

# Emerging Infections: The bugs are one step ahead and they are on the move

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# Our society is very mobile!

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Tiger Woods played golf in San Diego on January 27 and in Dubai on January 29, 2008

# The new kids on the block

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<b>Influenza H5N1(bird flu)</b>	<b>1997</b>	<b>MERS</b>	<b>2012</b>
<b>Metapneumovirus</b>	<b>2001</b>	<b>Enterovirus D68</b>	<b>2014</b>
<b>SARS-CoV</b>	<b>2003</b>	<b>Ebola</b>	<b>2014</b>
<b>Chickengunya</b>	<b>2004</b>	<b>Zika</b>	<b>2016</b>
<b>Human Bocavirus</b>	<b>2005</b>	<b>Influenza H7N9</b>	<b>2017</b>
<b>Influenza pH1N1</b>	<b>2009</b>		

What will allow you to discover the next emerging disease?

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**Take a travel history!**

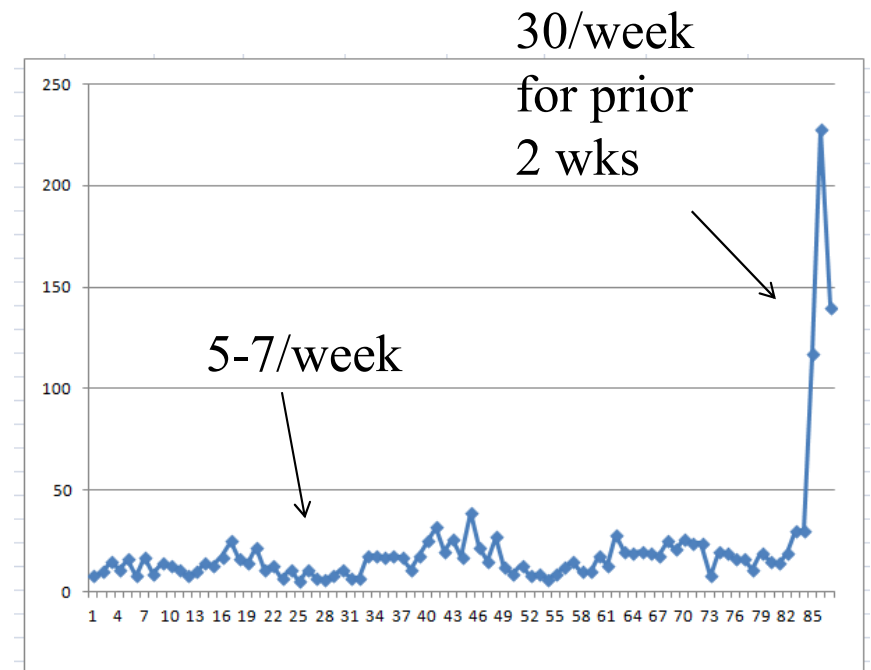


## Enterovirus D68-Acute flaccid paralysis



# The enterovirus D68 story

- Emergency medicine doctor in Kansas City noticed an unusual increase in severe asthma in the summer of 2014
- He/she called the local health department
- Health department noted an increase in laboratory detection of enterovirus/rhinovirus in their lab
- CDC notified 8/19/2014
- Virus identified via sequencing and MMWR published by 9/8/2014



Courtesy of M. Jackson

# Enterovirus D-68

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- 1395 cases in the United States in 2014; 138 cases in 2016
- Viral isolates from the 2014 outbreak were genetically similar to previous EV68 isolates
- Mild to severe respiratory illness
- Increase risk in young children and children with asthma
- No antiviral therapy available

# Enterovirus-D68

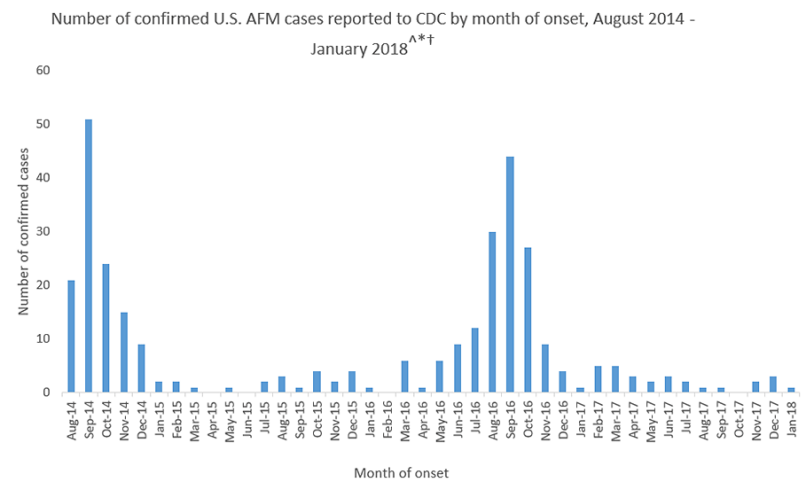
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- Shares biologic similarities with rhinoviruses
- Recognized in 1962: 4 California children with respiratory illness
- Reported rarely over next 36 years
- A few clusters between 2008-2010 with typically unusually severe respiratory illness in children (total 95 in world)
- Most illness appears in children
- Will there be more???



# Acute flaccid paralysis

- 320 cases in the United States since 2014
- Median age=8 years
- Most had fever and respiratory symptoms
- Mild lymphocytic CSF pleocytosis; glucose and protein normal or near normal
- CSF negative for EV68, EV71, and polio by PCR
- Clinically these cases are indistinguishable from polio thus a travel history and coordination of testing with your local and state public health lab is very important

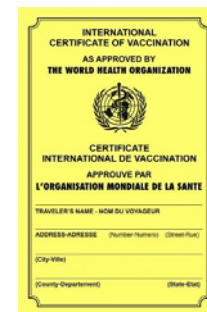


# Yellow fever



# Yellow Fever Outbreak-Brazil

- Started in 2017
- As of May 2018 there have been 364 deaths including international travelers
- WHO expanded areas in Brazil for which yellow fever vaccine recommended
- Vaccine recommended for travelers 9 months of age and older
  - Immunization should be provided  $\geq 10$  days before travel
  - Immunize only those at risk
  - Immunization only available at selected certified sites
- Expanded effort to immunize the general population in Brazil has led to a global shortage of vaccine



# Yellow fever-presentation

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- Incubation=3-6 days
- Symptoms
- Fever
  - Chills
  - Severe headache
  - Back pain
  - Fatigue
- Illness duration=5-7 days
- Subset of patients develop a biphasic illness with increase severity (30-60% mortality)
  - Jaundice
  - Bleeding
  - Shock
  - Organ failure



# Zika



# Zika-presentation

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- Incubation period=3-12 days
- Often asymptomatic
- Symptoms
  - Fever
  - Maculopapular red rash
  - Headache
  - Joint pain
  - Conjunctivitis
  - Myalgia
- Symptoms last several days up to 1 week

# Zika in the newborn



## Incidence of defects

- Overall=5%
- Perhaps higher in first trimester
- Not tightly associated with maternal sx

## Findings

- Microcephaly
- Hearing loss
- Retinopathy
- Joint contractures
- Hypertonia

## Evaluation

- Comprehensive physical exam
- Ophthalmology referral
- Hearing screen
- Lab testing
- Referrals for confirmed infection
  - Neurology
  - Endocrinology
  - Clinical Genetics

# Zika-differential diagnosis

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Measles

Rubella

Parvovirus

Enterovirus

Adenovirus

Dengue

Chickengunya

Malaria

Yellow fever

Leptospirosis



# Zika-diagnostic testing

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## Nucleic acid testing (NAT)

- Serum or Urine
- Decline over 6 weeks

## Trioplex rRT-PCR detects (FDA EUA)

- Zika
- Dengue
- Chickengunya

## IgM serology

- Cross reactions common
- Usually positive by day 4 of illness
- Remain positive for up to 12 weeks

Patients with exposure and compatible symptoms

- NAT alone is first line
- IgM serology if NAT negative

Pregnant women with symptoms should get both NAT and IgM

Screening asymptomatic pregnant women not routinely recommended

Screening of asymptomatic non-pregnant patients not recommended including pre-conception screening

# Chickengunya and Dengue



# Chickungunya

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- Made it to the Caribbean in 2013
- Rapidly spread in the Americas
- Transmitted by *Aedes aegypti* and *Aedes albopictus* (bite during the day)
- Incubation=2-12 days
- Presentation
  - Fever
  - Joint pain and swelling
  - Headache and myalgias
  - Rash
- Illness duration= 1 week

# Chickungunya

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- Differential Diagnosis: Dengue, Malaria, Leptospirosis, Rickettsia
- Diagnosis
  - Labs: Lymphopenia, thrombocytopenia, elevated creatinine, elevated transaminases
  - Serology: IgM
  - PCR

# Dengue

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- Clinically similar to and transmitted by the same mosquitoes as Chikungunya
- 4 distinct serotypes that do not provide cross protection
- Incubation period=5-7 days
- Often asymptomatic especially in children
- Symptoms: fever, headache (retro-orbital pain), myalgias, arthralgias, rash
- Illness duration 2-7 days
- Sequential infections increase risk of hemorrhagic fever
- Almost all United States cases have been in travelers/immigrants particularly from Puerto Rico

# Ebola



# Ebola

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- 25,855 cases/10,702 deaths as of April 15, 2015
  - Young children at lower risk compared to those 15 years of age and above
  - New outbreak in the Democratic Republic of the Congo in 2018
  - Symptoms include fever, headache, myalgia, abdominal pain and weakness followed by vomiting and diarrhea
  - Don't forget malaria and typhoid
  - Vaccine trial promising
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# Ebola-presentation

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- Incubation period=2-21 days
- Symptoms
  - Fever
  - Severe headache
  - Myalgia
  - Weakness
  - Fatigue
  - Diarrhea
  - Vomiting
  - Abdominal pain
  - Bleeding
- Illness duration 6-10 days





## Middle Eastern Respiratory Syndrome (MERS)



# MERS-CoV (Coronavirus)

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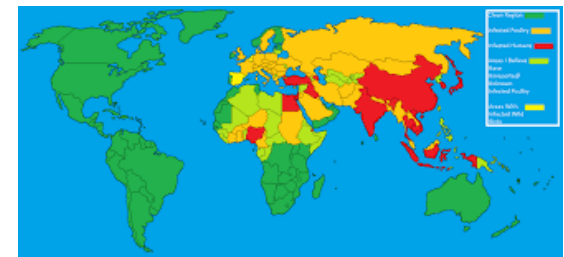
- First identified in September 2012
- 1900 cases and 412 deaths
- Presents with fever and respiratory symptoms. Occasional diarrhea. Incubation period 14 days
- Labs: leukopenia, thrombocytopenia, elevated LDH
- Majority of cases have a travel history to Saudi Arabia, UAE, Qatar, or Jordan
- Other countries Oman, Kuwait, Yemen, Lebanon, Iran
- No specific treatment available
- Prevention: hand washing, avoid contact with people who have respiratory disease



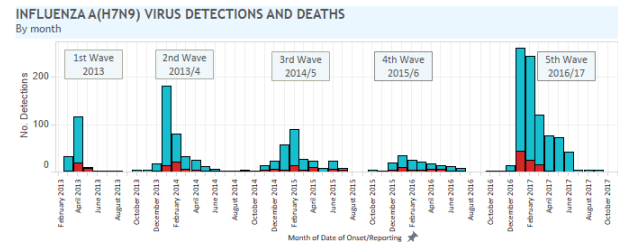
# The Birds



- Highly Pathogenic Avian Influenza (HPAI)
- H5N2, H5N8, H5N1 all identified in the United States December 2014-January 2015
- H7N9 among the latest concerning strains
- Some HPAI detected in the United States in birds
- Outbreaks in 5 domestic flocks, backyard flocks, wild aquatic birds
- Antiviral prophylaxis recommended for contacts
- Stay tuned and be wary of patients with influenza like illness who have bird contact



# H7N9 Influenza



- First reported in China in 2013
- Annual epidemics in China since then mostly in individuals with poultry exposure
- 5<sup>th</sup> epidemic in 2016-2017 included 766 human cases
- 39% mortality rate
- So far limited person to person transmission
- Based on the CDC Influenza Risk Assessment Tool H7N9 rated as having the greatest potential to cause a pandemic
- Potential vaccine candidate strains already stockpiled by CDC
- Suspect H7N9 if your patient has returned from China in the last 10 days, has respiratory tract illness, and had poultry exposure in China

# Avoiding H7N9 Influenza

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- Don't go to China
- Don't touch birds
- Avoid live poultry markets
- Eat fully cooked chicken and chicken eggs
- Don't eat from street vendors
- Hand hygiene

# Your role in identifying and preventing the spread of emerging infections

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- Be curious about things that seem out of the ordinary
- Take a travel history
- Report unusual cases to your local Health Department
- Immunize

# Resources

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- [CDC.gov](https://www.cdc.gov)
- [WHO](https://www.who.int)
- [AAP Red Book online](#)