

# Manual of Pediatric Physical Diagnosis

*Lewis A. Barness*

*Fifth Edition*

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# MANUAL OF PEDIATRIC PHYSICAL DIAGNOSIS

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*Fifth Edition*



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*To my first pediatricians,  
my mother and father*

## Preface to the Fifth Edition

This edition is necessary, not because the principles of physical diagnosis have changed, but rather because new diagnostic techniques have added significance to tried and successful methods of diagnosis. Extensive revision is made especially in three areas: examination of the newborn, the heart, and neurologic examination. As more technological advances occur, these and other areas may require further revision.

Several diagrams and tables have been added at the request of readers. It is hoped that these will be helpful. Without enlarging the book considerably, choosing the photographs and diagrams which are most helpful is difficult. Previous comments have been helpful, and further ones, as well as criticisms, remain welcome.

Also at the request of users of this small book, more tips have been added to make the performance of the physical examination more fun while simultaneously increasing the accuracy of the examination. It is hoped that more accuracy in the physical examination, which is essentially painless, will lead to fewer laboratory tests, which are not only painful but also expensive. Though many of the new diagnostic instruments are excellent, they are usually expensive and sometimes traumatic to the patient. The decision to use such instruments, as well as their interpretation, should be firmly based on careful assessment of historical and physical findings.

As with previous editions, I owe much to the criticism and suggestions of many. My secretary, Nancy Watson, has bravely deciphered semilegible notes, and her assistant,

Ellen Witkowski, has kept her functioning. Many of our house staff and students have made corrections. My wife and children have tolerated my isolation.

Since the publication of the fourth edition, the deaths of two men who had great impact on the development of this manual have occurred. My father, who died in 1973, not only believed but effectively practiced the concept that the future of the world depends on adequate development and support of children. He persisted in these practices even when he suffered the typical problems of old age. The second death was that of the first person I was permitted to appoint as chief resident in pediatrics. Dr. William Mellman, who died in 1980, was a thoughtful physician, who gave exacting but always pertinent suggestions. He was generous with his time and effort, and also believed a better world was possible through our children. To these men goes my special appreciation.

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# Preface to the First Edition

This manual originated several years ago as a series of mimeographed notes to second-year medical students at the University of Pennsylvania Medical School. Each year, the notes on pediatric physical examination expanded as no suitable text for the course was found.

Three years ago Dean John McK. Mitchell and Dr. Paul György suggested that this material be gathered together in book form. The material has been further expanded for this purpose.

Physical examination is a discipline learned by observing and practicing; my teachers have supplied the opportunity for these observations. Especially among these are included Dr. Paul György who taught me many tricks and fine points of examination of children; Drs. Charles Janeway and Sydney Gellis who taught me the approach to the pediatric patient; Dr. Bronson Crothers who taught an inimitable approach to the pediatric patient with neurologic disorders; seven classes of medical students who gave free and sometimes pointed criticisms and the many instructors in pediatric physical diagnosis at the University of Pennsylvania and Philadelphia General Hospital who gave inestimable aid.

The preparation of the final manuscript would have been impossible without the aid of Drs. Joseph Stokes, Fred Harvie, David Cornfeld, Donald Cornely and David Baker who have generously given of their time and knowledge in correcting the manual. Sections of this manual have been improved with the aid of Dr. Richard Ellis, the Eye; Dr. Philip Marden, Ear, Nose, and Throat; Dr. Joseph Atkins, the Larynx; Dr. Robert Kaye, the Chest; Dr. Sydney Friedman, the

Heart; Dr. C. Everett Koop, the Abdomen; Dr. Thomas Gucker, Orthopedics; Dr. Charles Kennedy, the Neurologic Examination; and Dr. Albert Kligman, the Skin. Miss L. Plunkett has been most cooperative in preparing many stencils and mimeographs of this material, and its modifications for use by the students, and Mrs. J. White and Miss Lisa Weiss have completed the final typing.

To all these, and to many others whose particular aid cannot at this time be associated with a particular name, I wish to express my sincere thanks. And finally, I should like to thank my wife and daughter for their patience during the many revisions of this manual.



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# INTRODUCTION

A COMPLETE PHYSICAL EXAMINATION in a child emphasizes many characteristics which differ from those in adults. It is important to recognize these differences and also the many variations among normal children.

This is a manual of the special methods used in pediatric physical diagnosis. It is assumed that the person using it has the basic knowledge of physical examination of adults, for which many textbooks have been written. Therefore, no extensive details are listed of the definition of a sign or of methods of eliciting a sign unless special methods are used in children. While the material in this manual includes only the actual physical examination, one must remember that diagnoses cannot be made by physical examination alone. Before beginning the examination, it is important that a careful and detailed history be taken of the patient and his family, and that this be made part of the patient's record. As the art of careful observation is learned, diagnosis by physical examination becomes easier. In the younger child from whom no history can be directly obtained, or in the child whose parents lack the ability of accurate observation, this is indeed necessary.

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The references used freely in the development of this manual include: Adams F. D.: *Physical Diagnosis*, ed 13. Baltimore, Williams & Wilkins Co., 1942. Davison W. C.: *The Compleat Pediatrician*, ed 6. Durham, Duke University Press, 1949. Green M., Richmond J. B.: *Pediatric Diagnosis*. Philadelphia, W. B. Saunders Co., 1954. Harvie F. H.: *Pediatric Methods and Standards*. Philadelphia, Lea & Febiger, 1962. Rudolph A. M.: *Pediatrics*, ed 16. New York, Appleton-Century-Crofts, 1977. Vaughn V. C., McKay R. J., Behrman R. E.: *Nelson Textbook of Pediatrics*, ed 11. Philadelphia, W. B. Saunders Co., 1979.

Examples of disease states will be given throughout the manual. At no time are these states to be considered the complete differential diagnosis of the sign given. The examples are given only to present a better understanding of the sign under discussion. The beginner may use this manual to learn to elicit a particular sign; the disease states indicated will later have meaning.

If further examples of a sign are desired, standard references are suggested. The references used freely in the development of this manual include the easily available standard pediatric texts (see p. 1).

There is no "routine" physical examination of a child. Each examination is individualized. Not only are there many physical differences which an examiner accustomed to adults might consider abnormal in a child, but also the variations among a group of children make the examiner more alert to the broad spectrum included in the term "normal." The physician adept at physical diagnosis in children is one who is aware of these variants.

Most of the observed variations can best be explained by the difference in growth rates of the organ systems as they occur from infancy to maturity. For example, the lymphoid tissue is relatively well developed in infancy, becomes maximally developed during childhood, and regresses to small adult proportions at puberty. The nervous system, on the other hand, is largely developed at birth and reaches almost complete adult size by the age of five years. The genital system, however, is infantile until puberty. These and other variations will be noted throughout the discussion of the physical examination.

A question frequently asked by the mother is, "Is my child normal?" One is rarely able at a single observation of that child to tell whether or not he is entirely normal, though one may frequently be able to tell that the child is abnormal. Normality in pediatrics, as in statistics, is often confused with the average, and statisticians conclude that there is considerable variation from the average in any normal stat-

ic population. Normality in children includes the many differences around the average of the age of the child being studied with adequate consideration of the child's background and environment. Determining normality in an ever-changing individual is even more difficult. In conducting a physical examination one looks for normal, variations from normal, and abnormal states. The general mental and physical state, congenital and acquired anomalies, and pathologic or disease states are determined.

The record of a complete physical examination in children has special importance not found in that of adults. This record of examination represents a report of one specific time in a child's life when that child is continually and rapidly changing. Therefore, it will be used as a basis for determining whether or not that child is growing and developing normally, according to a group of standards which are learned from books, mothers and patients. More important than a single observation of the child is the use made of this record in following the *rate* of change of the child at each subsequent examination. The rate of growth, rate of development, and indeed rate of progression of difficulties or anomalies far surpass for evaluation purposes the single examination. The single examination is valuable, of course, not only for determining acute illnesses, but also for determining for the physician, the parent and the child the gross evaluation of the potentialities and liabilities of the child. Thus, even small and apparently insignificant variants should be noted for each child, so that their importance may be adequately assessed in later examination.

For example, if it is known that a particular child with nausea and vomiting was adequately examined two weeks before his illness, that the liver was not palpable at the time, but it is now palpable 2 cm below the right costal margin, attention would be directed to the liver as a possible cause of the illness. In contrast, if it were known that two weeks before the acute illness the child's liver was palpable, less attention would be paid to the now palpable liver. This

type of notation is especially important for so-called innocent murmurs of childhood, which are notorious for their frequent change, the significance of which may take many months and many examinations to determine.

The physical examination in a child should also be a record which can be easily interpreted by other physicians. In the Appendix, therefore, is included a form for recording a physical examination (see p. 248). Though the method of recording the physical examination is in a logical order, the examination itself is not necessarily performed in this order.

## APPROACH TO THE PATIENT

EVERY DOCTOR has a series of tricks of examination which he has developed with experience. With an older child cooperation may be improved by such things as flattery of the patient's dress, conversation with the patient on his own level and a discussion of mutual interests. For the preschool child the physician may reassure and distract the patient with interesting objects. Frequently, a two- to four-year-old will remain quiet and apparently interested if the examiner starts a pointless story, particularly about imaginary animals, and asks the patient equally pointless questions about these animals. For the infant one must sometimes resort to various physical measures, such as sugar-feeding, to keep the patient quiet. Even a two-year-old may respond to flattery and, although bribery of any kind is normally deplorable, a judiciously offered lollipop may create an everlasting attachment between patient and physician.

Usually, the examination is performed while the parent is present. If the child is frightened or clings to the parent, sending the parent out of the room usually serves only to frighten the child more. On rare occasions the parent may be asked to leave the room, but this should be done before the examination begins, or preferably before the doctor enters the room for the examination. Before beginning the examination, one should always wash his hands with warm water. This serves to cleanse and warm the hands so that the patient is not made uncomfortable. The parents also become aware of the consideration of the doctor and appreciate routine hand washing. If the mother stands at the

examining table, she should be at the baby's feet. The physician should organize his approach so that a part is examined only once.

In general, one begins a physical examination using no instruments and gradually introduces the various necessary examining equipment. Frequently, a tentative diagnosis can be made simply by observing the child in the mother's arms or as he walks or stands in the room. This diagnosis may then be confirmed following the thorough examination. Usually, the patient is examined in a crib or on a table. The examining table or bed should be large enough so that the child will have no fear of falling, and high enough so that the doctor can examine the patient in comfort.

Physical examinations are performed on children by taking full advantage of opportunities as they present themselves. Anyone concerned with the physical and mental habits of children realizes that he must use all the wiles at his command to establish rapport with the child. The order of an adequate examination, therefore, is more or less determined by the child rather than the physician.

The examination is usually performed with the patient in the position most suitable to him. An infant or severely ill child, or a child who understands well, may be conveniently examined largely in the supine position. However, a six-month-old may have just learned to sit up and may be anxious to demonstrate this ability. Therefore, the examination should be done chiefly with the patient in the sitting position. Likewise, some children may prefer being examined while standing or in unusual positions, and these preferences should be respected if they will not interfere with a complete examination. It is especially important that the child with respiratory distress be examined in the position of most comfort and to provide the best airway, usually in a sitting or sometimes prone position.

An obstreperous or frightened patient, however, may reject all attempts at examination, but frequently even he can be examined completely in his mother's arms. This is espe-



cially the position of preference for many one- to three-year-olds. Other children may have such parts as their ears or mouth examined while being held by the mother (Fig 1-1). If the patient clings to his mother, his back and extremities may be examined in this position and the remainder of the examination can be done later with the patient on his back. It is usually unsatisfactory to attempt to examine the abdomen of a child in his mother's lap. If the mother is helping to restrain the patient she should be told to hold the patient's hands rather than arms. If she holds the arms, the hands are free to interfere with the examiner.

Occasionally, it may be necessary to restrain the patient for the examination of such parts as the ears or mouth. This may be done by placing the infant's arms under his back so that his own weight rests on his palms. The head may be restrained by either examiner or mother and the examination proceeds. An alternate method of restraint is "Mummifying" the infant (Fig 1-2). His right arm is wrapped with a fold of a sheet. Both ends of the sheet are pulled tight under his back and the left arm is wrapped with the doubled sheet

**Fig 1-1.**—The child is restrained in the mother's arms and the ears are examined.

