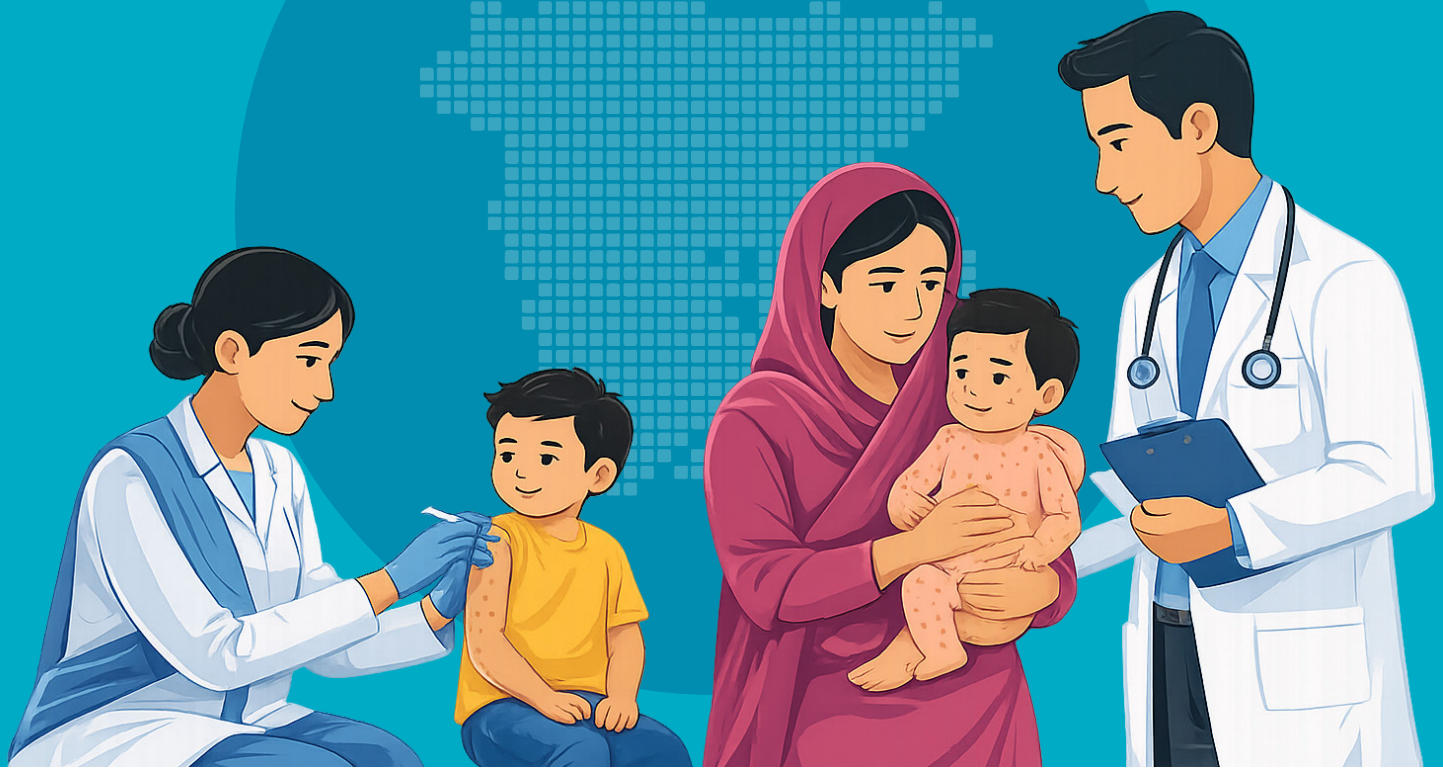
NATIONAL GUIDELINE
FOR THE MANAGEMENT OF
MEASLES



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National Guideline for the Management of Measles

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Directorate General of Health Services
Ministry of Health and Family Welfare
With technical support from UNICEF Bangladesh

Bangladesh, 2026

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FOREWORD

Measles remains one of the most contagious infectious diseases known to medicine, yet it is entirely preventable. That paradox, a disease we have the tools to eliminate but have not yet eliminated, defines both the urgency and the purpose of this National Guideline for the Management of Measles.

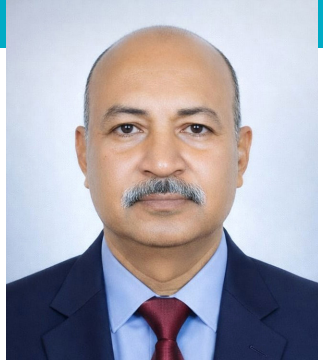
Bangladesh has made commendable progress in expanding immunization coverage and reducing the burden of vaccine-preventable diseases. Yet measles continues to cause outbreaks, hospitalisations, and preventable deaths, particularly among children in communities where vaccination coverage remains suboptimal, where malnutrition compounds vulnerability, and where the health system's capacity to detect and respond to cases needs strengthening. This guideline is our response to that unfinished business.

Developed by the Directorate General of Health Services with technical support from UNICEF Bangladesh, this guideline provides a standardised, evidence-based framework that equips health workers at every level, from the community health worker identifying a suspected case in a remote village to the paediatrician managing a critically ill child in a tertiary hospital, with clear, practical, and clinically sound guidance. It addresses the full spectrum of the measles response: early detection and notification, isolation and infection prevention, clinical management of uncomplicated and severe cases, outbreak response, and community engagement. It is a document designed not to sit on a shelf but to be used, referenced, and applied in the daily work of those who protect the health of our people.

I wish to express my sincere appreciation to Professor Dr. Abid Hossain Mollah for leading the expert technical team with exceptional dedication and clinical wisdom, and to Dr. Hasnain Ahmed of UNICEF Bangladesh for his sustained and substantive technical support throughout the process. I am equally grateful to every specialist, clinician, and public health professional who contributed their expertise to this endeavour.

To all healthcare providers and health managers across Bangladesh: this guideline carries our collective commitment to the children we serve. I urge you to apply it diligently, to train your teams in its use, and to uphold the standard of care it represents. Measles elimination is within our reach, and it begins with each of us doing our part.

Professor. Dr. Md. Halimur Rashid
Director, Disease Control
Directorate General of Health Services
Ministry of Health and Family Welfare



MESSAGE

FROM THE **DIRECTOR GENERAL**,
DIRECTORATE GENERAL OF HEALTH SERVICES

Measles is a disease we have long known how to prevent. Yet its continued presence among our children is a reminder that knowledge alone is insufficient, it must be accompanied by systems that reach every child, every community, and every corner of our country. This guideline is our commitment to that reach.

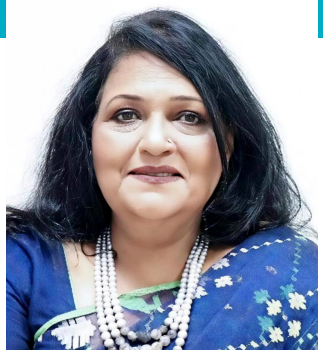
Bangladesh has made remarkable strides in immunization coverage and child health over the past two decades. These achievements are the result of sustained investment, dedicated health workers, and the trust of millions of families who bring their children to our facilities and our outreach programmes. However, measles continues to cause preventable deaths and serious complications, particularly among the most vulnerable, the malnourished child, the newborn too young to be vaccinated, the child in a community where coverage has fallen below the threshold of protection.

The National Guideline for the Management of Measles has been developed to equip every healthcare provider, from the community health worker conducting home visits to the paediatrician managing a complex case in a tertiary hospital, with clear, evidence-based, and operationally practical guidance. It standardises the way we identify, isolate, treat, and report measles across all levels of the health system, and it strengthens the links between clinical care, disease surveillance, and outbreak response.

This document is the product of considerable expertise, dedication, and collaborative effort. I am deeply grateful to Professor Dr. Abid Hossain Mollah for leading the expert technical team with distinction, and to all the clinicians, specialists, and public health professionals whose knowledge and commitment are reflected in every section of this guideline. I also wish to acknowledge UNICEF Bangladesh for the technical support provided throughout this process.

I call upon all healthcare providers, health managers, and public health professionals to embrace this guideline and apply it consistently in their practice. It is only through faithful implementation that we will translate these pages into healthier outcomes for the children of Bangladesh.

Professor Dr. Pravath Chandra Biswas
Director General
Directorate General of Health Services
Ministry of Health and Family Welfare



MESSAGE

FROM THE **ADDITIONAL DIRECTOR GENERAL**,
PLANNING & DEVELOPMENT, DGHS

The burden of measles is not merely a clinical matter. It is a mirror held up to the equity of our health system, reflecting where our immunization programmes have reached and where they have not, which communities are protected and which remain exposed, which children receive timely care and which do not. This guideline is our instrument for closing those gaps.

Measles spreads rapidly in the spaces we have not yet filled, among children who have missed vaccination, in communities with limited access to health services, and in households where the early warning signs are not recognised until the disease has already progressed. The consequences can be devastating: pneumonia, encephalitis, blindness, and death. Yet every one of these outcomes is preventable.

The National Guideline for the Management of Measles provides a coherent and comprehensive framework that addresses the full continuum of the measles response, from community-level surveillance and early case detection to clinical triage, isolation, complication management, and outbreak containment. It brings consistency where fragmentation has existed and clarity where uncertainty has caused delay.

I wish to commend Director of Disease Control, Professor Dr. Md. Halimur Rashid, for his leadership in bringing this process to fruition, and the distinguished group of experts whose clinical knowledge and public health experience are embedded in this document. Their contribution represents an act of service to the health of our nation. I also thank UNICEF for their commitment and technical support for development of this guideline.

I urge all healthcare facilities to integrate this guideline into their training, supervision, and quality assurance systems. A guideline has value only when it is used, and used well.

Foara Tasmim

Professor Dr. Foara Tasmim
Addl. Director General (Planning and Development)
Directorate General of Health Services
Ministry of Health and Family Welfare

MESSAGE

FROM THE **CHIEF OF HEALTH,**
UNICEF BANGLADESH

Measles remains one of the most infectious diseases known to medicine. Despite being entirely vaccine-preventable and amenable to effective clinical management, its control depends on the consistent application of evidence-based practices across the health system. The challenge has not been a lack of technical knowledge, but rather the absence of a nationally owned, evidence-based, and operationally detailed clinical guideline capable of translating that knowledge into action at every level of healthcare delivery in Bangladesh. This National Guideline for the Management of Measles has been developed to fill that critical gap.

The guideline arrives at a consequential moment. Bangladesh has committed to measles elimination, and the epidemiological trajectory is encouraging. However, elimination requires more than sustained immunisation coverage. It demands a health system capable of detecting every case through sensitive surveillance, classifying every patient accurately through structured triage, and managing every complication through competency-based clinical protocols. This document provides the framework for each of those functions. The introduction of the Fever Corner as a standardised clinical unit for the reception, assessment, and management of suspected measles cases across facility levels represents a significant operational advance, grounding infection prevention and clinical management within a single, accountable structure.

This guideline comes at a pivotal moment. Bangladesh has reaffirmed its commitment to measles elimination, and recent epidemiological trends are encouraging. However, achieving and sustaining elimination requires more than high immunisation coverage. It demands a health system capable of detecting every suspected case through sensitive surveillance, accurately classifying patients through structured triage, and effectively managing complications through standardized, competency-based clinical protocols. This guideline provides a comprehensive framework to support each of these functions. The introduction of the Fever Corner as a standardised clinical unit for the reception, assessment, and management of suspected measles cases across facility levels represents a significant operational advance, grounding infection prevention and clinical management within a single, accountable structure.

Technically, this guideline represents a rigorous synthesis of World Health Organization (WHO) clinical standards, Centers for Disease Control and Prevention (CDC) recommendations, and the national surveillance framework established under the Expanded Programme on Immunization (EPI) of the Directorate General of Health Services. It addresses the full spectrum of measles care, from uncomplicated cases managed at home through structured caregiver counselling to severe and complicated disease requiring intensive care, advanced respiratory support, and multidisciplinary specialist management. By aligning with the

National Guideline for Acute Flaccid Paralysis (AFP) and Vaccine-Preventable Diseases Surveillance, it ensures that clinical management and public health response function as a seamless continuum rather than as parallel and disconnected processes.

UNICEF Bangladesh is honoured to have provided technical support to this important initiative in close partnership with the Directorate General of Health Services (DGHS). I extend my sincere appreciation to Professor Dr. Md. Halimur Rashid for his visionary programmatic leadership, to Professor Dr. Abid Hossain Mollah for the distinguished clinical expertise and guidance he provided to the expert working group, and to all contributors whose collective dedication, technical rigour, and commitment have shaped this guideline. UNICEF reaffirms its steadfast commitment to supporting the Government of Bangladesh in achieving measles elimination and strengthening the clinical systems and capacities that protect every child from a preventable disease.

Dr. Malalay Ahmadzai
Chief of Health
UNICEF Bangladesh

EDITOR'S NOTE

At the very outset, I would like to express my gratitude for the blessings of Allah that enabled us to accomplish the task of developing this National Guideline for the Management of Measles.

We all know that measles is a highly contagious disease that can rapidly become devastating, particularly among children under 5 years of age, immunocompromised individuals, pregnant women, and unvaccinated population. However, with judicious supportive treatment, many lives can be saved. This nature of the disease necessitates the urgent development of a management guideline that can be easily and effectively used for measles case management by healthcare workers at all levels. The Directorate General of Health Services of Bangladesh entrusted this responsibility to a professional group comprising experienced clinicians and public health specialists, who worked relentlessly and ultimately completed the task.

Thanks are due to Professor Dr. Pravat Chandra Biswas, Honourable Director General of Health Services and Professor Md. Halimur Rashid, Director, Disease Control, DGHS, whose trust and institutional support made this work possible.

I wish to place on record my profound appreciation for Professor Dr. Chowdhury Ali Kawser, Former Professor of Paediatrics, Bangladesh Medical University, whose thorough review and constructive feedback have significantly strengthened the clinical rigour of this document. I am sincerely grateful for his generosity of time and expertise.

I must offer very special thanks to Dr. Hasnain Ahmed, Health Officer, UNICEF Bangladesh, for his technical support and dedication throughout the process. I would also like to acknowledge Dr. Mohammod Jobayer Chisti, Senior Scientist and Head of Clinical Research, Nutrition Research Division, icddr,b, the innovator of the low-cost Bubble CPAP that has saved countless children's lives, and Dr. Nabila Tabassum, a paediatrician practising in the United Kingdom, who generously extended her support behind the scenes throughout the development of this guideline.

Professor Dr. Md. Abid Hossain Mollah
Former Head of Department of Paediatrics, Dhaka Medical College
Senior Consultant, Department of Paediatrics
BIRDEM General Hospital, Dhaka-1000

List of Acronyms/Abbreviations

Clinical & Medical Terms

Serial	Acronym/Abbreviation	Expanded Term
1.	**ABCDE**	Airway, Breathing, Circulation, Disability, Exposure
2.	**ABG**	Arterial Blood Gas
3.	**AFP**	Acute Flaccid Paralysis
4.	**ALT**	Alanine Aminotransferase
5.	**AST**	Aspartate Aminotransferase
6.	**AVPU**	Alert, Voice, Pain, Unconsciousness
7.	**bCPAP**	Bubble Continuous Positive Airway Pressure
8.	**CBC**	Complete Blood Count
9.	**CRP**	C-Reactive Protein
10.	**DIC**	Disseminated Intravascular Coagulation
11.	**FiO2**	Fraction of Inspired Oxygen
12.	**HDU**	High-Dependency Unit
13.	**HFNC**	High-Flow Nasal Cannula
14.	**HIV**	Human Immunodeficiency Virus
15.	**HRCT**	High-Resolution Computed Tomography
16.	**ICU**	Intensive Care Unit
17.	**IgM**	Immunoglobulin M
18.	**IU**	International Unit
19.	**IV**	Intravenous
20.	**IVIG**	Intravenous Immunoglobulin
21.	**IYCF**	Infant and Young Child Feeding
22.	**MAM**	Moderate Acute Malnutrition
23.	**MUAC**	Mid-Upper Arm Circumference
24.	**NG**	Nasogastric
25.	**NSAID**	Non-Steroidal Anti-Inflammatory Drug
26.	**OPD**	Outpatient Department
27.	**ORS**	Oral Rehydration Salts
28.	**PBF**	Peripheral Blood Film
29.	**PCO2**	Partial Pressure of Carbon Dioxide
30.	**PEEP**	Positive End-Expiratory Pressure
31.	**PIBO**	Post-Infectious Bronchiolitis Obliterans
32.	**PPE**	Personal Protective Equipment
33.	**PT**	Prothrombin Time
34.	**RBS**	Random Blood Sugar
35.	**RME**	Routine Microscopic Examination

Serial	Acronym/Abbreviation	Expanded Term
36.	**RNA**	Ribonucleic Acid
37.	**RT-PCR**	Reverse Transcription Polymerase Chain Reaction
38.	**SAM**	Severe Acute Malnutrition
39.	**SGPT**	Serum Glutamic-Pyruvic Transaminase
40.	**SpO2**	Oxygen Saturation
41.	**SSPE**	Subacute Sclerosing Panencephalitis
42.	**UHC**	Upazila Health Complex
43	**VPD**	Vaccine-Preventable Disease

Organizations, Programs & Administrative Bodies

1.	**CDC**	Centers for Disease Control and Prevention
2.	**CHCP**	Community Health Care Provider
3.	**CHO**	Chief Health Officer
4.	**CS**	Civil Surgeon
5.	**DGHS**	Directorate General of Health Services
6.	**EPI**	Expanded Programme on Immunization
7.	**FWA**	Family Welfare Assistant
8.	**HA**	Health Assistant
9.	**HNIG**	Human Normal Immunoglobulin
10.	**HSO**	Hospital Surveillance Officer
11.	**icddr,b**	International Centre for Diarrhoeal Disease Research, Bangladesh
12.	**IEDCR**	Institute of Epidemiology, Disease Control and Research
13.	**IPH**	Institute of Public Health
14.	**IPC**	Infection Prevention and Control
15.	**LSO**	Local Surveillance Officer
16.	**MIS**	Management Information System
17.	**MMR**	Measles, Mumps, and Rubella
18.	**MOH&FW**	Ministry of Health and Family Welfare
19.	**MR**	Measles-Rubella
20.	**NITAG**	National Immunization Technical Advisory Group
21.	**NP&ML**	National Polio and Measles Laboratory
22.	**ORI**	Outbreak Response Immunization
23.	**RCCE**	Risk Communication and Community Engagement
24.	**SACMO**	Sub-Assistant Community Medical Officer
25.	**SCANU**	Special Care Newborn Unit
26.	**SIA**	Supplementary Immunization Activity
27.	**UH&FPO**	Upazila Health and Family Planning Officer
28.	**UNICEF**	United Nations Children's Fund
29.	**WHO**	World Health Organization

Executive Summary

Bangladesh is facing a massive measles outbreak since January 2026[1,2] affecting nearly all the Upazillas (administrative sub-districts) in the country and is still continuing till the development of this document. Gaps in immunization coverage, country situation – population density, urbanization, malnutrition in <5 children and sudden over-burdening of the health infrastructure resulted in crisis and sense of insecurity in the population. The Government immediately responded by expanding the capacity of the health facilities, availability of manpower and logistics including low-cost locally-made evidence based bCPAP for hypoxemia and outbreak response immunization, country-wide measles rubella immunization campaign with the support from development partners.

With this objective, the National Guideline for the Management of Measles, Bangladesh 2026 has been developed by the Directorate General of Health Services, Ministry of Health and Family Welfare, with technical support from UNICEF Bangladesh. It provides healthcare professionals with a standardised, evidence-based, and operationally practical approach to the management of measles.

The Public Health Challenge

The measles virus is among the most transmissible pathogens known, with a basic reproduction number (R_0) of 12–18 in unvaccinated populations.[3] Achieving and sustaining at least 95% population immunity through two doses of measles-containing vaccine within every district is essential for measles elimination, delivered through routine immunisation and supplementary immunisation activities.[4]

In Bangladesh, vaccination coverage remains uneven across districts, divisions, and population groups, with hard-to-reach communities, urban slums, and mobile populations consistently underserved. Malnutrition, vitamin A deficiency, and limited access to oxygen and emergency care further increase the risk of death, particularly among children under two years of age. These compounding factors make standardised clinical management not merely a quality-improvement objective, but a life-saving imperative.

Scope and Alignment

This guideline is intended for use by healthcare providers at all levels of Bangladesh's health system, from staff at upazila health complexes to clinicians at district hospitals, specialists at medical college hospitals, and tertiary care teams.

It is aligned with guidance from the World Health Organization, the Centers for Disease Control and Prevention, and UNICEF. It is also consistent with the national Expanded Programme on Immunization, recommendations of the National Immunization Technical Advisory Group (NITAG), and Bangladesh's measles elimination strategy.

Core Clinical Recommendations

All suspected measles cases – defined as fever with a generalised maculopapular, non-vesicular rash accompanied by cough, coryza, or conjunctivitis – must be immediately notified, isolated, and investigated using the standard Case Investigation Form (Annex VII). Isolation must be maintained for at least four days after the onset of the rash, with an extended isolation period for immunocompromised patients.

Clinical management is determined by disease severity. Uncomplicated cases be managed at home with vitamin A supplementation, paracetamol, oral rehydration, nutritional support, caregiver education on danger signs, and strict home isolation.

Vitamin A must be administered to all children with measles: 50,000 IU for infants under six months of age, 100,000 IU for infants aged six months to 12 months, and 200,000 IU for children aged 12 months and above. The first dose should be given on the day of diagnosis and repeated after 24 hours.

Cases involving complications, including pneumonia without severe respiratory distress, mild-to-moderate dehydration, acute otitis media, and mouth ulcers, require observation or hospital admission, targeted treatment, and close monitoring.

Severe cases – such as those presenting with an oxygen saturation (SpO_2) below 90%, encephalitis, shock, inability to feed, convulsions, severe acute malnutrition, or other serious complications – require emergency stabilisation, intravenous access, oxygen therapy, appropriate broad-spectrum antibiotics – require urgent referral to a facility with high-dependency unit (HDU) or intensive care unit (ICU) capacity.

Respiratory support follows a structured escalation pathway: Start oxygen therapy with locally made low cost bubble CPAP. If failed, escalate to mechanical ventilator. If bubble CPAP is not available, start oxygen therapy with low-flow nasal cannula. If low flow oxygen fails, escalate to high-flow nasal canula (HFNC) oxygen therapy. Each intervention should be initiated according to defined clinical criteria and systematically weaned once the child's condition stabilises.

Antibiotics should be used when a secondary bacterial infection is suspected. Ampicillin plus gentamicin is recommended as the first-line treatment for severe pneumonia. When staphylococcal infection is suspected, Cloxacillin/ Flucloxacillin may be added. If first-line treatment fails, intravenous ceftriaxone should be considered as a second-line option.

Surveillance and Outbreak Response

All suspected cases must be reported immediately through the national vaccine-preventable disease surveillance system. Reporting should proceed from community health workers/Hospitals to local surveillance officers/hospital surveillance officers, then forwarded to disease-surveillance focal persons, and district health authorities. Each district must submit its weekly linelist to EPI Headquarter by Tuesday.

Appropriate specimens – such as venous blood, nasopharyngeal swabs, or dried blood spots must be collected from the suspected cases in accordance with the national surveillance protocol and transported to the National Polio and Measles Laboratory at the Institute of Public Health in Dhaka.

A suspected outbreak is declared upon the identification of three or more fever-and-rash cases within 30 days in a population of approximately 10,000, or upon the detection of a single laboratory-confirmed case, according to National Guideline for AFP and VPD surveillance. The outbreak response includes immediate contact tracing, outbreak response immunization, and enhanced community-based surveillance.

Immunization

Achieving and sustaining at least 95% of two-doses measles-rubella vaccination coverage across all districts and population groups is the primary and most effective strategy for preventing measles.

Under the routine EPI schedule, the first dose is administered at nine completed months of age and the second at 15 completed months of age. Supplementary immunization activities, catch-up campaigns, and post-exposure prophylaxis within 72 hours of exposure for susceptible contacts must be implemented in accordance with NITAG recommendations and official outbreak declarations.

Health System Requirements

Dedicated Fever Corners must be established at upazila health complexes, district hospitals, and medical college hospitals to enable rapid triage and separation of suspected measles cases from the general patient population.

All facilities managing measles cases must maintain uninterrupted stocks of vitamin A, oral rehydration salts, paracetamol, appropriate antibiotics, eye drop/ointment, oxygen-delivery equipment, pulse oximeters, bubble CPAP devices, high-flow nasal cannula, nasogastric tubes, intravenous supplies, and masks. Healthcare workers at all levels must be trained in the application of this guideline.

Call to Action

The impact of this guideline will depend on its consistent and effective implementation. Every child presenting with fever and rash requires prompt identification, immediate isolation, vitamin A supplementation on the day of diagnosis, severity classification, and appropriate management based on the severity of the disease.

This guideline supports clinicians working at different levels of the health system in isolating suspected cases, classifying disease severity, recognising danger signs early, establishing a diagnosis, providing appropriate treatment, and ensuring timely referral to a higher-level facility whenever indicated.

Facility managers (UH&FPO, Superintendents, Hospital Directors etc.) should use this guideline for clinical management training and staff orientation, use it for case-based teaching, and adopt it as a reference for clinical audits. It will also help health managers to assess facility preparedness and address gaps, e.g., in vitamin A stocks, oxygen supplies. Addressing these gaps will strengthen the health system's capacity to manage outbreaks and other critical situations effectively.

Through consistent implementation at every level of care, this guideline will contribute to achieve improved clinical outcomes, reduced complications, and fewer preventable deaths from measles in Bangladesh.

1 Background and Objectives

Measles elimination has long been a global public health goal. The WHO South-East Asia Region, which includes Bangladesh, had set 2026 as its target year for elimination. That target has not been met – Bangladesh, along with Thailand, Sri Lanka, India, and Myanmar, has recently experienced significant measles outbreaks, a reminder that elimination requires sustained effort across immunisation, surveillance, and clinical management.

Declining vaccination coverage in recent years, delays in conducting the national measles-rubella follow-up campaign scheduled for 2024, and sustained disruptions to routine immunization services created a growing pool of susceptible children across the country, particularly infants and children under five years of age.[2]

These accumulated immunity gaps created the conditions for the outbreak that began in January 2026[1]. As of 27th July 2026, 124,745 cases, 730 deaths had been recorded nationally. (Source: DGHS Measles Press Release)

The majority of reported cases (79%) were among children under five years of age. Among these, 34% were infants under nine months of age, who are not yet eligible for routine immunisation and remain at particularly high risk.[5] In response, the Government of Bangladesh launched an emergency measles-rubella vaccination campaign on 5 April 2026. The campaign was progressively expanded to achieve nationwide coverage by late May 2026.

Despite these efforts, complicated cases and deaths continued to rise throughout May and June 2026, exposing gaps in standardised clinical management practices across all tiers of healthcare facilities. The outbreak response revealed considerable variability in clinical management across facilities, including in case identification, triage, isolation, supportive care, and referral.

Healthcare workers at primary, secondary, and tertiary facilities required clearer guidance on managing measles among all age groups and vulnerable populations, including infants, young children, adults, pregnant women, malnourished individuals, and immunocompromised patients. A nationally endorsed, evidence-based guideline was therefore urgently needed.

The objectives of this guideline are to:

- Standardise evidence-based, country-specific, and practically applicable approaches to the diagnosis, clinical management, and referral of measles cases across all levels of the healthcare system.

- Improve early detection, triage, notification, isolation, management, and appropriate referral of suspected and confirmed measles cases.
- Strengthen infection prevention and control practices and reduce measles transmission within healthcare facilities.
- Improve the management of uncomplicated, severe, complicated, and high-risk measles cases, particularly among infants, pregnant women, malnourished individuals, immunocompromised patients, and older people.
- Strengthen measles surveillance and health-system preparedness, including the availability of trained personnel, essential medicines, supplies, equipment, and referral services.
- Provide healthcare professionals with practical, evidence-based guidance to improve the quality and consistency of management of measles cases.
- Reduce measles-related complications, morbidity, and mortality and contribute to achieving Bangladesh's measles elimination goals.

2 Case Definition, Natural History and Pathogenesis

Case Definition-Clinical

Measles should be suspected when, any case presenting with[6]

- Fever
- Rash

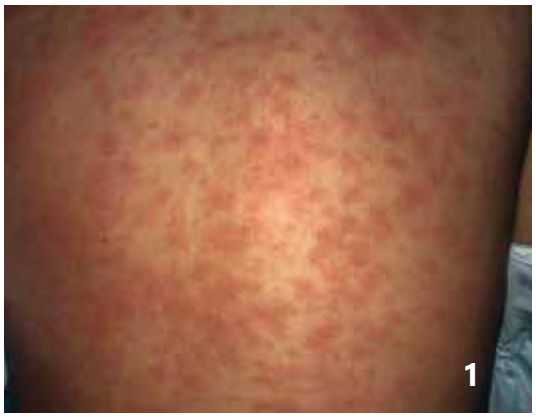
And any of the following:

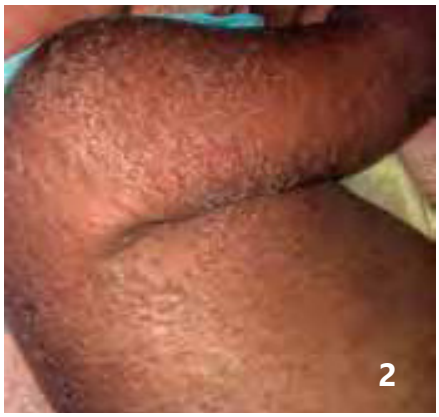
- Cough
- Coryza
- Conjunctivitis

Case Definitions-Public Health Surveillance

Case Type	Definition
Suspected Measles Case	Any person with fever and a generalised maculopapular, non-vesicular rash accompanied by cough, coryza (runny nose), or conjunctivitis; or any person in whom a clinician suspects measles.[7]
Laboratory-Confirmed Measles Case	A suspected case that tests positive for measles in a proficient laboratory, after vaccine-associated illness has been ruled out. Laboratory confirmation requires either the detection of measles-specific IgM antibodies in serum using an enzyme-linked immunosorbent assay (ELISA), or the detection of measles virus RNA in a throat swab, nasopharyngeal swab, or blood sample using reverse transcription polymerase chain reaction (RT-PCR).[7]
Epidemiologically Linked Measles Case	A clinically suspected case that has not been laboratory confirmed but is geographically and temporally linked to a laboratory-confirmed case or another epidemiologically linked case. The dates of rash onset in the linked cases must be 7–21 days apart.[7]

Case Type	Definition
Acute Measles-Related Death	A death occurring within 30 days of rash onset in a person with confirmed measles, when the death is attributable to measles or one of its complications and is not caused by an unrelated condition, such as trauma or a pre-existing chronic disease.[7]

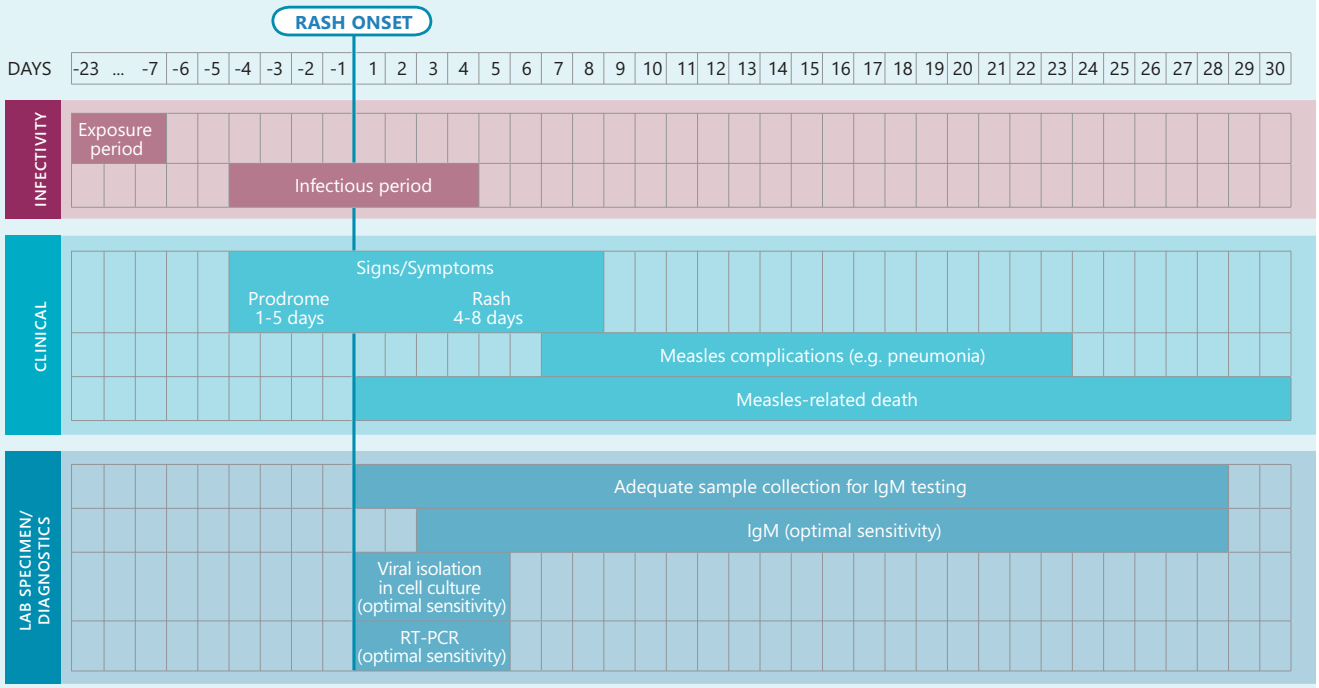




Photos: 1) Maculopapular non vesicular skin rash throughout the body

2) Maculopapular non vesicular skin rash throughout the body and peeling in axilla area

Timeline of infectivity, clinical disease and laboratory findings for measles virus infection



Although measles-related death may occur at any point from rash onset through the recovery phase, the majority of deaths result from complications — particularly pneumonia, sepsis, diarrhoea, and encephalitis — that develop or worsen after the first week of rash onset. Death on the first day of rash onset is exceedingly rare.[8]

Addapted from WHO, 2018

Natural History of Measles Infection

Measles infection progresses through four sequential phases following initial exposure to the virus:

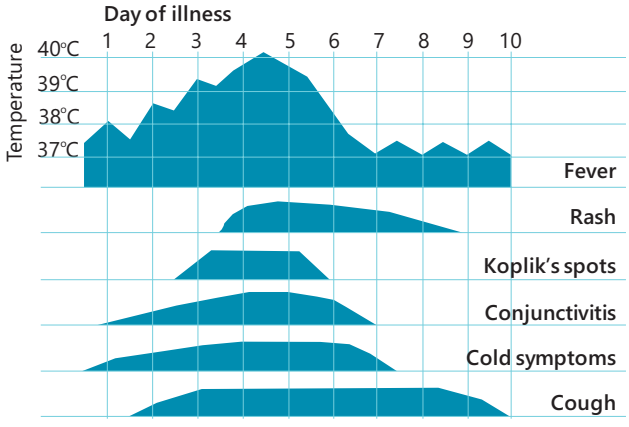
Incubation period for measles usually is 10–14 days (range 7–23 days).[8] The measles virus migrates from the upper airway to regional lymph nodes, causing primary and secondary viraemia and viral replication.[9]

Prodromal phase (approximately 4 days) – characterised by high fever, the appearance of Koplik spots over the buccal mucosa, cough, coryza, and conjunctivitis with photophobia. Viral shedding begins during this phase.

Exanthem phase: A red maculopapular rash appears on the fourth day of the prodrome, first over the forehead and behind the ears, then spreading downward to the trunk, extremities, and finally the palms and soles. (Photo 1)

Recovery phase: The rash fades over approximately seven days in the same progression in which it evolved, often leaving a fine desquamation of the skin. (Photo 2)

Figure 1: Evolvement of different phases of measles infection



Source: WHO Manual for the laboratory diagnosis of measles and rubella infection

Pathogenesis

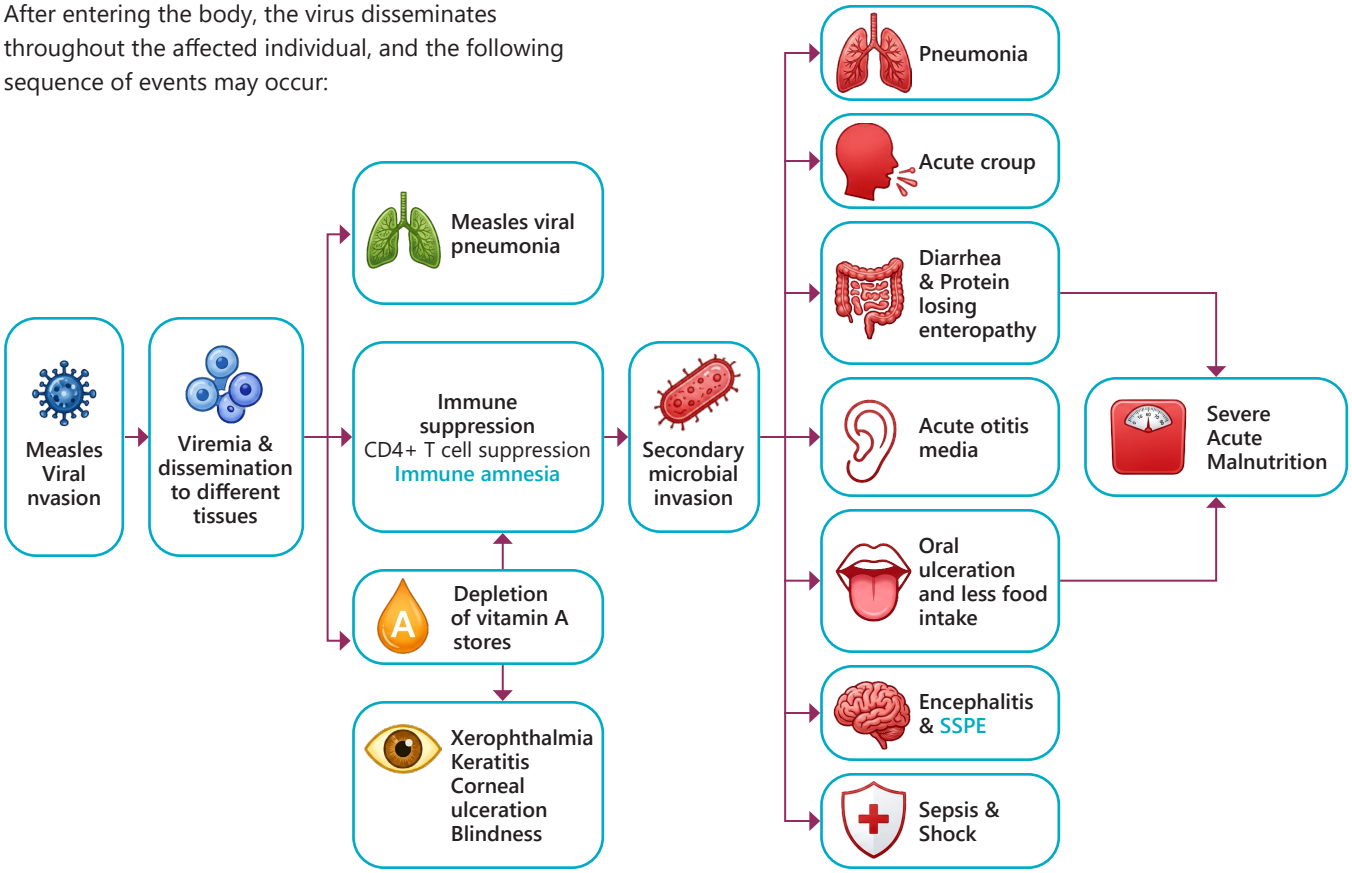
After entering through the upper respiratory tract, the measles virus spreads to the regional lymph nodes and then enters the bloodstream, causing viraemia. It subsequently replicates and disseminates to different tissues throughout the body. One of the principal pathological effects of measles is profound immune suppression, resulting from the depletion and dysfunction of immune cells, including CD4 T cells, as well as immune amnesia. This immune suppression increases susceptibility to secondary bacterial infections affecting the respiratory tract and lungs, gastrointestinal tract, liver, ears, skin, and brain. These complications may include pneumonia, diarrhoea, protein-losing enteropathy, and sepsis.

The measles virus may also deplete the body's vitamin A stores, increasing the risk of ocular complications, including visual impairment and blindness. Oral ulceration may reduce food intake and contribute to acute malnutrition.

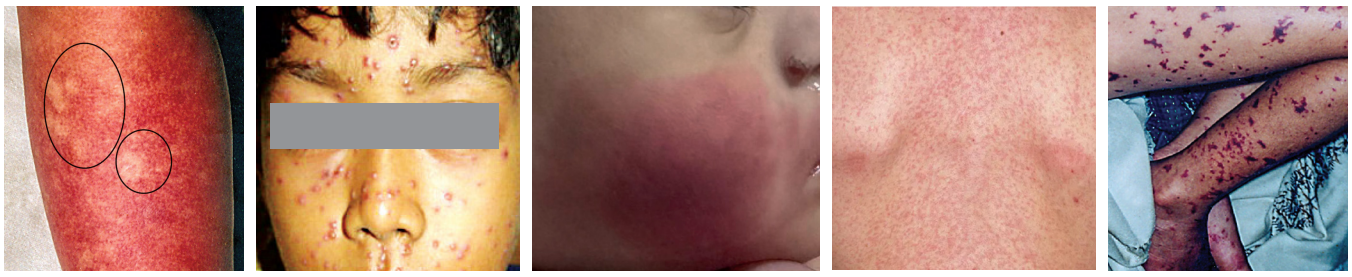
Severe disease, complications, and death are more common among children under five years of age, malnourished children, individuals with vitamin A deficiency, immunocompromised individuals, pregnant women, and unvaccinated populations.[1-5]

Figure 2: Pathogenesis and Major Complications of Measles Virus Infection. [9, 10]

After entering the body, the virus disseminates throughout the affected individual, and the following sequence of events may occur:



Diseases Mimicking Measles:



1 2 3 4 5

Dengue (1): Maculopapular rash, diffuse flushing eruptions (Islands of white in a sea of red: marked in circles) appearance occurs during the first 2 to 3 days of fever.

Chicken Pox (2): Vesicular itchy rash, appears after 24 hours of onset of fever, rashes of different stages of chicken pox appears simultaneously.

Fifth Disease (3): Erythematous rash sparing palm and soles (slapped cheek rash) appears one to two days after the onset of fever.

Rubella (4): Pink macular rash appear on the first day of fever and disappear by 3rd day.

Meningococcal septicaemia (5): Tender petechial rash of different size and shape with central necrotic area along with high fever.

3 Approach to Measles Case Management

Effective measles case management begins at the community level. Caregivers who notice fever with rash in a child or family member should promptly seek guidance from the nearest community health worker. The sick family member should be separated from other household members as soon as possible, with particular care taken to avoid contact with infants, pregnant women, and immunocompromised individuals. In the meantime, the caregiver should ensure the sick person receives paracetamol for fever, adequate fluids, nutrition and rest. Without further delay, the sick person should be brought to the Fever Corner of the nearest health facility, where they will be screened and assessed to determine the appropriate course of care.

All patients having fever and/or rash should be screened at the dedicated **fever corner** of the health facilities (Upazila Health Complex and upper tiers) to ensure rapid screening and triage of the measles cases and to reduce health care associated transmission.

At the Fever Corner, all suspected measles cases should be;

- Assessed and classified as measles with no complications, or with complications (severe/ non-severe)
- Provided with Vitamin-A and other supportive care
- Sent to the specimen-collection corner of the same health facility for collection of samples (blood, naso-pharyngeal swab, urine), and to send the collected samples to the designated lab
- Reported to the local surveillance officer.

Patients with suspected measles cases with no complications should be advised for;

- Home management with possible isolation from others
- Second dose of Vitamin-A supplementation (24 hours after the 1st dose)
- Recognition of danger signs, and when to return to the hospital or visit the nearest health facility.[11, 12]

Assess whether the patient has any of the warning signs or falls under the high-risk group as below:

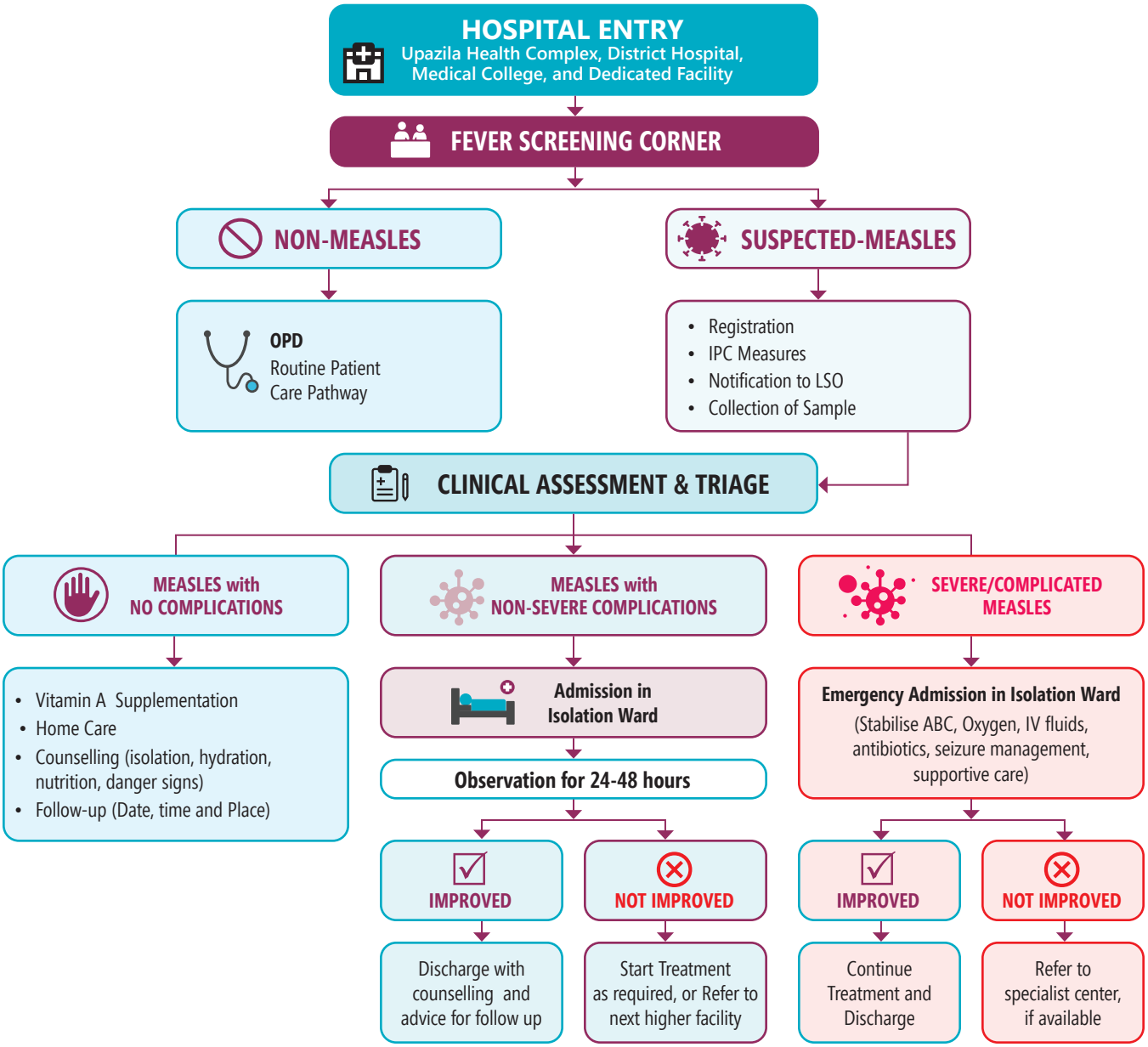
- Convulsions
- Lethargy or unconsciousness
- Severe respiratory distress (grunting respiration, severe lower chest wall in-drawing)
- Inability to drink or breastfeed
- Vomiting all oral intake
- Loose motion and dehydration
- Corneal clouding
- Deep or extensive mouth ulcers
- Dehydration

- Stridor (due to croup)
- Severe malnutrition.

High-risk group: If patient has no signs of severe illness, but is from a high-risk group (mentioned earlier), consider hospitalization for close monitoring for development of complications:

- Age: infants and adults, older than 20 years of age.
- Pregnant women.
- Undernourished children (particularly those with vitamin A deficiency).
- Persons with suppression of immunity (e.g., those with cancer, taking immunosuppressive medications or with HIV infection). In HIV cases, measles viral shedding can be very prolonged.

Figure 3: Hospital Entry and Measles Management Flow



4 Isolation of Measles Cases, Infection Prevention and Control

People with measles must be isolated from the susceptible individuals at home, in the community, and in healthcare facilities.

Duration of Isolation

Isolation should be:

- for at least **4 days** after rash onset (Measles is infectious from four days before rash onset to four days after rash onset)[7]
- for longer periods for immunocompromised patients (owing to prolonged viral shedding)[13]

Isolation ward at the Healthcare Facilities should meet the following requirements[11, 12]

- a separate ward at the periphery of the hospital building, preferably at the ground floor corner position
- not adjacent to the neonatal unit, areas designated for immunocompromised patients, or general paediatric wards
- adequate cross-ventilation and natural light
- adequate logistics and medicines for case management
- oxygen source, flowmeter with regulator, pulse oximeter, oxygen delivery equipment e.g., locally made, low-cost bubble CPAP
- proper waste management following the medical waste management guideline
- restriction of visitors
- hand washing corner (hand sanitiser and/or rub), and face-masks
- standard cleaning and disinfection procedures
- designated trained staff, ideally with measles immunity or vaccination.

If isolation area/ ward is unavailable, patients with suspected/confirmed measles should be kept together, but be segregated from other patients, particularly from high-risk group

Where a measles case requires HDU or ICU-level care during the infectious period, every effort should be made to maintain isolation precautions for as long as clinically feasible.

Home and Community Isolation should include the followings: [11]

- avoid school, daycare, public gatherings, and travel during the infectious period
- remain in a well-ventilated room, separated from other household members, where possible
- **avoid contact with infants, pregnant women, elderly persons, and immunocompromised individuals**
- well-oriented caregivers on infection prevention measures at home
- return immediately to a healthcare facility if any danger sign appears.

Infection Prevention and Control (IPC) Guideline:

- Health Mangers must ensure IPC practices at the health facility, following the standard guideline [7]
- Health manager should ensure training for all health care providers on Infection Prevention and Control (IPC)-
  - o proper hand washing techniques,
  - o knowledge about infectious period
  - o how to wear surgical mask and protective measures [7]
- Proper IPC practices including **signage** on respiratory-etiquette, wearing surgical masks, hand washing technique, etc. should be made available at facility entrances and in common areas such as waiting rooms, indoors, out-doors, and emergencies
- The health facility should have accessible handwashing stations and hand-hygiene supplies for everyone
- Health Facility should have a designated IPC focal person and who will carry out routine audits
- All suspected measles cases should be directed to the fever corner for screening, and advised for isolation either at home or at the health facility based on the severity to prevent further spreading of the disease.

5 Case Classification and Clinical Management (Supportive Management and Treatment of Complications)

Measles Case Classification and Management Summary

Classification	Signs and Symptoms	Management	Monitoring	When to Seek Care or Refer
Measles with no complications	• Alert mental status • Adequate feeding (breastfeeding or breastfeeding and complementary feeding, family foods).	• At home • Vitamin A administration: 1st dose immediately, 2nd dose after 24 hours of 1st dose (Dose according to age) • Advice for nutrition and fluid intake • Look for urine output, if the gap between 2 urine output is >6 hours, increase fluid intake • Isolation at home for 4 days. • Counselling on danger signs and infection prevention and when to come back to hospital • Caregivers must be able to o provide home care, maintain isolation, o administer medications correctly o Seek prompt medical attention[14] if any danger signs appear. • Provide symptomatic treatment • If temperature is >100.4° F (38°C)- tepid sponging and administer paracetamol. • If any discharge from eye: advice eye care.	The caregiver should monitor: • Alertness[14] • Temperature/ Fever • Respiratory rate • Lower chest wall • If possible, Oxygen saturation (SpO_2) • Urine output in last 12 hours • Feeding status • Discharge from eyes • Mouth ulcer.	Signs requiring Immediate return to a health facility • convulsions • lethargy or unconscious-ness • respiratory distress, grunting, severe chest wall indrawing • inability to drink or breastfeed • vomiting all oral intake • corneal clouding • deep or extensive mouth ulcers • dehydration • stridor due to measles croup • severe malnutrition.[7]

Classification	Signs and Symptoms	Management	Monitoring	When to Seek Care or Refer
Measles with Non-Severe Complications	• Diarrhoea with some dehydration • Pneumonia (presence of age specific fast breathing or lower chest wall in-drawing) • SpO_2≥90% in room air • Pus draining from the eyes • Severe earache, discharge from ear • Mouth ulcers interfering with feeding • Moderate malnutrition • Social vulnerability or limited access to follow-up care.[14]	• Admit the patient and observe at health facility (UHC, District Hospital or other health facilities) • Provide supportive care and treatment of complications • **Monitor the parameters listed in the next monitoring column** • If improved: Home management • If remains static: Continue treatment, atleast for 48 hours • If deteriorates: Review the treatment plan/refer to higher center.	Routine monitoring should include: • Alertness[14] • Temperature/ Fever • Respiratory rate • Lower chest wall in-drawing • Oxygen saturation (SpO_2) • Pulse/Heart rate • Hydration status • Urine output • Feeding status • Discharge from eyes • Mouth ulcer.	If deteriorates, refer to local higher facility (if any of the signs of severe/ complicated measles present).
Severe or Complicated Measles	• Unable to drink or breastfeed • Persistent vomiting (≥3 per hour)[15] • Convulsion • Lethargy or unconsciousness • Severe respiratory distress (e.g., grunting, severe lower chest wall in-drawing) • Persistent tachypnoea (>70/minutes) • Hypoxaemia (SpO_2 <90%) or cyanosis • Shock • Severe acute malnutrition • Corneal ulceration or opacity • Sepsis or severe bacterial infection • Immunocompro-mised patient.[14]	• Admit the cases in Medical College Hospital/Tertiary level health facilities/dedicated hospitals • Airway: secure airway • Breathing: ensure effective breathing (Give O_2 therapy) • Circulation: ensure hemodynamic stability by IV fluid or through nasogastric tube if IV channel can't be established • Drugs: use appropriate drugs for addressing complications • Continuous monitoring of the patients using AVPU (**A**lert, **V**oice response, **P**ain response, **U**nconsciousness)[15] • Refer to HDU, or ICU, If low AVPU.	Routine monitoring should include: • Alertness[14] • Temperature/ Fever • Respiratory rate • Grunting, stridor • Severe lower chest wall in-drawing • Monitor for functioning of bubble CPAP and other modalities of O_2 therapy • Oxygen saturation • Pulse/Heart rate • Hydration status • Urine output • Feeding status • Discharge from eyes • Mouth ulcer.	If not improved within 48 hours or deteriorates at any time, refer to ICU/HDU Indications of ICU/HDU: • SpO_2 remains <90% de-spite giving adequate oxygen ther-apy (at least after initial one hour), antibiotics and other supportive care (for at least for 48 hours) • Low AVPU[15] • Multi-organ involvement • Shock • Encephalitis.

Supportive Management

<table>
<tr><th>Clinical features</th><th>Management</th></tr>
<tr><td>Fever
Temperature
>100.4°F</td><td>
• Paracetamol 10–15 mg/kg/dose, every 6 hours, orally.
• Tepid sponging
• NSAIDs should not be used in children.[11, 14]
</td></tr>
<tr><td>Dehydration</td><td>
• ORS for mild to moderate dehydration.
• Nasogastric feeding may be considered when the child is unable to feed orally
• Intravenous fluids should be used in shock, severe dehydration, or inability to drink or in some dehydration associated with high purging (>15ml/kg/hour) or persistent vomiting (≥3 episodes/hour)[15]
• IV fluid should be administered cautiously especially in severe acute malnutrition, severe pneumonia to avoid overhydration (If severe dehydration in SAM, give slowly over 8-10 hours @ 15ml/kg/hour for the first 2 hours followed by 5ml/kg/hour for next 6-8 hours).[11, 14]
</td></tr>
<tr><td>Nutrition</td><td>
• Nutritional support should include continued breastfeeding, continued age-appropriate feeding, small frequent meals, high-calorie and high-protein foods, nutrition rehabilitation and follow up for malnourished children[11, 14]
• Monitor the child's weight and daily food intake
• Measure the child's weight for height to determine the child's nutrition status and follow the national guideline for management of Severe/Moderate Acute Malnutrition. (National Guideline for Management of SAM/MAM).
</td></tr>
<tr><td>Vitamin A</td><td>
<table>
<tr><th>Age Group</th><th>Dose</th></tr>
<tr><td>Less than 6 months</td><td>50,000 IU</td></tr>
<tr><td>From 6 months upto 12 months</td><td>100,000 IU</td></tr>
<tr><td>12 months and above</td><td>200,000 IU</td></tr>
</table>
Vitamin A should be administered immediately upon diagnosis and repeated after 24 hours. A third dose should be considered after 2–4 weeks in patients with eye involvement, severe malnutrition, or clinical signs of vitamin A deficiency.[9, 11, 14]
</td></tr>
<tr><td>Oral Care</td><td>
• Wash mouth with clean salted water at least four times a day.
• Avoid spicy foods.
• Nystatin drops (1ml 6 hourly for 5 to 7 days)
• Riboflavin supplementation (0.4 to 1mg daily according to age)
• Application of gentian violet, if mouth ulcer is present
• If superinfected with bacteria, treat with antibiotic, e.g., Amoxicillin for 5 days.
</td></tr>
<tr><td>Skin Care</td><td>
• Clean the skin gently with lukewarm water 1–2 times daily. A mild, non-irritating soap may be used if needed. Avoid rubbing the skin with a towel; instead, pat it dry gently
• Use emollient (soft petroleum gelly) for desquamating skin to avoid secondary infection
• Keep the nail short and clean to prevent excoriation
• Use loose, soft cotton clothes. Avoid synthetic clothes
• If pruritic, apply topical calamine lotion. If severe itching, oral chlorpheniramine may be used
• Monitor for signs of infection, such as cellulitis or other severe soft-tissue infections. If there is any soft tissue infections, consult with specialist as soon as possible.
</td></tr>
</table>

Clinical features	Management
Eye Care	• Clinical assessment of both eyes for any discharge, characteristics of discharge e.g. Clear/cloudy, corneal clarity, photophobia, pupillary light reaction • **For mild conjunctivitis** (clear and watery discharge), no treatment is necessary • Monitor for a change in discharge quality; if pus is present, then treat for bacterial conjunctivitis • If eye has pus or cloudy discharge, then treat with antibacterial ointment, such as tetracycline/ chloramphenicol eye ointment/drop, applied three times a day for 7 days • Clean the eye carefully using a clean cloth/sterile gauze, dipped in clean water and wipe from inner canthus to outwards • If corneal opacity/ulceration is present, consult an eye specialist and provide the 3rd dose of vitamin A supplementation within 2 to 4 weeks (preferable on 14th day) of 2nd dose • Do not use steroid ointment on infected eyes.

Management of Complications

Assessment	Investigation	Management	Follow up
Pneumonia and Respiratory Complications (Detailed respiratory support and escalation guidelines are provided in Annexes I & II)			
• Respiratory rate • Lower chest wall in-drawing • Respiratory noises (grunting, wheeze, stridor) • Cyanosis • O_2 saturation (SpO_2) by pulse oximeter • Mental status/ alertness • Feeding ability • Hydration status.[11, 14]	• Chest X-ray in severe disease (prior measures to be taken to avoid virus dissemination) • CBC, PBF • Blood glucose • Blood culture and other investigations as required.	• Respiratory support - Locally made, low cost bubble CPAP (O_2 therapy usually starts with 5 litre/min with 5 cm water pressure) • Low flow O_2 therapy, when bCPAP is not available: o (0.5-1litre/minute for neonate, o 1-2 litre /min for infants and children under2 years and o 2-4 litre /min for children >2 years) • High Flow Nasal Canula (O_2 therapy 2 litre/min; maximum of 12 litre/min for under 5 children, where feasible) • Non-severe suspected bacterial pneumonia: Amoxicillin 40–50 mg/kg/dose orally twice daily for 5 days • Severe pneumonia: Ampicillin 50 mg/kg every 6 hours plus gentamicin 7.5 mg/kg, IV once daily for 5-7 days or as required • Escalated with Cloxacillin/Flucloxacillin when staphylococcal infection is suspected. • When first line treatment fails, switch to Ceftriaxone (50–100 mg/kg/day) IV as the second line option.[15]	• Alertness[14] • Temperature • Respiratory rate • Grunting, stridor • Lower chest wall in-drawing • SpO_2 • Heart rate • Hydration status • Urine output • Discharge from eyes • Mouth ulcer • Feeding status.

Assessment	Investigation	Management	Follow up
Croup			
• Respiratory distress, • Development of stridor in calm child.	Neck AP X-ray/ chest X-ray only if diagnosis uncertain or severe disease suspected (not routinely recommended.)	• Nebulization with Adrenaline (1:1000 dilution) Dose: 0.5 ml/kg per dose (maximum amount is 6 ml, irrespective of age and body weight). Before nebulisation, equal volume of normal saline to be added with the calculated amount of adrenaline[16] • O_2 inhalation. **Steroid should not be given as it causes further immune suppression.**[7]	• Temperature, • Respiratory rate, • Pulse • Oxygen saturation • Hydration status • Feeding status • Alertness.[14]
Diarrhoea and Dehydration: (Details of management in Annex III)			
Clinical Assessment to determine the state of dehydration.	The following investigations can be done based on the clinicians assessment; • Stool RME • S. Electrolytes • S. Creatinine • Complete Blood Count.	**Mild dehydration:** Treatment should include ORS after each loose stool and continuation of feeding and breastfeeding. • <2yrs: 50-100ml. • >2yrs: 100-200ml. **Moderate dehydration:** 5% dehydration and correction within 4 hours. If high purging rate (more than 15ml/kg/hour) or persistent vomitting≥3 episodes/hour, rehydrate with IV fluid.[15] **Severe dehydration:** IV fluids should be used carefully in in SAM or pneumonia with severe dehydration. **Zinc supplementation:** according to age: **Age** / **Zinc Dose** <6 months / 10 mg daily for 10–14 days ≥6 months / 20 mg daily for 10–14 days **Overhydration should be avoided, particularly in severe pneumonia or severe acute malnutrition.**[14, 15]	Assess the state of hydration.
Eye Complications			
Clinical assessment for • Photophobia, • Corneal opacity • Ulceration • Discharge.	Not required, usually clinical diagnosis.	**If bacterial conjunctivitis:** tetracycline/ chloramphenicol eye ointment according to local protocol [14, 15] **Urgent ophthalmology referrals are required for** o corneal ulcer, o corneal opacity, o vision impairment, or o severe eye pain.	Clinical improvement.

Assessment	Investigation	Management	Follow up
Otitis Media			
Assessment for ear pain: Discharge from ear If the duration of discharge >14 days, evaluate for mastoiditis (e.g., mastoid tenderness or post auricular swelling).	Not required, usually clinical diagnosis.	If confirmed, Amoxicillin 40–50 mg/kg/dose, orally twice daily for 5 days. Pain may be managed with paracetamol. Consult ENT specialist if o persistent ear discharge o mastoiditis or other ENT complications.[15]	Clinical improvement.
Severe Acute Malnutrition			
Anthropometric measurement: • MUAC, • weight • height/ length and • Bipedal oedema.	Usually clinical diagnosis. Investigations as decided by the doctors.	Follow the national SAM guideline and include careful feeding, prevention of hypoglycemia, hypothermia, and infection by using broad-spectrum antibiotics when indicated, and micronutrient support. In SAM aggressive IV fluids should be avoided [15] **In severe dehydration (hypovolemia), administer IV fluid slowly as follows:**[15] - First 2 hours: 15ml/kg/hour - Next 6-8 hours: 5ml/kg/hour.	
Neurological Complications, Encephalitis			
• Convulsion • Altered consciousness • Severe headache • Neck stiffness or • Coma.		• Airway: Securing Airway • Breathing: Ensuring effective Breathing (Oxygen therapy (Bubble CPAP, low-flow oxygen mechanical ventilation) • Circulation: Ensure hemodynamic stability. (Intravenous fluid or through nasogastric tube if IV channel can't be established) • Drugs: Seizure control with diazepam (0.5mg/kg per rectal) or lorazepam (0.2mg/kg intravenous) • Continuous monitoring of vital signs and clinical status – look for AVPU: o **A**lert, o **V**oice response, o **P**ain response, o **U**nconsciousness[15] • Look for pupils • Blood glucose assessment.[15] • Referral to higher-level care, HDU/ICU, if needed.	

Assessment	Investigation	Management	Follow up
Sepsis and septic shock (details in Annex IV)			

• Fever
• Hypo or hyper-thermia (<95°F/ >101.4°F)
• Undue Tachycardia
• Poor perfusion
  o Prolonged capillary refill time (>3 sec)
  o Rapid thready pulse
  o Cold extremities
• Altered mental status
• Hypotension.
	• CBC, PBF,
	• Blood culture, before antibiotics, if possible
	• CRP/ Procalcitonin
	• S. Electrolytes
	• Blood glucose
	• Blood gas/ Lactate, if available
	• Blood for Urea, creatinine
	• Blood for SGPT, PT
	• Chest X-ray
	• Urine/ Stool C/S.
		• Ensure Airway, Breathing, and Circulation
		• Start antibiotics as early as possible
		• Administer IV fluid resuscitation
		In septic shock, administer IV fluid (Hartman solution/ Ringers' lactate)[15] as follows:
		– For children without SAM: 20ml/kg (maximum 40ml/kg infuse as rapidly as possible)[17]
		– For children with SAM: start 15ml/kg/hour, if no response by 1hour, then repeat the IV fluid at the same rate and duration (15ml/kg/hour)[15]
		In both categories, if there is no improvement (Rapid thready pulse, capillary refilling time >3 seconds and cold periphery), start inotropes/vasopressor[17] (see also Annex-IV)
		• Monitor pulse, and respiratory rate every 15 minutes, if both are increased, STOP IV fluid immediately
		• O_2 therapy (See Annexes I & II)
		• If hypoglycaemia (RBS<3mmol/litre), correct it.
			• Vital signs (Pulse, Blood Pressure, Respiratory Rate, Capillary refilling time)
			• Urine output
			• Cold periphery
			• Assess AVPU.[15]

Discharge Criteria

A patient may be considered for discharge when the following criteria are met:

- Afebrile and clinically stable for at least 24 hours [14, 15]
- Feeding adequately and able to maintain hydration
- Maintaining adequate oxygen saturation (SpO_2) while breathing room air
- Any complications have been identified, appropriately treated, and controlled
- The caregiver is able to continue care at home and understands the warning signs that require immediate medical attention
- The 2nd dose of Vitamin-A has been administered
- An appropriate follow-up plan has been arranged before discharge.

6 Referral

Indications for Referral

Urgent referral to a higher-level facility is indicated in the following circumstances: [14, 15]

- Increasing oxygen demand or SpO_2 below 90% or features of respiratory failure (if SpO_2 and FiO_2 ratio <315) developed any time after initial one hour of oxygen therapy.[18, 19]
- Encephalitis, recurrent convulsion, or reduced consciousness
- Shock
- Severe dehydration not responding to IV resuscitation
- Severe acute malnutrition
- Eye complications including corneal ulcer, corneal opacity, or vision loss
- Pregnant women
- Any immunocompromised patients with suspected or confirmed measles[20]
- Patients with other conditions requiring HDU or ICU care.

Referral procedure

A. Stabilise the patient

Before referral:

- Maintain airway
- Ensure adequate supply of O_2 for the duration of transportation to the referral center
- Start IV fluids if shock is present
- Correct hypoglycaemia
- Control seizures,
- Give the first antibiotic dose if indicated, and
- Keep the patient warm.[14, 15]

B. Communicate with higher center before referral

C. Complete the Referral Documentation

This includes;

- Patient identification,
- Symptoms and duration,
- Condition at the time of referral including vital signs
- Vaccination status
- Treatment given, and reason for referral.[14]

Sample Referral letter added in Annex V.

7 Infant and Young Child Feeding (IYCF) and Deworming

Infant and Young Child Feeding[21]

Healthcare workers should promote:

- Initiation of breastfeeding as early as possible after birth
- Exclusive breastfeeding during the first six months of life
- Continued breastfeeding up to two years of age and beyond
- Appropriate complementary feeding from six months of age
- A balanced and nutritious diet during and after illness
- Increased feeding and fluid intake during recovery.

Children recovering from measles should receive a nutritional assessment and appropriate counselling.[14, 15]

Community health workers – including Health Assistants, Family Welfare Assistants, and Community Health Care Providers – should:

- Assess the nutritional status of children recovering from measles during household visits
- Refer children with signs of malnutrition or inadequate weight gain to the nearest health facility for formal assessment and appropriate management.

Deworming

Deworming should be provided according to the national child-health schedule after the patient has become clinically stable. Deworming may be integrated with nutrition programmes, child-health campaigns, and school-health activities.[20, 22]

The following two anthelmintic medicines may be given:

- **Albendazole:** A single dose of 400 mg for children over 2 years of age, and 200 mg for children aged 1-2 years.
- **Pyrantel Pamoate:** 11 mg/kg per dose, administered three times in one day and repeated after two weeks.[9]

8 Immunization and Outbreak Vaccination Strategies

Routine Immunization

Measles vaccine is one of the most effective public health interventions ever developed, offering lifelong protection against a highly contagious and potentially fatal disease.[23] Vaccination averted nearly 59 million deaths between 2000 and 2024, reducing estimated measles deaths from 780,000 to 95,000 over that period.[23] Two doses are recommended, as a, single dose fails to protect up to 10 to 15% of recipients. Achieving and sustaining at least 95% two-dose coverage at national and district levels is the threshold required for population-level herd immunity and measles elimination.[23]

The effectiveness of measles vaccine is strongly age-dependent.[23] Vaccination before six months of age is ineffective owing to immunological immaturity and the neutralising effect of maternally transferred antibodies. Seroconversion rates improve from approximately 85% at six to eight months of age to 85 to 95% at nine months, and reach 95% or above from twelve months onwards as maternal antibody levels sufficiently wane.[23] The second dose provides an additional opportunity to protect those who did not seroconvert after the first, consolidating population immunity to the level required for elimination.[23]

Supplementary Immunization Activities (SIAs)

- SIA are mass immunization campaign over a limited period to boost the immunity, reaching the unreached and stopping an outbreak
- The Government of Bangladesh organises SIAs in accordance with recommendations from the NITAG, during which children receive measles-containing vaccine regardless of their previous vaccination status
- Priority groups include hard-to-reach populations, urban slums, migrants, low-coverage areas, and zero-dose children.[21]

Post-Exposure Prophylaxis

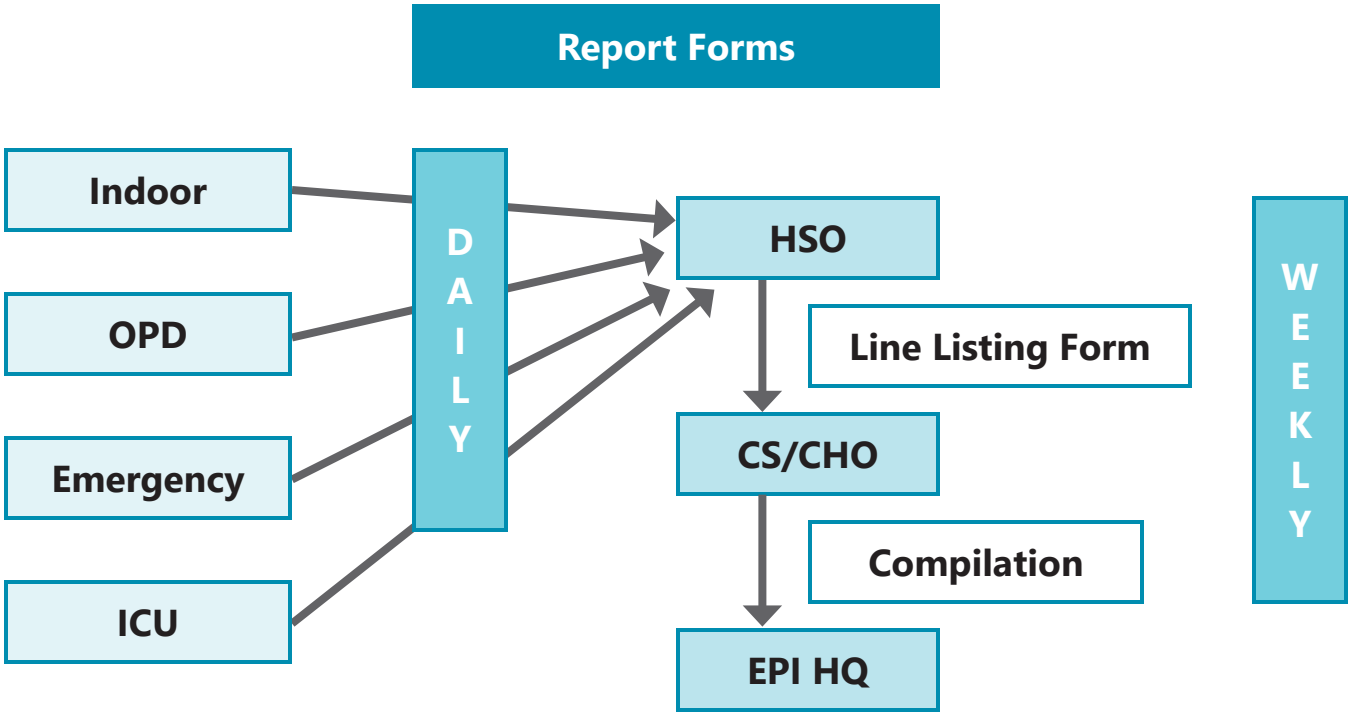
- MMR or measles-containing vaccine may be administered within 72 hours of first exposure to susceptible contacts where feasible and indicated. **Contraindicated in pregnancy, newborn and immunocompromised individuals e.g. SAM, HIV etc.** [9 12]
- Immunoglobulin may be administered within six days of exposure for selected high-risk contacts, including **young infants**, **pregnant women**, and **immunocompromised persons**. [9, 12]

9 Surveillance, Notification, and Outbreak Response

Reporting Flow

- All suspected measles cases must be reported immediately in accordance with national surveillance requirements and the national vaccine-preventable disease (VPD) surveillance guidelines.[24]
- A standard Case Investigation Form must be completed, and the Local Surveillance Officer (LSO) must be notified in accordance with national surveillance procedures.[24]

Figure 4: AFP and VPD Passive Surveillance Reporting Flow[24]



- Appropriate specimens – including venous blood, a nasopharyngeal swab, or a dried blood spot (DBS) – must be collected, appropriately stored, and transported to the designated laboratory in accordance with national surveillance guidelines.[24]
- Relevant case information should be shared with community health workers – including Health Assistants, Community Health Care Providers, and Family Welfare Assistants – to support community-based surveillance, contact tracing, and follow-up.[24]

Community-Based Surveillance and Response

Community health workers, including Health Assistants, Community Health Care Providers, and Family Welfare Assistants, serve as the first point of surveillance at the community level. Their responsibilities include:

- Conducting community visits following notification of a suspected measles case.[24]
- Carrying out contact tracing and preparing line lists of suspected cases within their catchment areas.[24]
- Sharing surveillance information with the Local Surveillance Officer on an ongoing basis.[24]
- Facilitating the collection and transportation of specimens to designated laboratories.[24]
- Supporting outbreak response Immunization activities when an outbreak is declared.[24]

Outbreak Definition and Response

- A suspected measles outbreak is defined as the occurrence of three or more cases of fever with a maculopapular rash within a 30-day period in a rural ward or urban mahalla with a population of approximately 10,000.[3]
- A single laboratory-confirmed case of measles or rubella must be treated as an outbreak requiring an immediate public health response, consistent with Bangladesh's measles elimination strategy.[24]

For detailed surveillance procedures and outbreak response activities, refer to the National VPD Surveillance Guidelines.[24]

10 Measles in Adults

Although traditionally regarded as a childhood disease, measles in adults has become increasingly important owing to waning **herd immunity, vaccine hesitancy, international and intra-country travel, and immunity gaps**. Adults may experience higher rates of morbidity, hospitalisation, and complications than children.[25-29]

Clinical Presentation

Classic Measles in Unvaccinated Adults

Unvaccinated adults typically present with high fever, prominent catarrhal symptoms, a dense maculopapular rash, severe constitutional symptoms, and high infectivity. Complications are substantially more common in this group.[27, 30]

Modified Measles in Vaccinated Adults

Measles infection may occur in previously vaccinated adults because of primary vaccine failure, waning immunity, or intense exposure. The clinical presentation is often atypical and may include low-grade fever, a sparse or transient rash, mild respiratory symptoms, absent Koplik spots, and reduced infectivity. Modified measles may resemble rubella, dengue, a drug eruption, or another viral exanthem.[31, 32]

Vaccination Recommendations for Adults

Adults without evidence of immunity require two doses of MMR vaccine with a minimum interval of 28 days. **Evidence of immunity** includes documented two-dose vaccination, laboratory evidence of immunity.[25-29]

Adults who have received only one prior dose are recommended to receive a second dose if they belong to **outbreak exposure groups**, such as healthcare workers, international travellers, and persons residing in close-contact settings, e.g. hostels, jails, barracks, factories, etc.[33]

MMR vaccine is contraindicated in pregnancy, severe immunosuppression, and in individuals with a severe allergy to vaccine components.[34, 35]

Complications of Measles in Adults

A. Respiratory Complications

Pneumonia: Pneumonia is the commonest cause of measles-related mortality.[26-29] It may occur in two types:

(i) Primary viral giant-cell pneumonia

(ii) Secondary bacterial pneumonia[26, 33]

(i) Primary viral giant-cell pneumonia is a severe and often fatal interstitial lung infection resulting from direct measles virus invasion of the lungs, particularly in severely immunocompromised individuals. Clinical manifestations may be minimal and can occur even in the absence of the characteristic rash.[28]

(ii) **Secondary bacterial pneumonia:** 25-35% of cases of measles can be complicated by secondary bacterial pneumonia, which usually occurs after the disappearance of the classical measles rash. Common organisms are S. pneumoniae, S. aureus, H. influenzae.[26]

Characters	Primary viral giant-cell pneumonia	Secondary Bacterial Pneumonia
Organisms	Measles virus	S. pneumoniae, S. aureus, H. influenzae (commonest)
Time of onset	During the "acute rash phase"	Develops later, during early recovery phase, as the rash fades, (usually, 5 days after rash)
Sputum /cough	Severe, persistent dry cough with clear or minimal mucus	Productive cough with thick yellow, green or purulent sputum
Risk factors	Malnourished, Immunocompromised adults	Immune amnesia *i. e.* measles virus induced Immune deficiency
Radiology	Diffuse, usually bilateral patchy infiltrates	Lobar Consolidation

Investigations

Recommended investigations include:[12, 28]

- Measles IgM, within 5 days from appearance of rash
- RT-PCR from nasopharyngeal or throat swab, and urine specimen
- Chest radiography

Additional investigations, if needed:

- HRCT of chest, if available
- Sputum and blood culture/sensitivity to exclude secondary bacterial pneumonia
- Arterial blood gas analysis
- Bronchoalveolar lavage (BAL) for culture and RT-PCR

Treatment

There is currently no approved antiviral treatment for measles.[25, 28, 32]

1. **Recommended management includes:**

- Vitamin A therapy, which reduces disease severity and mortality
- Antibiotics when bacterial infection is suspected[32]
- Intravenous immunoglobulin in selected severe cases[25, 28, 32]

2. **Acute Respiratory Distress Syndrome may occur in:**

- Immunocompromised adults,
- Pregnant women, and
- Patients with severe viral pneumonia.[30]

3. **Long-Term Pulmonary Sequelae**

- Bronchiectasis
- Post-infectious bronchiolitis obliterans (PIBO)
- Pulmonary fibrosis

B. Neurologic Complications:

- Encephalitis: Occurs in approximately 1 per 1000 cases. Clinical manifestations are: Altered consciousness, Seizures, Focal neurologic deficits. Permanent neurologic sequelae may occur.[30]
- Subacute Sclerosing Panencephalitis (SSPE): A rare delayed fatal neurodegenerative complication developing years after infection.[30] Clinical features include cognitive decline, behavioral changes, myoclonus, and progressive neurologic deterioration.

C. Gastrointestinal and Hepatic Complications

- Severe diarrhoea and dehydration: Especially dangerous in frail or malnourished individuals.[26]
- Hepatitis: Adults frequently develop elevated AST/ALT levels, mild hepatitis, and occasionally jaundice.[27, 30]

D. Ocular Complications

- Keratitis, corneal ulceration, and blindness, particularly in association with vitamin A deficiency.[26]

E. Hematologic Complications

- Leukopenia, lymphopenia, thrombocytopenia, and rarely disseminated intravascular coagulation (DIC).[9]

Indications of hospital admission:

1. Severe measles needs O_2 support,
2. High-risk patient group
3. Patient who needs-
   - o I/V fluid support
   - o Close follow-up (neurological, respiratory cases, etc.

Indications for ICU referral[26]

Patients should be referred to intensive care unit when they develop:

- Severe acute respiratory distress syndrome (ARDS)
- Hemodynamic instability or septic shock
- Multi-organ complications such as encephalitis, myocarditis, or acute kidney injury
- Suspected giant-cell pneumonia.

High-Risk Populations

1. **Geriatric Patients:** Measles in elderly adults is associated with severe pneumonia, dehydration, secondary bacterial infections, higher hospitalization rates, and increased mortality. Older adults with a history of vaccination during earlier vaccine eras may have incomplete immunity.[33]
2. **Pregnant Women:** Pregnancy increases the risk of severe pneumonia, a higher maternal hospitalization rate, miscarriage,[35] The live MMR vaccine is contraindicated during pregnancy.[34] Vitamin A is also not recommended.
3. **Malnourished Individual:** Malnourished individuals are prone to have impaired cell-mediated immunity, Vitamin A deficiency, and severe mucosal injury.They have a higher risk of developing corneal damage, pneumonia, and death.[26]
4. **Immunocompromised Patients:** Severe or atypical disease may occur in: HIV/AIDS, haematologic malignancy, organ transplant recipients, steroid/immunosuppressive therapy Speciality in clinical features of this group: Absent rash, prolonged viral shedding.
5. **Adults with chronic cardio-pulmonary disease.**
6. **Adults with Giant-cell pneumonia, Fulminant disease:** Mortality is significantly increased in this group.[30]

11 Measles in Pregnancy

Measles during pregnancy is a high-risk clinical condition requiring prompt recognition and coordinated management of both the mother and the fetus. Pregnancy involves a physiological **downregulation of cell-mediated immunity** to maintain fetal tolerance, which renders pregnant women significantly more susceptible to severe measles, including pneumonia, respiratory failure, hepatitis, encephalitis, and secondary bacterial infections, with correspondingly higher case fatality rates. The consequences for the fetus are equally serious, as measles during pregnancy is associated with preterm labor, spontaneous abortion, low birth weight, and, when acquired late in pregnancy, congenital measles, which carries a high risk of neonatal mortality.

Management of measles during pregnancy requires close collaboration among the obstetric team, pediatricians, infectious disease specialists, and the infection prevention and control focal person.

The following framework outlines the recommended actions according to the clinical status of the pregnant woman and the newborn:

Serial No.	Pregnant Mother status	Actions to be taken
1	Pregnant mother exposed to a suspected/ confirmed measles case	• Immunoglobin administration: Human Normal immunoglobulin (HNIG) or Intravenous Immunoglobulin (IVIG) should be given within 6 days of exposure (ideally within 72 hours) to help prevent or reduce risk of severity of the infection. • Home quarantine of the mother to prevent community spread. • Close observation for appearance of fever and rash for up to 12 days. • Seek immediate medical attention if any measles symptom appears e. g. high fever, rash, cough, coryza, conjunctivitis. *No MMR vaccine to pregnant mother (as MMR is a live attenuated virus vaccine)

Serial No.	Pregnant Mother status	Actions to be taken
2	Pregnant mother developed measles.	• Notification to health authority • Psychological support • Hospitalization in an Isolation ward to prevent viral dissemination • Supportive care e. g. Paracetamol, rest, fluids, foods etc. • Monitoring of mother e. g. hemodynamic status, for any clinical features of developing complications e. g. pneumonia, hepatitis, respiratory failure etc. • Monitoring of fetus e. g. movements, heart rate, CTG (cardiotocography), ultrasonogram etc. • Keep ready to manage any emergency developed either in mother or in fetus e.g., if premature labor– tocolysis (i.e., supportive treatment to suppress preterm labour) may be considered. ***No vitamin A supplementation to mother because of its teratogenic risk.**
3	Mother developed measles in late pregnancy (the baby may born with congenital measles, carries a high risk of neonatal mortality). Unlike rubella infection of mother, the risk of birth defect is rare in rubeola (measles) infection.	• Provide supportive care to mother and monitoring as above • Management of the baby in SCANU/NICU e. g., isolation, giving **IVIG** within 6 days of exposure, expressed breast milk • Monitoring the baby for any sign of measles.
4	Newborn with measles (Congenital) • Acquired via transplacental transmission if the mother is infected near delivery • Typically present at birth or within first 10 days of life with a characteristic maculopapular rash, fever, cough, runny nose, and red, watery eyes.[27]	• Management of the baby in SCANU/NICU • Breast milk, IV fluid if required. • Paracetamol, if fever (Dose: 10-15 mg/kg/dose 6 hourly) • **Vitamin A** supplementation (50000 IU) for 2 consecutive days • Monitoring for alertness, fast breathing, lower chest wall in-drawing, convulsions, heart rate, capillary refill time, hydration, urine output, primitive reflexes • Antibiotics, O_2 therapy, others as required.

12 Wellbeing of the Health Care Providers

- Protecting the safety, health, and well-being of healthcare providers is an institutional responsibility that must be continued to ensure throughout measles case management and outbreak response[36, 37]
- All healthcare providers involved in measles care must have documented immunity, demonstrated by either receipt of two doses of a measles-containing vaccine or laboratory-confirmed immunity. Those who are unvaccinated or incompletely vaccinated must receive the MMR vaccine before working in isolation areas[36, 37]
- Any healthcare provider with unprotected exposure to a confirmed measles case must report the exposure immediately to the IPC focal person. Susceptible contacts should receive the MMR vaccine within 72 hours of exposure[27]
- Immunoglobulin may be considered within six days of exposure for healthcare providers who are immunocompromised, pregnant, or have contraindications to MMR vaccination, in accordance with national policy[27]
- Dedicated staff should be assigned to measles isolation wards to limit the number of healthcare providers exposed, with rotation schedules that ensure adequate rest and prevent fatigue during periods of high workload[36, 37]
- Pregnant healthcare providers and those with immunosuppression or chronic illnesses should not be assigned to measles isolation areas
- All staff entering isolation areas must wear an appropriate mask and perform hand hygiene before and after patient contact
- Healthcare providers should be counselled about the risk of transmitting measles to unvaccinated household contacts, especially infants younger than nine months, pregnant women, and immunocompromised household members. MMR vaccination of susceptible household contacts should be ensured[24]
- Healthcare providers who develop fever or rash after exposure must immediately self-isolate, notify their supervisor, and remain off duty until cleared by a medical officer[38]
- Because outbreak response carries a high risk of stress, burnout, and compassion fatigue, managers must foster a stigma-free environment that encourages staff to report concerns, seek support, and take adequate rest. Distressed staff should be referred to counselling or occupational health services and, when clinically indicated, reassigned from high-exposure duties.

13 Risk Communication and Community Engagement

Risk Communication and Community Engagement (RCCE) is a critical component of measles prevention, preparedness, and outbreak response. Effective RCCE promotes public trust, improves the uptake of routine and supplementary immunization services, encourages timely care-seeking, and enables communities to actively participate in disease prevention and control efforts. RCCE should be integrated throughout all phases of measles preparedness and response and implemented through a coordinated, evidence-based, and people-centred approach.

The RCCE component aims to:

- Ensure timely, accurate and consistent information on measles prevention and response.
- Promote acceptance and uptake of routine immunization and outbreak response vaccination.
- Encourage early care-seeking and timely referral of suspected cases.
- Address rumors, misinformation and vaccine hesitancy.
- Engage communities as partners in outbreak prevention and response.

Key messages for caregivers at the facility and community:

- Measles is highly contagious. A child with measles must remain at home and avoid attending school, daycare, public gatherings, or other crowded places for at least four days after the rash appears.
- Continue breastfeeding throughout the illness. Frequently offer nutritious, soft foods, including khichuri, eggs, fish, vegetables, and fruits. Do not restrict food or fluids.
- Give vitamin A as instructed by the healthcare provider. Do not miss the second dose on the following day.
- Take the child to a healthcare facility immediately if the child cannot drink or breastfeed; develops fast or difficult breathing, convulsions, extreme drowsiness, or eye pain; or experiences any other worsening condition.[12]
- Two doses of the measles-rubella vaccine provide protection against measles. If the child has missed a scheduled dose, consult the nearest health facility regarding vaccination after recovery.

Audience specific communication tools should be developed & how to engage them:

Addressing vaccine hesitancy: Health workers should listen to caregivers' concerns without dismissing them, provide accurate, evidence-based responses using simple language, and engage local religious and community leaders where vaccine hesitancy is identified. Persistent vaccine hesitancy within a household or community cluster should be reported to the Upazila EPI Focal Person for follow-up.

Addressing misinformation: Health workers should avoid engaging in confrontational responses to misinformation. Instead, they should counter false claims by calmly and directly providing accurate information. Widely circulating misinformation should be reported to the Civil Surgeon or Chief Health Officer for a coordinated response. For detailed guidance on outbreak communication planning, community mobilization, and media engagement, refer to the WHO Outbreak Communication Planning Guide and the DGHS Risk Communication and Community Engagement Framework.

Community Mobilization should be done by engaging the following groups:

- Religious leaders
- Teachers
- Local government representatives
- Community volunteers
- Media
- Civil society organizations
- Community Radios
- Youth group

Key RCCE Interventions: Some of key RCCE activities are proposed below. Based on local contexts, some specific activities can be planned and implemented.

- Develop and disseminate harmonized key messages and communication materials on measles prevention and response.
- Conduct advocacy and orientation sessions for local government officials, community leaders, religious leaders, teachers, and media personnel.
- Implement interpersonal communication activities through health workers, volunteers, and community outreach mechanisms.
- Conduct community dialogues, courtyard meetings, school-based awareness sessions, and engagement activities in high-risk and low-coverage areas.
- Disseminate information through mass media, social media, mobile messaging, local cable networks, and other appropriate communication channels.
- Establish and strengthen social listening systems to monitor community perceptions, rumours, misinformation, and vaccine hesitancy.
- Develop and implement rumour management mechanisms, including rapid identification, analysis, and response to misinformation.
- Integrate community feedback collection and response mechanisms into routine and emergency immunization activities.
- Ensure regular analysis of community feedback and use findings to adapt communication strategies and operational responses.
- Build the capacity of health workers, frontline staff, and volunteers on RCCE approaches, interpersonal communication, and community engagement.
- Monitor and document RCCE activities, community perceptions, and behavioural outcomes to improve programme effectiveness.

14 Health System Preparedness and Logistics

Health facilities at all levels should maintain adequate stocks of essential medicines and supplies for measles case management, including vitamin A, oral rehydration salts, paracetamol, antibiotics, eye ointment, and oxygen delivery equipment. Supply chain management should ensure the uninterrupted availability of these essential medicines and supplies during outbreak periods, when demand may increase rapidly.

Health facilities should ensure the availability of functional pulse oximeters, weighing scales, nasogastric tubes, intravenous infusion sets and face mask. District and Upazila health managers should conduct periodic preparedness assessments and address identified logistical gaps in advance of peak measles transmission seasons.

Table: Necessary logistics/equipment for management of measles

Sl. No.	Equipment/logistics	Notes
1	Well-functioning Pulse oximeter	Continuous monitoring of SPO_2 for severe cases in all health facilities
2	Oxygen concentrator or O_2 cylinder with well-functioning regulator	Uninterrupted oxygen supply should be ensured during outbreaks in all health facilities where patients to be admitted
3	Locally-made low-cost bubble CPAP	Paediatric nasal prongs, graduated plastic bottle (0-10 cm) and a tube attached, IV infusion set should be locally available in all health facilities where patients to be admitted
4	High Flow Nasal Cannula (HFNC)	Appropriate paediatric interfaces should be available in health facilities where complicated or severe measles cases are to be managed
5	Suction apparatus	Should remain functional at all times

Sl. No.	Equipment/logistics	Notes
6	Nebulizer	Functioning nebulizer machine, paediatric masks should be made available
7	Glucometer with strips	Adequate strip supply should be maintained
8	Weighing scale	Infant and adult weighing scales required
9	MUAC tapes	Replace when worn or damaged
10	IV infusion sets and pumps	Paediatric burette sets (preferred for children) should be made available
11	Nasogastric (NG) tubes	Paediatric sizes should be available
12	Thermometers	Digital thermometers preferred
13	Isolation consumables	Masks, gloves, and hand sanitizers
14	Biomedical waste management materials	Yellow bags and sharps containers for infectious waste disposal

15 Human Resources, Roles, and Responsibilities

Effective measles case management and outbreak response require a clearly defined division of responsibilities across all levels of the health system – from national programme leadership to the community health worker conducting household visits. The table below outlines the core preparedness and response functions of each institution and cadre, providing a practical reference for health managers, facility in-charges, and programme officers at all levels. The relevant departments of DGHS should coordinate with each other's for preparedness and response initiatives.

Institution/Actor	Preparedness	Response
Disease Control, DGHS	– Lead national technical planning – Develop and update protocol, SOPs, advisories – Oversee preparedness monitoring	– Issue case alerts and escalation instructions – Lead national response coordination – Monitor disease trend
EPI, DGHS	– Ensure two-dose MR vaccination coverage – Conduct SIAs and catch-up campaigns – Ensure cold chain readiness – Identify and reach zero-dose children	– Activate outbreak response immunization (ORI) upon outbreak declaration – Coordinate rapid vaccination campaigns – Monitor outbreak response immunization coverage – Liaise with partners for vaccine supply
Hospital and Clinics, DGHS	– Oversee Fever Corner establishment and functionality – Pre-position essential clinical supplies – Ensure staff trained on protocol	– Activate hospital-level response coordination – Monitor Fever Corner and isolation ward status – Coordinate referral capacity across hospital network

Institution/Actor	Preparedness	Response
IEDCR	– Ensure adherence with measles surveillance protocols – Conduct orientation on case definitions and reporting tools – Train surveillance and field epidemiology staff – Coordinate with NP&ML, IPH Dhaka	– Analyse case-based surveillance data – Conduct field investigation of clusters – Coordinate laboratory confirmation – Prepare and disseminate situation reports
MIS, DGHS	– Integrate measles indicators into District Health Information Software (DHIS2) – Maintain EPI disease reporting module – Ensure weekly line listing data readiness – Develop outbreak dashboards	– Support real-time data flow from districts – Maintain data quality – Generate situation reports – Increase dashboard update frequency
Directors / Superintendents, Tertiary and District Hospitals	– Incorporate measles surge into hospital emergency plans – Establish and equip isolation wards – Constitute and train facility IPC and clinical response teams – Maintain clinical supply readiness	– Activate facility response within 24 hours of outbreak – Implement fast-track triage and isolation – Report surges to Civil Surgeon and MIS-DGHS – Activate temporary facility if case load exceeds capacity
Civil Surgeons / Chief Health Officers	– Lead district preparedness coordination – Maintain district cold chain and vaccine stock readiness – Ensure communication with DGHS	– Lead district outbreak response coordination – Compile and submit EPI Weekly Compilation Form to EPI HQ by following Tuesday – Report gaps to Disease Control, DGHS – Liaise with local government on community response
UH&FPOs	– Supervise facility and community preparedness – Ensure staff orientation on protocol – Maintain medicine, vaccine, Vitamin A and IPC logistic stocks – Ensure Fever Corner is functioning at UHC	– Implement response actions at facility and community levels – Adjust staff deployment during outbreaks – Ensure timely EPI reporting and line listing submission – Plan and conduct immunization sessions in hard-to-reach areas to vaccinate zero-dose populations

Institution/Actor	Preparedness	Response
Hospital Surveillance Officers	– Maintain EPI Disease Report Forms and line listing tools – Ensure specimen collection supplies are available – Complete orientation on reporting procedures	– Facilitate daily case notification and investigation – Complete EPI Disease Report Forms – Ensure specimen transport to NP&ML, IPH Dhaka
Community Health Workers (HAs, FWAs, CHCPs, SACMOs)	– Identify unvaccinated, malnourished, and zero-dose children – Disseminate measles prevention and vaccination messages – Support EPI outreach activities	– Conduct community visits following case notification – Carry out contact tracing and line listing – Support ORI activities – Counsel caregivers on home isolation and danger signs

When measles case load exceeds the routine management capacity of a health facility, prompt action is required to prevent deterioration in care quality, increased morbidity and mortality, irrational clinical management, and the amplification of healthcare-associated transmission.[39] Health facilities with limited infection prevention and control capacity can amplify disease transmission within the facility and into the broader community.[39] Health facilities should first maximise existing capacity through the expandability, convertibility, and adaptability of available space – repurposing wards, redistributing manpower, and reallocating logistics to create dedicated measles management areas.[39] Where case load exceeds what existing facilities can safely absorb, a temporary treatment facility should be established in an appropriate adjacent or nearby structure – which may include a school building, hostel, or large ventilated tent – meeting minimum standards for natural ventilation, lighting, clean water, toilet facilities, and sewage disposal, and staffed with designated personnel[39] Such arrangements must maintain infection prevention and control standards and must not compromise the delivery of essential routine health services. Activation of temporary facilities should be coordinated through the Director of the hospitals/Civil Surgeons or relevant health authority, with immediate notification to DGHS.[39]

16 Conclusion

Measles is preventable. That simple fact is the beginning and the end of everything this protocol stands for. Bangladesh has the vaccines, the health workers, the surveillance systems, and now the clinical guidance to eliminate measles as a public health threat. The priority actions are clear: identify and isolate every suspected case without delay, administer vitamin A on the day of diagnosis and after 24 hours of first dose, classify severity accurately and manage accordingly, escalate respiratory support based on clinical trajectory, protect healthcare providers, and notify through the surveillance chain consistently.

Beyond clinical management, measles elimination requires that the health system addresses its upstream vulnerabilities. Vaccination coverage must reach and sustain 95% at national and district levels, supported by high political commitment, adequate financing, a fully staffed EPI workforce, uninterrupted vaccine and logistics supply, and dependable surveillance data cross-checked at every level.

Population motivation - encouraging parents and communities to accept and seek vaccination timely and completely – is equally vital and must be backed by sustained risk communication and community engagement.

This guideline has been developed in the spirit of that collective commitment. Its success will be measured not in the quality of its writing but in the health of the children it protects. That is the only measure that matters.

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ANNEX I: Measles Associated Pneumonia Management Guideline

1. Clinical Assessment for Pneumonia

Assess:

- Respiratory rate
- Lower chest wall in-drawing
- Respiratory noises: grunting, wheeze, stridor
- Cyanosis
- SpO_2 (by pulse oximeter)
- Mental alertness
- Feeding ability
- Hydration status

WHO fast breathing thresholds:

Age	Fast Breathing
0 to <2 months	≥60/min
2 to <12 months	≥50/min
12 to 59 months	≥40/min

Respiratory rate >70/min (0–59 months) suggests severe respiratory distress and the need for urgent reassessment and escalation [8, 15]

2. Recognition of Severe Pneumonia

Consider severe pneumonia, if any of the conditions mentioned below presents in a child with cough and/or difficult breathing:

- SpO_2 <90%*
- Central cyanosis*
- Severe lower chest wall in-drawing*
- Grunting*
- Unable to feed due to respiratory distress
- Lethargy/unconsciousness
- Severe exhaustion/fatigue

Important bedside signs:

- Falling respiratory rate after prolonged tachypnoea suggests exhaustion and impending respiratory arrest.
- Drowsiness despite "normal" SpO_2 may indicate ventilatory failure with poor respiratory effort.**

3. Oxygen Therapy

Start oxygen if any of the following is present:

- SpO_2 <90%*
- Central cyanosis*
- Severe lower chest wall in-drawing*
- Grunting*
- Recurrent apnoea
- Acute stridor
- Respiratory rate >70/min

Target saturation:

- WHO minimum target: ≥90%

WHO oxygen therapy guidelines emphasize clinical assessment in addition to pulse oximetry.[15, 18]

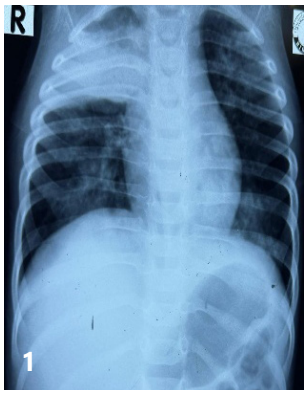
** WHO recommended conditions requiring oxygen therapy.*

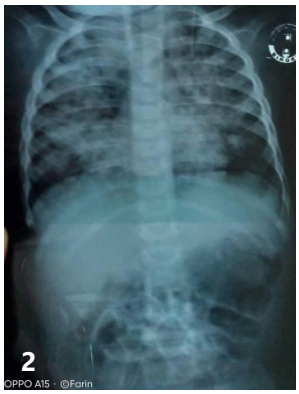
*** These conditions also need oxygen therapy although not mentioned in WHO guideline.*

4. Investigations

Consider in severe pneumonia:

- CBC (secondary bacterial infection/sepsis)
- Chest X-ray (consolidation: X-ray 1, patchy opacities: X-ray 2, or clinically deteriorating pneumonia or complications e.g. empyema, pneumothorax, abscess)
- Blood culture (Sepsis with poor peripheral perfusion/treatment failure)
- ABG (if available), hypercapnia/acidosis/ventilation decision





Photos: 4a) X-Ray Chest showing right upper zone consolidation (Lobar pneumonia) in a child with measles.

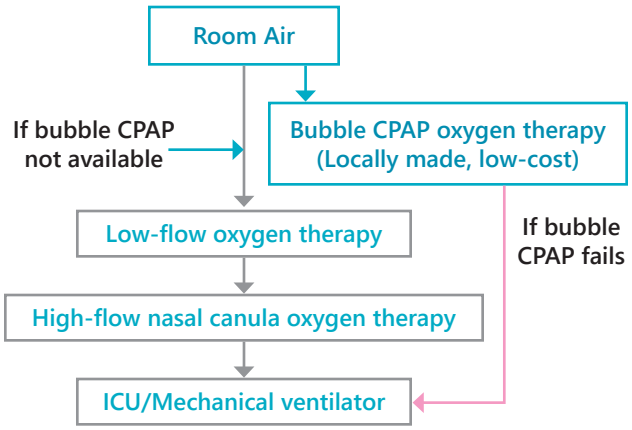
4b) X-Ray Chest of a child with measles showing bilateral patchy opacities (Bronchopneumonia).

- Creatinine and electrolytes (to evaluate renal function and electrolyte imbalance in severe illness)
- Blood glucose (detect hypoglycaemia in severe illness)

Avoid unnecessary transport and crowding to reduce viral transmission. Portable X-ray is preferred where available.[9, 39]

5. Respiratory Support Modalities

Respiratory support escalation pathway:[18, 19, 40]



A. Bubble CPAP (Locally made, low-cost) oxygen therapy [18, 19, 40]

Typical settings:

- Start with 5 cm H_2O pressure, and with 5 litre of O_2/Minute
- Increase H_2O pressure gradually to 6 to 8 cm H_2O, if needed

Monitor for:

- Bubbling in water filled semi-transparent plastic bottle
- Nasal secretion
- Worsening respiratory distress
  - o Respiratory rate, lower chest wall in-drawing, SpO_2 etc.
- Gastric distension
- Apnoea
- Reduced consciousness

Advantages of Bubble CPAP over low-flow and HFNC O2 therapy:

- Significantly reduces the rate of treatment failure and mortality in treating hospitalized severe pneumonia and hypoxemia compared to those with low flow oxygen therapy and HFNC[18, 19, 40]
- Reduces work of breathing
- Provides more stable oxygen delivery
- Provides mild positive airway pressure
- Washes out dead space

Pre-requisite for Bubble CPAP

Child should:

- Remain conscious
- Have patent airway
- Maintain respiratory effort

B. Low-flow oxygen therapy[18]

Low-flow oxygen delivers oxygen below the child's inspiratory demand.

Device	Oxygen flow setting
Nasal cannula (infants)	Up to 2 L/min
Nasal cannula (older child)	Up to 4 to 6 L/min
Face mask	5 to 10 L/min
Non-rebreather mask	10 to 15 L/min

Pre-requisite for low-flow oxygen therapy

Child should: have patent airway, maintain respiratory effort, remain conscious.

C. High-flow nasal cannula oxygen therapy (HFNC)

HFNC delivers heated humidified oxygen/air at flow rates that meet or exceed inspiratory demand.

Typical settings:

- Flow: 1 to 2 L/kg/min maximum 12 L/Min for under 5 children
- FiO_2: usually 0.40 to 0.60
- Better tolerated due to humidification
- Child should: have patent airway, Maintain respiratory effort, concious

HFNC oxygen therapy may reduce work of breathing and improve oxygenation in children with hypoxaemic respiratory failure.[18, 40]

6. Respiratory Support Escalation

Escalation to next respiratory support is based on:

- Worsening work of breathing
- Increasing oxygen requirement
- Fatigue/exhaustion
- Poor respiratory effort
- Worsening mental status
- Recurrent apnoea

Do NOT wait only for severe desaturation before escalation.[18]

7. Parameters for Escalation to Next Respiratory Support

Escalate to the next level if any of the following occurs despite oxygen therapy:[19, 41]

- Persistent hypoxemia (SpO_2<90% at least one after initiation of oxygen therapy)
- Increasing oxygen requirement beyond current setup
- Severe lower chest wall in-drawing
- Persistent grunting
- Persistent or severe tachypnoea
- Increasing fatigue/exhaustion
- Recurrent apnoea
- Poor respiratory effort
- Reduced consciousness
- Silent chest/poor air entry

If ABG is available:

- Evaluate rising CO_2 pattern
- Monitor respiratory acidosis (if PCO_2>60 mm of Hg)

8. Absolute Indications for Mechanical Ventilation

Mechanical ventilation/intubation is indicated if any of the following present:

- Recurrent apnoea ± bradycardia/desaturation requiring stimulation
- Severe exhaustion with poor respiratory effort
- Persistent hypoxaemia (at least after initial one hour of oxygen therapy) despite maximal non-invasive ventilation (Bubble CPAP/HFNC)[18, 19]
- Silent chest/impending respiratory arrest
- Reduced consciousness or inability to protect airway
- Terminal stage of septic shock/septic encephalopathy

If ABG available:

- Rising CO_2
- Respiratory acidosis/severe hypercapnia

These children require urgent HDU/ICU referral and preparation for intubation. [18, 19, 41]

9. Stopping/Weaning Oxygen

Stop oxygen when:

- SpO_2 ≥90% on room air for at least 15 minutes without signs of respiratory distress.
- Work of breathing improved
- Clinically stable
- Feeding adequately
- No severe respiratory distress

Following discontinuation, the child should be closely monitored for the next 8 hours for:

- Hypoxemia (SpO_2 <90%)
- Increased work of breathing
- Chest indrawing
- Nasal flaring
- Grunting
- Apnea
- Tachypnea
- Any other signs of clinical deterioration

If any of the above signs develop during the observation period, Bubble CPAP should be re-started immediately and the child will be reassessed.

Bubble CPAP-locally made, low cost-oxygen therapy:

- Bubble CPAP should be discontinued directly from 5 cm water pressure (**Positive End Expiratory Pressure-PEEP**).
- If the child is receiving a water pressure (PEEP) greater than 5 cm, then the PEEP should be gradually titrated down to 5 cm before attempting discontinuation.
- Once the child is stable on 5 cm water pressure, a trial off bubble CPAP titration may be undertaken.
- If the child maintains SpO_2 >90% in room air for at least 15 minutes without signs of respiratory distress, bubble CPAP can be discontinued.
- Following discontinuation, the child should be closely monitored for the next 8 hours for:
    - o Hypoxemia (SpO_2 <90%)
    - o Increased work of breathing
    - o Chest indrawing.
    - o Nasal flaring
    - o Grunting
    - o Apnea
    - o Tachypnea
    - o Any other signs of clinical deterioration

If any of the above signs develop during the observation period, bubble CPAP should be re-started immediately and the child should be reassessed.[18, 19]

Low-flow oxygen therapy

Titrate oxygen flow from 2 Litre to 1 Litre, then from 1 Litre to 0.5 Litre, and then off.

Following discontinuation, observe for 15 to 30 minutes and watch for:

- Desaturation
- Worsening distress
- Tachypnoea

High Flow Nasal Canulla oxygen therapy:

- Reduce FiO_2 first
- Then reduce oxygen flow/pressure gradually
- Trial off oxygen when stable.[18, 40]

10. When to discharge the patient

- Absence of danger signs for at least 24 hours
- No oxygen requirement for at least 24 hours
- Feeding adequately for at least 24 hours
- Caregiver understands the danger signs prior to discharge
- Follow-up plan established prior to discharge.[15]

ANNEX II: Procedure for Preparing Bubble CPAP [18, 19]

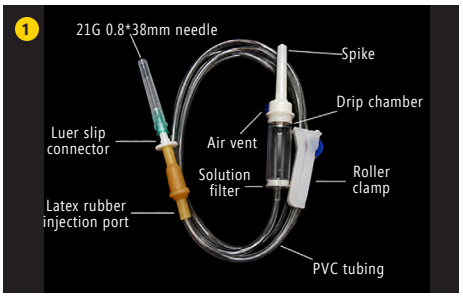
Materials Required for Bubble CPAP Preparation

- Clean water/bottled drinking water
- A graduated plastic bottle with markings from 0 to 10 cm and a tube attached, with a hole above the 0 cm mark
- IV infusion set
- WHO-approved oxygen nasal prongs
- Scissors
- Adhesive tape

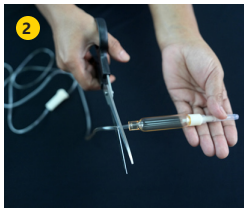
Materials Required for Bubble CPAP Preparation

Step 1: Preparing the Bubble CPAP Circuit

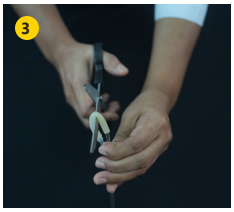
- Fill the graduated plastic bottle with clean water up to the 0 cm mark.
- Remove the needle from the IV set and cut the rubber injection port in half. Then remove the roller clamp and drip chamber from the distal portion of the IV set.
- Attach the halved rubber injection port piece to the distal end of the IV tubing.



Parts of infusion tube

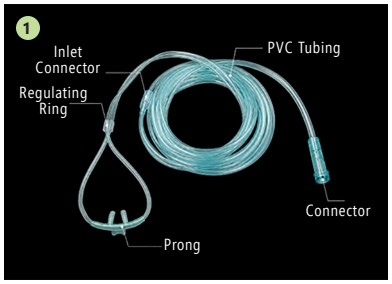


Discard the drip chamber

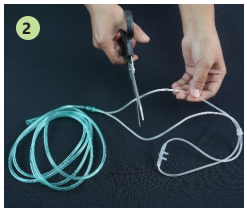


Cut the rubber piece at its midpoint to create two segments

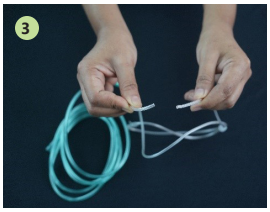
Attach the halved rubber piece to the distal end of the IV tubing



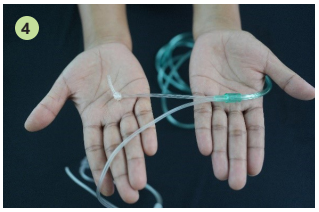
Parts of nasal prong



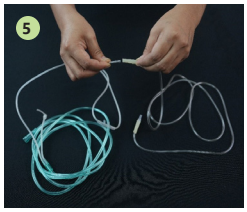
Cut off one of the limbs



Keep cut one end open



Ligate the cut end of the nasal prongs

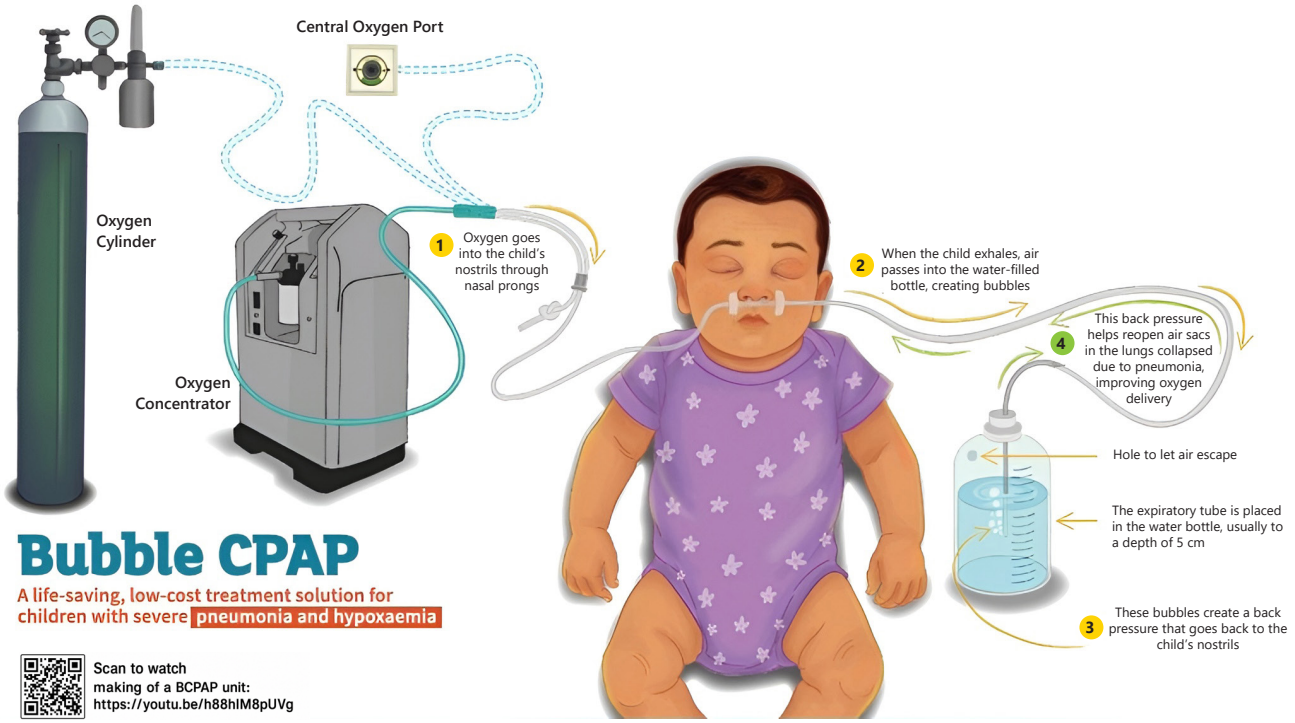


Connect the proximal end of the nasal prongs to the IV tubing

- Take the nasal prongs and cut off one of the limbs.
- Securely ligate proximal cut end of the nasal prongs.
- Connect the proximal end of the nasal prongs to the IV tubing.
- Connect the distal end of the IV tubing to the tube of the graduated bottle.

Step 2: Preparing Bubble CPAP for the Patient

- Immerse the tube inside the bottle to a depth of 5 cm below the water surface.
- Connect the proximal end of the Bubble CPAP circuit to an oxygen source. Always keep the bottle below the level of the patient's bed.
- An oxygen concentrator, central oxygen supply, or oxygen cylinder may be used as the oxygen source.
- Observe whether bubbles are forming normally. If bubbling occurs before the circuit is connected to the patient, there is a fault in the circuit. In that case, prepare a new circuit.
- Next, test the patient end (nasal interface) of the Bubble CPAP by occluding it with the palm of your hand. If bubbles appear in the bottle, the circuit is functioning properly.
- In a correctly assembled Bubble CPAP system, adequate bubbling helps maintain positive airway pressure during exhalation. This keeps the lungs expanded and makes breathing easier for the patient.
- If the patient remains hypoxemic for 10-15 minutes while receiving Bubble CPAP, increase the depth of the tube by 1 cm every 5 minutes until the hypoxemia resolves.
- Please don`t increase the depth of the tube below 8 cm of water



Bubble CPAP circuit

ANNEX III: Diarrhoea and Dehydration[15]

Children with measles may be complicated with diarrhoea. They should be evaluated for signs of dehydration and treated accordingly with oral or intravenous fluid based on severity.

A. REHYDRATION

Rehydration schedule of severe, some and no dehydration

<table>
<tr><th>Signs</th><th>Classification</th><th></th><th>Treatment</th></tr>
<tr><td>≥2 of the following signs –
Lethargy/ unconsciousness
Sunken eyes
Unable to drink or drinks poorly
Skin pinch goes back to normal very slowly (≥2 sec)</td><td>Severe dehydration</td><td>Plan C</td><td>Choice of fluid: Cholera saline, Ringer's lactate
If not available: Dextrose in Normal Saline or Normal Saline
Never use electrolyte free infusion (5%/10% Dextrose in Aqua)
Amount of fluid: 100 ml/kg
Route of rehydration: Intravenous
Duration of rehydration as per age of the child
<table>
<tr><td>Age of the child</td><td>First, give 30 mll/kg over</td><td>Then, give 70 mll/kg over</td></tr>
<tr><td><12 months</td><td>1 hour</td><td>5 hours</td></tr>
<tr><td>≥12 months</td><td>1/2-hour</td><td>2.1/2 hours</td></tr>
</table></td></tr>
</table>

N.B.:

- During IV rehydration, foods other than breast milk should be withheld, i.e, continue breast feeding
- Give ORS as soon as the child can drink, if the child is weak or vomits, give frequent small sips from a cup
- Resume age appropriate feeding promptly after rehydration

SAM related rehydration

In case of children with **SAM or severe underweight**, the correction of severe dehydration needs to be done slowly over 10-12 hours, as follows;

- For the first two hours; infuse @15ml/kg/hour
- At the end of 2nd hour, the IV fluid is discontinued and ORS is started and continued @10 ml/kg per hour for next 2 hours, then
- Slowed down to 5 ml/kg per hour for the next 10 hours, or until the fluid deficit is corrected. If the child is unable to drink due to weakness or vomiting, ORS is administered through NG tube drip.[14, 15]

Monitoring (Plan C)

Reassess the child every 15–30 minutes until a strong radial pulse is present. When full amount of IV fluid has been given, reassess the child's hydration status fully and decide accordingly –

- If signs of severe dehydration still present: Repeat IV fluid as outlined in Plan C
- If signs of some dehydration: Discontinue IV fluid and give ORS for 4 hours as in Plan B
- If no signs of dehydration: Advice mother to give ORS after each loose stool as in Plan A

Rehydration schedule of some dehydration

Signs	Classification		Treatment
≥2 of the following signs – Restless, irritable Sunken eyes Drinks eagerly, thirsty Skin pinch goes back to normal slowly	**Some dehydration**	**Plan B**	Choice of fluid: Oral rehydration solution (ORS) & continue breastfeeding Amount of fluid: 75 ml/kg Route of rehydration: Oral Duration of rehydration: 4 hours
N.B.: • During rehydration, foods other than breast milk should be withheld, • If purging rate is high (>15 ml/kg/hour), IV fluid, or persistent vomiting (≥3 episodes/hour), rehydrate with IV fluid • If the child is weak or vomits, give frequent small sips from a cup. After vomiting, wait for 10 munites, then contnue ORS more slowly			
Monitoring (Plan B) Reassess child's hydration status after 4 hours of oral rehydration and decide accordingly • If no signs of dehydration: Advice mother to give ORS after each loose stool as in Plan A • If signs of some dehydration: Rehydrate with ORS for another 4 hours as in Plan B • If signs of severe dehydration present: Rehydrate with IV fluid as in Plan C • Begin feeding the child in the clinic • Start Zinc supplementation as part of home treatment			

Rehydration schedule of no dehydration

Not enough signs to classify as some or severe dehydration	**No dehydration**	**Plan A**	Continue breastfeeding and age appropriate diet Choice of fluid: Oral rehydration solution (ORS) Others e.g., chira pani, cooked rice water, yogurt **Amount of ORS after each stool** Less than 2 years: 50-100 ml (10-20 teaspoon) 2 years and above: 100-200 ml (20-40 teaspoon)
N.B.: Avoid: Very sweet tea, soft drinks & sweetened fruit drinks.			

After rehydration, advise the caregiver:

- To continue treatment at home
- To continue feeding at home
- To come for routine follow-up in 5 days
- To follow up in 2 days if not improved

Return immediately if the child:

- Drinks poorly or is unable to drink or breastfeed
- Becomes sicker
- Blood appears in stool
- Develops fever

B. CONTINUE FEEDING

Age	Foods
< 6 months	Exclusive breastfeeding
> 6 months	Breastfeeding Freshly prepared energy-dense complementary foods, such as: • Khichuri • Mashed banana • Fresh fruit juice

Advise the caregiver to encourage the child to eat at least 6 times a day with an extra meal daily for 2 weeks after cessation of diarrhoea.

C. ZINC SUPPLEMENTATION

Age	Dose	Duration
< 6 months	10 mg/day	10 to 14 days
> 6 months	20 mg/day	10 to 14 days

ANNEX IV: Measles-related Sepsis/Septic Shock

Clinical Features

Suspect sepsis or septic shock in a child with measles, if associated with:

- Fever ≥38°C or hypothermia <36°C
- Toxic appearance
- Persistent age-adjusted tachycardia/tachypnoea
- Poor feeding
- Lethargy, irritability, or altered consciousness
- Capillary refill >3 seconds
- Cold extremities or weak pulse
- Reduced urine output
- Hypoxia/increased oxygen requirement
- Hypotension (late sign)
- Persistent poor perfusion after fluids [17]

Hypothermia: [9]

Mild: 36-36.4ºC

Moderate: 32-35.9ºC

Severe: <32ºC

Age-Specific Tachycardia[7]

Age	Heart Rate
<1 year	>160/min
1–2 years	>150/min
2–5 years	>140/min
5–12 years	>120/min
>12 years	>100/min

Age-Specific Tachypnoea[15]

Age	Respiratory Rate
<2 months	>60/min
2–11 months	>50/min
12–59 months	>40/min

Assessment

Use the **ABCDE**[42] approach.

Airway (Clearing the airway)

Breathing (Starting O_2 therapy)

Circulation (Placing an IV line)

Disability (Checking neurological status by AVPU/ GCS scale, pupillary light reflex, glucose)

Exposure (Checking for systemic or severe secondary complications like sepsis and others)

Assess for secondary bacterial infection including pneumonia, diarrhoea, otitis media, skin or soft tissue infection, oral ulcers, eye infection, urinary tract infection, meningitis, or encephalitis.[17]

Investigations

- CBC, PBF
- Blood for CRP/procalcitonin
- Blood culture, before starting antibiotics (if possible)
- Blood glucose
- Blood gas/lactate (if available)
- Blood for urea, electrolytes, creatinine
- Liver function tests e.g. SGPT, SGOT, PT, S Albumin
- Chest X-ray, if respiratory symptoms present
- Urine/stool culture, if indicated. [17]

Processing of investigations should not delay treatment.

Management

- Keep the baby warm
- Stabilize Airway
- Start oxygen therapy (Breathing): if SpO_2 <90% or respiratory distress (respiratory rate >70/min) is present. Start O_2 therapy with bubble CPAP.

If bubble CPAP is not available, give oxygen through low flow first and if required, high flow nasal cannula may be used.[18, 19]

- Circulation: establish IV access
  - In septic shock, administer IV fluid (Hartman solution/ Ringers' lactate) as follows:
    - **For children without SAM:** start IV fluid @20ml/kg (maximum 40ml/kg) and infuse as rapidly as possible
    - **For children with SAM:** Start IV fluid @15ml/kg/hour. If no response by 1 hour, then repeat the IV fluid at the same rate and duration (15ml/kg/hour),[15] and assess pulse, capillary refill time, body temperature
  - In both categories, if there is no improvement i.e. persistence of rapid thready pulse, capillary refilling time >3 seconds and cold periphery, start inotropes (IV adrenaline infusion 0.05–0.1 microgram/kg/min). [17]
  - Monitor pulse, respiratory rate every 15 minutes, and if both are increased, stop IV fluid immediately.
  - Drugs: Give Ceftriaxone 80 mg/kg IV once daily (maximum 4g).[15] If hospital-acquired infection, immuno-compromised state, or treatment failure, antibiotics may be escalated to extended spectrum.[17]
  - Correct hypoglycaemia (blood glucose <3mmol/L): Give 10% glucose IV, 5 mL/kg immediately. After glucose infusion, we need to continue giving oral/NG tube glucose 25ml (for new born/small baby) to 50ml (for older children) to prevent **rebound hypoglycemia**. Recheck glucose after every 15 minutes of oral glucose intake for one hour. If glucose level is low at any glucose test, repeat the 10% glucose IV @ same volume (5 mL/kg).[15, 17]
  - Arrange urgent HDU/ICU referral, if required.

Monitoring

Monitor[17]

- Heart rate
- Respiratory rate
- Blood pressure
- SpO_2
- Capillary refill time
- Mental status
- Blood glucose
- Urine output

Monitoring frequency:

- At least once in 5 minutes during resuscitation
- Every 30 minutes once improving
- Hourly when stable

HDU/ICU Referral

Urgent HDU or ICU referral is indicated for:

- Persistent shock or poor perfusion
- Respiratory failure
- Reduced consciousness
- Oliguria/anuria
- Rising lactate/metabolic acidosis
- Multi-organ dysfunction
- Need for vasoactive support or ventilation

Mechanical ventilation may be required in respiratory failure or septic shock requiring inotropes.[17]

ANNEX V: Referral Documentation and Referral Letter

The referral letter should include the following elements:

Field	Details to be Completed
Date	
Patient Name / Age / Sex	
Hospital or Registration Number	
Presenting Symptoms and Duration	
Temperature / Pulse / Respiratory Rate / BP / SpO_2	
Vaccination Status	
Provisional Diagnosis	
Stabilisation Measures Taken	Airway maintained | Oxygen given | IV fluids started | Hypoglycaemia corrected | Seizures controlled | Antibiotics given | Patient kept warm
Treatment Given	
Provisional Diagnosis	
Reason for Referral	
Higher Centre Informed (Yes / No)	Name of receiving doctor or unit:
Condition at Time of Referral	
Accompanying Documents	
Referring Clinician Name, Designation, Signature	
Facility Stamp	

ANNEX VI: RCCE Materials, Posters, and Leaflets

This annex contains risk communication and community engagement materials for distribution during measles outbreak response and routine immunization activities. Materials include the Factsheet for the Measles-Rubella Campaign 2026 and Frequently Asked Questions for the MR Campaign, which are available separately and should be reproduced and distributed through community health workers and health facility notice boards.

স্বাস্থ্যসেবা কেন্দ্রে অভিভাবকদের জন্য গুরুত্বপূর্ণ বার্তা:

- হাম অত্যন্ত সংক্রামক রোগ। শিশুর শরীরে র‍্যাশ দেখা দেওয়ার পর অন্তত ৪ দিন পর্যন্ত তাকে বাসায় রাখতে হবে এবং স্কুল, ভিড় বা সামাজিক জমায়েত থেকে দূরে রাখতে হবে।
- অসুস্থতার পুরো সময়জুড়ে শিশুকে বুকের দুধ খাওয়ানো চালিয়ে যান। বারবার পুষ্টিকর নরম খাবার দিন, যেমন খিচুড়ি, ডিম, মাছ, শাকসবজি ও ফলমূল। খাবার বা পানি কোনোভাবেই সীমিত করবেন না।
- চিকিৎসকের পরামর্শ অনুযায়ী ভিটামিন এ খাওয়ান। পরের দিনের দ্বিতীয় ডোজ দিতে ভুলবেন না।
- শিশুর পানি পান বা বুকের দুধ খেতে সমস্যা হলে, দ্রুত বা কষ্ট করে শ্বাস নিলে, খিঁচুনি হলে, অতিরিক্ত ঘুমঘুম ভাব দেখা দিলে, চোখে ব্যথা হলে অথবা অবস্থার অবনতি হলে দ্রুত হাসপাতালে নিয়ে আসুন।
- এমআর টিকার দুই ডোজ শিশুকে হাম থেকে সুরক্ষা দেয়। কোনো ডোজ বাদ পড়ে থাকলে, সুস্থ হওয়ার পর নিকটস্থ স্বাস্থ্যকেন্দ্রে গিয়ে টিকা সম্পন্ন করুন।

যেসব বিপদসংকেত দেখা দিলে দ্রুত হাসপাতালে ফিরে আসবেন

নিম্নোক্ত লক্ষণগুলোর কোনোটি দেখা দিলে দ্রুত নিকটস্থ হাসপাতাল বা স্বাস্থ্যকেন্দ্রে যোগাযোগ করুন:

- খিঁচুনি হলে
- শিশু অস্বাভাবিকভাবে ঝিমিয়ে পড়লে বা অচেতন হয়ে গেলে
- শ্বাস নিতে কষ্ট হলে, গোঁ গোঁ শব্দ করলে, অথবা বুক ভেতরে ঢুকে গেলে
- শিশু পানি, তরল খাবার বা বুকের দুধ খেতে না পারলে
- খাওয়ানো সবকিছু বমি করে ফেললে বা বারে বারে বমি হতে থাকলে
- চোখের কালো অংশ (কর্নিয়া) ঘোলা বা সাদা মনে হলে
- মুখে গভীর ক্ষত বা অনেকগুলো ঘা দেখা দিলে
- পানিশূন্যতার লক্ষণ দেখা দিলে (চোখ বসে যাওয়া, মুখ শুকিয়ে যাওয়া, প্রস্রাব কম হওয়া ইত্যাদি)
- শ্বাস নেওয়ার সময় বাঁশির মতো শব্দ হলে
- তীব্র অপুষ্টির লক্ষণ দেখা দিলে
- শিশুর অবস্থা খারাপের দিকে যাচ্ছে বলে মনে হলে।

দেশের বিভিন্ন অঞ্চলে হামের প্রকোপ দেখা দিয়েছে

হাম থেকে শিশুদের সুরক্ষিত রাখতে যা জানতে হবে ও যেসব আচরণ মেনে চলতে হবে

আপনার শিশু কি শরীরে লালচে দানাসহ জ্বরে ভুগছে?

এটি হাম হতে পারে

হাম কী?

- হাম একটি ভাইরাসজনিত সংক্রমিত রোগ, যা শিশুর রোগ প্রতিরোধ ক্ষমতা সাময়িকভাবে নষ্ট করে দেয়
- ফলে হামের জটিলতা হিসেবে পরবর্তী সময়ে প্রায়ই নিউমোনিয়া, মারাত্মক ডায়রিয়া, অপুষ্টি, মস্তিষ্কের প্রদাহসহ নানা রকম জটিলতা দেখা দিতে পারে, এমনকি শিশুর মৃত্যুও হতে পারে

হাম রোগের লক্ষণ


উচ্চ জ্বর
(৩-৫ দিন থাকতে পারে)


শরীরে লাল ফুসকুড়ি
(প্রথমে মুখে, পরে সারা শরীরে ছড়ায়)


কাশি


নাক দিয়ে পানি পড়া


চোখ লাল হওয়া বা পানি পড়া


খাওয়ার অনীহা বা দুর্বলতা

কীভাবে ছড়ায়?

একজন আক্রান্ত রোগীর কাশি, হাঁচির মাধ্যমে তার সংস্পর্শে আসা অন্যদের মধ্যে খুব দ্রুত ছড়ায়

আপনার শিশু আক্রান্ত হলে কী করণীয়?

- আক্রান্ত শিশুকে অন্যদের থেকে আলাদা রাখুন 
- দ্রুত নিকটস্থ স্বাস্থ্যকেন্দ্রে নিয়ে যান এবং ডাক্তারের পরামর্শ নিন 
- ডাক্তারের পরামর্শ ছাড়া ঔষধ খাওয়াবেন না 
- আক্রান্ত শিশুর পরিচর্যার সময় সংক্রমণ থেকে সুরক্ষার জন্য মাস্ক ব্যবহার করুন 
- আক্রান্ত শিশুকে স্পর্শ করার আগে ও পরে সাবান ও পানি দিয়ে দুই হাত ভালোভাবে ধুয়ে নিন 

আক্রান্ত শিশুর যত্ন

এ সময় আক্রান্ত শিশুর খাবার, পানীয় ও অন্যান্য স্বাভাবিক পরিচর্যা অব্যাহত রাখতে হবে 

যেসকল শিশু বুকের দুধ পান করে - তাদেরকে নিয়মিত বুকের দুধ খাওয়ান 

ভিটামিন-এ সমৃদ্ধ পুষ্টিকর খাবার, যেমন: গাজর, মিষ্টি কুমড়া, মিষ্টি আলু, পেঁপে, পালং শাক ও অন্যান্য সবুজ শাকসবজি খাওয়ান 

পর্যাপ্ত পানি পান করান 

কারা বেশি ঝুঁকিতে?

যেকোনো বয়সের মানুষের হাম হতে পারে, তবে ছোট শিশু যারা এখনো হাম-রুবেলা (এমআর) টিকা নেয়নি - তাদের ঝুঁকি সবচেয়ে বেশি

সুরক্ষার উপায়

হাম প্রতিরোধের একমাত্র কার্যকর উপায় সময়মতো শিশুর টিকা গ্রহণ নিশ্চিত করা।

- শিশুর বয়স ৯ মাস পূর্ণ হলে হাম-রুবেলা (এমআর) ১ম ডোজ এবং
- ১৫ মাস পূর্ণ হলে ২য় ডোজ টিকা নিশ্চিত করুন


২ বছরের কম বয়সি যে সকল শিশু হাম-রুবেলা (এমআর) টিকা এখনো গ্রহণ করেনি, তাদের জন্য অতি দ্রুত এই টিকা নিশ্চিত করুন


নিয়মিত টিকাদান কার্যক্রমে হাম-রুবেলা (এমআর) টিকা দেওয়া হয়। আপনার নিকটস্থ ইপিআই টিকাদান কেন্দ্র থেকে শিশুর টিকা নিন।


মনে রাখবেন; সম্পূর্ণ সুরক্ষা পেতে আপনার শিশুকে অবশ্যই সময়মত দুই ডোজ টিকা দিতে হবে।

হামের সংক্রমণ রুখে দিতে আপনার দ্রুত পদক্ষেপ অত্যন্ত জরুরি। আপনার শিশুকে সুরক্ষিত রাখতে অনুগ্রহ করে এই কাঙ্ক্ষিত আচরণগুলো মেনে চলুন। আপনার পরিবার ও প্রতিবেশীদের এই তথ্যগুলো জানিয়ে দিন এবং তাদেরও এসব আচরণ মেনে চলতে উৎসাহিত করুন।

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হাম কী?

- হাম একটি ভাইরাসজনিত সংক্রামক রোগ, যা শিশুর রোগ প্রতিরোধ ক্ষমতা সাময়িকভাবে নষ্ট করে দেয়
- ফলে হাম পরবর্তী সময়ে প্রায়ই নিউমোনিয়া, মারাত্মক ডায়রিয়া, অপুষ্টি, মস্তিষ্কের প্রদাহসহ নানা রকম জটিলতা দেখা দিতে পারে, এমনকি শিশুর মৃত্যুও হতে পারে

হামের সংক্রমণ রুখে দিতে আপনার দ্রুত পদক্ষেপ অত্যন্ত জরুরি। আপনার শিশুকে সুরক্ষিত রাখতে অনুগ্রহ করে এই কাঙ্ক্ষিত আচরণগুলো মেনে চলুন। আপনার পরিবার ও প্রতিবেশীদের এই তথ্যগুলো জানিয়ে দিন এবং তাদেরও এসব আচরণ মেনে চলতে উৎসাহিত করুন।

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হাম থেকে সুরক্ষার উপায়

হাম প্রতিরোধের একমাত্র কার্যকর উপায় সময়মতো শিশুর টিকা গ্রহণ নিশ্চিত করা।

- শিশুর বয়স ৯ মাস পূর্ণ হলে হাম-রুবেলা (এমআর) ১ম ডোজ এবং
- ১৫ মাস পূর্ণ হলে ২য় ডোজ টিকা নিশ্চিত করুন

২ বছরের কম বয়সি যে সকল শিশু হাম-রুবেলা (এমআর) টিকা এখনো গ্রহণ করেনি, তাদের জন্য অতি দ্রুত এই টিকা নিশ্চিত করুন

নিয়মিত টিকাদান কার্যক্রমে হাম-রুবেলা (এমআর) টিকা দেওয়া হয়। আপনার নিকটস্থ ইপিআই টিকাদান কেন্দ্র থেকে শিশুর টিকা নিন।

মনে রাখবেন; সম্পূর্ণ সুরক্ষা পেতে আপনার শিশুকে অবশ্যই সময়মত দুই ডোজ টিকা দিতে হবে।

হামের সংক্রমণ রুখে দিতে আপনার দ্রুত পদক্ষেপ অত্যন্ত জরুরি। আপনার শিশুকে সুরক্ষিত রাখতে অনুগ্রহ করে এই কাঙ্ক্ষিত আচরণগুলো মেনে চলুন। আপনার পরিবার ও প্রতিবেশীদের এই তথ্যগুলো জানিয়ে দিন এবং তাদেরও এসব আচরণ মেনে চলতে উৎসাহিত করুন।

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আপনার শিশু হাম-এ আক্রান্ত হলে কী করণীয়?

আক্রান্ত শিশুকে অন্যদের থেকে আলাদা রাখুন

দ্রুত নিকটস্থ স্বাস্থ্যকেন্দ্রে নিয়ে যান এবং ডাক্তারের পরামর্শ নিন

ডাক্তারের পরামর্শ ছাড়া ঔষধ খাওয়াবেন না

আক্রান্ত শিশুর পরিচর্যার সময় সংক্রমণ থেকে সুরক্ষার জন্য মাস্ক ব্যবহার করুন

আক্রান্ত শিশুকে স্পর্শ করার আগে ও পরে সাবান ও পানি দিয়ে দুই হাত ভালোভাবে ধুয়ে নিন

হামের সংক্রমণ রুখে দিতে আপনার দ্রুত পদক্ষেপ অত্যন্ত জরুরি। আপনার শিশুকে সুরক্ষিত রাখতে অনুগ্রহ করে এই কাঙ্ক্ষিত আচরণগুলো মেনে চলুন। আপনার পরিবার ও প্রতিবেশীদের এই তথ্যগুলো জানিয়ে দিন এবং তাদেরও এসব আচরণ মেনে চলতে উৎসাহিত করুন।

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হাম-এ আক্রান্ত শিশুর যত্ন

- এ সময় আক্রান্ত শিশুর খাবার, পানীয় ও অন্যান্য স্বাভাবিক পরিচর্যা অব্যাহত রাখতে হবে

- যেসকল শিশু বুকের দুধ পান করে - তাদেরকে নিয়মিত বুকের দুধ খাওয়ান

- ভিটামিন-এ সমৃদ্ধ পুষ্টিকর খাবার, যেমন: গাজর, মিষ্টি কুমড়া, মিষ্টি আলু, পেঁপে, পালং শাক ও অন্যান্য সবুজ শাকসবজি খাওয়ান

- পর্যাপ্ত পানি পান করান

হামের সংক্রমণ রুখে দিতে আপনার দ্রুত পদক্ষেপ অত্যন্ত জরুরি। আপনার শিশুকে সুরক্ষিত রাখতে অনুগ্রহ করে এই কাঙ্ক্ষিত আচরণগুলো মেনে চলুন। আপনার পরিবার ও প্রতিবেশীদের এই তথ্যগুলো জানিয়ে দিন এবং তাদেরও এসব আচরণ মেনে চলতে উৎসাহিত করুন।

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ANNEX VII: Suspected Measles Case Investigation Form

EXPANDED PROGRAMME ON IMMUNIZATION

SUSPECTED MEASLES CASE INVESTIGATION FORM

(Please complete every item and use dates according to the English system)

OUTBREAK ID: MSL BAN-_____ - _____ - _____ - _____
District Code - Upz/CC/Mun Code - Onset Year - Outbreak #

BACKGROUND INFORMATION **Is this INDEX case?** ☐ **Yes** ☐ **NO**

DATE FOCAL PERSON WAS NOTIFIED: ____/____/____ NAME OF PERSON NOTIFYING: _____

DATE OF INVESTIGATION: ____/____/____ Designation/Address: _____

Name of health facility: _____ Type of health facility: GOB ☐ Non GOB ☐

Date of Visit / Admission: ____/____/____ Medical Record #: _____

PATIENT IDENTIFICATION **CASE ID NUMBER: MSL BAN-** _____ - _____ - _____ - _____
District Code - Upz/CC/Mun Code - Onset Year - Case #

Patient's Name: _____ Father's/Guardian's Name: _____ Contact Number: _____

Date of Birth: ____/____/____ OR Age: ____ Sex: ☐ M ☐ F Religion: _____ House & Street Address: _____

If Rural; Village: _____ Union: _____ Upazila: _____ District: _____

If Urban; Mahalla: _____ Ward #: ____ Zone: ____ Municipality/CC: _____ District: _____

CLINICAL INFORMATION

1. Fever? ☐ Yes ☐ No	**Date of onset of fever:** ___/___/_____
2. Generalized maculopapular rash? ☐ Yes ☐ No	**Date of onset of rash:** ___/___/_____

ADDITIONAL CLINICAL INFORMATION

1. Cough? ☐ Yes ☐ No	2. Coryza? ☐ Yes ☐ No	3. Conjunctivitis? ☐ Yes ☐ No
4. Joint pain (arthralgia or arthritis)? ☐ Yes ☐ No 4a. **If YES,** which joint/s (note all): _____		
5. Lymph node swelling (Lymphadenopathy)? ☐ Yes ☐ No **If YES,** where ***(mark all that apply)?***		
5a. Sub-occipital? ☐ Yes ☐ No	5b. Post auricular? ☐ Yes ☐ No	5c. Cervical? ☐ Yes ☐ No
6. Pregnant (when applicable)? ☐ Yes ☐ No ☐ Unknown	6a. **If YES,** duration in weeks _____	

VACCINATION HISTORY

Type of Vaccine	Number of doses			Date of last dose (dd/mm/yyyy)
	Routine		SIA	
	By Card	By History		
MR				
Measles				
MMR				

TRAVEL HISTORY

Did the case travel outside his/her village/ mahalla during the 30 days before or within 7 days after rash onset OR any person visited the house/village/community of the case under investigation from an area/community of recent measles/rubella transmission during 30 days prior to rash onset? YES____ NO ___ Unknown ___ **If YES,** period of travel: _____/_____/_____ to _____/_____/_____ Place to/from travel: House and Street Address: _____

Village/Mahalla: _____ Union/Ward: _____ Upazila/Muni/CC: _____ District: _____

SPECIMEN COLLECTION

			To be completed at NPML, IPH, Dhaka	
Specimen	**Date collected**	**Date sent to NPML**	**Date Received at NPML**	**Specimen Code**
Serum (between 3-28 days of rash onset)	_____/_____/____	_____/_____/_____	_____/_____/_____	
DBS (between 3-28 days of rash onset)	_____/_____/____	_____/_____/_____	_____/_____/_____	
Urine (within 5 days of rash onset)	_____/_____/____	_____/_____/_____	_____/_____/_____	
Nasopharyngeal swab (within 7 days of rash onset)	_____/_____/____	_____/_____/_____	_____/_____/_____	

(after collecting specimen(s), send this form and specimen(s) to HSO) Signature of MT-Lab: _____ Date: _____

Case Investigated by: _____ Designation: _____ Signature: _____ Date: _____

Report sent by: _____ Designation: _____ Signature: _____ Date: _____

FOR LABORATORY USE ONLY

SPECIMEN CONDITION

Specimen	Cold?	Sufficient Quantity?	Leakage?	Turbid?	Desiccated?
Serum	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
DBS		☐ Yes ☐ No			
Urine	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
Nasopharyngeal swab	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No

LABORATORY RESULT

Specimen	Test Result	Date of Result
Serum (IgM) for Measles	☐ Positive ☐ Negative ☐ Equivocal ☐ Pending ☐ Not tested	_____/_____/_____
Serum (IgM) for Rubella	☐ Positive ☐ Negative ☐ Equivocal ☐ Pending ☐ Not tested	_____/_____/_____
DBS (IgM) for Measles	☐ Positive ☐ Negative ☐ Equivocal ☐ Pending ☐ Not tested	_____/_____/_____
DBS (IgM) for Rubella	☐ Positive ☐ Negative ☐ Equivocal ☐ Pending ☐ Not tested	_____/_____/_____
Measles Virus Isolation		
Urine	☐ Positive ☐ Negative ☐ Pending ☐ Not tested	_____/_____/_____
Nasopharyngeal swab	☐ Positive ☐ Negative ☐ Pending ☐ Not tested	_____/_____/_____
Genotype of Measles Virus:		_____/_____/_____
Rubella Virus Isolation		
Urine	☐ Positive ☐ Negative ☐ Pending ☐ Not tested	_____/_____/_____
Nasopharyngeal swab	☐ Positive ☐ Negative ☐ Pending ☐ Not tested	_____/_____/_____
Genotype of Rubella Virus:		_____/_____/_____

Name of person delivering specimen: _____ Designation: _____ Signature: _____ Date: _____

Name of person receiving specimen: _____ Designation: _____ Signature: _____ Date: _____

FINAL CLASSIFICATION

☐ Clinically compatible Measles ☐ Laboratory confirmed Measles ☐ Epidemiologically linked Measles

☐ Clinically compatible Rubella ☐ Laboratory confirmed Rubella ☐ Epidemiologically linked Rubella

☐ Discarded

SOURCE OF INFECTION

☐ Endemic ☐ Imported ☐ Import related ☐ Unknown

ADDITIONAL COMMENTS (if any):

FOLLOW UP INFORMATION:

1. **Did the case Followed-up 30 days after rash onset?** ☐Yes ☐No **IF YES,** Date of follow-up: ____/____/_____
2. **Is or was there any complication as a result of Measles infection?** ☐Yes ☐No
3. **If YES,** what (mark all that apply)? ☐ ARI ☐ Diarrhoea ☐ Otitis media ☐ Malnutrition ☐ Encephalitis ☐ Others (specify): _____
4. **Outcome of the case:** ☐ Alive ☐ Died (Date of death: ____/____/_____)

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ANNEX VIII: Development Initiative and the Contributors

Development process

The National Guideline for the Management of Measles has been drafted and compiled under the leadership of Professor Dr. Md. Halimur Rashid, Director of Disease Control, Directorate General of Health Services (DGHS), Ministry of Health and Family Welfare. The expert technical team was led by Professor Dr. Md. Abid Hossain Mollah, Former Professor & Head of Pediatrics, Dhaka Medical College. Dr. Hasnain Ahmed, Health Officer, UNICEF Bangladesh, provided overall technical guidance and support throughout the process.

Leading clinicians, paediatricians, infectious disease specialists, public health professionals, and programme managers from national medical institutions, teaching hospitals, government health authorities, and partner organizations contributed their expertise, clinical insights, and technical inputs, which were instrumental in shaping and finalising this guideline. The Directorate General of Health Services expresses its sincere appreciation to all contributors for their time, knowledge, and commitment to strengthening the health system response to measles in Bangladesh.

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