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The Acutely Ill Child

A Ready Reckoner



Editors
Biju M John
Vishal Sondhi
Shuvendu Roy
G Shridhar

2nd Edition

Foreword
Mukti Sharma

JAYPEE

Contents

SECTION 1: Supporting a Sick Child

1. **Assessment of a Sick Child** 3
   Daljit Singh, Aradhna Aneja
2. **Hypovolemic Shock** 9
   Aradhna Aneja, Daljit Singh
3. **Cardiogenic Shock** 11
   Aradhna Aneja, SK Jatana, Amit Pathania
4. **Septic Shock** 13
   Aradhna Aneja, Amit Pathania, Biju M John
5. **Anaphylactic Shock** 16
   SK Jatana, Aradhna Aneja, Amit Pathania
6. **Obstructive Shock** 18
   Aradhna Aneja, Daljit Singh
7. **Hyponatremia** 20
   Aradhna Aneja, Biju M John
8. **Hypernatremia** 22
   Aradhna Aneja, Biju M John
9. **Hypokalemia** 24
   Aradhna Aneja, Daljit Singh
10. **Hyperkalemia** 26
    Aradhna Aneja, Daljit Singh
11. **Hypocalcemia** 28
    Aradhna Aneja, Daljit Singh
12. **Approach to Arterial Blood Gas Analysis** 30
    Amit Pathania, Biju M John
13. **Sedation and Analgesia in Children** 36
    Aradhna Aneja, Biju M John
14. **Nutrition in a Critically Ill Child** 39
    Aradhna Aneja, Biju M John, Amit Pathania

SECTION 2: Respiratory Disorders

15. Approach to a Child with Respiratory Distress 47
Amit Pathania, Rakesh Gupta

16. Acute Respiratory Failure 49
Amit Pathania, Rakesh Gupta

17. Pediatric Acute Respiratory Distress Syndrome 52
Amit Pathania, Rakesh Gupta, Biju M John

18. Croup 56
Rakesh Gupta, Amit Pathania

19. Foreign Body Aspiration 58
Amit Pathania, Rakesh Gupta

20. Acute Bronchiolitis 60
Amit Pathania, Rakesh Gupta

21. Acute Severe Asthma 62
Rakesh Gupta, Amit Pathania

22. Mechanical Ventilation 65
Amit Pathania, Biju M John

SECTION 3: Cardiovascular Disorders

23. Approach to Cyanotic Infant 73
Arvind Mishra, Aradhana Dwivedi, Mukti Sharma

24. Cyanotic Spells or "Tet Spells" 77
Aradhana Dwivedi, Mukti Sharma, Arvind Mishra

25. Congestive Cardiac Failure 79
Mukti Sharma, Aradhana Dwivedi, Arvind Mishra

26. Hypertensive Emergencies in Children 84
Aradhana Dwivedi, Mukti Sharma, Arvind Mishra

SECTION 4: Hematological and Oncological Disorders

27. Disseminated Intravascular Coagulation 91
Amit Devgan, Barnali Mitra

28. Febrile Neutropenia 93
Vishal Sondhi, Barnali Mitra

29. Tumor Lysis Syndrome 95
Barnali Mitra, Vishal Sondhi

30. Hemophilia Emergencies 99
Barnali Mitra, Amit Devgan

31. Acute Transfusion Reactions 101
Barnali Mitra, Vishal Sondhi

32. Acute Illness in a Child with Sickle Cell Disease 104
Barnali Mitra, Vishal Sondhi

33. Bleeding Disorders 107
Vishal Sondhi

SECTION 5: Endocrine Disorders

34. Diabetic Ketoacidosis 111
Bikash Shreshta, V Venkateshwar, Biju M John

35. Hypoglycemia 114
Bikash Shreshta, V Venkateshwar

36. Syndrome of Inappropriate Antidiuretic Hormone Secretion 116
V Venkateshwar, Bikash Shreshta

37. Adrenal Crisis 118
Bikash Shreshta, V Venkateshwar

38. Diabetes Insipidus 120
Bikash Shreshta, V Venkateshwar

SECTION 6: Renal Disorders

39. Acute Kidney Injury 125
V Venkateshwar, Bikash Shreshta, Suprita Kalra

40. Hemolytic Uremic Syndrome 130
Bikash Shreshta, V Venkateshwar, Suprita Kalra

41. Renal Replacement Therapy 133
Bikash Shreshta, V Venkateshwar, Suprita Kalra

SECTION 7: Gastrointestinal Tract and Liver Disorders

42. Acute Abdomen 139
Vinod Dagar, Amit Devgan

43. Gastrointestinal Bleed 143
Vinod Dagar, Amit Devgan

44. Intestinal Obstruction 148
Vinod Dagar, Amit Devgan

45. Button Battery Ingestion 151
Sarvesh Kohli

46. Approach to Acute Liver Failure 153
Vinod Dagar, Amit Devgan

SECTION 8: Neurological Disorders

47. Approach to Coma 161
Arvind Mishra, KS Rana

48. Status Epilepticus 164
Vishal Sondhi

49. Increased Intracranial Pressure 169
Arvind Mishra, KS Rana

50. Head Injury in Children 172
Arvind Mishra, KS Rana

51. Acute Flaccid Paralysis 175
H Ravi Ramamurthy, KS Rana

52. Febrile Encephalopathy 180
Vishal Sondhi

53. Autoimmune and Demyelinating Disorders 183
Ruchika Jha, Vishal Sondhi

SECTION 9: Neonatal Disorders

54. Respiratory Distress in Neonates 189
G Shridhar

55. Neonatal Sepsis 192
G Shridhar

56. Neonatal Seizures 196
G Shridhar

57. Inborn Errors of Metabolism 199
Suprita Kalra

58. Approach to a Child with Ambiguous Genitalia 202
Sarguna K Logen

SECTION 10: Infections

59. Severe Dengue 209
Anjali Gautam

60. Complicated Malaria 211
Sucheta K Menon

61. Rickettsial Disease 213
Giridharan

SECTION 11: Toxicology and Environmental Hazards

62. Clinical Approach to a Suspected Case of Poisoning 217
Sachendra Badal, Shuvendu Roy

63. Hydrocarbon Poisoning 222
Sachendra Badal, Shuvendu Roy

64. Acetaminophen Toxicity 224
Sachendra Badal, Shuvendu Roy

65. Organophosphorus Poisoning 227
Sachendra Badal, Shuvendu Roy

66. Iron Poisoning 230
Sachendra Badal, Shuvendu Roy

67. Snake Bite Treatment Protocol 233
Sachendra Badal, Shuvendu Roy

68. Approach to Scorpion Bite 237
Sachendra Badal, Shuvendu Roy

69. Drowning 240
Suprita Kalra, Ranjit Ghuliani

70. Burns 242
Ranjit Ghuliani, Suprita Kalra

71. Electrical Injuries 245
Sarvesh Kohli

SECTION 12: Procedures

72. Use of Bedside Ultrasonography in PICU 251
Arvind Kumar

73. Endotracheal Intubation 254
Sanjeev Khera

74. Rapid-sequence Intubation 257
Sanjeev Khera

75. Central Venous Line (Femoral Vein) 259
Sanjeev Khera

76. Intraosseous Cannulation 262
Sanjeev Khera

77. Peripherally Inserted Central Catheter Insertion 265
Sanjeev Khera, Gaurav Ray

78. Radial Artery Cannulation 268
Sanjeev Khera

79. Umbilical Vein Catheterization 271
Sanjeev Khera, Gaurav Ray

80. Intercostal Drainage Tube Insertion 274
Mithlesh Kumar Tiwari

81. Thoracocentesis: Needle Aspiration of Pneumothorax 276
Sanjeev Khera

82. Abdominal Paracentesis 278
Sanjeev Khera

SECTION 13: Charts and Scales

Section Editors: *Vinod Dagar, Abhishek Pandey, Sarvesh Kohli, Ajay Beriwal, Bhaskar Bharadwaj*

83. Pediatric Advanced Life Support Algorithms 283

84. Pediatric Early Warning Score 291

85. Triage 292

86. Ventilator Illustration 294

87. Noninvasive Ventilation Illustration 295

88. Sedation Withdrawal 296

89. Rapid-sequence Intubation 298

90. Maintenance Intravenous Fluids in Children 300

91. Total Parenteral Nutrition and Enteral Nutrition 301

92. Edema in Nephrotic Syndrome 305

93. Coma and Pain Scales 307

94. Catheter and Tube Sizes 309
95. Blood Component Replacement 313
96. Abnormal Sodium 315
97. Transudate versus Exudate 316
98. Steroids and Efficacy 317
99. Emergency Drug Preparation 318
100. Important Formulae 319
101. Glucose-6-phosphate Dehydrogenase and Drugs 321
102. Drug Levels 322
103. Electrocardiogram Values 326
104. Intravenous Compatibility Charts 328
105. Sample Collection 336
106. Laboratory Values 337
107. Computed Tomography Scan and Lesions 344
108. Common Pediatric Applications 346
109. Pediatric Neuroimaging Primer 347
110. Pediatric Neurology Charts 352

Suggested Reading 357
Index 361

CHAPTER 34

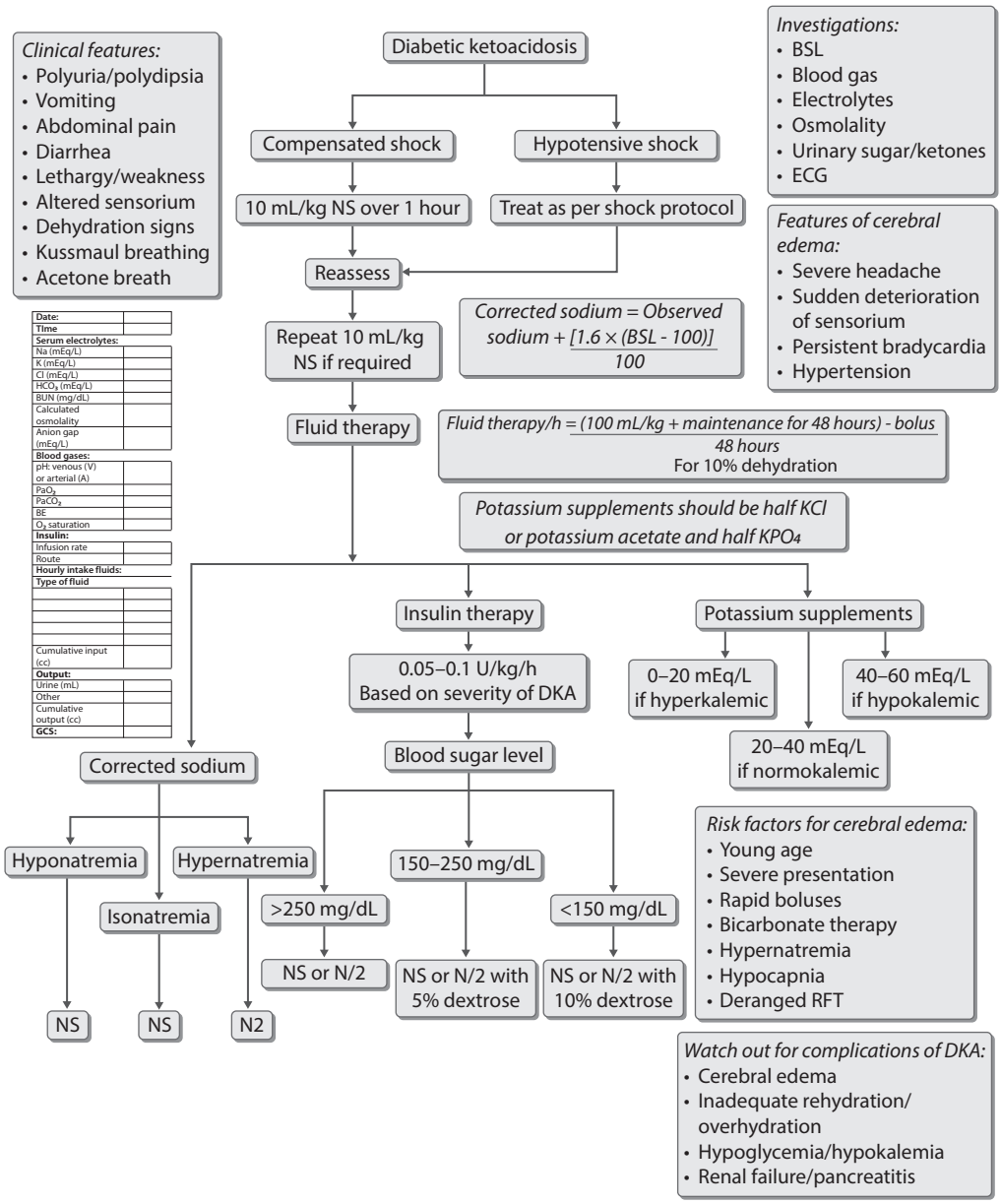
Diabetic Ketoacidosis

Bikash Shreshta, V Venkateshwar, Biju M John

- Diabetic ketoacidosis is the triad of hyperglycemia (>200 mg/dL), metabolic acidosis (venous pH <7.3 and bicarbonate <15 mEq/L) and ketonemia.
- A total of 20–40% of new-onset diabetes may present as diabetic ketoacidosis.
- Clinical features of diabetic ketoacidosis may be extremely variable and it requires a high degree of suspicion.
- Fluid therapy is the backbone of the diabetic ketoacidosis management. It includes the deficit correction (maximum 10% dehydration = 100 mL/kg), maintenance therapy as well as ongoing losses. The choice of fluid is dependent upon the corrected sodium level. Generally, it is NS at first for rapid expansion of the volume and may be changed to N/2 or ringer lactate or balanced salt solution depending upon the corrected sodium level.
- Dextrose should be added to maintenance fluid as per the blood glucose level. The range of dextrose in maintenance fluid can range from 0 to 12.5%. Dextrose level should be adjusted accordingly to aim for a blood sugar level fall between 50 and 100 mg/dL every hour and maintain between 200 and 300 mg/dL 6 hours after initiating fluid therapy.
- Insulin therapy has to be started only after 1 hour of starting fluid therapy. The dose of insulin is 0.1 U/kg/h. The additional dextrose level can be changed (0–12.5%) to maintain blood sugar fall and level as desired. If the required fall and level of blood sugar is not achieved despite change in dextrose level, then change in insulin level may be done accordingly (0.05–0.2 U/kg/h).
- Despite the adjustment in dextrose as well as insulin therapy, if the blood sugar level is not controlled, then a fault in insulin preparation, sepsis, insulin resistance, inadequate hydration, lactic acidosis, or electrolytes disturbance should be suspected.
- The insulin has to be continued till acidosis is corrected. Once acidosis is corrected (pH >7.3 and HCO_3^- >15 mEq/L), and the patient is able to take orally, then insulin infusion should be switched to subcutaneous insulin. The insulin infusion must be continued for 30–60 minutes after the first subcutaneous dose is administered to allow for delayed onset of action of the injected insulin.
- Generally, ongoing losses are taken care of by maintenance fluids. However, gastric losses by emesis/diarrhea should be replaced. Urinary losses should not be added to maintenance fluids.
- Bicarbonate therapy is contraindicated. Bicarbonate therapy may be used in condition where arterial pH <6.9 and there is impaired cardiac contractility and vascular tone as in cases with hypotensive shock undergoing active resuscitation with vasopressors.

- Start potassium therapy with administration of insulin. Starting concentration in fluid should be 40 mEq/L as a combination of potassium acetate and potassium phosphate. If the patient is hypokalemic (<3.5 mEq/L), a higher concentration of potassium, 60–80 mEq/L, may be necessary. Administer high concentrations of potassium only with electrocardiographic monitoring. If hyperkalemic (>6 mEq/L) at the outset, give only 0–20 mEq/L of potassium.
- Antibiotics are used if clinical or laboratory features of infection are present.
- Blood glucose to be measured 1 hourly till the levels are stabilized and electrolytes and blood gas analysis should be done 2–4 hourly till acidosis is corrected.
- ***Mild diabetic ketoacidosis (DKA):*** **pH 7.2–7.29 or bicarbonate <15 mEq/L, we could assume 5% dehydration.**
  Moderate DKA: **pH 7.1–7.19 or bicarbonate <10 mEq/L, we could assume 7% dehydration.**
  Severe DKA: **pH <7.1 or bicarbonate <5 mEq/L, we could assume 10% dehydration.**
- **Usually we correct 10 mL/kg for 1% dehydration.**
  Pre-illness weight could be an accurate way to analyze level of dehydration.
- **Insulin infusion could be started at 0.05 U/kg/h for mild cases.**
- Most of the cases shall recover and get re-hydrated in 12–18 hours.
- In case blood gas does not improve, pay attention to the non-gap acidosis, which could be due to extra chloride getting in from too much normal saline. In this situation, plasmalyte or balance salt solutions with lower chloride may be a better choice.
  Details of diabetic ketoacidosis are given in **Flowchart 1**.
  (Can try the two-bag system of infusing glucose and saline)

Flowchart 1: Diabetic ketoacidosis.



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The Acutely Ill Child
A Ready Reckoner

The Acutely Ill Child: A Ready Reckoner is a concise text that provides practical information on management of common emergencies in children. Categorized into different sections, each section deals with emergencies referrable to a system and its chapters briefly outline the salient features of the disease condition along with a management algorithm. This second edition covers several newer topics of interest with updated evidence-based protocols. The ready reckoner will serve as an immediate primary resource for all students, trainees, and clinicians involved in the acute care of sick children.

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