. Reception and Waiting:

General waiting space for out-patients and in-patients should be provided and located at the entrace to the department. Considerations should be given to wheelchair and stretcher patients and their parking space.

2, Changing and Prepration

This includes:

(a) Changing cubicles (dressing rooms) where patients change into Hospital garments or undress to the requirements of the radiographer prior to diagnosis. The changing cubicles should be adjacent to x-ray rooms for privacy and shorter travel distance. An outsized dressing room is provided for the convenience of patients in wheel chairs instead of a door, it is equipped with a certain so that the patient can manouvre easily.

(b) Toilets are provided for patients undergoing fluoroscopy and barium patients undergoing gastro-intestinal inviestigations. They should be adjacent to changing cubicles and accessible to the x-ray rooms.

3. Diagnostic X-ray room

This is the most important element in the radiology department. All diagnostic procedures are performed here with the aid of the x-ray machines. See figure 4.1. showing equipments.

Number of rooms - this depends on the out-patient and un-patient load. The United States Public Health Service (USPHS) recommends one diagnostic room for a 50 - bed General Hospital

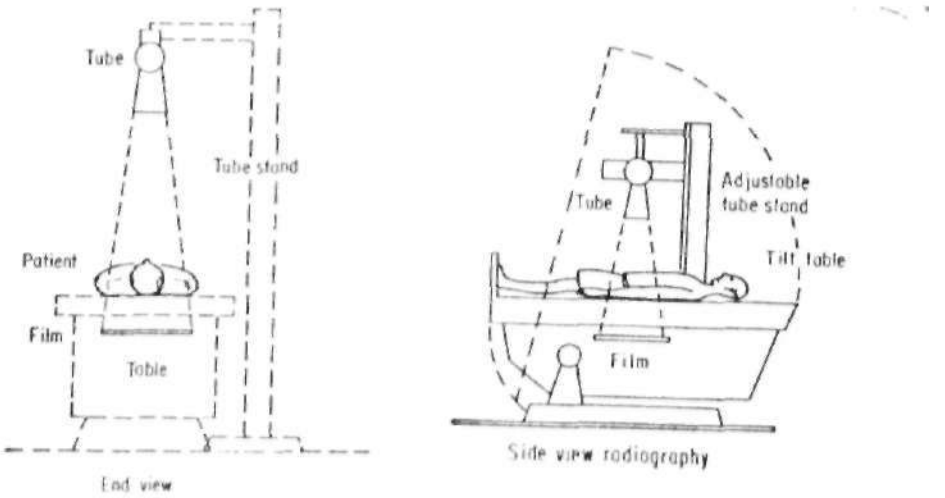


Fig. 4.3. Diagnostic radiology.

of 150 beds and above.

E. Todd Wheeler, in his book - Hospital Design and function, suggests the use of a formular for calculating the number of diagnostic rooms required in a given hospital considering the following:-

(i) Number of determinations per annum - DTY
(ii) Days per weeks in operation - DW
(iii) Hours per week in operation - HD
(iv) Determinations per room per hour - DTRH
(v) Weeks per year in operation - WKS

The number of determinations per room hour depends upon the ability of the radiographer and the complexity of the determination. However, average, on x-ray diagnostic determination takes about 15 minutes.

Survey of the existing hospital will be able to provide the average annual load (DTY)

Thus the formula gives the number of rooms.

$$N = \frac{DTY}{DW \times WKS \times HD \times DTRH}$$

DTRH vary from 2 to 6 depending upon the determination. Use 4, or if experience indicates otherwise, use 3 (that is, 15 to 20 minutes per determination).

4.2.3. Room Size

The optimum size of x-ray room is about (14' x 18') 4.2 x 5.4m with a control both

of 4 - 5m in size (width 2.2. m). The control booth be located to the right of the machine. So that the patient may be observed when the table is inclined, since machines with end-pivoted tables tilt to the right. The booth should have a viewing of lead glass opening into the room.

A small barium kitchen should be provided near or in the x-ray room for preparing barium fluids for gastro-intestinal investigation.

4.2.4 Location

The diagnostic x-ray department should be located on the first floor, conveniently accessible to both the out-patients and In-patients. It is also desirable to locate the department to the elevators and adjourning the outpatient department and near other diagnostic and treatment facilities.

The f nctional requirements of the department are usually best satisfied by locating the x-ray rooms at the end of a wing. In this location, the activity within the department will not be disturbed by through trafic to other parts of the hospital, and less shielding will be required because of the exterior walls.

4.2.5 Shielding

Primary barriers should be provided on all surfaces of the x-ray rooms which are exposed to the useful bean between the x-ray tube and

occupied areas. Secondary barriers should be provided on other room surface where protection is needed. In determing secondary barriers, consideration should be given to direction of leakage radiation which passes through the tube housing, and also to the secondary or scattered radiation emitted from objects being irradiated by either the useful bean, leakage radiation or other scattered radiation.

MINIMUM LEAD AND CONCRETE PROTECTIVE INSULATION FREQUENCY REQUIREMENT FOR VARIOUS X - RAY MACHINES

TYPE OF WORK	X-RAY GENERATED BY PEAK VOLTAGE	MINIMUM EQUIVALENT. THICKNESS OF LEAD	CONCRETE EQUIVALENT THICKNESS
Fluoroscopy	75KV	1.0mm	-
Radiography	100KV	1.5mm	120mm
Skin Therapy	100KV	1.5mm	120mm
Medium Therapy	150KV	2.5mm	-
" "	175KV	3.0mm	-
Deep "	200KV	4.0mm	220mm
" "	225KV	5.0mm	-
" "	300KV	9.0mm	-
" "	400KV	15.0	260mm

Source:

Hospitals Integrated Design by isadore Rosenifield (extracted by Ahmed M. in his Kano Township General Hospital - 1976 page 63).

Table 4.2

4.2.6 Film Processing and Viewing

Darkroom - This room is located between two x-ray rooms to facilitate handling of films. The x-ray films are processed in an area within the dark room separated from the loading counter by a partition at the end of the developing tack which helps to avoid accidental splashing and damage to the screens and films on the loading counter. Automatic processing machines capable of developing 140 films per hour (that is, one film in less than half a minute). Its size is about 350mm x 420mm. This has reduced size of dark rooms to small loading cubicles.

A viewing room is required at the output end of the automatic processing unit. Films will be sorted here before distribution to patients and departments. This room should be located near the office of the radiologist so that he may be immediately available for consultation.

A film storage alcove should be attached to the darkroom so that fresh films could be loaded into cassettes before they are taken to the x-ray rooms.

4.2.7 Staff facilities

These include offices for radiologist and radiographers, a rest room with toilet facilities. There is a need for storage spaces for used films and portable x-ray units used in surgery or emergency departments but under the case of radiology department.

4.2.8 General facilities

These include general storage for bulk supplies, a storage cabinet equiped with sliding doors and adjustable shelves. Materials such as films, opaque solutions, developing solutions and office supplies are stored here, daily limen supplies (x-ray rooms), gown storage, janitor's closet, and technicians' changing rooms.

4.3 Physical Medicine

It is the third and youngest of the adjunct and treatment facilities and thus includes both physical and occupational therapy. These services are little used as diagnostic aids, but they have risen to importance as therapentic aids serving outpatients and inpatients.

Physiotherapy includes exercise, manipulation, massage, thermal treatment, hydrotherapy and electro-therapy. A Patient may be assigned a routine including any or all of these. Each treatment may take a considerable time, and hence this department, while often a busy one, does not handle large numbers of patients daily as does radiology.

Occupational therapy also deals with physical handicaps or deficiencies, but is techniques are applied through processes of demonstration and training and not primarily manipulation. Its main purpose is not to replace the physical exercise and training of physical to supplement it with training in activities.

Physical therapy may help a patient regain motor control of a disabled member of his body; occupational therapy seeks to assist the patient in putting his regained physical ability to some economic or social use. This is the functional phase of occupational therapy. In another phase, the psychological, an effort is made to arouse a patient's interest in certain activities and thereby to help him demonstrate that he still possesses abilities and capacities though lost[4].

In some hospitals the department of physical medicine expans into a complete rehabilitation service involving other elements besides physical and occupational, therapy. These may include speech therapy; functional training for paralytic and paraplegic patients and for others physically handicapped; vocational training for those who can qualify for selected tasks in general workshop, and a sheltered workship for those whose capacity prevents their qualifying even for selected work; social service and vocational guidance, including job placement; parent education, special education for the handicapped, and general education for those children who must spend a protracted time in the rehabilitation centre. See figure 4.3 for some physical exercises.

4.3.1 Space allocation and location

Location of physical medicine department is closely related to function and should be such that it is easily accessible to the patients it serves. The travel from the hospital to the department should be as short as possible since most the patients it caters for disabled. Thus proximity to a motor entrance for the

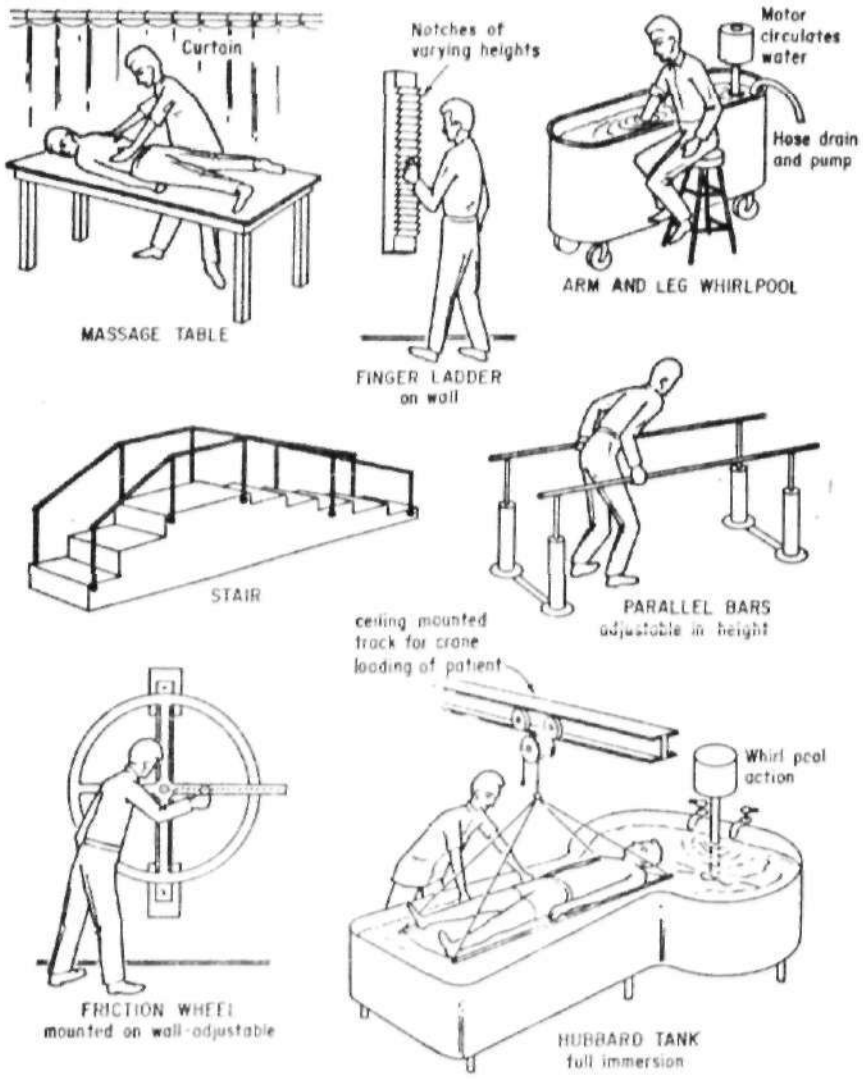


Fig. 4-7 Physical therapy equipment.

use of out-patients is desirable. A ground floor location, convenient for both in-and out-patients and for access to an out-door exercise area, is recommended.

The amount of space needed depends on the number of patients treated, the kinds of disabilities and the treatment required. No absolute standard can be recommended as th amount of space needed for physical therapy in a general hospital. The most that can be said is that, if possible, it is desirable to plan for at least a 1000 ft^2 of floor space ($100m^2$), free of structural obstructions. About half of that should be exercise area.[5]

4.3.2 Physiotherapy elements

(a) PatientsI reception and waiting
(b) Passive treatment area
(c) Changing and active treatment
(d) Staff facilities and storage

Reception Space

Accommodations for inpatients and out-patients. Adequate space for stretcher and wheelchair patients. The reception should be capable of keeping current records of patients should be provided. Adjacent to this space, there should be a small waiting space at the rate of 1.5^2 per patient.

Passive treatment:

There are three types of treatment areas: cubicle (dry), underwater exercise (wet) and exercise (open). Each is designed to meet the particular

requirements of the special equipment used for different kinds of treatment. For passive treatment requires cubicles for thermal, massage and manupulation treatment. Cubicles are best sub-divided and stretcher patients.

A hydrotherapy room for under water exercises should also be provided. This room requires space for under water exercise equipment, wheel stretcher, and a treatment table.

Changing and active treatment area:

This requires changing rooms for both sexes and a large active exercise hall.

..... The minimum size of the exercise room, as recommended in British Hospital Building Notes is 7m x 15m x 4.6m high. Maximum size is given as 9.0m x 18.0m x 5.5m high. . . . . [7]

Staff facilities and storage

These include:

- A general rest room and toilets
- Offices for administrative purposes
- Private room for patient interview and examination
- storage space for equipment and supplies usually needed in the treatment areas.

4.3.3 Occupational therapy facilities

The occupational therapy department usually includes a main therapy room with equipment and materials for painting and drawing, music, dramatics, clay modelling with sometimes a kiln for ceramics, weaving, sewing, and playing games; a second smaller space for a wood-working shop, isolated because of its noise and dust; an office for the therapist; storage for equipment used in the department, and also for carts taken to the patient's bedside, and lockers for the staff.

4.4 Pharmacy

The Pharmacy of a hospital is the department in which drugs are received, stored and dispensed to out-patients and issued to nursing units and other departments. In addition, in most larger hospitals, sterile and non-sterile preparations are manufactured in a sterile-products suite, as required by the medicines inspectorate (HMSO 1977). Finally, it is the department where the medical, dental, nursing and other staff members fund helpful consultative advice relative to current drugs therapy.

The nursing units and the outpatient department received the bulk of the pharmaceutical service, but it is also extended to pratically every department of the hospital. The surgical department requires germicidal solutions, anaesthetics, and other medications; the Emergency department receives drugs for emergency conditions; the outpatient department also requires

for medications for use in the clinics, the laboratory obtains reagent solutions from the pharmacy, the x-ray department requires radiographic opaques, the blood bank, the dietary and Housekeeping departments depend on it for chemicals and various forms of medications.

The essential functions of this department are three: first, dispensing, which is found in some form where-ever there is a hospital, either within it or in a nearby hospital, drug store, second, compounding, which also may be found in either place and requires the services of a registered pharmacist; and third, manufacturing, which is usually found only in the largest hospitals or in those connnected with schools of pharmacy. Only the dispensing section is open to the public. It is nose functional to have a separate dispensary in the outpatient deparmtment only to be supplied with bulk medication from the central dispensing unit serving all the departments.

The size of this department depends on the size of the General Hospital. The United States Public Health Service (USPHS) recommends $20m^2$ for a 50-bed hospital, $50m^2$ and $110m^2$ for 100-bed and 200-bed hospital respectively.

Its location should be near the service entrance easily accessible and reached from bulk stores area for bringing in supplies.

E. Todd wheeler gives the size of the pharmacy for a 300-bed as $135m^2$ - $216m^2$. The department comprises the following facilities.

1. Waiting space for outpatients dispensary
2. Storage for the pharmaceuticals to be dispensed
3. Distribution room for supplying requests to the hospital departments.
4. Offices (at least one for the pharmacist)
5. Storage for bulk chemicals and drugs
6. Storage for flammables
7. Storage for narcotics
8. Compounding area
9. Manufacturing unit if needed
10. Clerks and records Office

Other services to come under the diagnostic and treatment facilities include:

(a) the surgical operating suite

(b) Obsterical delivery suite

(c) Emergency unit, and

(d) Out patient department (O.P.D.)

4.5 The Surgical Operating Suite

The operating suite is a very complex workshop. It is one of the most important departments of any hospital. It is technically a therapentic and in which a team consisting of one or more surgeons, the anaesthetist, and surgical nurses operates upon or cares for the patient. The length of time and seriousness of the operation can vary from minutes to hours, which in turns affects both the size and numbers of operating rooms needed. In addition to the surgeon and the anaesthesiologist, who are in the room, the pathologist and radiologist may also be called in for consultation,

and students of various sorts may be present for observation of the operation. Blood, phasma, drugs, intravenous solutions, dressings, splints, water, cautery, ice, and many other items may be called for. Sometimes the electrical recording instruments or special pumps are used, and oxygen and suction are commonly needed. All these must be quickly available and many must be sterile.

4.5.1 Location

The department should be located at a dead end wing of the building in order to cut off un-necessary traffic to the suite.

The types of operations generally performed in a General Hospital include both minor and major cases. Minor operations are those requiring local anaesthesia while major ones are those generally requiring general anaesthesia.

The operations can be classified into five categories:

1.	General Surgical	64%
2.	Orthopaedic	14%
3.	Eye and ENT	10%
4.	Gynaecologic	6%
5.	Cystoscopic	6%
	TOTAL	100%

At the initial stage of the programme it should be decided where caesarian sections will be performed that is, whether in the delivery suite or in the surgical suite. It is the view of the author that caesarian sections be peformed in the delivery suite since these are natal cases and should be grouped together.

Cystoscopic operations performed by the urologist call for a special equipment but only a limited use of general anaesthesia. Cystoscopic cases are received from both the Nursing units as well as the outpatient department.

Figure 4.4 showe different arrangements for the surgical suite.

4.5.2 Composition of a Surgical suite

The surgical suite comprises basically three zones: the outer zone, the intermediate zone and the inner zone.

The Outer Zone

This Zone receives all traffic coming to the surgical suite. A reception space is required at the entrance with a small waiting space for the hospital staff and stretcher patients. This zone should be accessible from the emergency and nursing units. Elements of the zone include:

1. Reception and Records
2. Clerical Offices
3. Staff changing and rest room (Doctors and Nurses)
4. Non-Sterile Store

Intermediate Zone:

This is essentially a work and storage area. Outside personnel deliver services to this zone but do not penetrate the inner zone. Elements include:

1. Recovery room
2. Sterile Storage spaces
3. Nurses' Station

The recovery room should be an open ward type to ensure maximum observation by the nursing staff. The requirement is 1.5 to 2 beds per operating room.

The sterile store should be near the operating rooms for easy reach and big enough to take the requirements of the suite.

The Inner Zone

The inner zone is the space requiring a careful design in terms of flow of patients and operating staff. It requires a high level of aseptic condition. Elements here, include:

1. The operating room
2. Scrub-up space
3. Sterlizing room and/or sterile work room.

The operating room being the determining factor in sizing the entire operating suite. See figure 4.6 for functional relationships of operating theatre zones.