Measles: A (Brief) Primer on Clinical Presentation and Management

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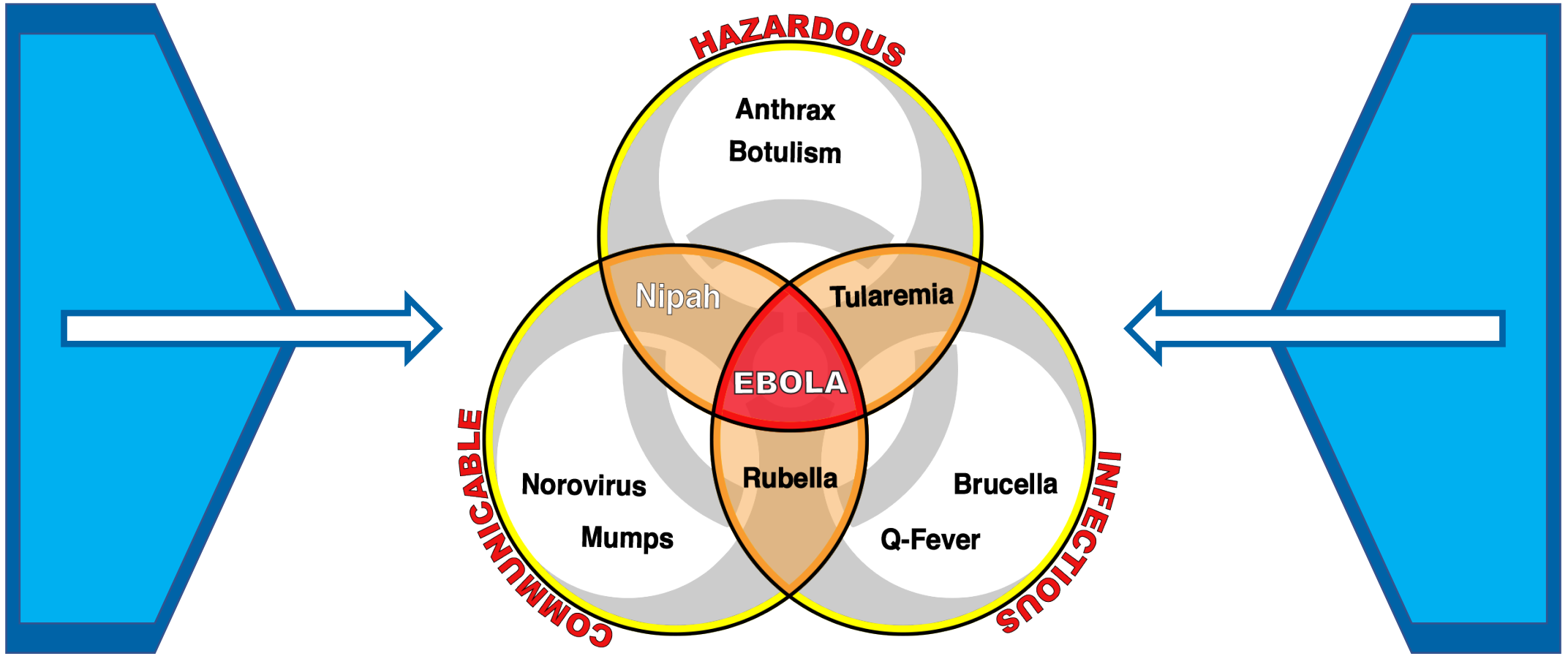
Measles: What is it?

- Acute febrile rash illness caused by measles virus
  - Many names: morbilli, rubeola, MeV, MV, measles morbillivirus, English measles, red measles

- Single-stranded RNA virus of the Paramyxoviridae family
  - Humans are only reservoir – eradication possible?
  - Entire viral genome has been sequenced allowing for identification of distinct wild-virus lineages*

Measles: What is it?

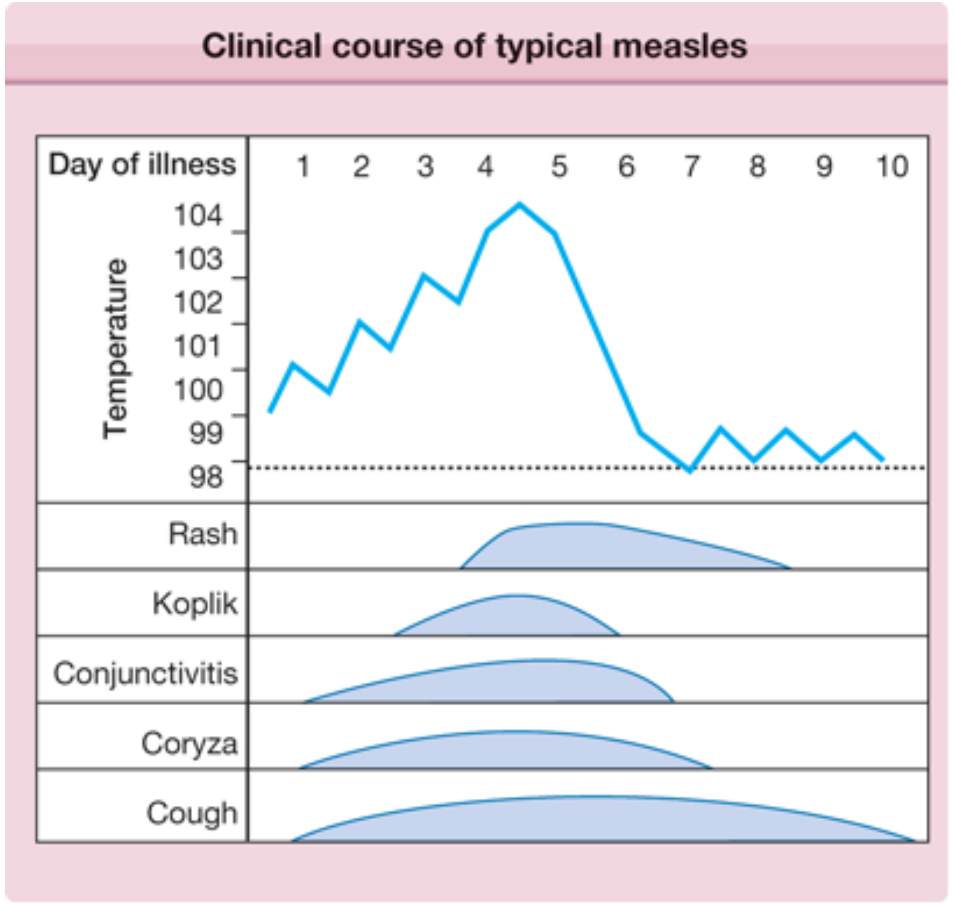
- Droplet or Airborne transmission
  - Can reside in the air in an environment for upwards of 2-3 hrs
- Highly contagious
  - 90% of susceptible household contacts will develop illness
  - R_0 is estimated to be 12-18 in an unvaccinated population



Cieslak et al. A Methodology for Determining Which Disease Warrant Care in a High-Level Containment Care Unit. Viruses 2019.

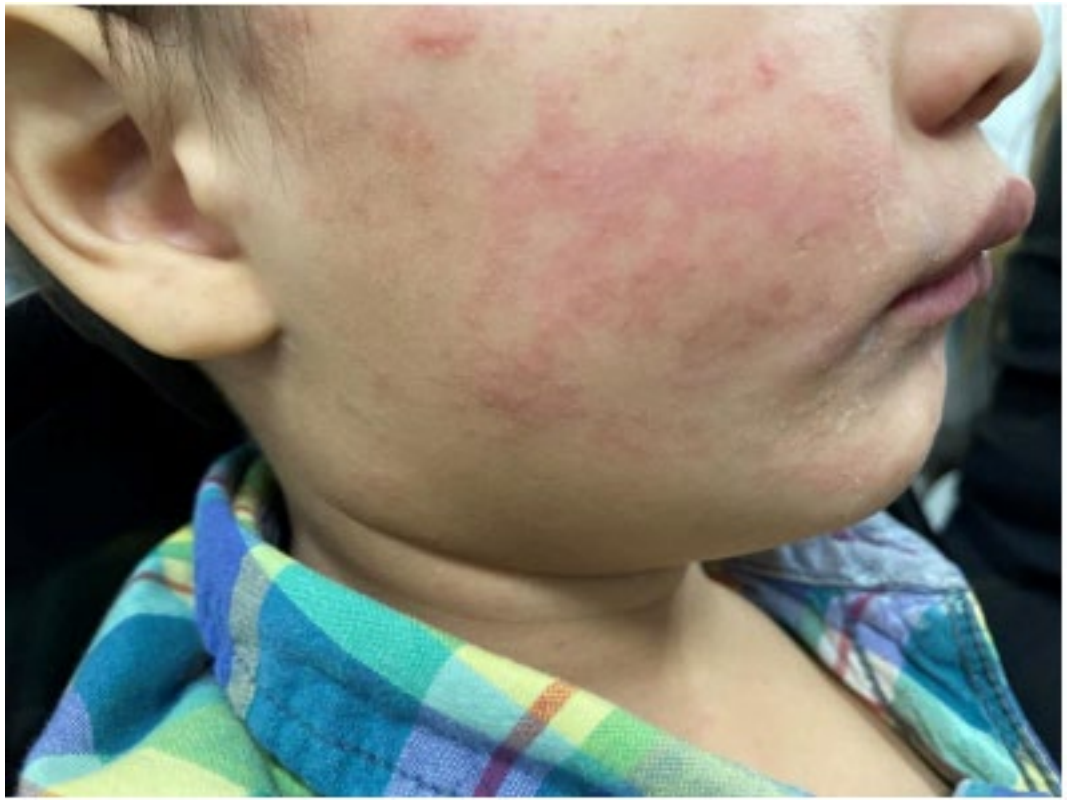
Clinical Case Definition

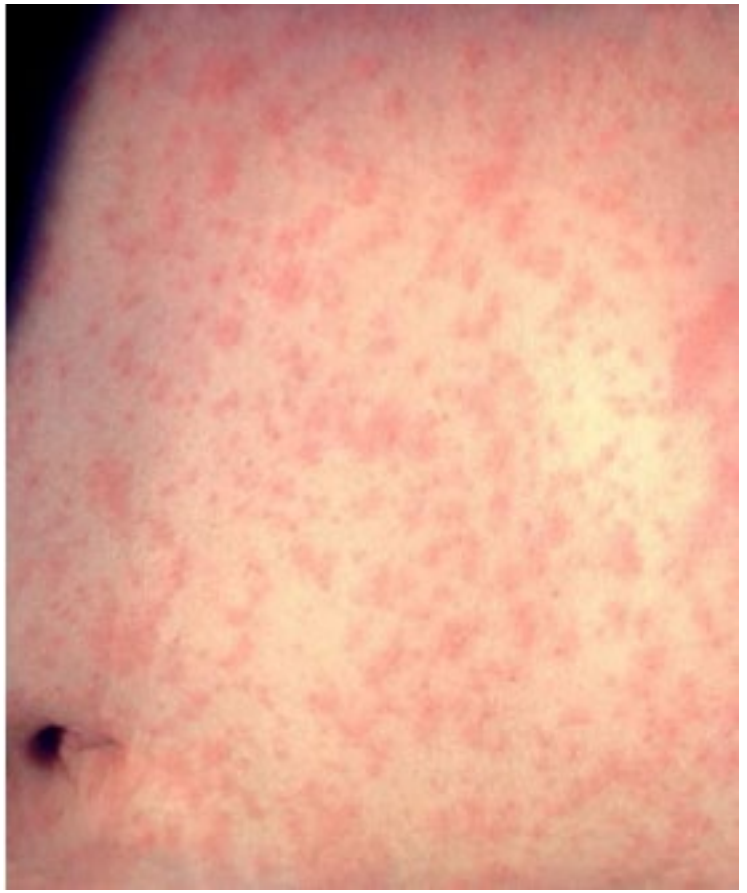
- Fever (up to 105°F)
- Rash
- At least one of:
  - Cough
  - Coryza
  - Conjunctivitis



Source: Goldsmith LA, Katz SI, Gilchrest BA, Paller AS, Leffell DJ, Wolff K: *Fitzpatrick's Dermatology in General Medicine, 8th Edition*: www.accessmedicine.com

Disease Course





Sequelae

Complication	Percentage
Hospitalization	20%
Diarrhea	8%
Otitis media	7-9%
Pneumonia	1-6%
Post-Infectious Encephalitis	1/1,000 cases
Death	1-3/1,000 cases
Subacute Sclerosing Panencephalitis (SSPE)	1/100,000 cases

Medical Countermeasures: Diagnostics

- Always consider clinical, epidemiologic and laboratory data
- Serology alone to test patient with low pre-test probability of having measles will result in more false positives
- NP/OP swabs (for RT-PCR) and serum (serology) should be collected

Medical Countermeasures: RT-PCR

- Most often performed on NP/OP swabs (urine possible as well)
- Ideal collection time within 3 days of rash onset
  - Proper specimen, collection, storage, processing essential
- CDC and state public health labs can also perform rRT-PCR)

Medical Countermeasures: Serology

- IgM testing alone can pose challenges
  - Cross-reactivity with other causes of febrile rash illnesses has been documented
  - False positive results are common in low endemicity
    - Patients without known exposure have been fully vaccinated

Medical Countermeasures: Therapeutics

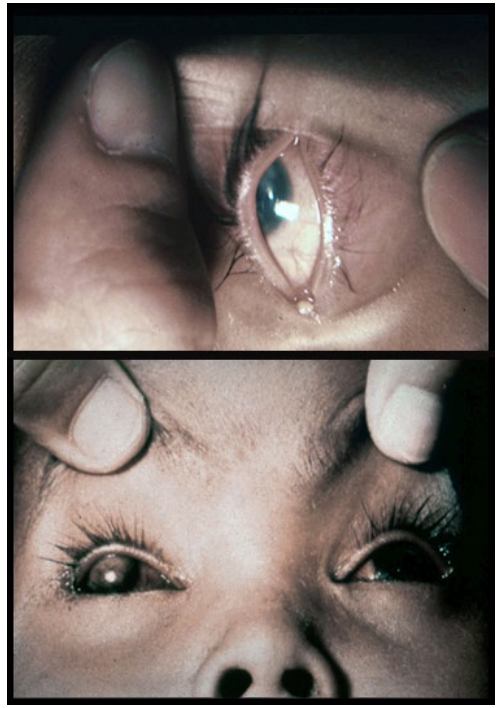
- No specific targeted antiviral therapy

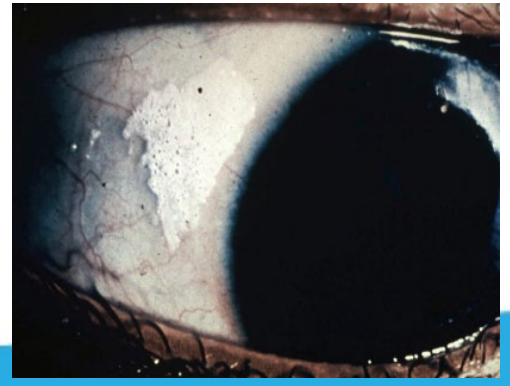
- Susceptible to ribavirin *in vitro* but data on clinical use, efficacy, safety very limited
  - Consideration for severe cases or complications (eg pneumonia requiring mechanical ventilation, <12 mnths of age w/ pneumonia, and immunocompromised patients
  - Dosing: 15-20 mg/kg/day PO in two divided doses
  - Optimal duration unknown (5-7 days?)

- Investigational therapies have been evaluated for subacute sclerosing panencephalitis (inosine pranobex, IFN alpha or beta)

Medical Countermeasures: Vitamin A?

- Vitamin A deficiency contributes to delayed recovery and risk of complications
  - In children – VitA deficiency can result in progressive xerophthalmia
  - VitA supplementation may be beneficial for reducing measles severity/mortality in nutritionally-deficient populations/low resource settings (benefit has NOT been shown in studies in resource-rich settings)
- For children with severe measles or those in resource-limited settings, WHO recommends VitA administration
  - Infants <6 mnths – 50,000 IU 1x/day x 2 days
  - Infants 6-11 mnths – 100,000 IU
  - Children ≥12 mnths – 200,000 IU





Medical Countermeasures: Prophylaxis

- PEP within target window (72hrs of exposure) may provide protection or modify clinical course of disease
  - Vaccination after this window only expected to protect from future exposures

- Immunoglobulin: Either IMIg or IVIg needs to be given within 6 days or initial exposure
  - Prioritized for adults at high risk of severe disease

Medical Countermeasures: Vaccination

- MMR Vaccine licensed in 1971 – live viral vaccine

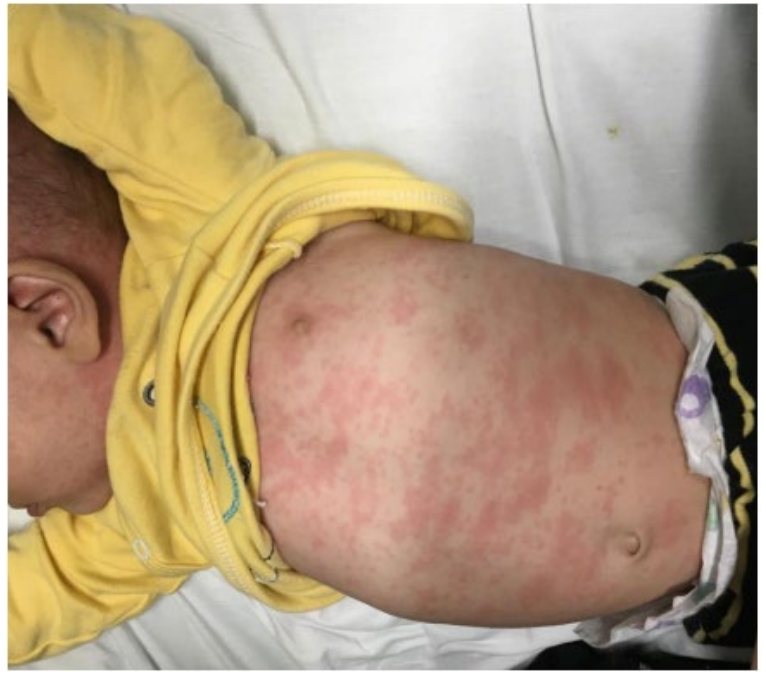
- HIGHLY EFFECTIVE: 2 doses 97-99.9% effective; 1 dose 93% effective
  - Dose 1: 12-15 mnths
  - Dose 2: 4-6 years
- International travel:
  - 6-11 mnths, 1 dose prior to departure
  - At least 12 mnths: 2 doses prior to departure

Medical Countermeasures: Vaccination

- Contraindications:
  - Severe immunocompromising conditions (eg hematologic malignancies, receipt of chemotherapy, long-term immunosuppressive therapy)
    - HIV if CD4%<15% or absolute CD4<200
  - Family history suggestive of congenital immunocompromising condition
  - Allergy to MMR
  - Pregnancy

Medical Countermeasures: Vaccination

- MMR can cause a self-limited Rash
  - Short-lived febrile rash syndrome not contagious to others
- MMR reaction often challenging to distinguish between true infection
  - Serology not useful
  - Molecular testing can differentiate true infection from MMR reaction



Medical Countermeasures: Vaccination Issues?

- Immunity to measles and mumps is presumed for adults born before 1957 (excepting HCWs)
  - At least one dose of MMR vaccine should be administered to adults born in 1957 or later
    - No increase in vaccine-associated AEs in people already immune
- Those vaccinated between 1963-1967 with a single dose inactivated vaccine may benefit from MMR dose
- “Catch-up” MMR immunization necessary for those lacking appropriate evidence of immunity or status unknown

Key Takeaways

- Measles meets criteria for potential global disease eradication
  - The US is in danger of losing elimination status
- Identify/Isolate/Inform/Initiate Care algorithm is crucial
- Vaccination is the most effective measure to control disease
- As long as there are gaps in immunization outbreaks will continue

References

- European Centre for Disease Prevention and Control: https://www.ecdc.europa.eu/en/measles/facts

- World Health Organization: https://www.who.int/news-room/fact-sheets/detail/measles

- Centers for Disease Control and Prevention: https://www.cdc.gov/measles/vaccines/index.html