RESPIRATORY THERAPY in critical care

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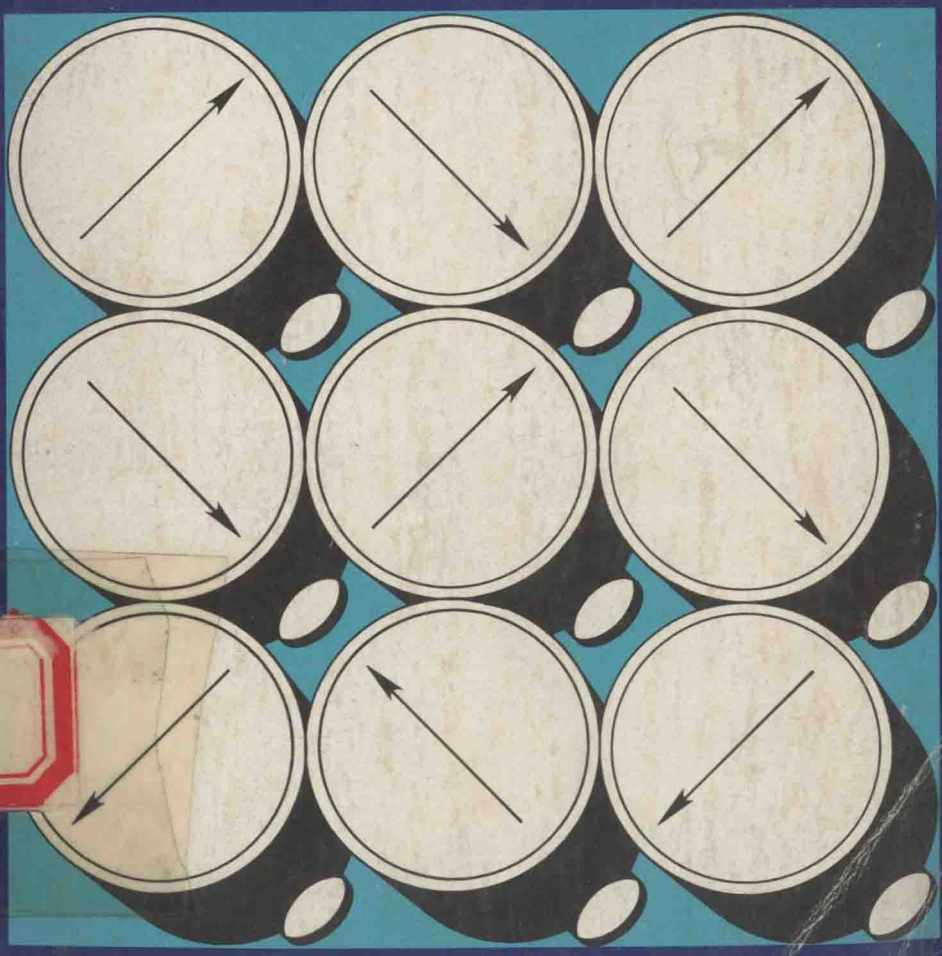

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RESPIRATORY THERAPY
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To
HAZEL

PREFACE

This small volume was developed to respond to the needs of respiratory therapists assigned to critical care units. Although their special skills are utilized in much the same manner everywhere, the problems of patients and the medical viewpoints regarding clinical management vary considerably among different services. An obvious example is the attitude of surgeons as compared to internists concerning the performance of tracheostomy. More fundamentally, however, the function of each unit is based on unique principles, depending not only on the predominant specialty involved, but also on its position in the hospital organization. Emergency and recovery room services are limited by time constraints, whereas burn patients receive intensive care as long as these special services are needed. Patient contact becomes more impersonal as larger numbers are treated for shorter periods. These differences in philosophy are often a source of confusion to inexperienced personnel.

Our efforts were first directed to on-the-job orientation to acclimate the novice to the nature and extent of activities in each unit. For a time it was sufficient to indoctrinate therapists to problems, procedures, and performance expectations. However, as critical care services were enlarged and more sophisticated monitoring devices were developed, this approach became inadequate and competence levels varied. After some discussions with members of the different departments involved, we instituted a course for senior therapy students entitled "Critical Care Concepts." Each type of intensive care service in the institution was viewed in turn, and its peculiarities and special problems emphasized. No attempt was made to explore the diagnostic and therapeutic procedures in depth. We soon observed a significant improvement in performance as well as an increase in motivation and enthusiasm.

We then attempted to organize in a systematic fashion the essentials of team organization and the allocation of tasks by the critical care supervisor. Eventually this came to occupy a primary position in the course, since we found that orientation to team concepts facilitated the introduction of the therapist to the position and duties involved in each clinical setting. The first three chapters deal with these principles.

We believed that the therapist would benefit from knowledge of a few specifics of clinical care that are frequent occurrences. For example,

an admonition not to start dextran before a sample of blood is drawn for cross matching could be lifesaving. We added a modicum of the conventional wisdom of medicine, as time permitted. The syllabus is covered in 32 clock hours, which is all that can presently be allocated. Its benefits to our therapists are sufficient to justify continuation of the effort; this book is intended to provide a foundation.

I wish to acknowledge the support of my medical colleagues in the Department of Anesthesiology, particularly the chairman, Dr. Ray T. Parmley. Of our ARRT instructors the following have been extremely helpful: Joan Taylor, Paula Miller, Barbara Ludwig, and Lorrie Mangold. In addition, sincere thanks are extended to Peggy Zacher, who prepared the manuscript with infinite patience and care.

A final thought: throughout the text are repeated references to the health care professional as *he*. Since no singular pronoun aptly encompasses both sexes, this can be insidiously downgrading to women. An equally destructive cliché is the use of *she* apposite to the nurse. The expression "he (she)" is inimical to literary cadence. I wish to emphasize that all such references are intended to be sexually unbiased and to anticipate that the female reader will feel included in all discussions appropriate to her profession.

Hugh S. Mathewson

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PART ONE

Basic considerations

1 Scope of critical care

Management of the critically ill is primarily concerned with those events that are closely bound to the preservation of life. These are manifold and intrinsically related, which makes their separate study and evaluation difficult. Changes in one organ system can hardly occur without others being affected. Treatment must often be instituted immediately on the arrival of the patient, and prompt decision making is a constant requirement. Experience is developed as a mosaic by constant dedication and review. This is simply a paraphrase of ars longa; Hippocrates would find critical care the quintessence of medical practice.

The answers to life-threatening challenges are provided by men and machines; these are the subjects of the following discussions. Personnel must be organized, trained, and inspired to work as a team. Diagnostic and therapeutic equipment must be understood and operated intelligently. Medical advances are gained at the price of increased involvement and complexity, but the personal rewards are great. It is hoped that the ideas set forth on these pages will lead the reader to professional maturity and the exercise of sound clinical judgment. They are only suggestions; the motivations must come from within.

Basic concepts

Critical care medicine is an identifiable area, but one that crosses the traditional lines of specialization. What it includes and where its boundaries lie are apparent only to those who declare it their field, each in a different way. There are, however, personality characteristics that identify the critical care professional and mark him as an individual with a distinctive point of view. He can be recognized as much by what he is as by what he does. The alertness to significant changes in patient condition, the sustained power of observation, the habit of anticipatory thinking, and the ability to communicate accurately are essential attributes. These characteristics bear emphasis in respiratory therapy training and are hallmarks of high competence. The responsibility for critical care falls on the therapist when respiratory failure is the life-threatening challenge.

An important unifying concept in critical care is geographic,

centering on the hospital that serves as the locus of community service. The large or dominant hospital will usually determine the nature and extent of this activity; for many reasons a limited care facility cannot provide the comprehensive coverage required. Respiratory therapy activities are primarily hospital oriented, with services extending throughout all acute care areas, and their scope and extent largely coincide with the degree of orientation and expertise of the respiratory care specialist.

Planning of services

It is difficult to carry through an intelligent program without an effective system organized by the hospital staff. The education and deployment of personnel involved in critical care services are made possible only with prior planning to provide community access that is simple, convenient, and expedient. The functional capacity of the facility relates more to the scope of management than to the number of beds. The respiratory therapist is indispensable to this phase of operation, since he interfaces with the patient and is conversant with the extent and boundary conditions of the clinical problem. However, he is more concerned with coverage and continuity of service than with individual therapeutic triumphs. Such development can proceed only from the organization of tasks, each assigned to the appropriate echelon of the critical care team.

Just as the limitations of the lesser trained personnel must define and limit their functions, so the therapist must limit his activities to those appropriate to his level of expertise. The traditional view of the therapist emphasizes many activities that are menial, simplistic, and prodigally wasteful of his time. Quite opposite to this outmoded ideal, the therapist should do nothing that the supportive echelons of his team can manage competently. Nor should the team do "by hand" routine procedures that can be performed by machines. The intensive care unit appeared at about the same time as the mechanical ventilator, which for the first time enabled clinicians to cope with respiratory failure. To illustrate, the mortality statistics following head injury have been completely revised. No one had envisioned the large number of these victims who could be salvaged and would recover without neurologic deficits, if they could be prevented from dying of ventilatory insufficiency either of central origin or as a result of intercurrent pneumonia. The problem was resolved logistically by the proper organization and allocation of tasks.

The therapist in emergency care

Most emergencies can be categorized into generic groups with common clinical features. Each type of problem requires certain treatment objectives that can be assigned to the team members. Some

forethought will reveal variations of the problem and constraints on personnel, machines, or time. Planning for catastrophe is the extreme application of this point of view; there are all gradations of lesser magnitude. Priorities will depend on the nature of the problems most frequently encountered, such as the head and chest injuries that appear often in areas of heavy highway traffic. Failure to organize and train in anticipation of these specific needs is to deny access of many individuals to those who can save their lives. The resources of emergency and intensive care must be expanded or contracted to accommodate demand, and the limits to which this flexibility extends must be the concern of the team leader in respiratory therapy.

Importance of records

With the assumption of responsibility for patient care, the hospital is held accountable for its clinical practices as substantiated by adequate medical records. Not only is this essential to community credibility and legal requirements, but the maintenance of records is the only means of evaluation through continuing feedback. Nowhere is this of greater importance than in critical care, wherein policy decisions based on available factual evidence are followed by large expenditures and crucial assignments of key personnel. The objective appraisal of quantitative data is an effective deterrent to unilaterally promoted programs and the tendency to repeat administrative mistakes. Time constraints make necessary a methodical approach to anticipated emergency needs, since attempts to manage by crisis may confront the institution with overwhelming demands.

Keeping intensive care records is difficult and exacting, but should be tractable with adequate planning. Since the end points are likely to be sharply contrasted, survival or death, mortality statistics may significantly reflect the quality of service. Such figures may help to define the real limits of critical care and the extent to which the community can underwrite the costs of life-threatening clinical problems. The respiratory therapist should receive proper instruction in charting medical data. His knowledge is by no means all encompassing, but his capacity to see the critical care problem in a logistic framework can be an important contribution toward the maintenance of an effective and accountable service.

Range of activities

Foremost among the services rendered by respiratory therapists in critical care units are the anticipation, prevention, and treatment of respiratory failure. Airway insertion or endotracheal intubation is often required. All functions relating to airway clearance and maintenance, mechanical ventilatory assistance, the use of oxygen, and the administration of nebulized water and aerosols fall directly within the therapist's

purview. Tracheostomy care, with its problems of humidification and aseptic protection, is a frequent responsibility.

Beyond these areas of primary expertise, however, there are many procedures to which the therapist may contribute. Cardiac and circulatory failure, shock and hemorrhage, musculoskeletal injuries, severe burns, convulsions, and coma are life-threatening situations demanding immediate, intelligent, and vigorous management. Under overload conditions the therapist may be pressed into service for duties beyond his conventional boundaries of expertise.

Attainment of competence

With continued service in critical care areas, the intelligent and motivated therapist will gain from experience. Much of what goes by the name of common sense is the ability to draw on knowledge accumulated from previous exposure to similar situations. Often diagnosis and treatment are not developed at once from first principles, and a rational plan evolves for reasons of which one is not immediately aware. Essential here are the conscientious pursuit of medical knowledge and the ability to bring these lessons to bear on current problems. Case reviews, particularly when they can be evaluated by others, contribute heavily to the growth of experience. Thus prepared the therapist can face the demands of rapid and critical decision making with confidence and assurance.

Summary

The respiratory therapist assumes an integral role in emergency and intensive care. To increase his capacities, educational efforts can be exerted to broaden his understanding of critical care problems. Since he is a hospital-based health care professional, these goals can be accomplished by organized, systematic study of ongoing activities in these areas.

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2 The critical care team

The organization of emergency and intensive care services is similar, since continuity is required in all these areas, and competent personnel must be available at all times. There must be a logistic allocation of resources to cover a variable clinical load. Continuous coverage of services is a fundamental responsibility. The respiratory therapist has much to offer in these areas: airway maintenance, ventilatory assistance, cardiopulmonary resuscitation—treatment of the common life-threatening problems. In critical care management, his specific expertise can be indispensable.

We can construct a hierarchy of health care professionals, adapted from a recent statement on health care manpower (Ament, 1974), to provide coverage for intensive care and emergency services. The physician may justifiably occupy the top position on each team. Primary decision making is vested in him, medicolegal responsibility rests on him, third-party payers remunerate him; there should be no doubt as to where the administrative impetus should originate. His diagnostic acumen and therapeutic expertise must be comprehensive enough to grasp each clinical situation and master its technical difficulties. Then, by orderly assignment of tasks, he can bring the specialized resources of the health care team to bear on the urgent needs of the patient. This requires continuing clinical observation reinforced by a background of study and reappraisal.

Furthermore, the physician must maximize the effectiveness of each member of the team. This requires the development of mutual professional respect, a measure of recognition of the talents and skills of each contributor. The nurse often assumes primary responsibility for the patient's comfort, including relief of apprehension and pain. The therapist or technician can be assured that his particular skills are not only essential to successful treatment, but are best provided by him. Each member must be made to feel an individual concern for the patient and a sense of personal satisfaction when improvement is achieved. The physician's support and encouragement are necessary to sustain a dedicated and enthusiastic effort from each person on whom the life of the patient depends.

Table 1. Acute care team—intensive care unit

Position	*Degree level or equivalent*
Physician	M.D. and Board or College
Acute care nurse	B.S. (4 or 5 years)
Respiratory therapy acute care technician	A.A. (2 years)
Respiratory technician	Certificate (1 year)
Recovery room and acute care aide	On-the-job trainee

Intensive and emergency care teams

The intensive care team is outlined in Table 1. The physician is listed at the top of the hierarchy. He may be an anesthesiologist, although other specialists engaged in resuscitative activities may do as well. The acute care nurse occupies the next position, one requiring special expertise in such areas as coronary or respiratory management and skills that can be brought directly to bear on the problems of the critically ill. These can include endotracheal intubation, intravenous therapy, arterial puncture, and electrocardiogram interpretation.

The respiratory therapist or the acute care technician would follow in this hierarchy. Both have completed education at the associate arts (A.A.) degree level and hold a registry or credentialing certificate to establish their positions. At present, the National Board of Respiratory Therapy (NBRT) is the single certifying body in this particular field, but other acute care specialties are less well defined. Only those underwritten and supported by governmental health agencies are likely to survive. The respiratory technician, also defined and certified by the NBRT, is subordinate to the therapist. Both positions can be looked on as steps in a vocational ladder; the technician may aspire to therapist status and qualify for this promotion by fulfilling additional educational requirements. Again, it is worthy of emphasis that overextension of personnel in emergency situations may press the technician into services ordinarily reserved for the therapist and that this eventuality should be anticipated by in-service training.

The recovery room and acute care aides exemplify persons who express an interest in intensive care and who demonstrate reasonable compatibility and effectiveness in these areas. They are trained on the job to perform limited tasks related to supply and equipment maintenance rather than to patient care.

A comparable hierarchy is suggested for the emergency room (Table 2). Here one may expect to find more individuals in the lower echelons, wherein the manual transport of patients and resuscitative parapher-

Table 2. Acute care team—emergency room

Position	*Degree level or equivalent*
Physician	M.D. and Board or College
Acute care nurse	B.S. (4 or 5 years)
Respiratory therapist, emergency care technician	A.A. (2 years)
Emergency care aide, ambulance service aide	On-the-job trainee

nalia are more often required. The size of the emergency service may encompass a broad range; it may even be the largest service in the hospital. According to laws recently instituted, emergency services must be available in the community and intensive care specialists must be engaged to assume charge of them. A group of physicians serving rotating duty on the service can provide continuity; these can be anesthesiologists. The emergency care nurse is comparable to the intensive care nurse, but in addition has administrative and organizational functions that reflect the wide fluctuations in patient volume. The effective allocation and assignment of tasks to technicians and aides may be urgently necessary during busy periods, and the ensuing results of treatment may depend mostly on the abilities of physician and nurse to supervise, to utilize personnel with maximum efficiency, and to cope with problems of overload.

The emergency care or ambulance service technicians occupy a controversial area. What may be expected of them at the scene of an accident is difficult to define. Educational programs for ambulance personnel have been organized and represent the only rational approach to supervision of their activities outside the confines of the hospital. Ideally they must possess all the skills of the intensive care physician, a goal that can hardly be approached. What falls within their capabilities should be carried out under supervision; beyond communication with physicians and nurses the results of their efforts are likely to be largely fortuitous. Nevertheless, the problem must be faced that resuscitation must often be carried out where the patient is injured or stricken, and the skills of the technician may represent the only hope for a successful result.

Technology

An important aspect of intensive care is the operation and maintenance of equipment. Many recent advances in clinical care have followed the appearance of sophisticated machines, either to perform new diagnostic tests or to supplement vital functions. A significant factor in the recognition of respiratory care as a definable specialty was