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
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

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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

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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

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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

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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

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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

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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

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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
- Lazzerini 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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