

New from the World of Viruses
2014

APIC Symposium
July 31, 2014

Objectives

1. Describe a new form of Hand Foot Mouth Disease circulating in our community since September 2013
 2. Consider the threat of MERS
 3. Review other new viral challenges spread by international travel
- All with implications for Infection Prevention

Focus on Enteroviruses

- Echo, Coxsackie and Enterovirus
- High proportion of infections are asymptomatic
 - Community wide epidemics can occur without evidence of apparent person to person spread
- Highly Transmissible
 - Fecal Oral route dominates
 - Pools, ponds, flies, surfaces and fomites
 - Hands of subjects and caregivers

Shared Characteristics

- Children main susceptible cohort
 - Immunologically naive
 - Poor hygiene
- Spread in warmer months in temperate climates
- Less seasonality in tropical and sub-tropical areas

Endemic and Epidemic

- Endemic fluctuation in predominant types
- Multiple strains circulate in most years
- In US: 2000 – 2005: Echovirus 9,30,18,13, & Coxsackie B5
- In a few years one strain dominates causing epidemic spread
- In Asia: Multiple strains circulate but recent epidemics due to Enterovirus 71

Clinical Disease Enteroviruses

- Extremely wide range of illnesses and severity
- Many clinical effects are shared by all members of the group
- More diversity of effect than with most respiratory viruses
- Only a few types of disease are associated with a particular strain
- Most enterovirus **do not** cause diarrhea

Enterovirus Rash



Herpangina lesions:
May be isolated or may occur with
rash or other manifestations



Hand-Foot-Mouth Disease with Exanthem





Vesicles on Hand in H-F-M



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Vesicle on Foot in H-F-M



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Atypical HFM

- First noted in US in 2011, in Hawaii in Sept 2013
- Earlier reports from Europe and Asia
- Coxsakie A16, A6 and Enterovirus 71
Coxsakie A6 variant differs:
 - More extensive rash, more likely to have vesicles and nail changes, less severe mouth involvement and possibly shorter illness, less severe malaise
- Enterovirus 71: more typical HFM features, more severe disease, encephalitis and fatality



Atypical HFM Blisters, Wider Body Distribution



Atypical HFM by Coxsakie A6 Looks like Herpes or Varicella



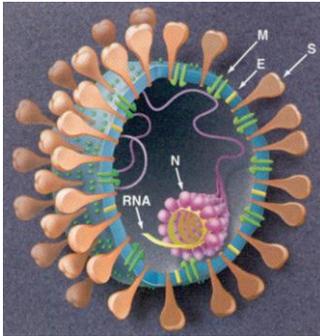
Atypical HFM Coxsakie A6



Visitors Coming Our Way?

- Out of Africa
 - Chikungunya
 - Zika
 - Hemorrhagic Fevers – Ebola and Marburg
- Out of Asia
 - SARS
 - Coxsakie A6
 - Enterovirus 71 Enhanced pathogenicity
- Out of the Tropics
 - Dengue
- Out of the Middle East
 - MERS
 - West Nile

Coronaviruses



Human Coronaviruses History

- 1930s Respiratory pathogen of animals
- 1960s Upper respiratory disease in humans
 - Group 1 HCoV-229E
 - Group 2 HCoV-OC43
- 2003 SARS-CoV
- 2004 HCoV-NL63
- 2005 HCoV-HKU1
- 2012 MERS-CoV

SARS Infectivity

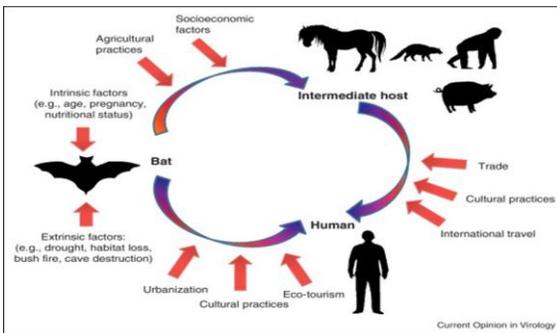
- SARS CoV more infectious than other human CoV
- Airborne spread
- Risk associated with crowding, aerosols, lack of effective masks, poor handwashing, health personnel working while ill
- Singapore and later Hong Kong & Beijing enacted severe enough quarantine and Infection Control measures to contain spread

SARS Clinical Features

- Abrupt onset of fever/ muscle aches/ headache/ chills, 25% diarrhea
- 30% ill for one week, resolve
- 70% shortness of breath, pneumonia by Xray
- 50% of these develop respiratory failure, need ICU, intubation and mechanical ventilation
- Overall fatality rate 10% < 60y, 50% > 60y
- Lymphocytopenia, thrombocytopenia and Liver Function abnormalities

MERS - CoV

- Initial 3 cases recognized in Sept 2013 – In London, and Saudi Arabia. All men with life threatening pneumonia from the Middle East.
- Corona virus isolated from sample of Saudi case in June 2013 at Erasmus Medical Center, Netherlands
- As of December 2013 182 documented human infections all with origin Middle East
- Mortality in documented cases 43%. Highest in > 60y, Immunocompromised and those with diabetes and or kidney failure
- Limited transmission to Health Care Workers
Mortality 30%



Role of Bats in Epidemiology of Novel Viruses – Applies to SARS-CoV, MERS-CoV, Hendra, Nimpah, Ebola and Rabies

If the Reservoir for MERS CoV is in Bats, Who is the Intermediate Host?

The Dromedary Camel for one! >90% have antibody



The First US MERS Case Came to Rural Indiana



Clinical Similarities SARS and MERS

- High mortality rate 10% v 43 %
- Short Incubation Period approximately 5 days mean (2-14 days)
- Severe respiratory illness worse in aged, immunocompromised and co-morbidity
- Rapid progression to lung failure and death
- Lungs and respiratory epithelium most affected
- 1/3 with Diarrhea
- Low White count characteristic

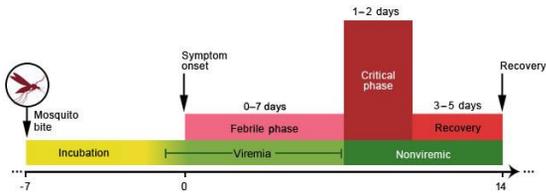
Epidemiologic Differences

- SARS - Rapidly progressive Epidemic with spread from Single focus to multiple countries with spread within those countries
- MERS – Slowly progressive epidemic with limited international spread from focal area
- SARS – High spread to HCWs –
- MERS – Limited HCW spread contained with usual Infection Control practices directed at respiratory pathogen

Dengue, Chikungunya & Zika Current Epidemics in the Pacific

- Mosquito Borne Diseases – Now more adapted to mosquitos in our state
- Currently Epidemic in French Polynesia with Spread to other Pacific locations
- Fever, rash, myositis, arthralgia, arthritis
- Diagnosis by PCR, Serology
- Dengue and Chikungunya have reached our shores – Local transmission of Dengue in 2001
- Chikungunya in returning HI residents

Phases of Dengue Virus Infection



Dengue Fever RAsh



Dengue rash



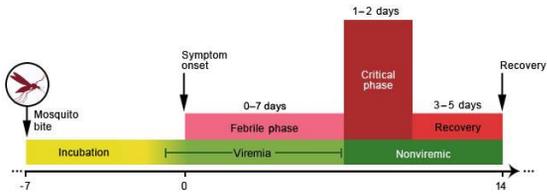


Dengue Febrile Phase
Hemorrhage
Site of Blood Pressure Cuff

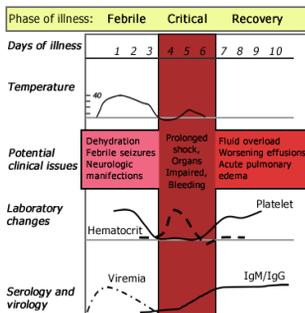


Dengue Febrile Phase:
 Facial Flushing
 Dehydration

Phases of Dengue Virus Infection



Dengue Virus infection Course

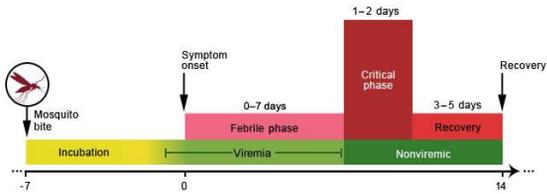


DENCO Slide Adapted from WCL Yip, 1980 by Hung NT, Lum LCS, Tan LH

Severe Dengue Critical Phase

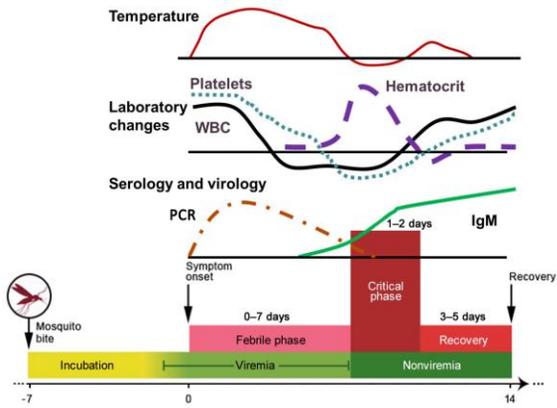
- Severe Plasma Leakage
 - Hemoconcentration
 - Fluid in Lungs
- Severe Bleeding
- Severe Organ Involvement
 - Hepatic: AST or ALT level > 1000 U/L
 - Neurologic: impaired consciousness
 - Myocardial Dysfunction

Phases of Dengue Virus Infection

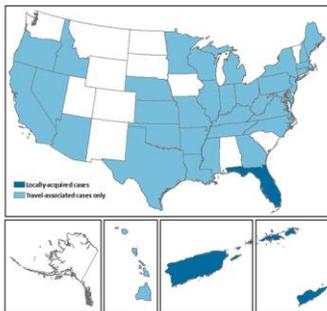


Dengue Convalescent Phase Rashes “Islands of White in a Red Sea”





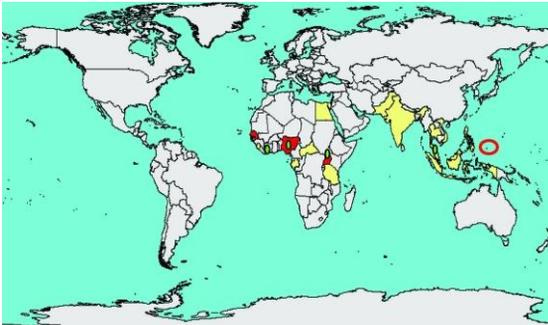
Chikungunya in the US 2014



Chikungunya in the Americas



Zika Virus
Out of Africa 1947 to Yap 2007 & Tahiti 2013



Ebola and Marburg Viruses

- Cause of Hemorrhagic Fevers
- Spreading by international travel in Africa
- Currently most active in Sierra Leone and Liberia
- Highly contagious with environmental contamination more than aerosol and droplet spread
- Health care workers at high risk

Travel Medicine Prevention

Don't Get Hit! **Trauma**

Don't Get Bit! **Insect Borne**

Don't Get Lit! **Drugs / Alcohol**

Don't do "It"! **STDs**

Don't Eat Shit! **Fecal-Oral**
