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## Acute Diarrheal Diseases: Comprehensive Teaching-Learning Module

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# Acute Diarrheal Diseases: Comprehensive Teaching-Learning Module

MBBS 3rd Year | Competency-Based Medical Education (CBME)

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### **1. Module Overview**

#### **1.1 Learning Objectives**

By the end of this module, MBBS 3rd year students will be able to:

### **Clinical Competence**

- Diagnose and classify different types of acute diarrhea
- Assess dehydration status using WHO criteria
- Apply appropriate rehydration and pharmacological management
- Recognize complications and initiate timely interventions

### **Psychosocial Awareness**

- Address family dynamics and caregiver stress
- Demonstrate cultural competence in diverse settings
- Implement community-based psychosocial support
- Recognize stigma associated with diarrheal diseases

### **Public Health Perspective**

- Understand epidemiology in Indian context
- Implement NHM/ICDS/ASHA program integration
- Design community-level prevention strategies
- Participate in outbreak investigation and control

### **Professional Development**

- Access and critically appraise medical literature
- Use various teaching methodologies effectively
- Maintain learning portfolios and self-reflection
- Collaborate in multidisciplinary healthcare teams

## **1.2 Module Structure**

Session	Topic	Duration	Methodology
1	Introduction & Epidemiology	90 min	Lecture + Interactive Dashboard
2	Pathophysiology & Clinical Features	90 min	PBL + Case Discussion
3	Management Strategies	120 min	Workshop + Skills Lab
4	Psychosocial Aspects	60 min	Role-play + Group Discussion
5	Prevention & Control	90 min	Community Outreach Planning
6	Practical Workshop	180 min	OSCE Stations

Session	Topic	Duration	Methodology
7	Case-Based Integration	120 min	Problem-Based Learning
8	Field Visit	Half-day	Experiential Learning
9	Assessment & Feedback	90 min	Comprehensive Evaluation

### 1.3 Assessment Framework

#### Formative Assessment (60% weightage)

- **Pre/Post Session Quizzes:** Knowledge verification
- **Case Analysis Exercises:** Clinical reasoning
- **Practical Skills Checklists:** Competency assessment
- **Peer Assessment:** Professional development

#### Summative Assessment (40% weightage)

- **Written Examination (20%):** MCQs + Short answers
- **Practical Examination (10%):** OSCE stations
- **Case Analysis (10%):** Written case study

#### Continuous Assessment (20% additional)

- **Participation:** Class engagement and group work
- **Portfolio:** Learning reflections and assignments
- **Field Work:** Community outreach documentation

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## 2. Theoretical Foundations

### 2.1 Epidemiology

#### Global Burden

- **Annual Cases:** 1.7 billion worldwide
- **Deaths:** 443,832 (mostly children <5 years)
- **Leading Cause:** 3rd most common cause of death in children
- **Regional Variation:** Highest burden in South Asia and Sub-Saharan Africa

#### Indian Context

- **Annual Cases:** 1.5 million reported
- **Deaths:** 25,000-30,000 annually
- **Case Fatality Rate:** 1.5-2% (higher in rural areas)
- **Peak Season:** June-October (monsoon-related)

### Risk Factors

- **Age:** Highest incidence in children <5 years (30% of cases)
- **Socioeconomic:** Poverty, poor sanitation, malnutrition
- **Environmental:** Contaminated water, inadequate hygiene
- **Behavioral:** Handwashing practices, food handling

## 2.2 Etiology & Pathophysiology

### Infectious Agents

- **Viral (60%):** Rotavirus, Norovirus, Adenovirus
- **Bacterial (15%):** E. coli, Shigella, Salmonella, Campylobacter
- **Parasitic (10%):** Giardia, Cryptosporidium, Entamoeba
- **Unknown (15%):** Non-infectious causes

### Pathogenic Mechanisms

1. **Adherence:** Bacterial attachment to intestinal mucosa
2. **Toxigenesis:** Enterotoxin production (cholera, E. coli)
3. **Invasion:** Mucosal invasion (Shigella, Salmonella)
4. **Cytotoxicity:** Direct cell damage (Rotavirus)

### Physiological Consequences

- **Fluid Loss:** Secretory diarrhea (cholera toxin)
- **Inflammatory Response:** Bloody diarrhea (Shigella)
- **Malabsorption:** Nutrient loss and malnutrition
- **Electrolyte Imbalance:** Acid-base disturbances

## 2.3 Clinical Features

### Classification by Stool Characteristics

- **Watery Diarrhea:** Rice-water stools (cholera), clear liquid (rotavirus)
- **Bloody Diarrhea:** Dysentery with mucus and blood (Shigella)
- **Mucoid Diarrhea:** Mucus without blood (parasitic infections)

### Associated Symptoms

- **Systemic:** Fever, vomiting, abdominal pain
- **Dehydration Signs:** Dry mouth, decreased urine output, lethargy
- **Nutritional:** Weight loss, malnutrition, vitamin deficiencies

## 2.4 Complications

### Acute Complications

- **Severe Dehydration:** Hypovolemic shock, renal failure
- **Electrolyte Imbalance:** Hyponatremia, hyperkalemia

- **Metabolic Acidosis:** Lactic acidosis, ketoacidosis

#### Chronic Complications

- **Malnutrition:** Growth retardation, micronutrient deficiencies
  - **Immunodeficiency:** Increased susceptibility to infections
  - **Developmental Delay:** Cognitive and physical impairments
- 

### 3. Management Strategies

#### 3.1 A-B-C-D Approach

##### A: Assess and Classify

- **History:** Duration, frequency, stool characteristics
- **Physical Examination:** Vital signs, dehydration assessment
- **Laboratory:** Stool examination, blood tests if indicated

##### B: Rehydrate

- **Oral Rehydration:** First-line for most cases
- **Intravenous Fluids:** Severe dehydration or unable to drink
- **Maintenance Fluids:** Continue feeding during illness

##### C: Continue Feeding

- **Age-appropriate Diet:** Breast milk, normal foods
- **Nutritional Support:** Micronutrients, therapeutic feeding
- **Feeding Techniques:** Small frequent meals

##### D: Disease-specific Treatment

- **Antibiotics:** Selective use for specific pathogens
- **Zinc Supplementation:** All cases of acute diarrhea
- **Antimotility Agents:** Avoid in most cases

#### 3.2 Dehydration Assessment

##### WHO Classification

- **No Dehydration:** Normal mental status, eyes, thirst
- **Some Dehydration:** Restless/irritable, sunken eyes, thirsty
- **Severe Dehydration:** Lethargic/unconscious, very sunken eyes, unable to drink

### Clinical Signs

- **Mental Status:** Alert → Restless → Lethargic
- **Eyes:** Normal → Sunken
- **Tears:** Present → Absent when crying
- **Mouth:** Moist → Dry
- **Skin Pinch:** <2 seconds → >2 seconds

### 3.3 Oral Rehydration Therapy

#### WHO ORS Composition

- **Sodium:** 75 mmol/L
- **Glucose:** 75 mmol/L
- **Potassium:** 20 mmol/L
- **Citrate:** 10 mmol/L
- **Osmolarity:** 245 mOsm/L

#### Administration Guidelines

- **Infants:** 50-100 mL/kg over 4 hours
- **Children:** 50-100 mL/kg over 4 hours
- **Adults:** As needed to replace losses
- **Monitoring:** Vomiting, urine output, clinical improvement

### 3.4 Pharmacological Management

#### Zinc Supplementation

- **Dosage:** 10-20 mg/day for 10-14 days
- **Benefits:** Reduces duration by 25%, decreases stool volume
- **All Cases:** Recommended for all acute diarrhea episodes

#### Antibiotic Therapy

- **Indications:** Bloody diarrhea, cholera, systemic infection
  - **First-line:** Ciprofloxacin for Shigella
  - **Cholera:** Doxycycline or azithromycin
  - **Duration:** 3-5 days based on clinical response
- 

## 4. Case Studies

### 4.1 Case 1: Acute Watery Diarrhea

#### Patient Profile

- **Name:** Aarav Kumar, 2.5 years
- **Location:** Urban slum, Mumbai



- **Presenting Complaint:** Loose motions since yesterday

#### Clinical Findings

- **Stool:** 8-10 watery stools, no blood/mucus
- **Vital Signs:** Heart rate 120/min, respiratory rate 35/min
- **Dehydration:** Some dehydration (sunken eyes, thirsty)
- **Nutrition:** Moderately malnourished

**Diagnosis** Acute watery diarrhea (some dehydration) - likely viral gastroenteritis

#### Management

1. **Rehydration:** ORS 75 mL/kg over 4 hours
2. **Zinc:** 20 mg/day for 14 days
3. **Feeding:** Continue breastfeeding + normal diet
4. **Follow-up:** Daily monitoring for 3 days

#### Learning Points

- Early recognition of dehydration signs
- Importance of continued feeding
- Role of zinc in reducing diarrhea duration
- Community-level prevention strategies

### 4.2 Case 2: Acute Bloody Diarrhea

#### Patient Profile

- **Name:** Priya Sharma, 14 years
- **Location:** Rural village, Uttar Pradesh
- **Presenting Complaint:** Blood in stools for 3 days

#### Clinical Findings

- **Stool:** 10-12 episodes with blood and mucus
- **Vital Signs:** Fever 101°F, abdominal tenderness
- **Dehydration:** No dehydration
- **Social:** School absenteeism, family concern

**Diagnosis** Bacillary dysentery (Shigella infection)

#### Management

1. **Antibiotics:** Ciprofloxacin 15 mg/kg twice daily for 3 days
2. **ORS:** Maintenance fluids
3. **Zinc:** 20 mg/day for 14 days

#### 4. **Hygiene:** Handwashing education

##### **Learning Points**

- Differentiation from watery diarrhea
- Antibiotic indications in bloody diarrhea
- Psychosocial impact on adolescents
- Prevention through improved sanitation

#### 4.3 **Case 3: Cholera Outbreak**

##### **Patient Profile**

- **Name:** Ramesh Yadav, 35 years
- **Location:** Flood-affected area, Bihar
- **Presenting Complaint:** Severe vomiting and diarrhea

##### **Clinical Findings**

- **Stool:** Rice-water stools, profuse diarrhea
- **Vital Signs:** Severe dehydration, hypotension
- **Electrolytes:** Metabolic acidosis
- **Community:** Multiple affected family members

**Diagnosis** Cholera with hypovolemic shock

##### **Management**

1. **IV Fluids:** Ringer's lactate 100 mL/kg over 3 hours
2. **Antibiotics:** Azithromycin 1g single dose
3. **ORS:** Transition after stabilization
4. **Public Health:** Contact tracing, water chlorination

##### **Learning Points**

- Recognition of cholera epidemic
  - Aggressive rehydration in severe cases
  - Public health response to outbreaks
  - Community-level containment strategies
- 

## 5. **Psychosocial Aspects**

### 5.1 **Family Dynamics**

#### **Caregiver Burden**

- **Emotional Stress:** Anxiety about child's health

- **Economic Impact:** Loss of work, treatment costs
- **Social Isolation:** Stigma and discrimination
- **Family Roles:** Gender-specific caregiving responsibilities

#### Support Strategies

- **Counseling:** Address fears and misconceptions
- **Economic Support:** Link to government schemes
- **Family Education:** Involvement in care planning
- **Community Support:** Local support groups

### 5.2 Cultural Considerations

#### Traditional Beliefs

- **Hot/Cold Theory:** Diarrhea as “heat” imbalance
- **Herbal Remedies:** Common first-line treatment
- **Spiritual Causes:** Attribution to supernatural factors
- **Dietary Restrictions:** Cultural food avoidance

#### Cultural Competence

- **Respect Beliefs:** Integration with modern medicine
- **Language Barriers:** Use of local languages
- **Health Literacy:** Culturally appropriate education
- **Community Leaders:** Involvement of religious leaders

### 5.3 Stigma & Discrimination

#### Sources of Stigma

- **Contagious Nature:** Fear of transmission
- **Sanitation Issues:** Association with poor hygiene
- **Social Taboos:** Discussion of bowel movements
- **Economic Status:** Link to poverty

#### Mitigation Strategies

- **Health Education:** Correct misconceptions
- **Community Programs:** Inclusive diarrhea control
- **Policy Support:** Anti-discrimination measures
- **Media Campaigns:** Positive messaging

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## 6. Prevention & Control

### 6.1 WASH Interventions

#### Water Safety

- **Household Treatment:** Boiling, chlorination, filtration
- **Safe Storage:** Clean containers, covered vessels
- **Source Protection:** Wells, piped water systems
- **Quality Monitoring:** Regular testing programs

#### Sanitation

- **Toilet Construction:** Individual and community toilets
- **Open Defecation Free:** Village-level certification
- **Waste Management:** Proper disposal systems
- **Handwashing Stations:** Schools and public places

#### Hygiene Promotion

- **Behavior Change:** Handwashing with soap
- **Food Hygiene:** Safe preparation and storage
- **Environmental Cleaning:** Surface disinfection
- **Personal Hygiene:** Bathing and clothing

### 6.2 Vaccination Programs

#### Rotavirus Vaccine

- **Coverage:** 2-dose schedule (6 and 10 weeks)
- **Impact:** 40% reduction in severe diarrhea
- **Target:** Infants in routine immunization
- **Storage:** Cold chain maintenance

#### Cholera Vaccine

- **Oral Vaccine:** 2-dose schedule
- **Indications:** Outbreak settings, high-risk areas
- **Duration:** 2-3 years protection
- **Integration:** With other preventive measures

### 6.3 Community Mobilization

#### Stakeholder Engagement

- **Local Leaders:** Religious and community leaders
- **Women's Groups:** Self-help groups and cooperatives
- **School Programs:** Health education in schools
- **Youth Clubs:** Peer education programs

#### Behavior Change Communication

- **Mass Media:** TV, radio, social media campaigns
- **Interpersonal Communication:** ASHA and community health workers
- **Group Education:** Community meetings and workshops

- **Monitoring:** Behavior change indicators
- 

## 7. Indian Healthcare Context

### 7.1 National Health Mission

#### Objectives

- Reduce child mortality from diarrhea by 70% by 2030
- Achieve universal coverage of ORS and zinc
- Strengthen surveillance and outbreak response
- Integrate with broader RMNCH+A approach

#### Key Components

- **RMNCH+A:** Reproductive, Maternal, Newborn, Child and Adolescent Health
- **NRHM:** National Rural Health Mission
- **NUHM:** National Urban Health Mission

### 7.2 ICDS & Anganwadi System

#### Role in Diarrhea Control

- **Growth Monitoring:** Early detection of malnutrition
- **Nutrition Rehabilitation:** Therapeutic feeding centers
- **Mother Education:** Hygiene and feeding counseling
- **Supplementary Nutrition:** Reduces diarrhea incidence

#### Coverage

- **Anganwadis:** 1.3 lakh centers nationwide
- **Beneficiaries:** 8.2 million children daily
- **Workers:** Trained community health workers

### 7.3 ASHA Program

#### Program Features

- **Selection:** Local women with 8th grade education
- **Training:** 23-day basic module + refresher training
- **Incentives:** Performance-based payments
- **Technology:** Mobile applications for reporting

#### Diarrhea Management Role

- **Case Identification:** Early detection and referral
- **ORS Distribution:** Home-based treatment

- **Health Education:** Community awareness programs
  - **Monitoring:** Treatment compliance and outcomes
- 

## 8. Practical Skills

### 8.1 Dehydration Assessment

#### WHO Algorithm

1. **Mental Status:** Normal vs Restless/Lethargic
2. **Eyes:** Normal vs Sunken
3. **Tears:** Present vs Absent when crying
4. **Mouth:** Moist vs Dry
5. **Skin Pinch:** Goes back quickly vs Slowly (>2 seconds)
6. **Thirst:** Drinks normally vs Drinks eagerly/Unable to drink

#### Classification

- **No Dehydration:** All signs normal
- **Some Dehydration:** 2+ signs present
- **Severe Dehydration:** 2+ severe signs present

### 8.2 ORS Preparation

#### Materials Needed

- **ORS Packet:** Pre-packaged WHO formulation
- **Clean Water:** 1 liter for one packet
- **Clean Container:** For mixing and storage
- **Spoon/Cup:** For administration

#### Preparation Steps

1. **Boil Water:** Cool to room temperature
2. **Empty Packet:** Into clean container
3. **Add Water:** Exactly 1 liter
4. **Mix Thoroughly:** Until dissolved
5. **Storage:** Use within 24 hours

### 8.3 Patient Counseling

#### Key Messages

- **Continue Feeding:** Age-appropriate diet during illness
- **ORS Administration:** Correct technique and amounts
- **When to Return:** Danger signs requiring medical attention
- **Prevention:** Handwashing and safe water practices

## Communication Skills

- **Active Listening:** Understand family concerns
  - **Simple Language:** Avoid medical jargon
  - **Demonstration:** Show rather than tell
  - **Follow-up:** Regular contact and support
- 

## 9. Assessment Tools

### 9.1 Multiple Choice Questions

**Sample Questions** **Question 1:** Which of the following defines acute diarrhea according to WHO? - A) Passage of 1-2 loose stools per day - B) Passage of 3 or more loose stools per day - C) Passage of formed stools with mucus - D) Passage of stools with blood only

**Answer:** B) Passage of 3 or more loose stools per day

**Question 2:** Which sign is most reliable for assessing severe dehydration in children? - A) Dry mouth - B) Sunken eyes - C) Slow skin pinch (>2 seconds) - D) Decreased urine output

**Answer:** C) Slow skin pinch (>2 seconds)

### 9.2 OSCE Stations

**Station 1: Dehydration Assessment** **Task:** Assess dehydration status in a child mannequin **Time:** 5 minutes **Assessment Criteria:** - Systematic examination approach - Correct identification of signs - Appropriate classification - Communication with “parent”

**Station 2: ORS Preparation** **Task:** Prepare ORS solution correctly **Time:** 5 minutes **Assessment Criteria:** - Correct measurement of water - Proper mixing technique - Hygiene maintenance - Patient education

### 9.3 Case Analysis Rubrics

#### Scoring Criteria

- **Content Knowledge (40%):** Accuracy of medical information
- **Clinical Reasoning (30%):** Logical diagnostic and management approach
- **Psychosocial Awareness (15%):** Family and community considerations
- **Communication (15%):** Clarity and organization of response

#### Grade Descriptors

- **Excellent (80-100%):** Comprehensive, accurate, well-reasoned
- **Good (60-79%):** Mostly correct with minor gaps

- **Satisfactory (40-59%):** Basic understanding with significant gaps
  - **Unsatisfactory (<40%):** Major deficiencies in knowledge or reasoning
- 

## 10. References & Resources

### 10.1 Key Guidelines

#### WHO Guidelines

- **Treatment of Diarrhoea:** A manual for physicians and other senior health workers
- **Oral Rehydration Salts:** Production of the new ORS
- **Integrated Management of Childhood Illness:** Diarrhea module

#### IAP Guidelines

- **Indian Academy of Pediatrics:** Diarrhea management in children
- **National Guidelines:** Management of acute diarrhea
- **Community Pediatrics:** Preventive strategies

### 10.2 Research Papers

#### Epidemiology

- Bhutta et al. (2022): Global burden of childhood diarrhea
- Troeger et al. (2018): Estimates of global, regional, and national morbidity, mortality, and aetiologies of diarrhoeal diseases

#### Management

- Munos et al. (2010): The effect of oral rehydration solution and recommended home fluids on diarrhoea mortality
- Lazzarini et al. (2016): Oral zinc for treating diarrhoea in children

#### Prevention

- Clasen et al. (2015): Effectiveness of a rural sanitation program on diarrhea, soil-transmitted helminth infection, and child malnutrition in Odisha, India
- Praharaj et al. (2016): Norovirus infection in children with acute gastroenteritis in Odisha, India

### 10.3 Online Resources

#### Educational Platforms

- **CDC Diarrhea Resources:** <https://www.cdc.gov/diarrhea/>
- **WHO Diarrhea Fact Sheet:** <https://www.who.int/news-room/fact-sheets/detail/diarrhoeal-disease>



- **BMJ Learning:** Interactive diarrhea modules

#### **Indian Resources**

- **NHM Guidelines:** <https://nhm.gov.in/>
  - **IAP Resources:** <https://iapindia.org/>
  - **ICMR Publications:** <https://www.icmr.gov.in/>
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#### **Hyperlink Index**

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