

# INTENSIVE CARE UNITS IN LATIN AMERICA<sup>1</sup>

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*Many hospitals in Latin America are greatly interested in the idea of providing better care for critical cases with the help of intensive care units. A number of hospitals have already set up such services, and many others have plans to do so in the near future. The purpose of this article is to explain certain fundamentals connected with the planning and operation of intensive care units, based on the experience acquired by PAHO in the course of a project designed to study the application of progressive patient care to the organization of hospital services.*

In 1968 the Pan American Health Organization, with financial assistance from the W.K. Kellogg Foundation (Battle Creek, Michigan), embarked on a joint project with six university hospitals in Latin America for the planning and installation of intensive care units. The institutions selected to execute the project are situated in Brazil, Chile, Colombia, Peru, Uruguay, and Venezuela. The basic criterion in selecting the six hospitals where the units would be located was that if possible they should be able to be used for demonstration purposes for the benefit of other hospitals interested in establishing this type of service. Two meetings were arranged, with the participation of consultants from the University of Michigan,<sup>3</sup> PAHO advisory staff,<sup>4</sup> and representatives of each of the six countries, to

define the features these units should possess in Latin American countries having a shortage of hospital resources and hence unable to attain the standards in regard to equipment, installations, and personnel to be found in highly industrialized countries that have had wide experience in the operation of intensive care units.

The present article gives first of all a general account of "progressive patient care," and then outlines the main features that PAHO stipulated for the planning and installation of the six intensive care units involved in the project.

## Progressive Patient Care

This is a system under which hospital and other services are organized on the basis of the health needs of groups of patients, these needs being met or attended to by medical care and nursing care given at various levels and in the most suitable surroundings, at the right time and in the most appropriate conditions for the individual patient. Progressive patient care interrelates "need" with the level of "clinical care" required to treat and satisfy that need adequately.

Subject to slight variations in one or two countries, the range of services arising out of the application of progressive patient care is traditionally as follows: intensive care, intermediate care, care of physically capable (self-

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sufficient) patients, prolonged care (for chronic cases), domiciliary care, and care in the out-patient department.<sup>5</sup>

This classification confuses the grade of

service with the type of patient for which it is intended, and also with the machinery for supplying it. The following classification would seem more appropriate and simple:

<i>Grade of care</i>	<i>Classification of patients</i>	<i>Location of services</i>
Intensive	Acute critical cases (patients who may survive)	Intensive care unit Resuscitation service Emergency service (certain procedures only)
Intermediate	Acute noncritical cases	Hospitalization unit for acute cases Recovery service
Minimum	Physically capable or partially incapacitated patients requiring minimum care	Hospitalization unit for convalescent patients Hospitalization unit for chronic cases Outpatient department Home care

The proposed classification divides the grades according to the "amount" of medical and nursing care needed, indicates the general clinical characteristics of the patients eligible for each grade, and lists the hospital departments appropriate for each of the three grades.

The general clinical features of an intensive care unit (ICU) are the same as those of a hospitalization service for critical patients requiring comprehensive and constant medical and nursing care. Even if the need for intensive care services in a given hospital is very great, and the medical personnel favor the establishment of various types of intensive care in a variety of units, it is essential that the hospital adopt the policy of starting out with a single unit that admits patients without clinical, age, or sex discrimination. Once the hospital has acquired adequate experience and operating capacity, then it will be possible to establish other units in the light of the demand, and to determine the clinical characteristics of each. It is not always possible to provide every type of

care to patients within an intensive care unit; for example, treatment of mental patients or of infectious and contagious cases will depend on the physical facilities of the unit for looking after this type of patient.

#### Clinical Criteria for Admission and Discharge

It is difficult to determine how serious is the condition of patients admitted to an ICU. The judgment of the individual hospital physician must be based on clinical criteria thoroughly discussed in the various specialist units. These criteria should be put down in writing and distributed among the medical staff, but they cannot be standardized and applied to all hospitals because of differences in types of illness and in the services any given hospital can offer. Nevertheless, there are three general clinical situations that can serve as guidance in formulating criteria for admission and discharge: (a) patients showing symptoms of instability in one or more of the major physiological systems—circulatory, respiratory, renal, digestive (heart stoppage, respiratory block, coma, serious dehydration, and other

<sup>5</sup>United States Public Health Service. *Elements of Progressive Patient Care*. Publication 930-C-1, 1962.

similar states); (b) patients showing stable conditions in the major physiological systems, but in grave danger of developing serious complications, e.g., patients with coronary affections who have achieved adequate circulatory stability, but who at any given moment are likely to develop arrhythmia; patients undergoing major surgical operations and by definition running the same risk, i.e., patients in whom the monitor function is the essential factor in detecting a crisis; (c) patients who because of their clinical condition require constant medical and nursing supervision and the use of specialized equipment, e.g., cases of renal hemodialysis, respiratory problems requiring positive and negative pressure respirators, and so on.

The strict and proper application of clinical criteria for the admission of patients to the unit and discharge from it is a fundamental aspect of the efficient utilization of intensive care services.

#### *Medical Services in an ICU*

By the very nature of intensive care units, their medical services should be organized in such a way as to ensure "continuity" in the care given to each patient. This is achieved by opening the doors of the unit to all the medical staff of the hospital; each patient will have his own physician in charge, who is also the one who had him admitted to the hospital and felt it necessary to have him transferred to the unit. In this sense the unit will not have medical personnel specifically assigned to it. To ensure continuous medical supervision, residents in the final year of medicine and surgery will be detailed to take turns in providing services in the unit and giving emergency treatment whenever the physician in charge is not available, although the latter will be contacted at any time of the day or night if he needs to be informed, so that he can decide as to what treatment should be given the patient. Inter-branch consultation will be very frequent in an ICU. The physician in charge will request consultations and will proceed accordingly if

he is qualified to do so. Otherwise he will hand his patient over to the best qualified specialist for the treatment or procedure indicated.

The organization of medical services as thus described calls for a "medical coordinator," who will be responsible for drawing up the clinical criteria for admitting and discharging patients and for defining the minimum standards of patient care required to produce the best medical results. Both the clinical criteria and the medical service standards should be based on a close clinical scrutiny of the effective and potential number of hospital patients needing intensive care. In this task the medical coordinator will receive guidance from each of the chiefs of the hospital's sections and clinical services. These should collaborate actively, forming a standing advisory body to define and keep up to date the standards and criteria for admission and discharge.

Once the unit has begun to function, the medical coordinator will be responsible for strict compliance with the admission and discharge criteria and the medical care standards. In his "coordinating" capacity, he will not be expected to give any medical treatment himself; however, he may have such responsibilities when he acts in the capacity of hospital physician. In other words, the medical coordinator will devote all his time to the unit during the planning stage and the first weeks of operation. Subsequently, his services will be available only when needed to cope with any problem arising in the unit in connection with the medical services.

The organizational structure of the medical services as thus described is ideal, since it obviates the need to set up a new service within the hospital and hence to appoint a chief and permanent medical staff, which is a definite trend in many hospitals. Intensive care, obviously, is not a specialty but a clinical stage in the evolution of certain cases, and hence any general practitioner or specialist should have the right and the duty to look after his patient from the intensive care to the minimum care phase. In practice it has been observed that care of patients with coronary thrombosis falls

within the specialist field of cardiology, and hence medical personnel can be attached to the unit to look after this type of patient.

### *Nursing Services in an ICU*

The nursing services of an ICU should have a strictly clinical slant; the highest level of competence should be demanded, and the services should be so arranged as to be available constantly 24 hours a day and 365 days a year. The unit will have the largest proportion of direct nursing care of all the hospital units, and the constant tension under which the nurse works calls for special character and personality traits to enable her to adapt to an atmosphere of permanent crisis. The nurse should acquire knowledge and experience in handling critical cases and in using the specialized equipment, and hence she requires special training.

Inservice training of nursing personnel and auxiliaries, the formulation of rules for nursing care, and supervision to ensure compliance with the rules laid down—all this indicates the need to appoint a head nurse.

### **Organization of an ICU**

The activities carried on in an ICU are divided into two main groups: clinical and nonclinical. The clinical activities are those where decisions and implementation require a measure of clinical (medical and nursing) judgment. Hence this group of activities will be the exclusive responsibility of the physician and the nurse. Nonclinical activities will be carried out by an official, other than the physician or the nurse, who will also deal with administrative coordination and information. The division into clinical and nonclinical activities will be based on a detailed analysis of all the functions carried out in the unit by the "medical coordinator" as representative of the medical profession, the "head nurse" as representative of the nursing services, and an intermediate-level representative of the hospital administration, known as the "administrative

assistant" of the unit. Thus three areas of responsibility are prescribed for the execution of the unit's activities; they form an administrative structure that enables the physician and the nurse to devote themselves wholeheartedly to patient care and not to waste their training and experience on activities other than those in their professional field.

The medical coordinator, the chief of clinical nursing, and the administrative assistant of the unit constitute a panel, which should be coordinated and directed by an official at the hospital-director level, with sufficient authority to take decisions in regard to budgeting, appointment of staff, changes in organization of auxiliary and general departments, and coordination of the modernization or construction program. Proper selection of the officials who are to form this panel is one of the key factors in the success of the unit. What are the qualifications regarded as ideal for each of these officials? The decisions the medical coordinator will have to take suggest the need for a professional with clinical experience, one who has had a first-class academic training and has qualities of leadership within the medical profession that make for respect and acceptance among his colleagues. He must be convinced of the need for intensive care procedures and for teamwork, as a basic means of improving and perfecting hospital services. The head nurse should be a professional who has demonstrated a progressive attitude toward the



**Intensive care unit in the San Juan de Dios Hospital in Bogotá, Colombia.**

clinical care of patients. She should possess an energetic personality while having a sound head on her shoulders, an outstanding capacity for self-criticism, and a very good sense of human relations. She should not have held administrative posts previously, since this would necessitate changes in outlook in her new strictly clinical activities. The administrative assistant of the unit should ideally have had administrative training, but until this condition can be met the post can be filled by an official who has shown administrative ability, in other words, decision-making capacity, ingenuity, and a gift for human relations.

### Functional and Architectural Planning of an ICU

The effective demand for services in any given hospital should be the criterion for determining the number of beds in the ICU. Nevertheless, a hospital lacking experience in handling such services should begin the physical planning of the unit cautiously and should fix the number of beds in the light of the number of cases that can be handled adequately, especially in the matter of nursing services. On the basis of the experience gained in the University Hospital, Ann Arbor, Michigan, which is similar to that of other university medical centers, it has been estimated that the ideal number of beds for an intensive care unit should be not less than eight or more than 12, with 10 as the average. The maximum operational capacity of an intensive care nursing team comprises a unit of 12 beds, judging from the experience of the medical center at Ann Arbor. In the event of the demand being greater than the number of beds available, it is better to set up a new unit than to expand the old one.

The adoption of a coefficient based on the total number of beds in the hospital is an unsatisfactory method of determining the number assignable to the ICU, since the demand for intensive care bears no relation to total beds but is dependent rather on the scope and type of services available, which can differ

markedly from one hospital to another with the same number of beds.

The ICU should be located within the hospital precincts, but away from the main internal traffic so that the patients can easily be reached while at the same time there is quiet and a tranquil atmosphere. In general, it is desirable that the unit should be situated close to the operating theaters and recovery rooms, since many of the patients may proceed from these departments. For similar reasons, it is important that there should be ease of access between the unit and the emergency ward, and that the unit can be easily reached from the department of radiology, the clinical laboratory, and the sterilization center, in the interests of the services these will provide for critical cases.

The arrangement of the beds should meet the following conditions: accessibility, possibility of continuous observation, and privacy to make the patient feel at ease. A patient in an ICU may at any given moment require the simultaneous care of physicians and nurses, who in many instances will have to use special equipment that takes up a good deal of space. Some of the beds should be located close to the monitoring apparatus and oscilloscope; this equipment, and the oxygen and suctioning installations, can hamper the movements of the physicians and nurses around the patient. Hitherto, ease of observation of patients has been the basic reason for planning the physical structure of the ICU in the form of unrestricted spaces housing groups of patients. However, the principle has been evolving, and beds now tend to be arranged in such a way that while the patients can easily be seen through observation windows, a feeling of privacy is maintained by means of separate cubicles. Ease of observation has been greatly simplified by the use of monitors and audiovisual communication systems. Patients who although in a critical condition are still in full possession of all their faculties need quiet surroundings, away from the noise caused either by other patients or by the staff working within the unit.

Rooms should be available where adequate isolation techniques can be applied for patients whose condition makes isolation essential. The professional staff should have access to a lecture room with space for at least 10 persons, where small seminars, technical discussions, and other activities of that kind can be conducted. It is also useful if a working area can be set aside, close to the nurses station, where professional staff can work on case histories. For the convenience of the residents, especially those on the night shift, one of the rooms should be set aside as a rest room.

The nursing services should have a station separated from the patients' quarters where the central monitor fitted with an alarm should be placed. Thus the patients will not be able to hear the alarm signals or overhear conversations concerning their clinical condition. Similarly, a special area should be set aside where the nurses can relax, since nurses are on call permanently and are under particularly severe psychological strain.

The workrooms should be similar to those in the hospitalization units; nevertheless, it is important that an ICU nurse should do only a minimum of cleaning; the cleaning of instruments and care of equipment will be in the hands of nonclinically skilled service personnel.

The unit's administrative assistant, a secretary, and service personnel will be in charge of nonclinical duties, and they should be allotted adequate space to perform them. The administrative assistant and the secretary should have an office cut off from the clinical area and close to the main entrance to the unit, where they can keep an eye on the movements of patients and visitors and supervise the delivery of equipment, supplies, and dietary articles. There should also be adequate storage space for drugs, nursing supplies, equipment, instruments, stationery, clothes, and other articles of daily use.

In view of the critical nature of the cases in an ICU, visits by members of families should be allowed only on a very restricted basis. This means setting aside space for a waiting room,

close to the unit but not where it will cause interference with the movements of patients, personnel, or supplies entering or leaving the unit.

### Special Equipment and Installations

Hospitals are at liberty to select the medical equipment they consider essential for the ICU. Nevertheless, there are types of equipment which because of the complexity of their calibration, maintenance, and operation are often more of a hindrance than a help in medical and nursing activities. As a basic philosophy for the project, it was decided to recommend that the hospitals acquire only the equipment indispensable for the proper care of patients in a critical state of health.

Here are some observations on monitoring equipment:<sup>6</sup>

- "Modular" type equipment makes it easier to expand the monitoring system.
- All units should start by installing a basic monitoring system and add modules as the demand for resources increases.
- The monitoring system for each bed requires only a one- or two-channel monitor-visoscope. A pacemaker by each bed is not essential, but there should be one available at all times, preferably the battery-operated type.
- It is essential to have an emergency trolley carrying a monitor-visoscope, electrocardiograph, and defibrillator.
- The master monitor with visoscope-selector and alarm signal should be placed in the nurses' station.

The equipment for the unit should be selected in the light of the assurance given by physicians and nurses that it is entirely justified and bearing in mind particularly the economic effect on the institution of purchasing and maintaining it.

When the equipment is purchased, it is important that installation and maintenance services should be included. The unit's electric

<sup>6</sup>United States Public Health Service. *Equipment Consultative Notes* 1(1), 1969.

installations should have very strict specifications ensuring grounding for each piece of metal equipment and apparatus within reach of the patient, stable voltage, and plugs near each bed, not less than eight in number and connected up with at least two different circuits. The planning and installation of the electric wiring should be done by technicians so that the efficiency of the work is guaranteed. It is essential that the unit's electricity network should be connected with the hospital's emergency plant by means of an automatic device. The equipment and installations needed will differ with each hospital, so that no specific recommendations can be made.

### **Relationship between the ICU and Other Services and Departments of the Hospital**

The establishment of an ICU will create various kinds of relationships with the diagnosis and treatment subdepartments and the general services of the hospital. We shall describe briefly the relations between the ICU and the departments most closely connected with the unit's operation.

#### *Emergency Care Department and Recovery Rooms*

In the first place, it is important to explain the difference between the concept of intensive care and those of "emergency" and "recovery." In the classification of the various grades of progressive care mentioned earlier, we saw that the emergency service of the hospital provides intensive care for patients arriving in the service in an acute critical state, allowing them to return home once they have fully recovered. If the patient has only partially recovered, he should be admitted to a hospitalization unit for intermediate care; and finally, if he is to continue under intensive care, he should be transferred at once to the ICU.

The need for intensive care has always existed in hospitals, and in general it is provided in a large measure in the recovery rooms. There is no doubt that the professionals in

charge of postanesthetic recovery rooms and cardiology services have been the ones to show most interest in the intensive care problem. The relationship is more or less traditional; objectives vary, since the services are geared to postanesthesia recovery, and hence the patient will be looked after there for an average of two hours until his recuperation status is compatible with his immediate transfer to the regular services where he will continue his convalescence. Clearly, in some hospitals where a great proportion of the work involves major surgical operations, a large number of patients will have to be transferred to the ICU.

#### *Hospital Admissions Department*

The utilization of the beds in the ICU will depend largely on the acceptance and strict application by each hospital physician of the clinical criteria for the admission and discharge of patients. But this alone is not enough: it is essential that when an ICU patient has been transferred to a regular hospital service, the transfer should be made as soon as possible to the appropriate clinical service. It is the responsibility of the hospital admissions department to maintain beds available in the various hospitalization wards and to transfer patients coming from the ICU to them.

The department should also organize a quota system, based on the register of admissions, showing the average length of stay and occupation index in each of the inpatient services so as to keep beds available for patients coming from the ICU and give them preference over other patients.

#### *Surgery and Anesthesiology Departments*

The departments of anesthesiology and surgery will have served an appreciable number of ICU patients or are equipped to serve them. In view of the critical condition of patients undergoing intensive care, it is of the utmost importance to have a round-the-clock anesthesia and surgery service. This system may be similar to that used for emergency cases, but

rules must be laid down governing the procedure to be followed by the medical and nursing services of the unit in requesting anesthesia and surgery services at any time, day or night. Some hospitals where the emergency services are very active have their own surgical and anesthesiology services which can at the same time be used to supply the needs of the unit. Each hospital should work out, in the light of its own peculiar circumstances, the most expeditious and efficient procedure for ensuring that the ICU can have recourse to those services in a reasonably short time.

#### *Radiology, Pathology, Clinical Laboratory, and Immunotransfusion Departments*

The patients in the ICU will require the services of the departments of radiology and pathology, the clinical laboratory, and the immunotransfusion department to a larger extent than other units of the hospital. The services required of these departments call for easy physical access so as to avoid establishing branches of the departments within the unit itself.

When planning the unit, the medical coordinator, the head nurse, and the administrative assistant of the unit should study the following questions carefully with the chiefs of each of the departments concerned:

- What are the regular working hours of the departments of radiology and pathology, the clinical laboratory, and the immunotransfusion department?
- What services do these departments provide during working hours and outside working hours?
- Who is responsible within the unit for requesting services from the department in question, during ordinary working hours, and outside working hours?
- What services can be provided using mobile radiology equipment within the unit itself?
- How does the ICU establish priority of service in the use of radiodiagnosis procedures in emergency cases?

- How and by whom will patients from the ICU be taken to the radiology department?

- Which of the personnel are to be made responsible for taking samples for the clinical laboratory and for immunotransfusion, during normal working hours and outside working hours in emergencies?

- How will the results of radiodiagnosis, clinical laboratory, and pathology tests be transmitted to the unit? Who will attach them to the case history and how will they be brought to the notice of the doctor in charge?

- Who determines what blood tests can be requested by the unit during the regular working hours of the immunotransfusion department and outside working hours, and how will these blood tests be obtained?

- Who will be responsible for handling and carrying blood and blood components, during working hours and outside working hours?

- Who will make the blood counts, carry out crossmatch tests and the other immunological reactions required, during and outside the department's working hours?

- Who will make transfusions and evaluate the reactions?

- Will a blood bank be necessary in the unit, and if so where will it be located and under what conditions?

These points relate to only a few of the more important matters to be gone into in programming the services for which the ICU will have to rely on the departments of radiology and pathology, the clinical laboratory, and the immunotransfusion department. Each hospital should adopt the procedure by which it can best take advantage of the services of the various departments.

#### *Department of Pharmacy and Sterilization Room*

As far as the services of the department of pharmacy and the sterilization room are concerned, the officials in charge of the unit should study in detail the system of communication, means of transport, and quantity and



quality of supplies the unit will need periodically; the storage of medicines and antiseptics; the regulations governing the handling of drugs under the legislation in force in the particular country; the handling of sterile substances that need to be resterilized after a certain date; procedures in regard to used or soiled articles, etc. Those in charge of the hospital should regard supplies of medicines and sterilization materials to the unit as a matter of the utmost importance.

To maintain the principle that nonclinical activities should be the responsibility of personnel other than the physician and the nurse, it is essential to establish a definite routine by which services are furnished to the unit on a regular basis, and the personnel of the unit do not have to go and fetch them from the various departments.

In organizing activities connected with the department of pharmacy and the sterilization room, the same method should be used as was described in regard to the radiology, pathology, clinical laboratory, and immunotransfusion departments. This narrows down to ascertaining what already exists and what is needed; who is responsible; and how the services are to be carried out 24 hours a day and seven days a week.

#### *Department of Nutrition and Dietetics*

It might be thought that a few patients in a critical condition, concentrated in an ICU, do not need particularly careful attention on the part of the dietetics department. In actual fact, they require an extraordinary amount of attention from this department as part of their nutritional therapy.

The great variety of special diets prepared for the ICU calls for careful planning, from the diet as prescribed by the physician, through the technical supervision of the preparation and distribution of special meals, to the careful feeding of the patient—the phase in which close collaboration is necessary between the nursing personnel and the dietetics services.

Communications between the ICU and the

department of nutrition and dietetics should be defined clearly, suitable arrangements being made for feeding patients after hours. Procedures may differ from one hospital to another according to the degree of centralization or decentralization of the department and variations in the feeding habits of different countries.

#### *Department of Maintenance*

The special installations and equipment used in an ICU make a close functional relationship desirable between the unit and the hospital maintenance department. This should be established right from the phase of planning the unit's facilities. The plans showing the sanitary, hydraulic, electrical, oxygen, and suctioning installations should be available to assist the department in establishing a systematic program of preventive maintenance. The electronic monitoring equipment: oscilloscopes, electrocardiographs, pacemakers, defibrillators, and other instruments should be periodically overhauled, as should also the special installations and the unit's premises generally.

#### *Housekeeping Services (Laundry, Cleaning, and Sanitation)*

We have stressed the need for the service and maintenance departments to work regularly and spontaneously with the unit. The laundry, cleaning, and sanitation services should observe this same approach scrupulously if the unit is to attain maximum efficiency. These services should be planned at all stages and phases, so as to determine the system of communications to be used, the extent of the services needed, etc., in such a way that the requirements can be met in accordance with a timetable to be fixed according to the resources available. Rules must be laid down for handling contaminated clothing, techniques for disinfecting the isolation wards, general cleaning schedules for floors, walls, windows, equipment, furniture, and utensils generally. The timetable for the

cleaning staff should be so arranged, in consultation with the medical and nursing personnel, that the work can be done during hours when special procedures need not be interrupted.

#### *Case Histories and Statistics*

The keeping of case histories in an ICU will not differ fundamentally from the system used in ordinary hospital services. There may be variations in the frequency with which tell-tale signs are recorded, and possibly there will be more regular use of certain forms such as that showing electrolytic balance, etc. The statistics kept will be those providing indicators of utilization, both qualitative and quantitative, covering the entire unit.

A study on mortality and morbidity carried out before the services of the unit begin to operate will serve as a basis for subsequent comparative analyses, illustrating the benefit of the unit in reducing the mortality indices and average periods of hospitalization.

#### *Assignment of Personnel to the Unit*

In referring to the organization of the unit's medical services, the need must be stressed for each patient to be under the care of a physician. Patients admitted to an ICU may be classified as private, semiprivate, and indigent cases. The provision of medical services for patients in the first two groups will not give rise to any major difficulties; on the other hand, the assignment of physicians to take care of patients in the third category may do so, and hence it is advisable to make provision for this problem at the planning stage of the unit. Several types of schemes can be established for this purpose, such as assigning to each clinical department the responsibility for making physicians available on a rotating system to look after poor patients. The contractual commitments this might involve should be dealt with on the basis of the statutes and regulations in force in the particular hospital.

As regards nursing personnel, it is important to realize that intensive care, constant and comprehensive, requires a generous supply of

clinical nurses with first-class training and special skills. The project under consideration made provision for 10 nurses and 10 auxiliaries to meet the nursing needs, 24 hours a day and seven days a week, in a unit with 10 beds, on the basis of an average of two trained nurses and two auxiliaries per shift. The head nurse is not included in this estimate, but it does allow for absences for reasons of vacation, sick leave, public holidays, and other days off occurring in a hospital with regular eight-hour shifts. In countries where the working day is six hours, the number of nurses will be proportionately higher. It is important to note that hospitals will have to train as many nurses as possible so that extra hands will be available to work in the unit if unforeseeable situations should arise, or to replace staff who leave.

The care given to critical cases does not in itself create a new type of medical specialty; but the clinical nursing services assigned to the unit definitely do have certain features that can be regarded as a genuine specialty field for nurses. First of all, a hospital nurse who is to undertake intensive care work needs to have had previous training in the handling of critical cases, and she also needs to undergo instruction in the handling and functioning of certain specialized and highly delicate equipment. A nurse selected for the unit should have had a sound clinical training; she should have discernment, and a personality enabling her to take rapid decisions and to perform her duties in an atmosphere of constant physical and mental stress. In view of these varied requirements, we would recommend giving definite incentives to encourage nursing personnel to go in for intensive care work. The incentives might include higher pay, longer holidays, and similar benefits calculated to encourage candidates and to give more recognition to nursing staff.

In addition to the administrative assistant, the ICU requires the services of a secretary-typist to handle all the secretarial work: information, messages, requests. The secretary will work according to a special timetable so that she can replace the administrative assistant of the unit when he ends his regular working

day. The unit will also need three or four messengers so as to maintain a 24-hour service. The messengers will perform many of the duties laid down in the programming schedule—transport of patients, moving of heavy equipment, and other such tasks. The messenger on the night shift will be responsible for certain duties such as passing on messages and obtaining drugs or special supplies that for one reason or another have not been provided for in the regular routine of the unit, or else have been consumed sooner than expected.

### Cost Factors

Medical care of patients is costly and will increase the patient-day costs more and more as the service is intensified and the quality improved. In the Latin American context it is not known how high the costs of an ICU will mount and what ratio they will bear to the patient-day cost in units for acute cases receiving intermediate care. Theoretically, it could be argued that even though the patient-day costs are much higher for patients in an ICU than for those in ordinary units, the cost per case could be reduced, at any rate for certain types of illness. This theory will have to be tested in the course of the project.

Any hospital deciding to organize and install an ICU should have a clear idea of the estimated investment and running costs. Investment costs will cover all the outlay for the conversion of the actual premises, whether by modernization, expansion, or construction. We have recommended that the ICU should be situated in an area requiring as little alteration as possible, so as to avoid high construction costs and thus speed up the physical planning program. Similarly, we have suggested that arrangements be made to install the oxygen plant and to plan a central suction pump unit. The cost of the latter is high, and as a rule the machinery has to be imported; in addition, these installations require first-class maintenance services, and even then the equipment can fail. This would suggest that mobile suction pumps should be available so as to be able to

cope with any emergency. The purchase of special equipment is an important item in the hospital's investment budget. There is an immense variety of equipment on the market for ICU purposes. But it is recommended that the utmost care be taken in purchasing monitoring equipment, oscilloscopes, etc., and that only what is absolutely necessary should be acquired. Every year new models appear, and hence the unit should think carefully before investing in costly equipment that may become largely obsolete in a very short time. The level of the unit's running costs will vary according to the number and grade of the nurses, auxiliaries, and administrative staff assigned to the new service; and the consumption of medicines, especially intravenous injections, blood components, etc., will affect these costs. Expenditure on personnel and supplies should be calculated as accurately as possible so as to show the budgetary allocation needed.

Although the investment and running costs of the ICU are bound to be high, the hospital will obviously gain the benefit of improvement in the quality of its clinical services; the medical staff will find it encouraging to have at their disposal a special service for treatment of their patients; and the hospital will have acquired a clinical branch of outstanding value for medical and paramedical teaching, enhancing its prestige not only in its own particular sphere but in a much broader sense. All this will help to make the functioning of the hospital more efficient and enable it to establish a scale of charges consistent with patient care in an ICU; and the resulting revenue will make a notable difference to the budgetary position of the unit.

### The ICU as a Means of Training Health Personnel

An ICU can be one of the most effective means of bringing about changes in outlook, gaining experience of new approaches in diagnosis and treatment, and acquiring skill in the use of special procedures and promptness

in making clinical assessments and rapid decisions where these can have a salutary or disastrous effect on the condition of the patient. Intensive work in a physician-nurse-auxiliary team constitutes an excellent frame for the teaching of teamwork. The stress to which critical cases are constantly subjected in the unit induces in the health personnel a new sense of responsibility in coping with emergencies and crises. This is extremely valuable for the student as well as for the working professional, and the unit can thus work out teaching programs at the undergraduate, specialist, and continuing education levels.

Direct patient care takes up all the available time, and hence participation by groups of students is limited. It is nevertheless recommended that undergraduate students follow closely the clinical evaluation of patients they have been studying when for one reason or another these are admitted to the intensive care unit, so that continuity of patient care comes to be seen as a basic factor in the training of the future physician.

In intern and resident programs, the ICU constitutes an extremely valuable stage in student rotation duties. The services of the resident in internal medicine and surgery are essential to maintain and guarantee continuous medical vigilance.

The preparation of the rota for interns and residents is the responsibility of those in charge of medical education in the particular medical school, and it is made out and put into practice in conjunction with the medical coordinator of the unit.

### **The Teaching of Medical Care Administration and the ICU**

The medical treatment and teaching activities of intensive care units literally make them laboratories for the teaching of medical care administration, since such concepts as planning, organization, management and control, utilization of manpower and finances, teamwork and human relations, communications, public relations, working morale,

clinical-administrative evaluation, and other important matters can be demonstrated clearly in the functioning of the ICU.

### **Summary**

In 1968 PAHO joined with six university hospitals in Brazil, Chile, Colombia, Peru, Uruguay, and Venezuela in a project for the installation of intensive care units. The underlying principle was that the six units should gain experience that they would subsequently use for the benefit of other hospitals interested in establishing similar units.

The article explains the role of intensive care as an aspect of the modern concept of "progressive patient care," and describes the features regarded as desirable in the intensive care units to be set up in the six hospitals. It is recommended that they should not be over-ambitious in the early stages; that units should not exceed a certain size (12 beds); and that when expansion is called for it should be by installation of a new unit rather than by enlargement beyond the limit laid down. Great stress is laid on smooth articulation within the general organization of the hospital, since in Latin America especially, the intensive care unit will have to rely on the facilities of all the other departments. It is therefore suggested that very strict rules should be worked out so that the medical and nursing staff will know in virtually all circumstances and at all times of the day or night what services they can expect as a priority right or privilege.

Practical hints are given on the physical layout of the unit within hospital precincts and of the various services within the unit; on the need for caution in spending scarce funds on luxury equipment that may rapidly go out of date; on minimum staffing standards and ways of getting the most out of the personnel available, especially the indispensable and hard-worked nurses; and on sound administrative structure. The administrative basis suggested is a panel consisting of a medical coordinator, a head nurse, and an administrative assistant, working directly under a senior official of the hospital with decision-making powers.

The author advocates intensive work in a physician-nurse-auxiliary team as an excellent frame for the teaching of teamwork, and considers that in addition to their immense clinical value, intensive care units are literally laboratories for the teaching of medical care administration. □