

# GHAI Essential Pediatrics

For over four decades Ghai Essential Pediatrics has been this subcommittee's undergraduate and postgraduate teaching in pediatrics. The book has been used by generations of health professionals in child healthcare. With contributions from experts in the field, the tenth edition is thoroughly updated and revised to ensure that the book provides the latest information on diagnoses and therapies.

- Alignment with the competency-based undergraduate curriculum Commission
- Focus on child nutrition, growth and development
- Emphasis on recognition and management of common pediatric conditions
- Liberal use of algorithms and tables emphasizing differential diagnosis

edition

### **Vinod K Paul**

Member (Health), NITI Aayog  
Government of India, and  
Former Professor and Head, Department of Pediatrics  
All India Institute of Medical Sciences, New Delhi

### **Arvind Bagga**

Professor and Head, Department of Pediatrics  
Chief, Division of Pediatric Nephrology  
All India Institute of Medical Sciences, New Delhi

### **Ramesh Agarwal**

Professor, Division of Neonatology  
Department of Pediatrics  
All India Institute of Medical Sciences, New Delhi

### **Anuja Agarwala**

Hon. Senior Advisor (Nutrition), INCLEN  
Nutrition Consultant, Blossom Children Clinic  
Former Senior Dietitian, Department of Pediatrics  
All India Institute of Medical Sciences, New Delhi

### **P Ashok Babu**

Joint Secretary (RCH)  
Ministry of Health and Family Welfare  
Government of India, New Delhi

### **Anurag Bajpai**

Consultant Pediatrics and Adolescent Endocrinology  
Department of Health and Family Welfare, New Delhi

### **PSN Menon**

Consultant and Head  
Department of Pediatrics  
Jaber Al-Ahmad Armed Forces Hospital, Kuwait

### **Rakesh Kumar Pilania**

Associate Professor, Allergy Immunology Unit  
Department of Pediatrics, Advanced Pediatrics Centre  
Post Graduate Institute of Medical Education and Research, Chandigarh  
WHO Collaborating Centre for Education, Research and Training in  
Pediatric Immunology

### **Anu Thukral**

Additional Professor, Division of Neonatology  
Department of Pediatrics  
All India Institute of Medical Sciences, New Delhi

### **Prem Sagar**

Additional Professor  
Department of Otolaryngology and Head Neck Surgery  
All India Institute of Medical Sciences, New Delhi

### **Sandeep Samant**

Professor, Department of Otolaryngology and Head-Neck Surgery  
Feinberg School of Medicine, Northwestern Memorial Hospital  
Greater Chicago, IL, USA

### **Jhuma Sankar**

Additional Professor, Division of Pulmonology and Intensive Care  
Department of Pediatrics  
All India Institute of Medical Sciences, New Delhi

### **Naveen Sankhyan**

Professor, Pediatric Neurology Unit  
Department of Pediatrics, Advanced Pediatrics Centre  
Post Graduate Institute of Medical Education and Research, Chandigarh

*Preface to the Tenth Edition*  
*Preface to the First Edition*  
*Contributors*

## **1. Introduction to Pediatrics**

**1**

*Vinod K Paul*

Historical perspective 1

Challenge of child health 2

National programs on child health 3

## **2. Growth**

**6**

*Ramesh Agarwal, Naveen Sankhyan, Vandana Jain*

Concept of growth 6

Biology of growth 6

Factors affecting growth 8

Assessment of physical growth 9

Growth charts 12

Disorders of growth 16

Failure to thrive 21

## **3. Development**

**22**

*Ramesh Agarwal, Naveen Sankhyan*

Normal development 22

Domains of development 24

Developmental assessment 36

Nurturing care 39

## 11. Infections and Infestations

22

*Tanu Singhal, Rakesh Lodha, Sushil K Kabra*

Fever 220

Common viral infections 225

Common bacterial infections 254

Other bacterial infections 261

Fungal infections 272

Protozoal infections 274

Congenital and perinatal infections 284

Helminthic infections 286

Health care-associated infections 292

Rational antimicrobial therapy 293

## 12. Diseases of Gastrointestinal System and Liver

29

*Anshu Srivastava, Barath Jagadisan, Surender K Yach*

Vomiting 294

Dysphagia 298

Constipation 300

Abdominal pain 303

Acute diarrhea 309

Persistent diarrhea 315

Chronic diarrhea 317

Gastrointestinal bleeding 325

Disorders of the hepatobiliary system 328

Jaundice 331

Liver failure 333

Chronic liver disease 334

Ascites 336

Portal hypertension 338

Autoimmune liver disease 340

Chronic hepatitis B infection 340

Hepatitis C infection 341

Metabolic liver disease 342

Hepatic manifestations of systemic diseases 344

Neonatal cholestasis 345

Liver transplantation 346

## **19. Diseases of Central Nervous System 571**

*Rashmi Kumar*

Neurological diagnosis 571  
Congenital malformations 574  
Neurocutaneous syndromes 576  
Cerebral palsy 578  
Seizures and epilepsy 579  
Epilepsy 580  
Headache 583  
Infections and acute encephalitis syndrome 583  
Raised intracranial pressure, space occupying lesions and hydrocephalus 589  
Coma 592  
Hemiplegia 594  
Paraplegia and quadriplegia 597  
Ataxia 598  
Movement disorders 600  
Neurological regression 602

## **20. Neuromuscular Disorders**

**605**

*Sheffali Gulati*

Approach to evaluation 605  
Disorders affecting anterior horn cells 607  
Peripheral neuropathies 609  
Acute flaccid paralysis 611  
Neuromuscular junction disorders 612  
Muscle disorders 614

## **21. Childhood Malignancies**

**618**

*Rachna Seth*

Acute leukemia 619  
Chronic myeloid leukemia 627  
Lymphoma 628  
Retinoblastoma 634  
Wilms tumor 636  
Neuroblastoma 638

## 32. Integrated Management of Neonatal and Childhood Illness 79

*P Ashok Babu, Sumita Ghosh*

Integrated management of neonatal and childhood illness strategy 793

Outpatient management of young infants age up to 2 months 794

Outpatient management of sick child age 2 months to 5 years 797

IMNCI charts, 2022 802

## 33. Rational Drug Therapy 84

*Anu Thukral, Kana Ram Jat*

Introduction 840

Analgesics, antipyretics, non-steroidal 840

Anti-inflammatory drugs (NSAIDs) 840

Antiarrhythmics 841

Agents for myasthenia 842

Antimicrobials 842

# Index

## Competency based Underg

<i>Code</i>	<i>Competency</i>
PE1.1	Define the terminologies growth and development and development
PE1.2	Discuss and describe the patterns of growth in infants, children and adolescents
PE1.3	Discuss and describe the methods of assessment of growth and development against national standards. Enumerate the parameters used for assessment of growth in children and adolescents
PE1.4	Perform anthropometric measurements, document in growth chart
PE1.5	Define development and discuss the normal development of motor, cognitive, social behaviour, social, adaptive and language
PE1.6	Discuss the methods of assessment of development
PE1.7	Perform developmental assessment and interpret
PE2.1	Discuss the etiopathogenesis, clinical features and management of failure to thrive
PE2.2	Assessment of a child with failing to thrive including eliciting history, physical examination and investigations
PE2.3	Counselling a parent with failing to thrive child
PE2.4	Discuss the etiopathogenesis, clinical features and management of short stature
PE2.5	Assessment of a child with short stature: Elicit history, physical examination and investigations
PE2.6	Enumerate the referral criteria for growth related problems
PE3.1	Define, enumerate and discuss the causes of developmental delay and intellectual disability in children
PE3.2	Discuss the approach to a child with developmental delay
PE3.3	Assessment of a child with developmental delay—elicit history, physical examination and investigations
PE3.4	Counsel a parent of a child with developmental delay
PE3.5	Discuss the role of the child developmental unit in management of children with developmental delay
PE3.6	Discuss the referral criteria for children with developmental delay
PE3.8	Discuss the etiopathogenesis, clinical presentation and management of cerebral palsy



<i>Code</i>	<i>Competency</i>
PE6.11	Visit to the adolescent clinic
PE6.12	Enumerate the importance of obesity and other NCD
PE6.13	Enumerate the prevalence and the importance of re
	adolescents and children
PE7.1	Awareness on the cultural beliefs and practices of b
PE7.2	Explain the physiology of lactation
PE7.3	Describe the composition and types of breast milk a
	and human milk
PE7.4	Discuss the advantages of breast milk
PE7.5	Observe the correct technique of breastfeeding and
PE7.7	Perform breast examination and identify common p
	nipples, cracked nipples, breast engorgement, breas
PE7.8	Educate mothers on antenatal breast care and prepa
PE7.9	Educate and counsel mothers for best practices in b
PE7.10	Respects patient privacy
PE8.1	Define the term complementary feeding
PE8.2	Discuss the principles, the initiation, attributes, freq
	complementary feeding including IYCF
PE8.3	Enumerate the common complimentary foods
PE8.4	Elicit history on the complementary feeding habits
PE8.5	Counsel and educate mothers on the best practices
PE9.1	Describe the age related nutritional needs of infants
	micronutrients and vitamins
PE9.2	Describe the tools and methods for assessment and
	children and adolescents
PE9.3	Explain the calorific value of common Indian foods
PE9.4	Elicit document and present an appropriate nutrition
PE9.5	Calculate the age related calorie requirement in hea
PE9.6	Assess and classify the nutrition status of infants, chi
PE9.7	Plan an appropriate diet in health and disease
PE10.1	Define and describe the etiopathogenesis, classify in
	features, complication and management severe acu
	malnutrition (MAM)
PE10.2	Outline the clinical approach to a child with SAM a

<i>Code</i>	<i>Competency</i>
PE12.16	Describe the causes, clinical features, diagnosis and management of vitamin B complex deficiency
PE12.17	Identify the clinical features of vitamin B complex deficiency
PE12.18	Diagnose patients with vitamin B complex deficiency and anemia
PE12.19	Discuss the RDA, dietary sources of vitamin C and their role in health
PE12.20	Describe the causes, clinical features, diagnosis and management of vitamin C deficiency
PE12.21	Identify the clinical features of vitamin C deficiency
PE13.1	Discuss the RDA, dietary sources of iron and their role in health
PE13.2	Describe the causes, diagnosis and management of Fe deficiency anemia
PE13.3	Identify the clinical features of dietary deficiency of iron
PE13.4	Interpret hemogram and iron panel
PE13.5	Propose a management plan for Fe deficiency anemia
PE13.7	Discuss the RDA, dietary sources of iodine and their role in health
PE13.8	Describe the causes, diagnosis and management of deficiency of iodine
PE13.9	Identify the clinical features of iodine deficiency disorders
PE13.11	Discuss the RDA, dietary sources of calcium and their role in health
PE13.12	Describe the causes, clinical features, diagnosis and management of calcium deficiency
PE13.13	Discuss the RDA, dietary sources of magnesium and their role in health
PE13.14	Describe the causes, clinical features, diagnosis and management of magnesium deficiency
PE14.2	Discuss the risk factors, clinical features, diagnosis and management of fluid and electrolyte imbalance
PE14.3	Discuss the risk factors, clinical features, diagnosis and management of fluid and electrolyte imbalance
PE14.4	Discuss the risk factors, clinical features, diagnosis and management of fluid and electrolyte imbalance
PE15.1	Discuss the fluid and electrolyte requirement in health and disease
PE15.2	Discuss the clinical features and complications of fluid and electrolyte imbalance and the management
PE15.3	Calculate the fluid and electrolyte requirement in health and disease
PE15.4	Interpret electrolyte report
PE15.5	Calculate fluid and electrolyte imbalance
PE16.1	Explain the components of Integrated Management of Neonatal and Child Health guidelines and method of risk stratification

<i>Code</i>	<i>Competency</i>
PE20.7	Discuss the etiology, clinical features and management of neonatal jaundice
PE20.8	Discuss the etiology, clinical features and management of neonatal respiratory distress, including meconium aspiration and transient tachypnea of the newborn
PE20.9	Discuss the etiology, clinical features and management of neonatal sepsis
PE20.10	Discuss the etiology, clinical features and management of neonatal meningitis
PE20.11	Discuss the clinical characteristics, complications and management of neonatal asphyxia (large and small for gestation)
PE20.12	Discuss the temperature regulation in neonates, clinical features and management of neonatal hypothermia
PE20.13	Discuss the temperature regulation in neonates, clinical features and management of neonatal hypoglycemia
PE20.14	Discuss the etiology, clinical features and management of neonatal hyperbilirubinemia
PE20.15	Discuss the etiology, clinical features and management of neonatal hypocalcemia
PE20.16	Discuss the etiology, clinical features and management of neonatal hypomagnesemia
PE20.17	Discuss the etiology, clinical features and management of neonatal hypophosphatemia
PE20.18	Identify and stratify risk in a sick neonate using IMN
PE20.19	Discuss the etiology, clinical features and management of neonatal coagulopathy
PE20.20	Identify clinical presentations of common surgical conditions in neonates: congenital esophageal atresia, anal atresia, cleft lip and palate, and congenital diaphragmatic hernia
PE21.1	Enumerate the etiopathogenesis, clinical features, complications and management of congenital contract infection in children
PE21.2	Enumerate the etiopathogenesis, clinical features, complications and management of post-streptococcal glomerular nephritis in children
PE21.3	Discuss the approach and referral criteria to a child with acute renal failure
PE21.4	Discuss the approach and referral criteria to a child with chronic renal failure
PE21.5	Enumerate the etiopathogenesis, clinical features, complications and management of chronic renal failure in children
PE21.6	Enumerate the etiopathogenesis, clinical features, complications and management of acute renal failure in children
PE21.7	Enumerate the etiopathogenesis, clinical features, complications and management of chronic renal failure in children
PE21.8	Elicit, document and present a history pertaining to renal disease in children
PE21.9	Identify external markers for kidney disease, like facial features, edema, anasarca

<i>Code</i>	<i>Competency</i>
PE23.8	Identify external markers of a cardiac disease, e.g. cyanosis, clubbing, caries, arthritis, erythema rash, chorea, subcutaneous nodules and document
PE23.9	Record pulse, blood pressure, temperature and respiratory rate
PE23.11	Develop a treatment plan and prescribe appropriate drugs like diuretics, anti-failure drugs, and inotropic agents
PE23.13	Choose and interpret blood reports in cardiac illness
PE23.14	Interpret pediatric ECG

PE23.15 Use the ECHO reports in management of cases

Mybooksfactory.com

PE23.16	Discuss the indications and limitations of cardiac catheterization
PE23.17	Enumerate some common cardiac surgeries like BT shunt, Fontan, and other surgeries
PE24.1	Discuss the etiopathogenesis, classification, clinical presentation and management of congenital heart diseases in children
PE24.2	Discuss the classification and clinical presentation of various types of diarrhea
PE24.3	Discuss the physiological basis of ORT, types of ORS and their uses
PE24.4	Discuss the types of fluid used in pediatric diarrheal diseases
PE24.5	Discuss the role of antibiotics, antispasmodics, antisecretory agents in the management of acute diarrheal diseases
PE24.6	Discuss the causes, clinical presentation and management of dehydration
PE24.7	Discuss the causes, clinical presentation and management of overhydration
PE24.8	Discuss the causes, clinical presentation and management of electrolyte imbalance
PE24.9	Elicit, document and present history pertaining to diarrheal diseases
PE24.10	Assess for signs of dehydration, document and present
PE24.11	Apply the IMNCI guidelines in risk stratification of children with diarrhoea
PE24.13	Interpret RFT and electrolyte report
PE24.14	Plan fluid management as per the WHO criteria
PE24.15	Perform NG tube insertion in a manikin
PE24.17	Perform interosseous insertion model

<i>Code</i>	<i>Competency</i>
PE27.11	Explain the need and process of triage of sick children
PE27.12	Enumerate emergency signs and priority signs
PE27.13	List the sequential approach of assessment of emergency
PE27.14	Assess emergency signs and prioritize
PE27.15	Assess airway and breathing: recognise signs of severe severe chest indrawing, grunting
PE27.16	Assess airway and breathing. Demonstrate the method to open airway in a simulated environment
PE27.17	Assess airway and breathing: administer oxygen using
PE27.18	Assess airway and breathing: perform assisted ventilation
PE27.19	Check for signs of shock i.e. pulse, blood pressure, capillary
PE27.21	Choose the type of fluid and calculate the fluid requirement
PE27.23	Assess for signs of severe dehydration
PE27.24	Monitoring and maintaining temperature: define hypothermia complications and management of hypothermia
PE27.25	Describe the advantages and correct method of keeping warm
PE27.26	Describe the environmental measures to maintain temperature
PE27.27	Assess for hypothermia and maintain temperature
PE27.28	Provide BLS for children in manikin
PE27.29	Discuss the common causes, clinical presentation, risk factors
PE27.30	Demonstrate confidentiality with regard to abuse
PE27.31	Assess child for signs of abuse
PE28.1	Discuss the etiopathogenesis, clinical features and management
PE28.2	Discuss the etiopathogenesis of pharyngotonsillitis
PE28.3	Discuss the clinical features and management of pharyngitis
PE28.4	Discuss the etiopathogenesis, clinical features and management
PE28.5	Discuss the etiopathogenesis, clinical features and management
PE28.6	Discuss the etiopathogenesis, clinical features and management
PE28.7	Discuss the etiology, clinical features and management
PE28.8	Discuss the types, clinical presentation, and management of children
PE28.9	Elicit, document and present age appropriate history and including stridor
PE28.12	Analyse the clinical symptoms and interpret physiological



<i>Code</i>	<i>Competency</i>
PE29.11	Identify external markers for hematological disorders, e.g. ecchymosis, lymphadenopathy, bone tenderness, loss of
PE29.12	Perform examination of the abdomen, demonstrate organ
PE29.13	Analyse symptoms and interpret physical signs to make a
PE29.15	Perform and interpret peripheral smear
PE29.16	Discuss the indications for hemoglobin electrophoresis and
PE29.18	Enumerate the referral criteria for hematological conditions
PE30.1	Discuss the etiopathogenesis, clinical features, complications of meningitis in children
PE30.2	Distinguish bacterial, viral and tuberculous meningitis
PE30.3	Discuss the etiopathogenesis, classification, clinical features of hydrocephalus in children
PE30.4	Discuss the etiopathogenesis, classification, clinical features of in children
PE30.5	Enumerate the neural tube defects. Discuss the causes, clinical features of neural tube defect
PE30.6	Discuss the etiopathogenesis, clinical features, and management of
PE30.7	Discuss the etiopathogenesis, clinical features, complications of in children
PE30.8	Define epilepsy. Discuss the pathogenesis, clinical types of in children
PE30.9	Define status epilepticus. Discuss the clinical presentation of
PE30.10	Discuss the etiopathogenesis, clinical features and management of
PE30.11	Discuss the etiopathogenesis, clinical features and management of
PE30.12	Enumerate the causes of floppiness in an infant and discuss and management
PE30.13	Discuss the etiopathogenesis, clinical features, management of in children
PE30.14	Discuss the etiopathogenesis, clinical features and management of

<i>Code</i>	<i>Competency</i>
PE32.6	Discuss the genetic basis, risk factors, clinical features, management and genetic counselling in Turner's syndrome
PE32.7	Identify the clinical features of Turner syndrome
PE32.8	Interpret normal karyotype and recognize the Turner karyotype
PE32.9	Discuss the referral criteria and multidisciplinary approach in Turner syndrome
PE32.10	Counsel parents regarding: 1. Present child; 2. Risk of future children
PE32.12	Identify the clinical features of Klinefelter syndrome
PE33.1	Describe the etiopathogenesis, clinical features, management of congenital hypothyroidism
PE33.2	Recognize the clinical signs of hypothyroidism and hyperthyroidism
PE33.3	Interpret and explain neonatal thyroid screening reports
PE33.4	Discuss the etiopathogenesis, clinical types, presentation, management of type 1 diabetes mellitus in children
PE33.5	Interpret blood sugar reports and explain the diagnosis of diabetes mellitus
PE33.7	Perform genital examination and recognize ambiguous genitalia
PE33.8	Define precocious and delayed puberty
PE33.9	Perform sexual maturity rating (SMR) and interpret the results
PE33.10	Recognize precocious and delayed puberty and refer to specialist
PE33.11	Identify deviations in growth and plan appropriate management
PE34.1	Discuss the epidemiology, clinical features, clinical presentation, management of tuberculosis in children and adolescents
PE34.2	Discuss the various diagnostic tools for childhood tuberculosis
PE34.3	Discuss the various regimens for management of tuberculosis
PE34.4	Discuss the preventive strategies adopted and the objectives of the Tuberculosis Control Program
PE34.5	Able to elicit, document and present history of contact with tuberculosis
PE34.7	Interpret a Mantoux test
PE34.8	Interpret a chest radiograph
PE34.9	Interpret blood tests in the context of laboratory evidence of tuberculosis
PE34.10	Discuss the various samples for demonstrating the organism
PE34.13	Enumerate the newer diagnostic tools for tuberculosis
PE34.14	Enumerate the common causes of fever and discuss the complications and management of fever in children
PE34.15	Enumerate the common causes of fever and discuss the complications and management of child with exanthematous fever