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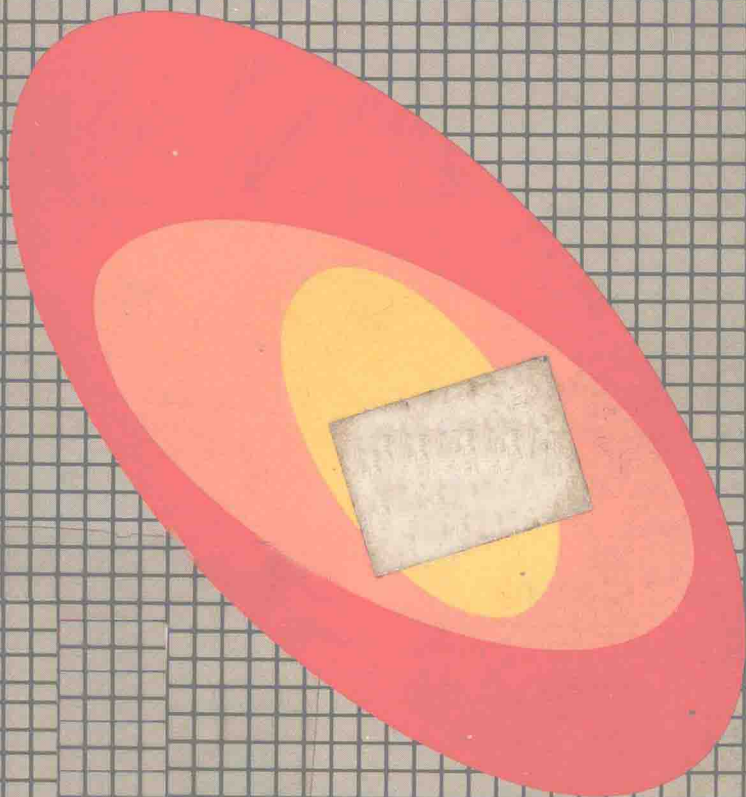
**Spiral**<sup>®</sup>  
Manual



# MANUAL OF CLINICAL PROBLEMS IN PEDIATRICS

WITH ANNOTATED  
KEY REFERENCES  
SECOND EDITION

Edited by  
Kenneth B. Roberts, M.D.



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**KENNETH B. ROBERTS, M.D.**

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The Johns Hopkins University School of Medicine; University of Maryland  
School of Medicine; Sinai Hospital of Baltimore, Baltimore

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Second Edition

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In memory of John T. Hayford, Jr., M.D., and Susanne Hogue Deas, M.S.W.,  
and with prayers of health for Ellen, Sharyn, and Dennis:  
May those who use the information in this book apply it wisely and gently.

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## PREFACE TO THE SECOND EDITION

A recent alumnus of a northeastern U. S. medical school expressed praise for the first edition of the *Manual* as follows: The elevators at his school's teaching hospital are so notoriously slow that the students and house officers developed an "elevator library," the idea being to use the waiting and transit time profitably. The *Manual of Clinical Problems in Pediatrics* was not only "elected" to this library but was held in high esteem, since it made possible the acquisition of a clinical orientation to a disorder between beginning the trek to the emergency department and the time of arrival.

The compliment is accepted with pride—but with reservation as well. The format of the first edition was what we intended (basic for the students, references for the house officers), but the focus was skewed. It appeared we were interested only in children with disorders affecting various organ systems and not in all children and the aspects of growth, development, and behavior that make pediatrics vital. In the second edition, we have reoriented several chapters and added others, creating a part on growth, development, and behavior to help establish some balance. And the thread can be detected throughout the rest of the *Manual* as well.

In the second edition, as in the first, we have combined the points of view of generalist and specialist in each chapter. We greatly appreciate the input of various consultants, who reviewed text and provided valuable comment on accuracy and currency: Drs. Jacob Felix, Barbara Howard, Alan Lake, Allen Schwartz, Edward Sills, and Jerry Winkelstein. In addition, Drs. Evan Charney, Richard Cohn, Margaret Mohrmann, and Patti Vining graciously reviewed chapters by their fellow contributors. And each contributor accepted the editor's pencil with admirable grace. Thank you all.

Contrary to our expectations (and, I daresay, those of our families and colleagues), revising the *Manual* took a great deal of time and focused attention. We are indebted to those around us and to Little, Brown and Company for patient support through the project. Again, our gratitude and praise to Laraine Fisher, who word-processed our taped and stapled scraps into a second edition with efficiency, accuracy, and skill, correcting our errors without sacrificing speed or our egos. And, when it came down to the wire, Shelley Schaffer came to the rescue; she was still typing long after even the house staff had gone to sleep (and that *is* above and beyond the call, isn't it!). For her help, for her cheer, and for her support: a most sincere thank you. (I hope her next all-nighter brings her more fun.)

K. B. R.

## PREFACE TO THE FIRST EDITION

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We are constantly asked by junior medical students, "What book should I get for Pediatrics?" Often, what we recommend is an encyclopedia; what they need is a dictionary. Our house officers, after their first taste of sleep deprivation, rapidly abandon the massive texts in favor of a manual in one pocket, a handbook in the other, and a request for key articles to photocopy (and, perchance, to read). This volume attempts to meet the needs of both groups.

One hundred clinical problems in pediatrics are considered in this manual. For each, there is a brief text designed to present an overview and an orientation rather than an exhaustive review. In addition, more than 2,000 references have been selected to augment the text and are categorized and annotated to guide the reader; special consideration has been given to articles in the most widely available journals and to reviews (editorial or comprehensive) with useful bibliographies. Specifics concerning treatment are not detailed in the text; the reader should consult the referenced articles or the companion *Manual of Pediatric Therapeutics* in this Little, Brown and Company series.

To assure accuracy, currency, and perspective, each section was either written by a pediatrician with special knowledge in the given area and reviewed by a generalist or vice versa. The editor is particularly grateful to the contributors for their responsiveness to the exhortation to "keep the text basic, suggest advanced readings in the reference section," and for their generous cooperation in making suggested changes. Drs. Evan Charney and Margaret Mohrmann helped in the task of editing; I am greatly in their debt for their masterly assistance. Other pediatricians who reviewed and provided valuable comment on portions of the manuscript are Drs. Arnold Capute, Jacob Felix, Jerome Paulson, Richard Talamo, David Valle, and Jerry Winkelstein.

Drs. Verdain Barnes, John Littlefield, and Robert Drachman helped initiate and encourage this project. Ms. Kathleen O'Brien (of Little, Brown and Company), Mrs. Ellen Roberts, and Dr. Evan Charney deserve special thanks for their confidence and patient support through the many months of preparation of this volume. Credit for completion of the book belongs to Laraine Fisher: we submitted rough copy to her, and she somehow made it into a book. If the quality of the contents comes close to her degree of secretarial skill, we will be proud indeed.

K. B. R.

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## **I. EMERGENCIES**

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## 1. CARDIOPULMONARY ARREST AND RESUSCITATION

Kenneth B. Roberts

Cardiopulmonary arrest deserves its premier position in this manual, being the most important and certainly the most dramatic emergency in children. Underlying causes include respiratory disorders, trauma, sudden infant death syndrome, congenital heart disease, sepsis, metabolic disturbances, anesthesia and other drugs, drowning, neuromuscular diseases, and others. Although cessation of cardiac activity may appear clinically to be a sudden, catastrophic event, there are often signs of impending arrest. Respiratory distress deserves particular attention, since most cardiac arrests in children are preceded by respiratory insufficiency. In addition, glucose and electrolyte abnormalities, which may have serious consequences, are often preventable or recognizable before becoming clinically apparent. Children at risk for hypoxia, hypoglycemia, and hyperkalemia require appropriate monitoring and observation.

It is axiomatic that the earlier effective resuscitation is instituted, the better the prognosis. If the patient has not been hypoxic prior to cardiopulmonary arrest, there is considered to be a period of about 4 minutes before discernible brain damage occurs; since hypoxia is usual in children prior to cardiac arrest, there may be even less of a "grace period" in this age group. A rough estimate of when arrest occurred is obtained by examination of the pupils, which start to dilate 45 seconds after effective circulation ceases and are usually completely dilated by 1 minute and 45 seconds.

The mnemonic *A, B, C* gives the initial steps in resuscitation: *Airway, Breathe, Circulate*. Patency of the airway should be ensured by lifting the mandible and manually clearing the pharynx, if necessary. Suction and intubation may be advantageous, but resuscitation must not be delayed because equipment is not immediately available. As soon as a clear airway is established, breathing for the patient must begin. Inattention to this principle has been noted as the most apparent error in resuscitation and the one to which failure to survive is most often attributed. Again, although equipment, such as a self-filling bag with oxygen, is desirable, promptness of ventilation is paramount; mouth-to-mouth or mouth-to-tube breathing can deliver adequate oxygen (exhaled air is 16–17% oxygen).

The mainstay of artificial circulation is so-called closed-chest cardiac massage; one seeks not to massage but to compress the thorax. This is usually preceded in adults by a precordial "thump" because of its value in the treatment of ventricular dysrhythmia. The maneuver is not routine in children, however, because ventricular dysrhythmias are uncommon in children, and the "thump" is ineffective in anoxic asystole (the most common cause of arrest in children) and hypovolemic shock.

The precise technique of chest compression depends on the size of the patient. The procedure is performed in newborns and infants by encircling the chest with both hands and then exerting pressure with the thumbs over the precordium and midsternum. The technique used in older children is similar to that used in adults, except that the base of the palm should rest higher on the sternum to avoid lacerating the liver. The process is most efficiently accomplished with the patient on a hard surface, since if it is to be effective, the chest must be "squeezed" and intrathoracic pressure increased. In adults, proper technique can produce a peak systolic pressure greater than 100 mm Hg, but since the diastolic pressure approaches 0, mean pressure seldom exceeds 40 mm Hg. This produces a carotid blood flow of one-fourth to one-third of normal; it is clear that with inadequate compression, this will be even lower, and integrity of the central nervous system will be compromised. It is therefore imperative to monitor the adequacy of chest compression by palpation of the carotid or femoral pulse.

These ABCs, which should begin as soon as cardiopulmonary arrest is diagnosed, share three important features: (1) none requires equipment; (2) all must be instituted promptly; and (3) all can be done by a single person. During this phase of resuscitation, a return of reactivity of the pupils is a sign of adequate cardiorespiratory support.

The next step in the resuscitation process involves pharmacologic agents, the most useful of which is epinephrine. This drug increases myocardial contractility, elevates perfusion pressure, lowers defibrillation threshold, and restores myocardial conduction in some cases of electromechanical dissociation. In the absence of effective circulation, the epinephrine should be injected into a major central vein or directly into the heart.