PRELIMINARY EXPERIENCE WITH RESPIRATORY INTENSIVE CARE IN AIN SHAMS FACULTY OF MEDICINE

THESIS

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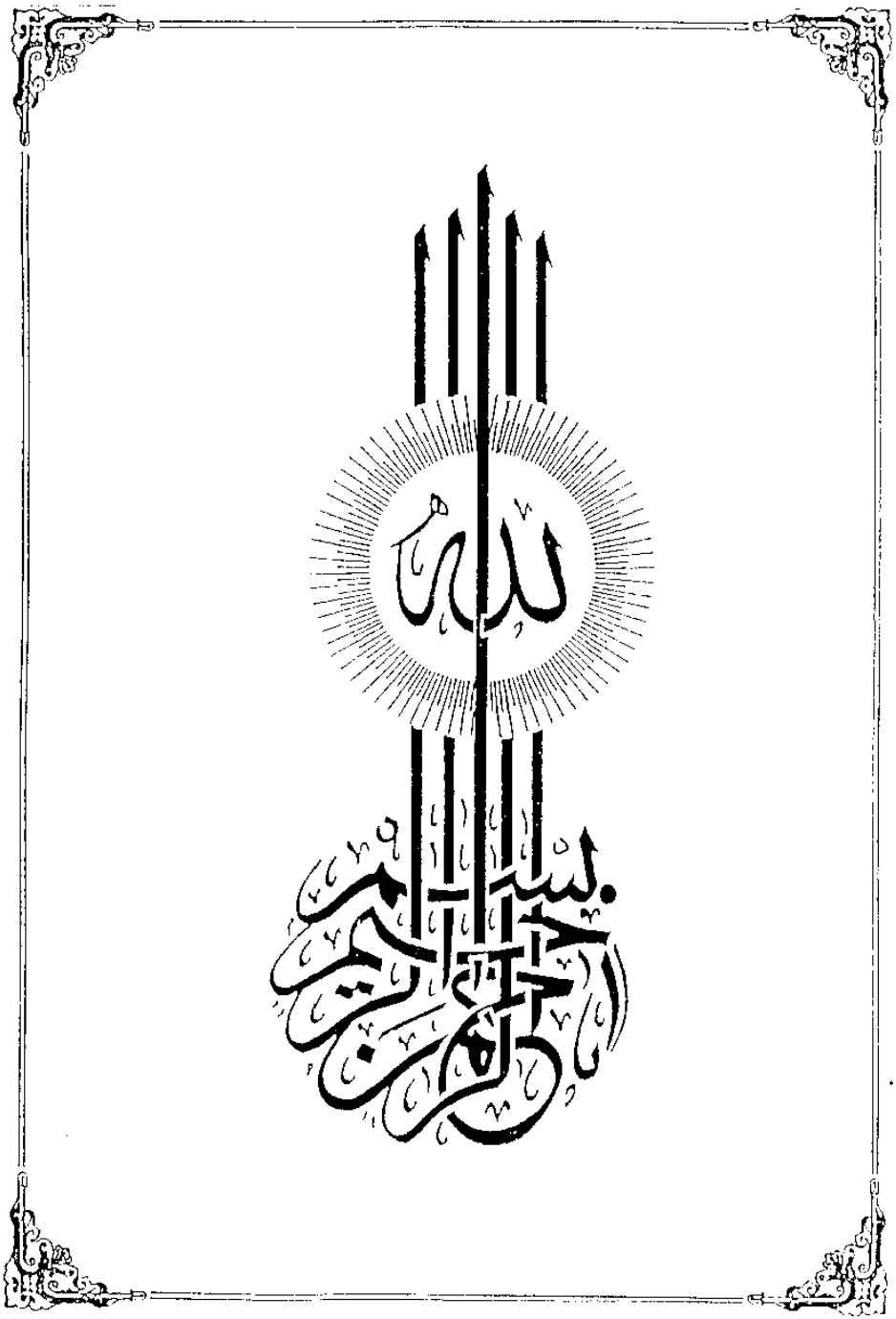

CONTENTS

Abreviation

Respiratory intensive care unit . (RICU)

Intensive care unit . (ICU)

Coronary care units . (CCU_s)

Arterial blood gases . (ABG)

Central venous pressure . (CVP)

Computed Tomography . (CT)

Pulmonary embolism . (PE)

Adult Respiratory Distress Syndrome (ARDS)

Acute severe asthma . (ASA)

Acute respiratory failure . (ARF)

Respiratory quotient . (RQ)

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

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INTRODUCTION AND REVIEW OF LITERATURES

INTRODUTION AND REVIEW OF LITERATURE

Critical care is a 24 hours per day, seven days per week, service by well trained physician, prepared to take incisive action to sustain patients'vital functions. (Max Harry and Herbert., 1971).

The intensive care unit (ICU) is designed for patients who need and can benifit from facilities and services which are not available in general hospital wards. Such patients usually have failure, or potential failure, of one or more systems. They there- fore need continous support, monitoring nursing care and avalibility of medical staff. In 1967 was recognised that an ICU was an economic arranged for the treatment of grave illness and not only improves the chances of a patient with a desperate illness but was also likely to promote an improvement in the general level of medical and nursing care (BMA,1967). Since then, intensive care or critical care medicine has developed enormously and is uncommon in developed countries to find any but the smallest hospitals without their own ICU.

It has been said that the direct antecedent of the icu was the postoperative room which dates back to the time of Florence Nightingale, (Hilberman., 1975), but intensive care is not limited to postoperative patients and many would regard modern intensive care as dating from the poliomyelitis epidemic of the early 1950's This porvided the stimulus for provision of long term artificial ventilation, with an immediate reduction in mortality (Lassen., 1953). and through this the development of mechanical ventilators.

At first, most ventilated patients were nursed in general wards but the high complication rate, largely because of mechanical failure of airway equipment and ventilators, resulted in several centers establishing respiration units in the late 1950's (Pontoppidan et al., 1977).

During the early 1960's Coronary Care Units [illegible] for continous electrocardiographic montoring of patients with myocardial infarction (Shillingford et al., 1964) and to make the best use of the [illegible] which had become available for cardioversion, (Lown et al., [illegible]) and pacing (Portal et al., 1962).

Continous hemodynamic monitoring provided early warning of complications occuring in those patients who had undergone open surgery. Modern intensive care has developed from an amulgam of the lessons learnt from respiratory and coronary care with continued momentum provided by the clinical and technological developments in cardiopulmonary resuscitation, pharmacological and mechanical circulatory support, advances in the treatment of renal failure, respiratory failure, cerebral oedema, multiple organ failure, and patient monitoring system. (Wylie and Churchil, 1984).

EVOLUTION OF RESPIRATORY CARE

In 1952, Scandinavian countries , especially Denmark, was struke by a poliomylitis epidemic of unprecented severity. . From July 24 to December 3, the hospital for communicable disease in Copenhagen admitted 2,722 patients, of whom 315 had respiratory muscle paralysis requiring respiratory support.

Early in the epidemic all patients were treated in the one tank and six cuirass respirator available. Uncuffed tracheostomy tubes were used to secure an open airway, adequate humidification of inspired gas was not available, and effective chest physical therapy was hampered by body-enclosing respirators. Of the first 31 patients with respiratory paralysis admitted in 1952, 27 died, most within three days. When the thirty-second pateints, a 12 year old girl, was nearing a terminal state of respiratory failure, an anesthetist, Bjorn Ibsen, was consulted. A tracheostomy was promptly performed, followed by insertion of a cuffed endotracheal tube and initiation of manual artificial ventilation with a conventional to and fro system.

Thus, the patient had been improved by the measures usually carried out by the anaethetist in the operating theatre (Ibsen., 1952). The therapeutic principles demonstrated by Ibsen now become the accepted methods for management of respiratory paralysis throughout the region. Teams of ventilator assisting of nurse, anaethetist interns and medical students provided round the clock ventilation and respiratory care in shifts. The overall mortality rate of patients with respiratory paralysis was reduced to less than 40 per cent (Henning et al, 1977)

Most of the essential principles of positive pressure mechanical ventilation and airway care were implemented during the [illegible] epidemic. Chest physical therapy with meticulous attention to postural drainage, manual assistance to coughing, and tracheobronchial aspiration of secretions were universely applied (Ingwersen, 1976).

Inspired gas was partially humidified in the to and fro system with partial rebreathing and more effective by pass humidifiers soon become available. Orotracheal intubation preceded tracheostomy thus avoiding the hazards of emergency tracheostomy without airway control. PH and blood gas electrodes were not available, but adequacy of manual ventilation was monitored with acceptable accuracy by measurement of end-tidal carbon dioxide concentration, and occasionally by total bicarbonate content of plasma. Adequacy of oxygenation was judged by clinical observation and by measurment of arterial oxygen saturation or by oximetry. Weaning was accomplished by gradual reduction in the number of assisted breaths as the patients ability to breath spontaneously improved, a forerunner of present day intermittent mandatory ventilation (IMV) method. In 1955, the New England region was struk by a severe epidemic of paralytic poliomylitis, and anaesthesiologists again assumed an important role in the care of patients with respiratory failure. At the Massachusetts General Hospital an entire floor was converted to a poliomylitis respiratory failure unit. Mechanical ventilation by tank respirators and [illegible] ventilator, an early version of the volume-preset device were capable of providing controlled ventilation. The superiority of intermittent positive pressure ventilation (IPPV) was once more demonstrated as it had been in 1948 - 49 (Bower et al., 1950).

Systemic study of the efficiency of gas exchange and the optimal ventilation pattern was hardly feasible until blood - gas electrodes became available for routine clinical use in the early [illegible] and Sefen., 1965).

The Respiratory Unit at Churchil Hospital, [illegible] opened in 1958., primarily as a center for treatment of patients [illegible] disease and respiratory failure . In [illegible] Intensive Care Unit was opened at university hospital of Baltimore [illegible].

A full-time staff of nurses, physicians and chest physical therapists set the standards for present - day staffing patterns of multidisciplinary ICU. Although these early respiratory units were generally small, with capacities of five or six beds, they served an important role in teaching and clinical research , and in developing quantitave, physiologically sound methodology for prevention and treatment of acute respiratory failure. Advances in many other fields of medicine have also had major impacts on survival from acute respiratory failure. (Henning et al., 1977).

ROLE OF RESPIRATORY INTENSIVE CARE.

Recent experience has indicated that an intensive care unit designed and staffed to manage the many proplems resulting in acute respiratory failure is highly effective in salavaging patients who otherwise would have died.

The proplem of acute respiratory failure encom passes a wide clinical spectrum of magnitude that most commonly hospitals today are challenged to provide appropriate services. The most commonly encountered precipitating causeSof acute respiratory failure are acute respiratory infecton in patients with chronic obstructive lung disease, chest trauma, post-operative, accidental or self induced poisoning , revesible neurologic emergencies and hypoxemic states due to sévere pneumonitis and the adult respiratory distress syndrome with its many causes. The overall proplem is growing because of the increasing incidence of chronic obstructive lung disease.

The increasing recognition of respiratory failure in non obstructive states, the increasing use of surgery in old persons, as well as the alarming incidence of poisoning in our younger population (Thomas et al., 1971).

RESPOSIBILITIES OF RESPIRATORY CARE SERVICES

Advances in cardiopulmonary physiology, together with developments in technology for diagnosis and treatment of patients with cardiopulmonary disorders, necessitate the organization of highly specialized service for respiratory care.

To meet the need of the patients, as dete rmined by the medical staff ,this service has multiple responsibilities, including :

(A) Storage and delivery of respiratory therapy equipment, monitors, and ventilators within the hospital.

ventilators within the hospital.

(B) Adminstration of medical gases , therapeutic aerosols ,and mechanical ventilation under medical supervision.

(C) Participation in rehabilitation of patients with chronic pulmonary diseases by the use of techniques such aspatient and family education ,breathing retraining ,and chest physical therapy.

(D) Participation as a member of the cardiopulmonary resuscitation team, and assistance in emergency care of any patient with upper airway obstruction or apnea from any cause.

(E) Assistance in the management of patients requiring long-term respiratory support including mechanical ventilation and airway care.

(F) Assumption of full responsibility for the pulmonary function laboratory whenever feasible ,the pulmonary laboratory should provide at least spirometry and blood gas measurements.

(G) Development of policies and methods of acceptable practice for the care of patients being treated for pulmonary disease in accordance with current professional standards ,and generally accepted practice .

(H) Provision of active educational programs for respiratory therapy technical staff ,medical staff and other members of health care team .(William et al 1980)

GUIDE LINES FOR ORGANIZATION AND FUNCTION:

To carry out these functions and responsibilities - previously mentioned - in the most efficient manner we should consider that :

FIRST: the essence of any organized intensive care service is a commitment to care. This must begin with the physician - director and be supported by the entire professional staff and hospital adminstrator . Care must be given with great enthusiasm by the nursing and paramedical persons. (Thomas et al.. 1971).

SECOND: the respiratory care services must be autonomus and under the direction of a physician who is responsible to medical care ,and [illegible] adminstration with respect to non medical manners. The respiratory care service must have its own table of organization ,records ,policy and manual procedures , and budget. (William et al .. 1980).

THIRD: critical care must be given in a humanistic team work [illegible]

FOURTH: the porposed guide lines should not be the ultimate ,but the scope of the care is still an 'endless-pit', there are, and will continue to be ,great variations from hospital to hospital in the service provided. It is important to mention again the fact that this care should be developed with the philosophy that there should be provisions for enlarging the scope of services rendered.
LASTLY: in case of hospitals unable to provide high level critical respiratory care, policies and procedures should be developed for transfering patients to hospitals that provide such care . (William et al ., 1980).

GEOGRAPHY AND BEDS:

It has been an almost universal experience that adequate care for acute respiratory failure cannot be adminstered on a general medical or surgical ward. Intensive respiratory care is best managed in a physically distinct area designed and equipped to meet the problems of the common respiratory emergencies .

The number of beds necessary for intensive respiratory care will vary with hospital location and population. In general ,at least 5 per cent of the hospital's total beds will berequired for intensive respiratory care ,these beds should be available in organized units.

The basic beds commitment should be adapted to individual needs and flexibility of unit capacity should be retained if at all possible.

Space should include at least 12 width feet per bed and width space is far important than bed length space ,an allocation of 108 squarefeet per bed is an averagespace figure. (Thomas et al., 1971).
Ideally, the ICU bedshould be mobile, easy to operate and allow all procedures to be performed with a minimum of disturbances to the patient and effort from the staff. Other important features are ease of cleaning, [illegible] for patient's chart and a radiolucent base and mattress, [illegible] image intensifier can be used for insertion of transvenous catheters and so on without moving the patient. (Thomson., 1980).

Each bed cubicale should be equipped with piped oxygen , [illegible]

and vaccum and should have facilities for cardio-vascular and respiratory monitoring (Thomas.et al ., 1971) and connected to a central station for display, alarm and recording, and facilities should be existed at each bed for advanced respiratory and circulatory support. This is very important because the incidence of arrhythmias secondary to acute respiratory insufficiency is often as high or higher than the incidence of arrhythmias occuring in the coronary care units. so ,we must conclude that a rigid dichotomy between the disciplines of cardiology and pulmonary disease is an artificial and dangerous division (Alfred., 1971)

Physically ,the unit should have adequate bed space and movable partitions for flexibility. Construction should produce no obstacle to the constant visual observation of the nurse. The unit should be physically part of a general intensive care unit to provide for cooperation and training (Thomas., 1969).

There are several requirements for other aspects of intensive care such management of renal failure, neurologic care and care of acute infectious disease, it may there-forebe desirable for large hospitals to subdivide their general intensive care unit into special purpose modules. If the intensive care unit is divided along medical and surgical lines, the units should be as close as possible both geographically and in the use of consulting personnel and technical equipment. In the broadest sense, all intensive care problems deal with impaired gas transport at the tissue level. Geographicallyisolated units for each individuals service often re-sult in very inefficient use of personnel and equipment. Facilities are needed for isolation of acute infectious disease. These may take the form of glass-partitioned cubicles with non-recirculating ventilation systems, approximately one isolation bed per six acute general intensive care bed is adequate. patients with devasting infections such as staphylococcus pneumonia, bacteriollogically active tuberculosis and meningococcal meningitis must be isolated (Thomas., 1971).

The airflow in the unit should be climate controlled, exchanges 12 times hourly and continously positive with respect to the corridors and wards outside.

In a review of R.I.C service , William et al. (1980) , recommended the following :