Pediatric Nutrition in Clinical Practice

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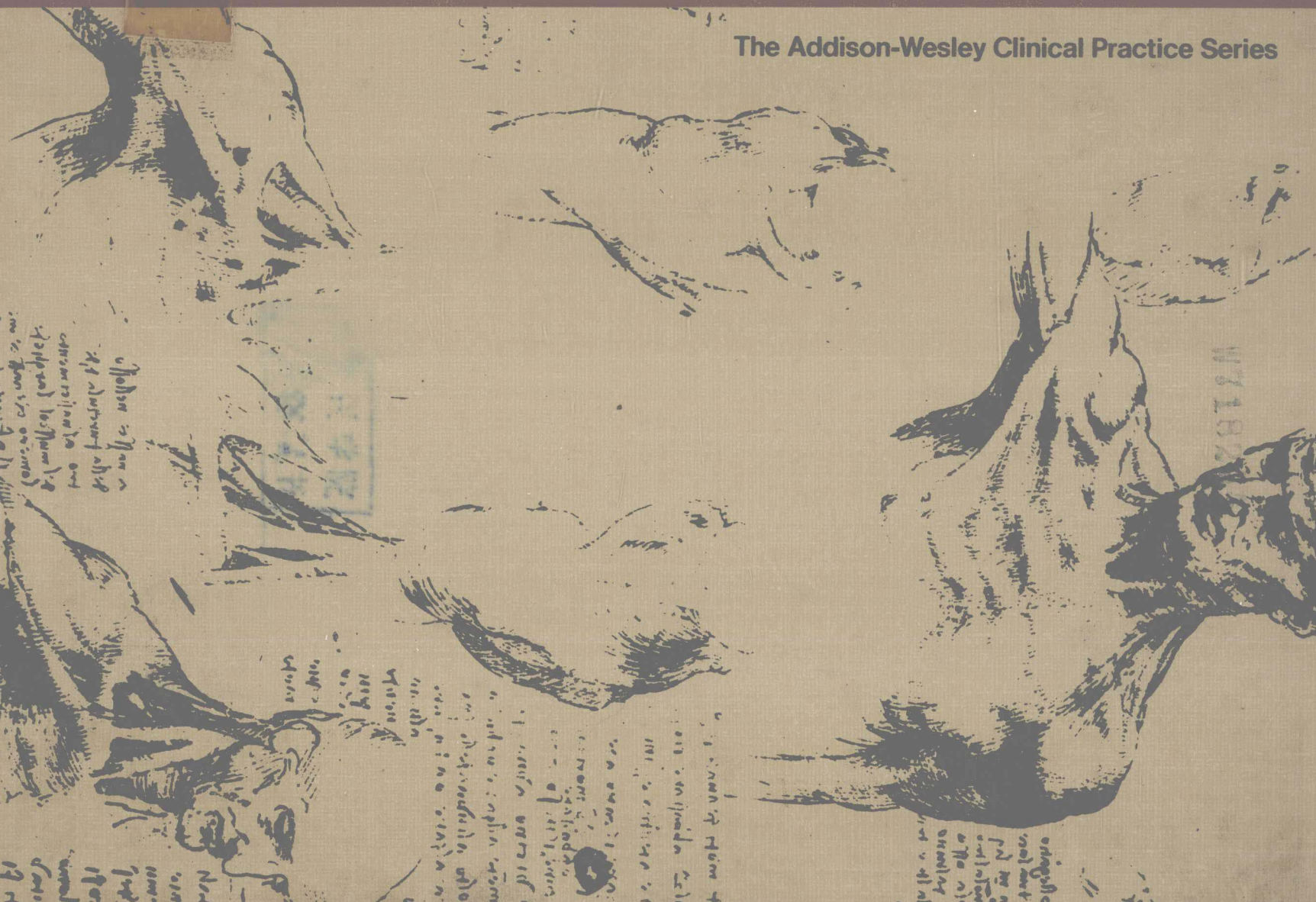

Pediatric Nutrition in Clinical Practice

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Pediatric Nutrition in Clinical Practice

To Betsy, Rachel,
Paige, and Simone

Publisher's Foreword

The **Clinical Practice Series** provides current clinical information in a practical and accessible format. Each title in the series addresses an important topic in modern primary care medicine. Essential pathophysiology is presented in the context of clinical material; the emphasis is always on sound diagnosis and management. Recommendations on when to refer are often included.

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Foreword

As in all branches of science there have been peaks and valleys in the science of nutrition, especially in its applications to medicine. During the first half of this century nutritional science made dramatic contributions to the health of our population. The concept of essential amino acids, the discovery of vitamins (those organic compounds required in minute quantities for the normal functioning of cellular systems) and the discovery of trace minerals (the minerals also needed in minute amounts for cell functions) gave physicians the tools to combat specific nutritional deficiencies. Rickets and scurvy, the most common vitamin deficiencies of infants and children in this country, were eradicated. Pellagra, a major vitamin-deficiency disease in the southeastern section of the United States was conquered. And in Asia the common deficiency disease beri-beri was markedly reduced in incidence.

The practice of infant and child feeding was strikingly altered by the advances in nutritional science. Fortification of cow's milk with vitamin D and of white flour, breadstuffs, and cereals with vitamins and minerals guaranteed that children eating these foods would obtain needed nutrients not available in unfortified foods. Commercially prepared infant-feeding preparations became available, providing satisfactory nutrition for infants not being breast-fed, that is, most of the infants in the United States.

Malnutrition was still a major problem in many parts of the world, but in this country those specific nutritional disorders with immediate dramatic manifestation became rarities. As a result, the

teaching of nutritional science in our medical schools was no longer emphasized, and physicians lost interest in nutritional science. The science itself, however, was not dormant. Research took a new turn—the examination of the long-term consequences of current dietary habits, as, for example, the high intakes of sodium chloride, saturated fatty acids, and calories and the reduced ingestion of indigestible carbohydrates, or fiber. The possibility of prevention of atherosclerosis, cancer of the bowel, and hypertension by changes in nutritional practice was considered. Because medical practitioners were relatively indifferent to or uneducated in nutritional science, nonmedical sources rushed in to fill the vacuum. Books on diets became best sellers; proponents of megavitamin treatment, or of other unusual diets, developed a large following; and newspaper columns provided a major source of nutritional advice for many people.

It is apparent that physicians must again become interested in nutritional science in order to be able to supply the balanced advice concerning diets and nutritional needs sought by patients and their families. This book by William MacLean and George Graham, who are both pediatricians and nutritional scientists, combines the necessary theoretical information for understanding the chemistry and physiology of nutrients and the application of this information to the nutritional needs of individuals throughout the growing period. The practical advice is sound and well balanced, and it recognizes differing points of view in areas of incomplete knowledge. But withal it is concrete and unequivocating. The sections on the feeding of infants, whether infants are breast-fed or given prepared feedings, are sufficiently detailed to help the practitioner handle the day-to-day problems of infant feeding. Other chapters also offer information necessary to provide sound advice to families who are concerned about the food habits of older children and adolescents. This book provides all health practitioners concerned about nutritional requirements during growth with a valuable source of the knowledge needed to counsel and instruct families concerning proper dietary practices.

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Preface

One of the first concerns of a new mother is how best to feed her baby. She is likely to seek advice on nutrition from the primary care practitioner. Most physicians feel comfortable advising mothers regarding feeding during the first year of life, although the advice given is frequently based more on tradition than on sound nutritional principles. Beyond the first year, mothers are left pretty much on their own. Few physicians have had much formal nutrition education during their training. As a result it may be difficult to provide sound guidance and to answer questions on nutrition from parents who are exposed to a confusing and often contradictory lay literature on the subject.

This book was written to provide a nutritionally sound and practical approach to normal nutrition and common nutritional problems for practitioners dealing with patients from diverse ethnic and social backgrounds. It is not a comprehensive reference book. Unlike most nutrition textbooks, it does not approach the subject through a review of individual nutrients. Rather it is patient oriented. We hope it will prove valuable to primary care physicians, pediatricians, nurse practitioners, and house officers.

The first two chapters deal with "the basics"—essential nutrition knowledge that is presupposed in the rest of the book. The rest of the first half of the book addresses the feeding of normal infants and children. The book provides a variety of ways of feeding children adequately and advice on nutrition that is not rigid but adheres to basic principles.Vegetarianism is treated as an approach

to diet that is compatible with nutrition but that presents problems that both practitioners and parents need to be aware of.

The second half of the book deals with nutritional problems commonly encountered in pediatric practice. Iron deficiency anemia is the most frequently encountered nutrient deficiency in otherwise healthy children; a separate chapter is devoted to this subject. Lactose and milk intolerance, often suggested as potential diagnoses, are in fact rare according to strict diagnostic criteria. The relative merits of approaches used to confirm these conditions are discussed.

Many chronic illnesses result in protein-energy malnutrition (marasmus and kwashiorkor), although these conditions are frequently unrecognized; Chapter 10 details these syndromes. Chapter 11 gives a physiologic approach to the dietary management of undernutrition and the other common pediatric diseases that produce malabsorption and, subsequently, poor nutritional status.

Although most small premature infants are cared for in specialized centers, the nutrition of the premature infant over 1500 g is appropriately the responsibility of the primary care practitioner. Chapter 12 examines the nutrient needs of these infants and how they differ from those of the term infant. It also addresses the adequacy of breast milk and specialized infant formulas for meeting these needs.

Obesity continues to increase in importance as the most common form of malnutrition in the United States. The relationship of obesity in infancy to obesity in later life is reappraised in Chapter 13, and the complex cultural and nutritional factors that contribute to obesity are addressed.

In producing this book there has been a third unnamed collaborator, Mrs. Marguerite Taylor, without whose constant willingness to dig out references and to type and retype manuscript our efforts would not have taken final form. We would also like to thank the editorial staff of Addison-Wesley for leading us through the complexities of creating a book.

William C. MacLean
George Graham

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1 Goals of Good Nutrition and Assessment of Nutritional Status

Contents

Overview

Practitioners and parents alike are exposed to ever-increasing amounts of nutrition information and misinformation. There is a preoccupation with good nutrition and often an unrealistic expectation of what good nutrition can do. This chapter provides guidelines for assessing nutritional status using

standard growth charts and a few simple additional anthropometric or laboratory measurements. The use and abuse of Recommended Dietary Allowances in assessing food intakes are explained.

GOALS OF GOOD NUTRITION

Good nutrition is not an end in itself. As physicians and parents alike have become more interested in and "sophisticated" about various aspects of nutrition, many have lost sight of what good nutrition is and what role good nutrition can reasonably be expected to play in the overall health of the child. The basic four food groups of 30 years ago have gradually been replaced by a much more complicated set of rules for "good nutrition." Mothers today no longer follow nutritional patterns passed from generation to generation. Rather, with the best interests of their children at heart, they try to adjust eating habits in accord with the confusing and often conflicting body of fragmentary nutrition knowledge to which they are exposed. Most mothers today are aware of the controversies surrounding sodium intake, consumption of cholesterol and animal fat, "empty calories," complex versus simple sugars, food additives and behavior, and dietary fiber. Rarely is a mother neutral regarding these topics. In fact, it is fair to say that in many cases what used to be a healthy interest has turned into a preoccupation with "good" nutrition.

In many cases what used to be a healthy interest has turned into a preoccupation with "good" nutrition.

This preoccupation with nutrition has had several consequences. As already mentioned, many parents and physicians have come to expect too much of "good" nutrition. The well-nourished child is seen as somehow endowed with an extraordinary ability to ward off infections, as better able to concentrate in school, and as potentially protected to a large degree from many diseases prevalent among adults. The national nutrition goals recently set forth by the U.S. Senate Select Committee on Nutrition have reinforced this view by suggesting that changes in our dietary habits would markedly decrease the incidence of dental caries, hypertension, atherosclerosis and its sequelae, and cancer of the colon.

All of these expectations are to some extent based on factual information. *Severely* malnourished children, for example, are more susceptible to infection and are apathetic, but the severity of malnutrition in which these functional derangements have been documented is rarely encountered in children in this country except in association with chronic disease. Similarly, there are individuals with hyperlipidemia whose condition does respond to

Nutrition is just one environmental factor interacting with the child's genetic make-up.

dietary modification, but they are a small minority. In this case, as in most, the genetic make-up of the individual interacts with a multiplicity of environmental factors, among them nutrition, in determining the health of the child. It is unrealistic, then, to expect changes in food habits alone to alter markedly the prevalence of most diseases.

The preoccupation with the consequences of undernutrition is one of many factors that have elevated obesity to the number one nutritional problem among children.

The preoccupation with the consequences of undernutrition is one of many factors that have elevated obesity to the number one nutritional problem among children. Because most of us overeat as adults, we have inflated ideas about the amount of food that a healthy child should eat. Portions served to children are usually much larger than they need to be. Dessert is used as the ultimate inducement for the child to clean his plate. Failure to maintain a high level of consumption is seen as potentially subjecting the child to the dangers of malnutrition. Even by generous standards, most children in the United States are fed excessive amounts of calories and protein. Many parents supplement the diet with vitamins and minerals "just in case." These practices most certainly contribute to the increasing prevalence of obesity and may establish poor eating habits that are carried throughout life.

Attempts to prevent obesity may lead to poor diets.

More and more parents and physicians *are* concerned with the growing trend toward obesity. Not infrequently, however, well-intentioned efforts to prevent obesity lead to equally poor nutrition—for example, feeding infants skim-milk-based diets that are hypocaloric and low in essential fatty acids. Here again, in an effort to eschew one extreme, another extreme position is embraced. Efforts to prevent obesity are often centered only on the energy *intake* side of the equation with little regard to the factors influencing energy *utilization.*

Although neither undernutrition nor overnutrition is desirable, the range of food intake providing adequate nutrition between these extremes is not as narrow as many think it to be.

None of this discussion should be construed to mean that good nutrition is not important. It is, as long as we maintain a sense of perspective. Good nutrition can and should facilitate the growth and development of a healthy child. Although neither undernutrition nor overnutrition is desirable, the range of food intake providing adequate nutrition between these extremes is not as narrow as many think it to be. Early in life the range of acceptable foods is narrow; yet the range of intake that maintains adequate nutrition is quite wide. Later in childhood, as taste and food preferences become developed, there are numerous acceptable means of nourishing the child. The role of the physician is to guide parents and children within this range, balancing the principles of good nutrition with the food preferences, habits, and lifestyle of the family.

To advise parents appropriately, the practitioner must reach conclusions in his or her own mind in two areas. First, the physician must be able to make an objective assessment of the child's

nutritional status. Second, the physician must be able to ascertain the child's food intake and how this intake relates to some standard of desirable intake. Nutritional status is much more easily evaluated than food intake, especially for those not trained in nutrition per se. More important, good nutritional status is the outcome we are primarily interested in.

Nutritional status is affected by more than food intake alone.

Nutritional status is affected by more than food intake alone. Food intake may be adequate, but malabsorption may be present. Chronic infection may prevent efficient utilization of nutrients, or chronic diseases, such as congestive heart failure, may increase the nutrient requirements of the child. In practice, then, if nutritional status is judged to be adequate, one can be relatively sure that food intake, absorption, and utilization are acceptable and that the necessity of a detailed dietary history is obviated to a large extent.

A brief nutritional history is always indicated regardless of nutritional status, since the child may be thriving despite inadvisable nutritional practices.

A brief nutritional history is always indicated regardless of nutritional status, since the child may be thriving despite inadvisable nutritional practices. If nutritional status is poor, food intake must be ascertained in detail, although one should keep in mind that intake is only one of a variety of possible causes of poor nutritional status.

ASSESSMENT OF NUTRITIONAL STATUS

In most cases nutritional status can be evaluated on the basis of anthropometric measurements in conjunction with one or two readily available laboratory determinations. Measurement of height, weight, and head circumference is routine for physicians who care for infants and children. The nutritionist adds the measurement of skinfold thickness and mid-arm circumference. All five of these measurements can be made by a nurse or an aide who has been specifically trained. As the use of these measurements becomes routine, the physician will gain more confidence and sophistication in interpreting anthropometric data as they relate to the child's nutritional state.

Height and Weight

Accurate determination of height at each well baby visit is essential.

Accurate determination of height (or recumbent length up to the age of two years) at each well baby visit is essential. A surprising number of infants are referred for evaluation of failure to thrive whose serial values for length are not available. Height or length is difficult to measure accurately, especially for the young infant. Proper equipment makes the task easier. The most sophisticated piece of equipment for measuring length in newborns is the