



西安交通大学

研究生创新教育系列教材

新生儿学

NEONATOLOGY

主编 李晖



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Preface

In order to afford a better reference book for neonatology teaching to overseas, Chinese medical undergraduates and postgraduate students, we have all worked hard to compile this primary edition that will be helpful to those who provide care for newborns. This is the first edition of English handbook of neonatology in Xi'an Jiaotong University.

There are 20 chapters in this book. It introduces the neonatal physiological characteristics, nursing key points, various common diseases, its therapeutics, common NICU medication guidelines and common neonatal procedures respectively. The chief editor had been in NICU of Children Hospital Boston, as a visiting scholar for one year and has achieved clinical and scientific research training. This hospital is also known as Brigham and Women's Hospital, which affiliates the Harvard Medical School.

This book introduces many new international concepts, such as NIDCAP (Newborn Individualized Developmental Care and Assessment Program), KMC (Kangaroo Mother Care), and so on. The chief editor has keen interest and is motivated by her profession and experience to make a textbook of neonatology for the medical students and doctors.

We would like to acknowledge and thank all the editors for their timeless contributions that serve as a foundation for this textbook. Here, the readers will find a comprehensive guide to care for both healthy and ill newborn infants. Normal newborn care, neonatal disease processes, and neonatal procedures are discussed and illustrated in a straightforward, concise manner that will provide the pediatrician, family practitioner, resident, neonatal nurse, and medical students

with the core of knowledge required to provide comprehensive neonatal care.

The outstanding value of this handbook can be attributed to its expert editors and contributors. Our sincere appreciation goes to all the writers who gave this privilege to make this book worthy and beautiful. Due to the busy clinical work, the editors had to work during their spare time; there might be some insufficiency in this book. Any suggestions and expert's opinions are warmly welcomed from readers.

Chief Editor: PROF. HUI LI

January 1st, 2014

Contents

Chapter 1 Organization of the Neonatal Care	(1)
1.1 Introduction	(1)
1.2 NICU Family Suite	(3)
1.3 NICU Lactation Room	(3)
Chapter 2 Introduction of Newborns	(5)
2.1 Definition	(5)
2.2 Classification of Newborns	(5)
2.3 Physical Examination of Newborns	(9)
Chapter 3 High-risk Pregnancies and High-risk Infants	(23)
3.1 High-risk Pregnancies	(23)
3.2 The High-risk Infants	(34)
3.3 Multiple Gestation Pregnancies	(36)
3.4 Prematurity and Intrauterine Growth Restriction (IUGR).....	(40)
Chapter 4 Assessment and Care of Newborns	(51)
4.1 Delivery Room Care	(51)
4.2 Nursery Care	(53)
4.3 Resuscitation of the Newborn	(56)
4.4 Post-Resuscitation Care	(61)
4.5 Neurodevelopment and Care in the NICU	(63)
4.6 NIDCAP	(66)
4.7 Kangaroo Mother Care (KMC)	(68)
4.8 Pain Management in Newborn Infants	(71)
4.9 Discharge Criteria	(74)
4.10 Post-discharge Follow Up	(74)
Chapter 5 Temperature Control	(75)
5.1 Heat Production	(75)

5.2	Mechanisms of Heat Loss	(76)
5.3	Management to Prevent Heat Loss	(76)
5.4	Neutral Thermal Environment	(77)
5.5	Hazards of Temperature Control Methods	(79)
Chapter 6	Neonatal Enteral Nutrition	(80)
6.1	Infant Nutrient Requirements	(80)
6.2	NICU Protocol for Gut Priming in Preterm Infants	(83)
6.3	Choice of Enteral Feeding	(85)
6.4	Minimal Enteral Feeding (Trophic Feeding)	(87)
Chapter 7	Parenteral Nutrition	(94)
7.1	Indications	(94)
7.2	Nutrient Goals	(94)
7.3	Energy Requirements	(94)
7.4	Fluid Requirements	(97)
7.5	Composition	(98)
7.6	Infusion Routes	(104)
7.7	Monitoring	(104)
7.8	Complications	(105)
7.9	Metabolic	(105)
7.10	Calculations	(105)
Chapter 8	Fluid and Electrolytes	(107)
8.1	Introduction	(107)
8.2	Therapy	(108)
8.3	Conclusion	(112)
Chapter 9	Infections of Newborns	(113)
9.1	Sepsis	(113)
9.2	Infection Control Guidelines in NICU	(118)
9.3	Environment Control	(121)
9.4	NICU MRSA Standard Guidelines for Singleton 123 Multiple Births	(123)
Chapter 10	Respiratory Tract Disorders	(125)
10.1	Apnea	(125)

10.2	Respiratory Distress Syndrome	(125)
10.3	Transient Tachypnea of the Newborn	(127)
10.4	Meconium Aspiration Syndrome	(130)
10.5	Diaphragmatic Hernia	(137)
10.6	Pulmonary Hemorrhage	(142)
10.7	Persistent Pulmonary Hypertension of the Newborn	(145)
10.8	Pneumothorax	(150)
10.9	Pneumomediastinum	(152)
10.10	Pulmonary Interstitial Emphysema	(153)
Chapter 11	Congenital Heart Disease	(157)
Chapter 12	Digestive System Disorders	(163)
12.1	Gastroesophageal Reflux Disease (GERD)	(163)
12.2	Necrotizing Enterocolitis	(164)
12.3	Thrush	(169)
12.4	Meconium Ileus (MI)	(171)
12.5	Hypertrophic Pyloric Stenosis (HPS)	(172)
12.6	Pylorospasm (PS)	(174)
12.7	Neonatal Diarrhea	(176)
Chapter 13	Neonatal Hematological Disorders	(189)
13.1	Anemia in the Newborn Infant	(189)
13.2	Neonatal Polycythemia	(196)
Chapter 14	Neonatal Jaundice	(198)
14.1	Bilirubin	(198)
14.2	Physiological Jaundice	(199)
14.3	Pathological Jaundice	(199)
14.4	Bilirubin Encephalopathy (Kernicterus)	(202)
14.5	ABO Incompatibility	(207)
14.6	Rh Incompatibility	(208)
14.7	Exchange Transfusion	(209)
Chapter 15	Disorders of Nervous System	(214)
15.1	The Cranium	(214)
	References	(311)

15.2	Traumatic, Epidural, Subdural, and Subarachnoid Hemorrhage	(216)
15.3	Intracranial-Intraventricular Hemorrhage and Periventricular Leukomalacia	(217)
15.4	Brain Injury from Inflammation, Infection, and Medications	(222)
15.5	Hypoxia-Ischemia Encephalopathy (HIE)	(223)
15.6	Spine and Spinal Cord	(230)
15.7	Neonatal Seizures	(231)
15.8	Peripheral Nerve Injuries	(243)
Chapter 16	Disorders of Endocrine System	(247)
16.1	Infants of Diabetic Mothers	(248)
16.2	Hypoglycemia	(251)
Chapter 17	Disorders of Genitourinary System	(255)
17.1	Introduction	(255)
17.2	Physiologic Characteristics of the Urinary System in the Children	(255)
17.3	Characteristics of the Urination and Urine	(256)
17.4	Diagnostic Considerations	(256)
17.5	Renal Vein Thrombosis (RVT)	(257)
17.6	Circumcision	(258)
17.7	Acute Renal Failure (ARF) in Neonates	(258)
Chapter 18	Retinopathy of the Prematures	(263)
18.1	Introduction	(263)
18.2	Diagnosis	(263)
18.3	Treatment	(264)
18.4	Prevention	(264)
Chapter 19	Common Neonatal Procedures	(266)
19.1	Umbilical Vein Catheterization (UVC)	(266)
19.2	Heel Stick (Capillary Blood Sampling)	(269)
19.3	Intubation	(271)
19.4	Lumbar Puncture (Spinal Tap)	(274)

Chapter 20 Common NICU Medication Guidelines	(277)
20.1 Acyclovir	(277)
20.2 Albumin	(278)
20.3 Aminophylline	(278)
20.4 Ampicillin	(279)
20.5 Atropine Sulfate	(280)
20.6 Calcium Glubionate	(281)
20.7 Cefotaxime Sodium	(284)
20.8 Ceftazidime	(285)
20.9 Ceftriaxone Sodium	(285)
20.10 Clindamycin	(286)
20.11 Dexamethasone	(287)
20.12 Digoxin	(288)
20.13 Dobutamine	(289)
20.14 Dopamine	(290)
20.15 Erythromycin	(291)
20.16 Heparin Sodium	(292)
20.17 Ibuprofen	(293)
20.18 Indomethacin	(294)
20.19 Insulin, Regular	(295)
20.20 Midazolam	(296)
20.21 Phenobarbital	(297)
20.22 Phenytoin	(298)
20.23 Ranitidine	(299)
20.24 Surfactants	(299)
20.25 Theophylline	(300)
20.26 Vitamin K1	(301)
20.27 Zidovudine	(301)
20.28 Furosemide (LASIX)	(302)
20.29 Heparin	(304)
Appendix	(307)
References	(311)

Chapter 1 Organization of the Neonatal Care

1.1 Introduction

Universally 4 million newborns die and another 4 million are stillborn every year. 98% of these neonatal deaths take place in the developing countries. Looking at the state of the world's newborns one can see that neonatal mortality rate is about 4–5 per 1000 in the developed countries and nearly 10 fold this in the developing world. Causes that underlie these newborn deaths differ according to a country's development rank. According to the WHO estimates for the year 2001, newborns die due to infections (32%), birth asphyxia and trauma (29%), prematurity (24%) and congenital anomalies (10%), mostly in the developing countries. When organizing neonatal care services in a country or a region, priorities should be decided by looking at neonatal and perinatal mortality rates and causes of neonatal and perinatal deaths. Causes of neonatal and perinatal deaths in the developing countries have been documented, which reflect some common underlying problems in the health systems. Starting points in the organization of neonatal health care services seem to include: improving women's health and social status, family planning practices, antenatal care and safe delivery conditions. Attention should also be paid to neonatal resuscitation, essential newborn care and sick newborn care practices. Communities and health professionals should be advocated of newborn health in order to seek and deliver newborn health care. Existing health systems should be re-organized to host regionalized perinatal care. Organization of the Neonatal Intensive Care Unit (NICU) includes:

- A total of 45 beds.
- A direct elevator from Labor to Delivery, where a special stabilization room has been constructed for the immediate specialized care of high-risk newborns.
- A self-contained Blood Gas Laboratory for immediate blood-gas results.
- Digital Imaging Readers in the unit, allowing X-rays to be read without delay.

- Isolation rooms that can also be used for rooming in, multiple births and bereavement support.
- Hemodynamic monitoring.
- Omni beds, which can be used as incubators and warmers so babies do not have to be moved between the two. Each Omni bed has a built-in scale so critically ill babies can be weighed without being moved. Health-care workers have access to babies from both sides of the bed, which can be turned so the baby does not have to be turned.

There are 3 sinks in each patient care area. Foot pedals regulate water flow. Hospital approved hand scrub is in a container and above each sink. Hospital approved hand lotion is also available at hand washing sinks. Alcohol-based waterless hand gel pump dispensers are at each sink and patients' bedside. Triage room and isolation rooms each have 1 sink.

Additional hand washing sinks are located outside the patient care rooms. Hospital approved antimicrobial hand agent alcohol-based waterless gel pump dispensers and plain soap dispensers are available at each sink. Sterile and clean supplies are contained in a clean, locked storage room. Additional storage space for sterile and clean respiratory equipment is located in the neonatal respiratory supply area. Clean NICU equipment such as isolettes, cribs, warming beds, and scales are kept in the equipment storage room located in the NICU. Clean IV infusion pumps are stored in the neonatal respiratory therapy storage area. Formulas are boxed and stored on shelves in the workrooms and equipment storage rooms.

The Division maintains an active relationship with the Division of Maternal-Fetal Medicine in the Department of Obstetrics and Gynecology. In addition to conventional newborn intensive care, the following neonatal services are also available:

- High frequency oscillatory and jet ventilators.
- Inhaled nitric oxide.
- Comprehensive pediatric surgical subspecialties.
- Infant Progress Clinic.
- Parent Liaison Services / Family Centered Care.
- Bedside pulmonary function testing.
- 24-hour in-house coverage by board-certified neonatologists.

- Advanced point of care laboratory testing including self-contained blood gas laboratory.
- Advanced information systems including digital imaging readers.
- One of the few regional systemic hypothermia programs for euro protection of newborns.
- Continuous neurointensive care EEG telemetry monitoring for high risk newborns.

1.2 NICU Family Suite

The newly designed NICU Family Suite offers families who are shortly going home and provides opportunity to practice what they have learned in the comfort of a hotel-like suite that is just steps away from NICU staff. The new Family Suite provides a truly warm and inviting setting to help parents gain confidence in caring for their tiniest additions.

1.3 NICU Lactation Room

The newly renovated NICU Lactation Room offers a unique venue for moms who need to express their milk in close proximity to their babies. This attractive space gives moms the opportunity to privately attend to the task, and unwind for a moment in a quieter setting than is often found on the busy NICU floor.

1. Growth Monitoring in the NICU

► Policy

To ensure optimal growth for all infants.

► Procedure

- All infants are weighed by nursing daily.
- Length and occipital frontal curve measurements are performed at birth by the attending physician and then weekly, as deemed appropriate, by the neonatal dietitian and/or an alternate member of the medical team for all infants weighing < 1800 grams. Infants weighing > 1800 grams are measured biweekly following birth.

2. Discharge and Transfer Planning in the NICU

► Policy

To ensure that each infant discharged or transferred on a special feeding has a nutrition summary and a formula recipe.

► Procedure

- The primary nurse will notify the neonatal dietitian of discharge or transfer plans for infants on special feedings as soon as plans are considered.
- A copy of the mother's milk/formula preparation instructions will be provided by the neonatal dietitian. The infant's growth chart will be provided, as appropriate.
- Primary caretakers of infants discharged to home on special feedings will be instructed by the neonatal dietitian and/or an alternate member of the medical team. Documentation will be completed in the progress notes section of the medical record.

Chapter 2 Introduction of Newborns

2.1 Definition

A newborn is an infant who is only hours, days, or up to the few weeks old. In medical contexts, newborn or neonate refers to an infant of the first 28 days after birth including all term, preterm and full term infants. Before birth, the term fetus is used. The neonatal period is a highly vulnerable time for an infant, who is completing many of the physiologic adjustments required for extra uterine existence. The high neonatal morbidity and mortality rates attest to the fragility of life during this period; in the United States, of all deaths occurring in the 1st yr, two thirds are in the neonatal period.

An infant's transition from intrauterine to extrauterine uterine life requires many biochemical and physiologic changes. No longer dependent on maternal circulation via the placenta, the newborn's respiratory system must function for exchange of oxygen and carbon dioxide. Newborn infants are also dependent on gastrointestinal tract function for absorbing food, renal function for excreting waste and maintaining chemical homeostasis, hepatic function for neutralizing and excreting toxic substances, and function of the immunologic system for protecting against infection. The neonatal cardiovascular and endocrine systems also adapt for self-sufficient functioning. Many of a newborn infant's special problems are related to poor adaptation because of asphyxia, premature birth, life-threatening congenital anomalies, or the adverse effects of delivery.

2.2 Classification of Newborns

1. Newborn Classification Based on Gestational Age

- Preterm (premature) — born before 37 weeks' gestation.
- Term — born between the beginning of week 37 and the end of week 41 of gestation.
- Post-term (post mature) — born at 42 weeks' gestation or more.