Management of
THE NEWBORN

ARTHUR HAWLEY PARMELEE

SECOND
EDITION

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Clinical Professor of Pediatrics, University of Southern California School of Medicine; Senior Attending Pediatrician, Los Angeles Childrens Hospital; Pediatric Consultant, Bureau of Maternal and Child Health, State of California Department of Public Health

Formerly Clinical Professor of Pediatrics (Rush), College of Medicine, University of Illinois, and Attending Pediatrician, Presbyterian and Cook County Hospitals, Chicago

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Preface to Second Edition

THE RECEPTION of the first edition was gratifying. It indicated that such a book helped to fill a real need, particularly of young physicians in practice, residents, interns, medical students and nurses. Advances in medicine occur so rapidly that revision was essential by the time the first printing was exhausted.

The major portion of the book was devoted to the characteristics of the normal newborn. This was so because its primary purpose was to tell the story of the newborn as I had come to understand it from personal clinical observation and study. Some revision was necessary because of new knowledge of prenatal and neonatal physiology but, in general, the unique features of neonatal life remain unchanged.

I have endeavored to preserve the original character of the book and at the same time substitute new concepts for the old wherever indicated.

Retrolental fibroplasia, oxygen therapy of premature infants and infections of the newborn as related to the staphylococcus are subjects which have been completely rewritten. Extensive revision has been made in the discussion of hyaline membrane syndrome, resuscitation of the newborn, and infants of diabetic mothers. Among the subjects that have been partially revised are congenital malformations, hemolytic disease, kernicterus, hemorrhagic disease of the newborn and physiologic icterus. Many new references have been added to those appearing in the first edition.

I am indebted to many for the information used in making this revision. References to the articles in medical periodicals I have consulted are listed at the ends of the appropriate chapters. I wish to acknowledge the help I have had from these and also the special information and data obtained from the following texts:

1. Nesbitt, R. E. L., Jr.: *Perinatal Loss in Modern Obstetrics* (Philadelphia: F. A. Davis Company, 1957).

2. Cross, V. M.: *The Premature Baby* (Boston: Little, Brown & Company, 1957).

3. *Perinatal, Infant, Childhood and Maternal Mortality,* Children's Bureau Statistical Series No. 42 (Washington, D. C.: U. S. Department of Health, Education and Welfare, Social Security Administration, 1957).

4. *Infant Health Needs in California* (Berkeley: State of California Department of Public Health, 1957).

Some of the clinical material referred to in this edition is from the Los Angeles Childrens Hospital and I gratefully acknowledge this fact.

I wish to thank the many medical colleagues whose faith and encouragement have supported me in the task of preparing this revised edition. I wish also to thank my secretary, Mrs. Grace Galech, for invaluable help in typing and assembling the manuscript. I am particularly grateful to the executives and staff of The Year Book Publishers for their fine co-operation and efficiency. To them my sincere thanks.

A. H. PARMELEE

Preface to First Edition and Acknowledgments

THIS BOOK has been written as a story of the newborn. It is not a textbook in the ordinary sense. No attempt has been made to cover the subject in an encyclopedic manner. Rather I have attempted to tell what sort of individual the newly born infant is, why he is what he is, what his peculiar problems are and what is indicated in the way of rational care. The approach is clinical. Personal experiences are cited frequently and I chose, for the most part, to omit conditions with which I have not had personal contact. The material cited and illustrated is largely from Cook County Hospital and Presbyterian Hospital of Chicago.

In preparing the manuscript I have made free use of standard textbooks and monographs. I wish here to acknowledge the valuable help I have had from them. Articles in medical periodicals which have been consulted are listed at the end of each chapter. Particularly helpful were the following texts, from which important facts and data have been obtained.

1. Arey, L. B.: *Developmental Anatomy* (Philadelphia: W. B. Saunders Company, 1943).

2. Barcroft, J.: *Researches on Prenatal Life* (Springfield, Ill.: Charles C Thomas, Publisher, 1947).

3. Dunham, E. C.: *Premature Infants: A Manual for Physicians,* Children's Bureau Publication No. 325 (Washington, D. C.: U. S. Government Printing Office, 1948).

4. Grulee, C. G., and Ely, R. C.: *The Child in Health and Disease* (Baltimore: Williams & Wilkins Company, 1948).

5. Grulee, C. G., and Sanford, H. N.: in *Brenneman's Practice of Pediatrics* (Hagerstown, Md.: W. F. Prior Company, Inc., 1945), Vol. 1, chap. 42.

6. Holt, L. E., Jr., and McIntosh, R.: *Holt's Diseases of Infancy and Childhood* (11th ed.; New York: Appleton-Century-Crofts Company, Inc., 1940).

7. Nelson, W. E. (ed.): *Mitchell-Nelson Textbook of Pediatrics* (4th ed.; Philadelphia: W. B. Saunders Company, 1945).

8. Potter, E. L., and Adair, F. L.: *Fetal and Neonatal Death* (2d ed.; Chicago: University of Chicago Press, 1949).

9. Reuss, A.: Pathology of the Newborn Period, in von Pfaundler, M., and Schlossmann, A.: *The Diseases of Children*, tr. by M. G. Peterman *et al.* (Philadelphia: J. B. Lippincott Company, 1935), Vol. I.

10. Smith, C. A.: *The Physiology of the Newborn Infant* (Springfield, Ill.: Charles C Thomas, Publisher, 1947).

11. Tow, A.: *Diseases of the Newborn* (New York: Oxford University Press, 1937).

12. Windle, W. F. *Physiology of the Fetus* (Philadelphia: W. B. Saunders Company, 1940).

13. Chapters by B. M. Patten and C. G. Hartman; L. B. Arey; F. L. Adair and E. A. Schumann, in Curtis, A. H.: *Obstetrics and Gynecology* (Philadelphia: W. B. Saunders Company, 1933), Vol. I.

Certain of the illustrations in this book have appeared elsewhere. Figures 4, *A*, 5, 16, 27 and 38 appeared in my chapter, "The Newborn Child," in *Obstetrics and Gynecology*, Vol. I, A. H. Curtis, editor (Philadelphia: W. B. Saunders Company, 1933), and Figures 4, *A*, 7 and 28 in my chapter, "The Diseases of the Newborn," in *The Child in Health and Disease*, C. G. Grulee and R. C. Ely, editors (Baltimore: Williams & Wilkins Company, 1948).

A. H. PARMELEE

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Introduction

Recognition of the importance of the newly born infant as a subject for special consideration in the field of medical investigation as well as in medical practice has increased greatly in recent years. Although the subject has attracted the interest of many men in the past, the newborn now occupies a more prominent place in medicine than ever before. It may be worth while to review some of the causes of this new, or at least revived, interest in a subject as old as medicine itself and some of the implications of this widespread interest. These are perhaps not set down in the order of their relative importance, but each has exerted a significant influence.

First, public health authorities have recognized the persistence of a high neonatal mortality in spite of a constantly falling general infant mortality. Attention has been focused on the neonatal age group in an effort to find the causes for this state of affairs and do something about it. The result has been improved technics in hospital maternity departments both for the delivery rooms and for the nursery.

Second, obstetricians and pediatricians have come to realize that the welfare of the newborn, from a medical point of view, is a joint responsibility in which each has an important role. The high mortality of the first day of life and the dominant position in mortality figures occupied by the prematurely born infant puts directly on the shoulders of the obstetrician the responsibility for

improvements in obstetric technics and obstetric judgment and also suggests the importance of intelligent prenatal care. Premature infants constitute only about 6 per cent of the total number of live births, yet practically one-half the deaths in the first month of life are in this group. Reducing the number of premature births and also making some infants born prematurely less premature, when it can be done without danger to the mother, are measures that are in the hands of the obstetrician. Through this means a real reduction in neonatal mortality may be possible. The responsibility for postnatal care is, in many hospitals, that of the pediatrician or is shared by the obstetrician and the pediatrician. Indirectly, at any rate, it is a pediatric responsibility since the education of the obstetrician in the care of the newborn comes through the pediatric teaching in our medical schools.

Third, the physiologic and biochemical peculiarities of the newborn have become attractive fields for investigation. Clinical and laboratory research has inevitably extended to the fetus and the embryo and from this, significant practical information has emerged. Increasing numbers of scientists and clinicians are each year selecting this fascinating subject for intensive study.

Fourth, a major factor in the prominence now given to this subject in medical thinking, partly cause and partly effect perhaps, is a new concept of the newborn which has gradually taken shape. This is a realization that the newborn infant is really not new at all when born, he is only newly born. Life begins for each new being with the fertilization of the ovum. The development of the embryo and growth of the fetus proceed from that point on in a continuous and harmonious manner, following an almost constant pattern which is ages old. The goal of this pattern of development is maturity. Some individual variations result from hereditary factors. There are also alterations in the progress of development related to maternal health, but in general the growth pattern is predetermined and constant.

The aim of fetal growth is to attain a state of anatomic and

physiologic maturity by the end of the normal gestational term that will be adequate for the requirements of extrauterine life. Gestational age largely determines the readiness for this transition because it determines the state of maturity reached. Thus, an infant born at a gestational age of 34 weeks differs greatly in his anatomic and physiologic make-up from one born at 37 weeks. He will even differ substantially from one of 35 weeks and still more from one of 36 weeks.

Each stage of growth must thus be considered a unit in an unbroken harmonious sequence of growth. A motion picture of fetal growth from conception to term would portray a series of individual units in sequence. The film stopped at any point would reveal a complete unit differing from the one preceding it and from the one to follow, but faithful to the detail of that particular stage of development in the continuing sequence.

An understanding of the anatomic, physiologic and biochemical peculiarities of the infant at birth is essential to a proper evaluation of his reactions to extrauterine life. These will differ in individual instances depending on the stage of maturation attained at the time of birth. But even a full term infant is still relatively immature. Within a few weeks he will be a different individual and his reactions will be different. He will be just that many weeks farther on the road to maturity.

The neonatal period can thus be seen to be a merging of prenatal and postnatal physiology as influenced by the adjustments made necessary by birth. At no other time in life are such abrupt, fundamental and vital adjustments necessary. The dramatic action in the establishment of pulmonary respiration, for example, is almost beyond comprehension. It is complex and hazardous. There are many other equally complex and important adjustments, such as those in circulation, nutrition, elimination and temperature control, that must be made. Some of these are urgent and others less urgent for immediate needs, but all are essential. The majority of newborn infants make the transition so smoothly