The Modern Classification for Planning of the Critical Care Units

Ass. Prof. Dr. Assem M. El. Shazly - Monefia University

Introduction

After the Patient complains is investigated by a doctor, he may advice his patient accordingly to his case, either with a prescription or admission in a hospital usually for treatment and medical care. This treatment could be of several types, medial or surgical. Patient admitted in a hospital usually spends most of his time in bed for nursing care. This medical care needed is provided by either doctors or nurses according to the degree of care and supervision classified.

To facilitate nursing medical care, the patient stays in either single, double bedrooms or wards where beds are grouped for the full attention and direct access of medical care team.

Background:

The classification of patients according to their needs was carried out more than one hundred years ago in England by Miss Florence Nightingale , who practiced progressive patient care in her operation of open wards. "It was her plan to place the sickest patient at the head of the ward nearest the nurse's desk, while the convalescent or least ill patients were placed in rear beds."

The fact that the hospital patients don't require the same degree of attention, and it is wasteful for a convalescent patient who will leave the hospital in few days to occupy a bed, which is surrounded with equipment and personnel needed for a patient who is critically ill, lead to the Progressive Patient Care concept.

"The Progressive Patient Care concept has been developed to overcome the

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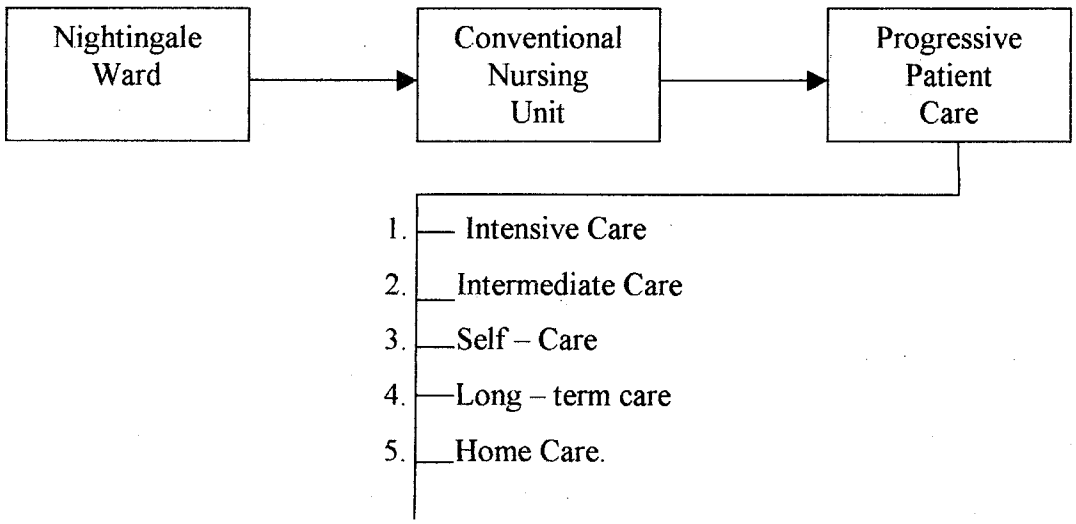
deficiencies of the conventional nursing unit". The conventional nursing unit usually separates patients by type of services needed, age or sex, and the patient often remains in the same unit during the various stages of his illness. The Progressive Patient care is a system of organizing nursing and hospital facilities to provide each patient with the exact degree of care and supervision that he needs."[2]

The Classification of patient care in the hospital.

According to Progressive Patient Care concept, is divided into five Categories:

1. Intensive Care
2. Intermediate Care
3. Self – Care
4. Long – term care
5. Home Care.



For critically and seriously ill patients who are unable to communicate their needs or who require extensive nursing care and close supervision, these patients are under the direct observation of nurses who have been trained for such cases. All necessary life-saving emergency equipment, drugs, medical

[2]Massoud,A., Dr. Arch. "The General Hospital as an Architectural Organism."

gases and supplies should be immediately available.

The critical care units are divided into 2 categories due to the nursing specialization care, and age of patient, i.e.

1- Medical / Surgical Intensive Care Unit (ICU).

2- Premature or Newborn Intensive Care Unit (NICU).

Site Selection for Critical Care Units

The Surgical ICU should be as close as possible to the surgical suites and recovery, to minimize transportation of patients after operation, also should have a convenient access from the accident and emergency department, laboratory and radiology departments.

The Medical ICU should be as close as possible to the cardiac catheterization unit, have a convenient access from the accident and emergency department, laboratory and radiology departments.

The Surgical / Medical ICU be located on any patient floor, with the possible exception of obstetrics.

The NICU should have an efficient and controlled access from the labor and delivery area and the emergency department.

Criteria for Critical Care Units

After taking into consideration that most of patients admitted to this unit are from either the recovery room or the emergency department, that the intensive care unit should be located convenient to those two areas for these reasons:

1. Saving time in transferring the patient to the critical care unit, time which would mean his life.
2. Generating less traffic
3. Reducing the possibilities of cross infection.
4. The location should eliminate the need for through traffic.

6. Medical emergency teams may be able to respond promptly to emergency calls within minimum travel time.

7. The critical care units should be far away from noise and any pollution.

8. Both medical and surgical cases of either sex may be treated in an intensive care unit and in the same ward. Exceptions to this would be badly burned patients who should be isolated to protect against infection of the burned areas and staph pneumonia or similar cases, which might infect others in the unit.

9. Beds in the unit should be used only for intensive care and sufficient beds should be available for above normal emergencies.

10. Patents should be moved to intermediate care nursing units as soon as intensive care is not required."

Size of Critical Care Units

"The comparison tends to show that in 50-to 150- bed hospitals where demand is small, the most logical location for the intensive care unit would be integrated with a nursing unit. In larger, 200-to 600-bed hospitals, the separate location appears preferable.

Surgical ICU depends on the number of operation rooms, so as to be 2 beds per operation room. However such department is recommended to be between 6 to 12 beds, due to economic factors concerning the best utilization of nursing team.

Medical ICU depends on survey of number of cases approached by emergency and community surrounding but also it is recommended to be between 6 to 12 beds.

1-Intensive Care Units Program

The intensive care units required special space to accommodate ICU beds and required equipment for effective staff functions. In addition, Space arrangement

shall include provisions for immediate access of emergency equipment from other departments.

Not every hospital will provide all types of intensive care. Some hospital may have small combined unit; others may have separate, sophisticated units for highly specialized treatments.

A- Intensive Care (General)

"The following shall apply to all types of intensive care units unless otherwise noted. Each unit shall comply with the following provision:

The location shall offer convenient access from the emergency, respiratory therapy, laboratory, radiology, surgery, and other essential departments and services. It shall be located so that the medical emergency resuscitation teams may be able to respond promptly to emergency calls within minimum travel time. The location shall be arranged to eliminate the need for through traffic.

In new construction, where elevator transport is required for intensively ill patients, the size of the elevator cars will be minimum of 1.50meters wide and 2.30 meters deep, and maximum of 1.75 meters wide and 2.75 meters deep.

In new construction, each patient space (whether separate rooms, cubicles, or multiple bed space) shall have between of 12.0 to 14.0square meters of clear floor area, and multiple bed space shall contain at least 10.20 square meters per bed. with a minimum headwall width of 3.30 meters per bed, exclusive of anterooms, vestibules, closets, locker, wardrobes, and /or alcoves.

When private rooms or cubicles are provided, view panels to the corridor shall be required and shall have drapes or curtains, which may closed. Where only one door is provided to a bed space, it shall be at least 1.20 meters wide and arranged to minimize interference with movement of beds and large equipment. Sliding doors shall not have floor tracks and shall have hardware that minimizes jamming possibilities. Where sliding doors are used for access

to cubicles within a suite, a 0.90 meters wide swinging door may also be provided for personnel communication.

Each patient bed area shall have space at each bedside and provisions for visual privacy from casual observation by other patients and visitors. For both adult and pediatric units, there shall be a minimum of 2.40 meters between beds. Each patient bed shall have visual access, other than skylights, to the outside environment with not less than one outside window in each patient bed area. Clerestory windows with windowsills above the heights of adjacent ceilings may be used, provided they afford patients a view of the exterior and are equipped with appropriate forms of glare and sun control. When partitioned cubicles are used, patients' view to outside windows may be through no more than two separate clear vision panels.

Systems for rapid and easy information exchange with a hospital are important. Nurse calling systems for two- way voice communication shall be provided. The call system for the unit shall include provision for an emergency code resuscitation alarm to summon assistance from outside the intensive care unit.

Hand-washing fixtures shall be convenient to nurse stations and patient bed areas. There shall be at least one hand-washing fixture for every three beds in open plan areas, and on in each patient room. The hand-washing fixture should be located near the entrance to the patient (cubicle or room) should be minimize splashing water on to the floor, and should be equipped with handsfree operable controls.

Administrative center or nurse station. This area shall have space for counters and storage. It may be combined with or include centers for reception and communication. There shall be direct or remote visual observation between the administration center or nurse station and all patient beds in the intensive care unit.

Emergency equipment storage. Space that is easily accessible to the staff shall be provided for emergency equipment such as a CPR cart.

Medication station. Provision shall be made for storage and distribution of emergency drugs and routine medications. This may be done from a medicine preparation room or unit, from a self- contained medicine-dispensing unit, or by another system. If used, a medicine preparation room or unit shall be under visual control of nursing staff. If shall contain a work counter, cabinets for storage of supplies, sink with hot and cold water supply, refrigerator for pharmaceuticals, and doubled locked storage for controlled substances. Convenient access to hand-washing facilities shall be provided.

The electrical, medical gas, heating, and air conditioning shall support the needs of the patients and intensive care team members under normal and emergency situations.

At least one airborne infection isolation room shall be provided. The number of airborne infection isolation rooms shall be determined based on an infection control risk assessment. Each room shall contain only one bed.

The following additional service spaces shall be immediately available within each intensive care suite. These may be shared by more on intensive care unit provided that direct access is available from each.

a. Securable closets or cabinet compartments for the personal effects of nursing personnel, located in or near the nurse station. At a minimum, these shall be large enough for purses and billfolds. Coats may stored in closets or cabinets on each floor or in a central staff locker area.

b. Clean workroom or clean supply room. If the room is used for preparing patient care items, it shall contain a work counter, a handwashing fixture, and storage facilities for clean and sterile supplies. If the room is used only for storage and holding as part of a system for distribution of clean and sterile supply materials, the work counter and handwashing fixture may be omitted.

Soiled and clean workrooms or holding rooms shall be separated and have no direct connection.

c. Clean linen storage. There shall be a designated area for clean linen storage. This may be within the clean workroom, a separate closet, or an approved distribution system on each floor. If a closed cart system used, storage may be in an alcove. It must be out of the path of normal traffic and under staff control.

d. Soiled workroom or soiled holding room. This room shall be separate from the clean workroom. The soiled workroom shall contain a clinical sink (or equivalent flushing–rim fixture). The room shall contain a lavatory (or hand-washing fixture). The above fixtures shall have a hot and cold and space for separate covered containers for soiled linen and a variety of waste types. Rooms used only for temporary holding of soiled material may omit the clinical sink and work counter. If the flushing – rim clinical sink is eliminated, facilities for cleaning bedpans shall be provided elsewhere.

e. Nourishment station. There shall be a nourishment station with sink, work counter, refrigerator, storage cabinets, and equipment for hot and cold nourishment between scheduled meals. The nourishment station shall include space for trays and dishes used for nonscheduled meal service. Provisions and space shall be included for separate temporary storage of unused and soiled dietary trays not picked up at mealtime. Handwashing facilities shall be in or immediately accessible from the nourishment station.

f. Ice machine. There shall be available equipment to provide ice for treatment and nourishment. Ice-making equipment may be in the clean workroom or at the nourishment station.

g. Equipment storage room or alcove. Appropriate room (s) or alcove (s) shall be provided for storage of large items of equipment necessary for patient care and as required by the functional program. Its location shall not interfere with the flow of traffic.

h. An X-ray viewing facility shall be provided in the unit.

The following shall be provided and may be located outside the unit if conveniently accessible.

a. A visitor' waiting room will be provided with convenient access to telephones and toilets. One waiting room may serve intensive care units.

b. Adequate office space immediately adjacent to be intensive care unit will be available for critical care medical and nursing management/administrative personnel. The offices will be linked with the unit by telephone or an intercommunications system.

c. Staff lounge (s) and toilet (s) shall be located so that staff may be recalled quickly to the patient area in emergencies. The lounge shall have telephone or intercom and emergency code alarm connections to the intensive care unit it serves. If not provided elsewhere, provision. For the storage of coats, etc., shall be made in this area. Consideration should be given to providing adequate furnishings, equipment, and space for comfortable seating and the preparation and consumption of snacks and beverages. One lounge may serve adjacent intensive care areas.

d. Sleeping and personal care accommodations staff on 24-hour, on-call work schedules.

e. Multipurpose room (s) for staff, patients, and patients families for patient conferences, reports, education, training sessions, and consultation. These rooms must be accessible to each nursing unit.

g. A housekeeping room (Janitor closet) shall be provided within or immediately adjacent to the intensive care unit. It shall not be shared with other nursing units or departments. It shall contain a service sink or floor receptor and provisions for storage of supplies and housekeeping equipment.

h. Storage space (Parking) for stretchers and wheelchairs shall be provided in a strategic location, without restricting normal traffic.

i. Laboratory, radiology, respiratory, therapy, and pharmacy services shall be available. These services may be provided from the central department or from satellite facilities as required by the functional program.

B- Coronary Intensive Care Unit

Coronary patients have special needs. They are often fully aware of their surroundings but still need immediate and intensive emergency care. In addition to the previous general standards the following standards apply to the coronary intensive care unit:

Each coronary patient shall have a separate room for acoustical and visual privacy.

C- Combined Medical /Surgical and Coronary Intensive Care

If medical, surgical, and coronary intensive care services are combined in on intensive care unit, at least 50 percent of the beds must be located in cubicles.

D- Pediatric Intensive Care

Critically ill pediatric patients have unique physical and psychological needs. Not every hospital can or should attempt to have a separate pediatric intensive unit. Many hospitals will be able to safely transfer their patients to other facilities offering appropriate service. If a facility has specific pediatric intensive care unit, the functional program must include consideration for staffing, isolation, and the safe transportation of intensively ill pediatric patients, along with life support and environmental system, from other areas. At least on airborne infection control room shall be provided, with provisions for observation of the patient. The total number of infection control rooms shall be increased based upon an infection control risk assessment.

In addition to the standards previously listed for intensive care units, each pediatric intensive care unit shall include:

Space at each bedside for parents.

Sleeping space for parents who may be required to spend long hours with the patient. If the sleeping area is separate from the patient area, it must be in communication with the intensive care unit staff.

Consultation/demonstration room within, or convenient to, the pediatric intensive care unit for private discussions.

Provisions for formula storage. These may be convenient the pediatric intensive care unit but must be available for use at all times.

Separate storage cabinets or closets for toys for use by the pediatric patients.

Additional storage for cots, bed linens, and other items needed to accommodate parents' overnight, and space allowance.

Examination and treatment room(s). Examination and treatment rooms shall have a minimum floor area of (11.15 square meters). The room shall contain a handwashing fixture; storage facilities; and a desk, counter, or shelf space for writing.

E. Newborn Intensive Care units

Each Newborn Intensive Care Unit (NICU) shall include or comply with the following:

1. The NICU shall have a clearly identified entrance and reception area for families. The area shall permit visual observation and contact with all traffic entering the unit. A scrub area shall be provided at each public the unit. A scrub area shall be provided at each entrance to the patient care area(s) of the NICU. All sinks shall be hands-free operable and large enough to contain splashing.

2. At least one door to each room in the unit must be large enough to accommodate portable X-ray equipment. A door 1.10m. wide should accommodate most x- ray equipment. Both width and height must be considered.

3. There should be efficient and controlled access to the unit from the Labor and Delivery area, the Emergency Room, or other referral entry points.

4. When viewing windows are provided, provision shall be made to control casual viewing of infants.

5. In the interest of noise control, sound attenuation shall be a design factor.

6. Provision shall be made for indirect lighting and high – intensity lighting in all nursing

7. A central area shall serve as a control station, shall have space for counters and storage, and shall have convenient access to handwashing facilities. It may be combined with or include centers for reception and communication and patient monitoring.

8. Each patient care space shall contain a minimum of 9.25 square meters excluding sinks and aisles. There shall be an aisle for circulation adjacent to each patient care space with a minimum width of 0.90 meter.

9. An airborne infection isolation room is required in at least on level of nursery care. The room shall be enclosed and separated from the nursery unit with provisions for observation of the infant from adjacent nurseries or control area(s).

10. Blood gas lab facilities should be immediately accessible.

11. Physician's sleeping facilities with access to a toilet and shower shall be provided. If not contained within the unit itself, the area shall have a telephone or intercom connection to the patient care area.

12. Sleeping space may be needed for parents who may be required to spend long hours with the neonate, but precautions must taken in account for cross-infection and privacy. This space may be separate from the unit, but must be in communication with the (NICU) staff.

13. A respiratory therapy work area and storage room shall be provided.

14. A consultation /demonstration /breast feeding or pump room shall be provided convenient to the unit. Provision shall be made, either within the room

or conveniently located nearby, for sink, contour, refrigeration and freezing, storage for pump and attachments, and educational materials.

15. Provide charting and dictation space for physicians.

16. Medication station.

17. Clean workroom or clean holding room.

18. Soiled workroom or soiled holding room.

19. Provide a lounge, locker room, and staff toilet within adjacent to the unit suite for staff use.

20. Emergency equipment storage. Space shall be provided for emergency equipment that is under direct control of the nursing staff, such as a CPR cart. This space shall be located out of normal traffic.

21. Housekeeping room (Janitor closet). A housekeeping room shall be provided for the unit. It shall directly accessible from the unit and be dedicated for the exclusive use of the NICU. It shall contain a service sink of floor receptor and provisions for storage of supplies and housekeeping equipment.

22. Space should be provided for the following:

a. A visitors' waiting room.

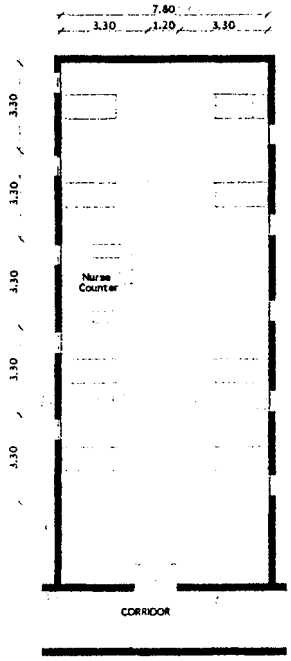
b. Nurses / supervisors office or station.

c. Multipurpose room(s) for staff, patient and patients 'families for patient conferences, reports education, training sessions, and consultation. They may be on other floors if convenient for regular use. One such room may serve several nursing units and/ or departments."[3]

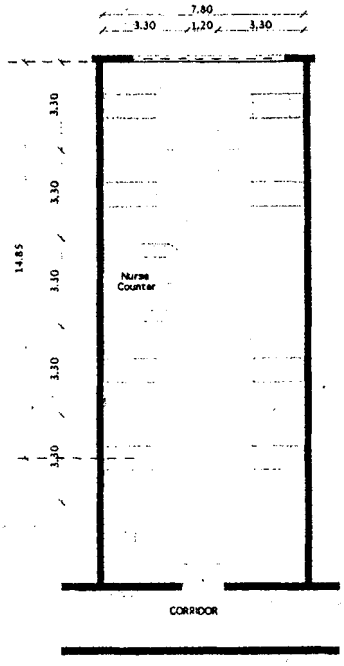
Analysis

Several plans where developed for bed distribution in a ICU ward according to the needs which fulfill the criteria and needs required .

[3] 1996-97 Guidelines for Design and construction of Hospital and Health Care Facilities. AIA Press , Washington, D.C. , 1998

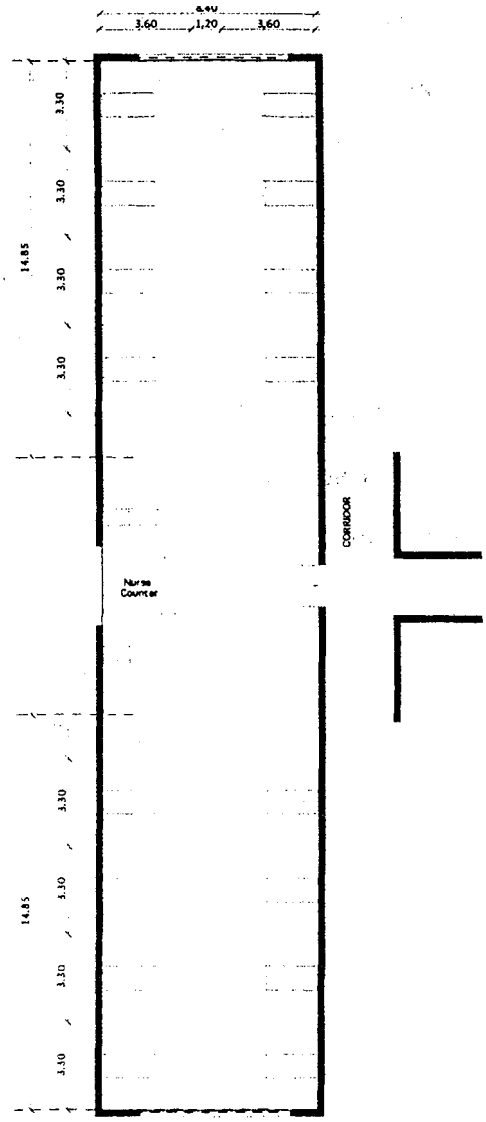


Plan A



Medical / Surgical I.C.U.

Plan C



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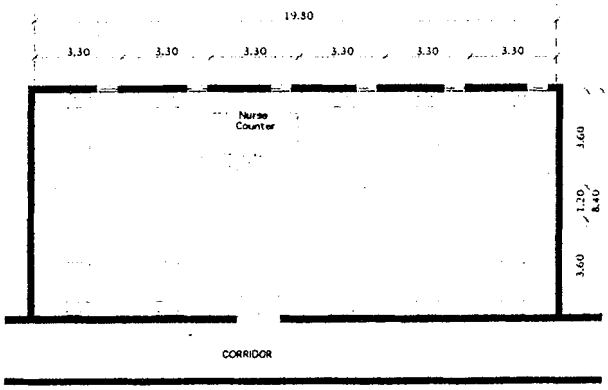
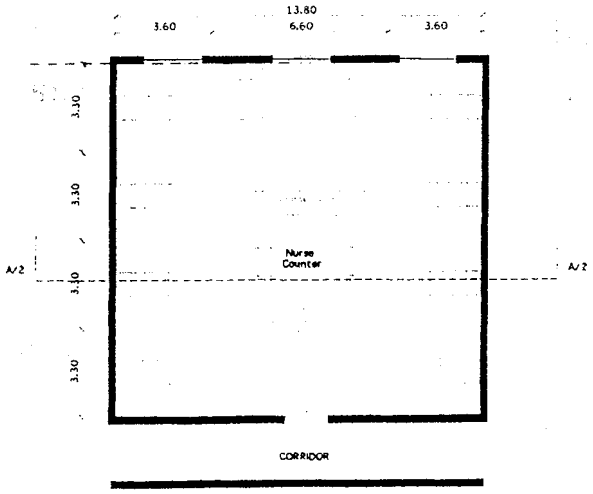


Plan B



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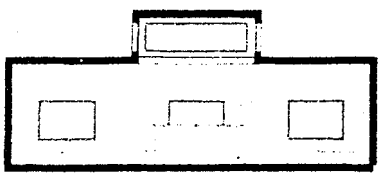

SEC A/2

Plan A: ICU with side windows in a wing type building.

Plan B: ICU with front window in a wing type building

Plan C: ICU within middle of other departments and one-side windows

Plan D: ICU located at a dead end of building.

Plan E: ICU square or circle type with or without clerestory.

Plan A:

- Natural Light: Good distribution of natural light but could cause glare to patient. Treatment from glare to windows should be considered.
- View: weak view due to limited width of window opening.
- Relation to nurse station: when the nurse station is near the entrance for control, her supervision is weak to the remote beds.

Plan B:

- Natural Light: Weak distribution of natural light and needs glare treatment to windows head of patients.
- View: poor view due to limited width of window ahead of patients.
- Relation to nurse station: The location of the nurse station near the center of the ward is very convenient for nurse visual supervision and nursing efficiency. Also the location in front of the entrance helps in the control of the ward.

Plan C:

- Natural Light: Good distribution of natural light close to the first three beds to the window (according to the height of window),but the remote beds to the window position is weak. No glare for patient eye.
- View: Better view to patients' closer to the window.
- Relation to nurse station: similar to plan A.

Plan D:

This case is specially intended for larger ICU wards.

- Natural Light: Similar to plan C.
- View: Better view to patients' closer to the window.

- Relation to nurse station: The location of the nurse station near the center of the ward is very convenient for nurse visual supervision and nursing efficiency although her supervision is weak to the remote beds. Also the location in front of the entrance helps in the control of the ward.

Plan E:

- Natural Light: Similar to plan C.
- View: Better view to patients' closer to the window.
- Relation to nurse station: The location of the nurse station near the center of the ward is very convenient for nurse visual supervision and nursing efficiency for all beds. Also the location in front of the entrance helps in the control of the ward.

Conclusions

-If the number of beds is over 10 Beds, it is recommended to locate ICU at the dead end of building hospital, or in a wing type building.

-If the I.C.U equal is equal or less than 8 beds, it may bet the located other than the dead end, the ratio of which width to depth, not exceeding 3: 1, so as the minimum net width dimension is 7.80 meters.

-A Square shape plan is also recommended so, as each side of the wall is not less than 13.20 meters.

-If ICU to be located at last floor in low rise building hospital is possible to plan a clerestory for natural light.

-It is recommended to locate the door entrance in a location controlled by the nurse station and preferable to plan an air lock for sound and environmental control.

- It is recommended to locate the nurse station at the center of the ward to accomplish the best visual supervision between nurse & patient
- It is recommended to have an access to the nurse station for services and communicate with all other related services.

- In case of difficulty for patients to visual communicate with their relatives in the ICU ward, it is recommended to install an inner circle television for audio–video communication between the patients' bed and their visitors in the waiting room outside the ICU.

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أستاذ مساعد د. عاصم محمد الشاذلي – كلية الهندسة بشبين الكوم – جامعة المنوفية

ملخص البحث

نظرا لتطور مباني المستشفيات والمراكز الصحية في الآونة الأخيرة والتي صاحبها تطوير في جميع الأقسام الطبية والخدمية للمستشفى، فان البحث يتطرق إلى إحدى فروع هذه الأقسام وهى قسم العناية الحرجة .

وقد قام الباحث بتوضيح أنواع الرعاية المختلفة ومستوياتها ، ومن ثم قام بدراسة المتطلبات الفراغية والعلاقات الوظيفية والاحتياجات .

وبعد تصميم عدة نماذج واحتمالات للقسم وبناء على الدراسة ومقارنتها بالمحددات المطلوبة أستنتج الباحث المميزات والعيوب بكل نموذج.

بناء على تحليل المميزات والعيوب توصل الباحث إلى توصيات أساسية ونتائج تؤخذ في الاعتبار عند التخطيط والتصميم للعناية المركزة وتعتبر كإطار للعمل بداخله يوصل المصمم إلى أفضل اتجاهات للحلول في تصميم المستشفيات.