

***TROPICAL  
MEDICINE CASE  
STUDIES  
- NONSURGICAL***



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# PRESENTATION OBJECTIVES



- Employ a rationale in developing differential diagnosis
- Identify a useful differential diagnosis of among potential disease states
- Effect appropriate disease management in a limited resource setting

# DIAGNOSIS: A RECOGNIZED PATTERN OF DISEASE



# MAKING A DIAGNOSIS:



Searching for clues that match a recognized pattern of disease



**CAN YOU SOLVE  
THIS CASE OF**

**TROPICAL FEVER?**

# HISTORY



This seven-year-old girl is brought to you in remote eastern Honduras. Her parents explain that five days ago she suddenly developed fever, vomiting, severe headache, and pain on moving her eyes.

# HISTORY



Several other children in the neighborhood have been similarly ill since the onset of the rainy season with its customary heat and onslaught of mosquitoes.

# WHAT ARE YOUR QUESTIONS ABOUT THE HISTORY?



# PHYSICAL EXAM

Child is lethargic but arousable. Temperature is 39 degrees, pulse 70, respirations 30 and shallow, capillary refill 4 seconds, chest clear to auscultation.



# PHYSICAL EXAM

Heart has a soft systolic murmur, abdomen is mildly distended with enlarged liver and spleen, and without tenderness. She has a fine macular rash on her extremities.



# WHAT ARE YOUR QUESTIONS ABOUT THE PHYSICAL EXAM?



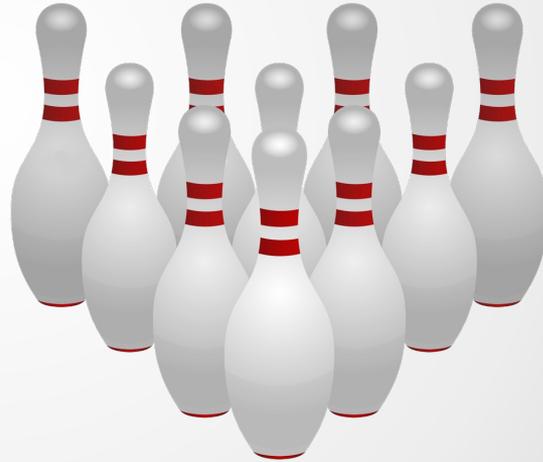
# WHAT IS YOUR DIFFERENTIAL DIAGNOSIS?



# ACUTE TROPICAL FEVER DIFFERENTIAL DIAGNOSIS

Consider:

- Influenza
- Dengue
- Typhoid fever
- Yellow fever
- Measles
- Malaria



# HOW CAN YOU NARROW THIS DIFFERENTIAL?

Consider:

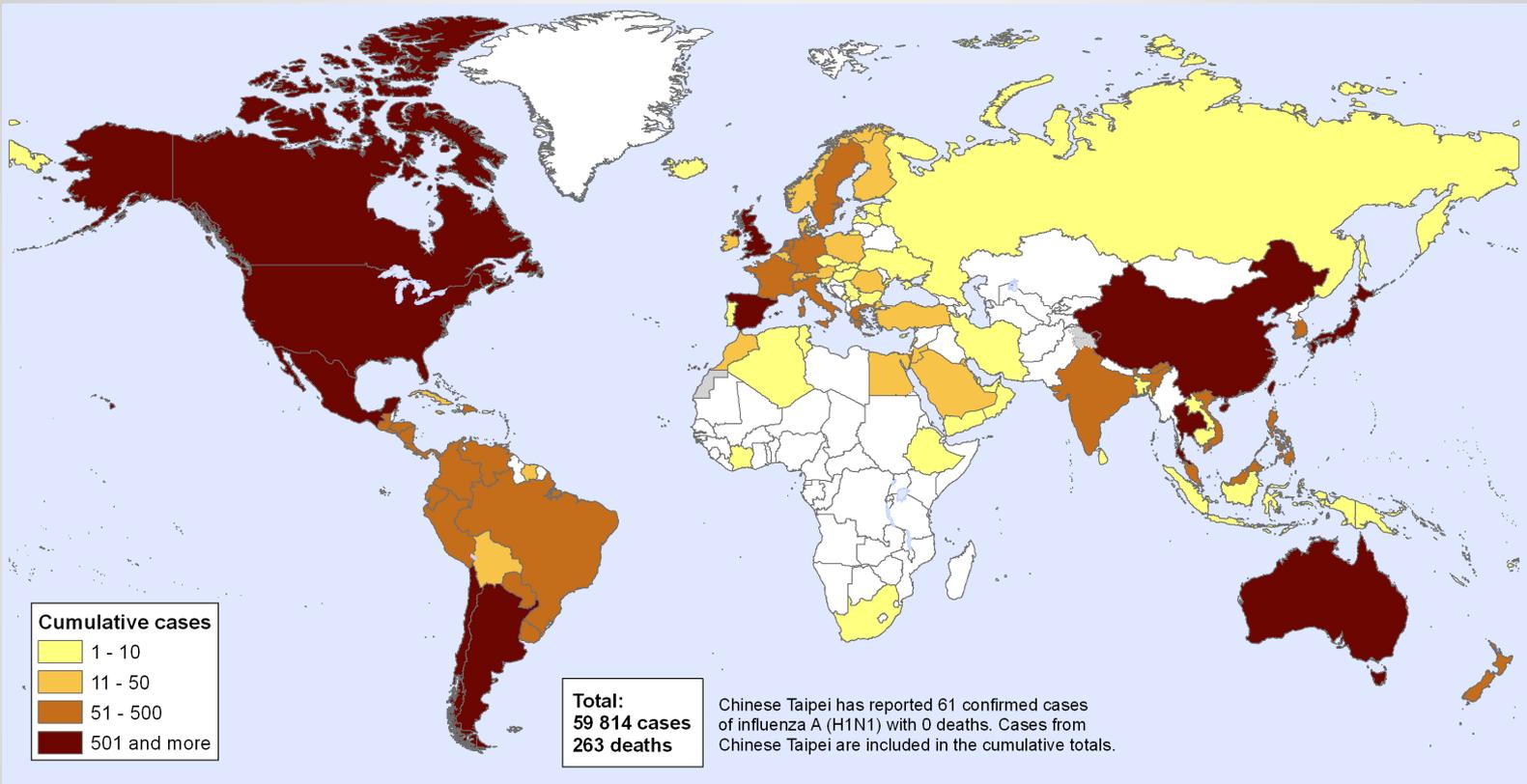
- Influenza
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- Measles
- Malaria



# FIRST CONSIDER GEOGRAPHY & EPIDEMIOLOGY



*Note: Many developing nations do not  
have reliable health statistics*



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Data Source: World Health Organization  
 Map Production: Public Health Information



# INFLUENZA



■ Countries or areas where dengue has been reported

Note: Lines define the boundaries of year-round survival of the dengue mosquito vector, *Aedes aegypti*, and represents areas where dengue transmission is possible.

Acknowledgment: Adapted from World Health Organization.

# DENGUE

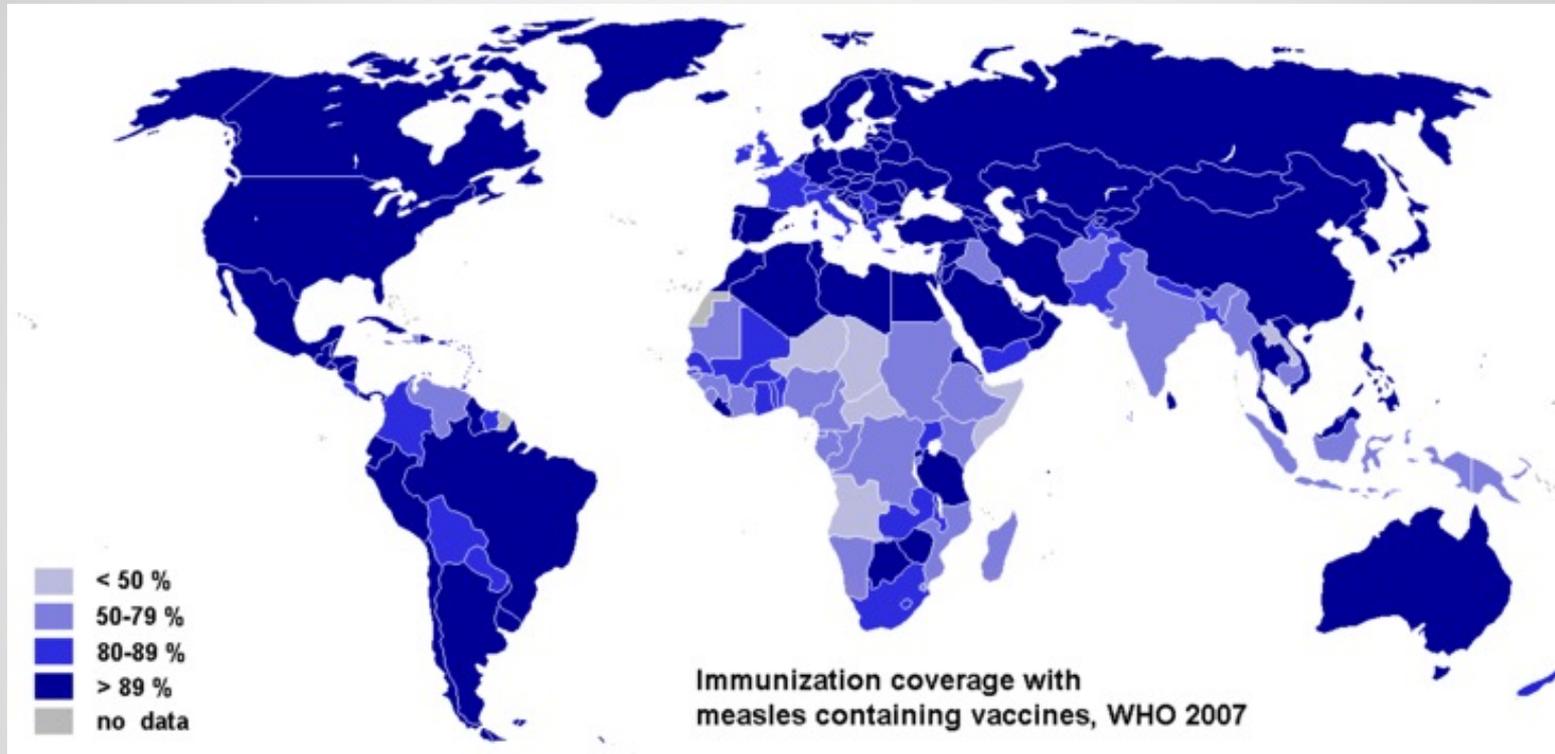


# TYPHOID

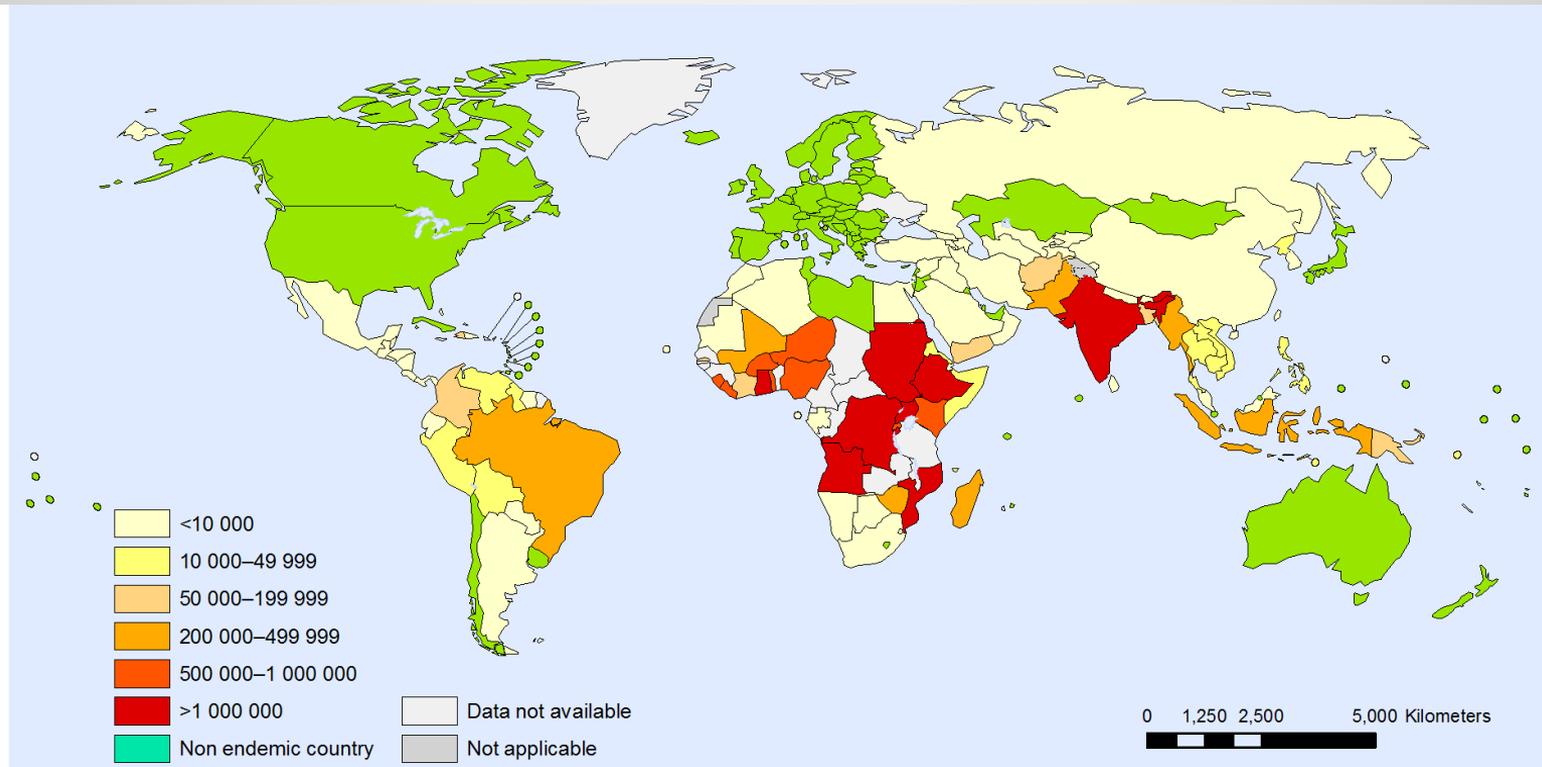
Approximate Global Distribution of **Yellow Fever**,  
by State/Province, 2007



**YELLOW FEVER**



# MEASLES VACCINE COVERAGE



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 Map Production: Public Health Information and Geographic Information Systems (GIS)  
 World Health Organization



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# MALARIA

# BASED ON GEOGRAPHY YOU NARROW THIS DIFFERENTIAL TO:

Consider:

- Influenza
- Typhoid fever
- Malaria
- Dengue



# HOW TO FURTHER NARROW THE DIFFERENTIAL DIAGNOSIS?

Consider:

- Influenza
- Typhoid fever
- Malaria
- Dengue



# WHAT BASIC TESTS WOULD YOU RECOMMEND?

Consider:

- Influenza
- Typhoid fever
- Malaria
- Dengue



# WHAT ARE TESTS FOR INFLUENZA?

# INFLUENZA TESTS

- Viral culture of nasopharynx is the most reliable test, but is not available in low-resource facilities
- Rapid diagnostic tests are 70-80% sensitive, are not often available, but hold promise for improved diagnosis
- CBC may demonstrate lymphocytosis, leukopenia, and/or monocytosis – all nonspecific to influenza

# WHAT ARE TESTS FOR TYPHOID?

# TYPHOID TESTS

- Blood culture is the best test, but rarely available in low-resource facilities.
- The Widal test, a serologic cold agglutinin test, is nonspecific, requires acute and convalescent titers.
- Anemia, leucopenia, low platelets, and elevated liver enzymes may occur in typhoid fever, but are nonspecific.

# COMPLETE BLOOD COUNT

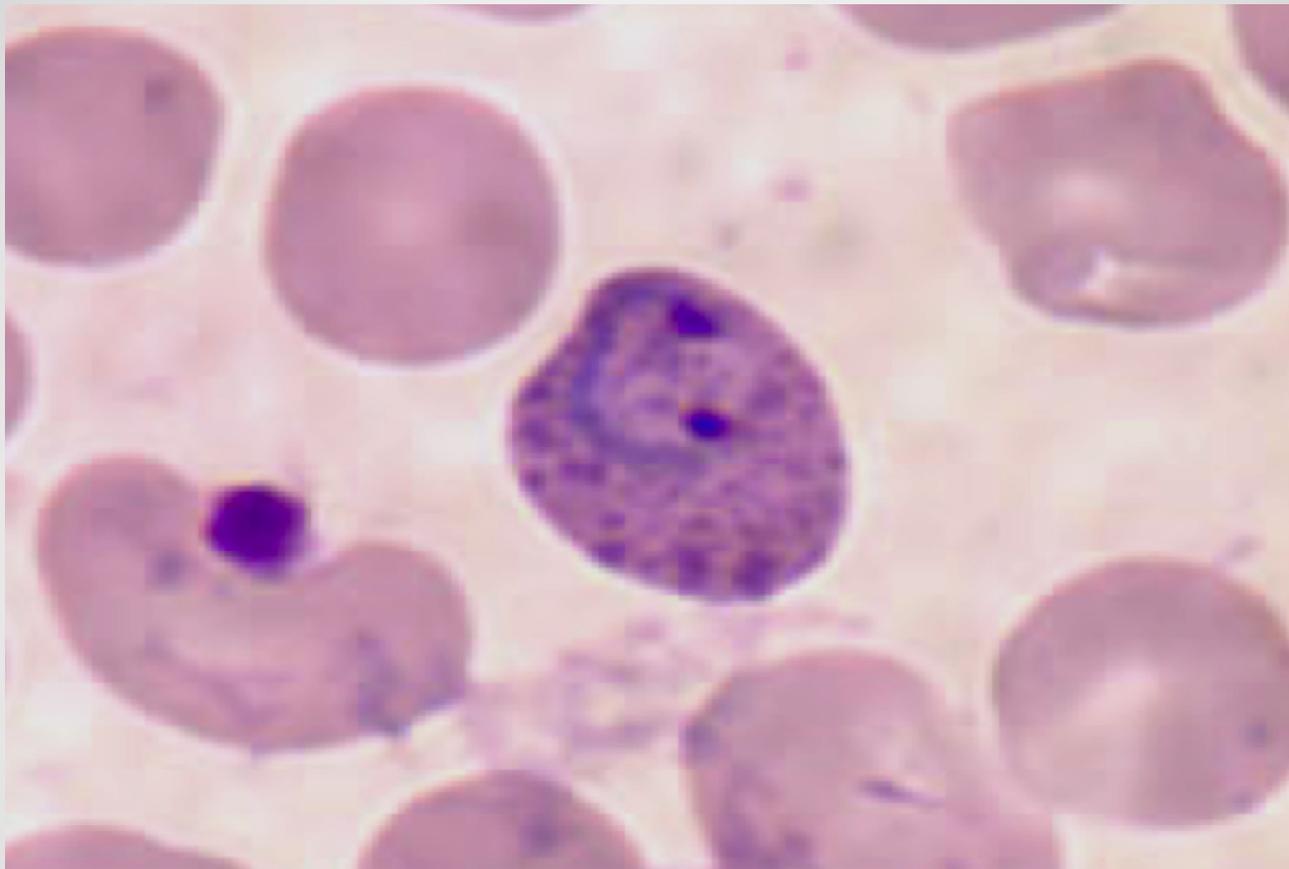


- Hemoglobin: 9
- White blood cells: 12,000 with bands 10%, polys 45%, lymphs 35%, eos 10%
- Platelets: 45,000

# **WHAT ARE TESTS FOR MALARIA?**

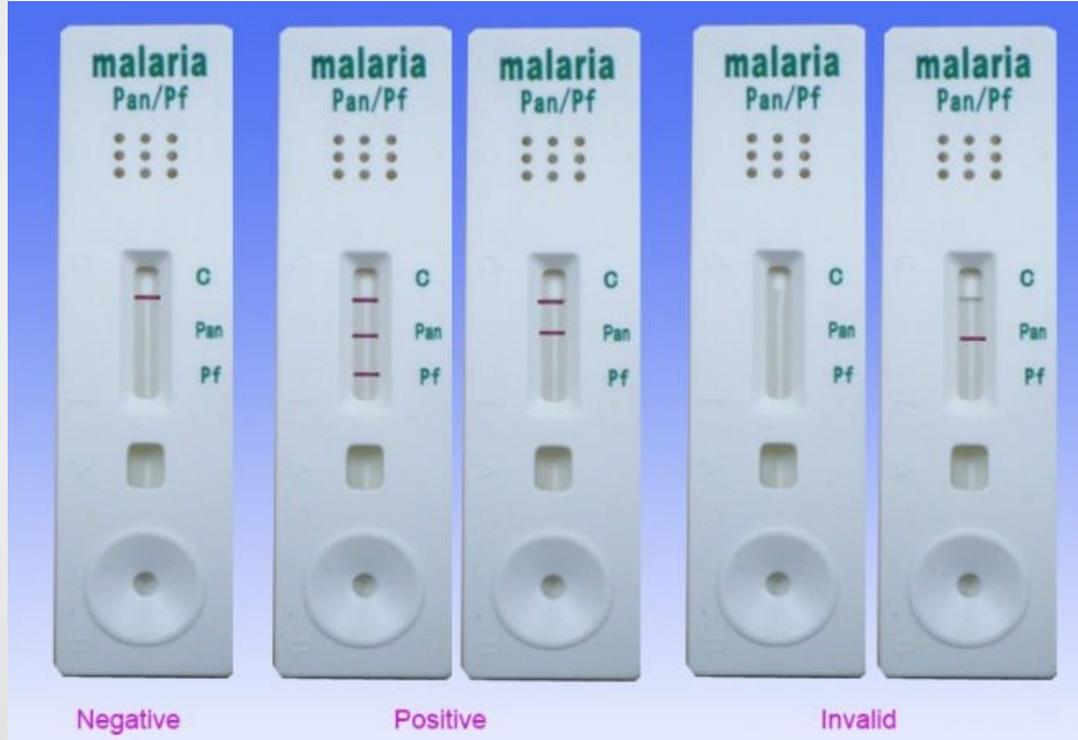
# MALARIA TESTS

- Identification of ring-like *Plasmodium* protozoa within red blood cells on Giemsa-stained smear of whole blood.
- Thick blood films are more sensitive in detecting malaria protozoa. Thin blood smears permit identification of the *Plasmodium* species.
- Malaria smears should be obtained every 12 hours to diagnosis and to evaluate treatment response.



***PLASMODIUM* PROTOZOA**

# WHAT ARE PROS & CONS OF RAPID MALARIA TESTS?



# RAPID MALARIA TESTS

## Pros:

- Low cost (US \$ 0.25 - 0.60) each when purchased in volume
- Results in minutes
- Useful where skilled microscopy is not available

## Cons:

- Gives only *P. falciparum* or non-*P. falciparum* infection results
- Less reliable in low malaria burden

# MALARIA TEST



You perform repeated thick and thin blood smears with Giemsa stain, but you *do not* identify any ring-like *Plasmodium* parasites within red blood cells.

# **WHAT ARE TESTS FOR DENGUE?**

# DENGUE TESTS

- Complete blood count: neutropenia, lymphopenia, atypical lymphocytosis, thrombocytopenia, and rising hematocrit.
- Urinalysis: proteinuria and hematuria.
- Elevated liver enzymes
- Dengue-specific tests include virus culture, nucleic acid detection by PCR, viral antigen detection, or serology for specific antibodies.
- What other test is useful?

# TOURNIQUET TEST

Also known as capillary fragility test, determines a patient's hemorrhagic tendency.

- A blood pressure cuff is inflated 5 minutes between the systolic and diastolic pressures.
- The test is positive if 20 or more petechiae per square inch
- A positive test result is not specific for dengue infection. Other causes include bacterial sepsis, leptospirosis and other viral hemorrhagic fevers.



**POSITIVE TOURNIQUET TEST**

# TOURNIQUET TEST



You perform a tourniquet test and find 15-20 petechiae per square inch appear distal to the cuff

# WHAT DO YOU KNOW ABOUT DENGUE FEVER?



# DENGUE BACKGROUND

- Caused by an arbovirus with four serotypes. Infection with one serotype of dengue virus provides immunity to only that serotype.
- The vector of dengue virus infection is the *Aedes aegypti* mosquito, which feeds during the day, is adapted to the human habitat, often bites indoors, and breeds in small pools of water.

# DENGUE SIGNS & SYMPTOMS

- Abrupt onset of fever and chills• Severe frontal headache, pain on eye movement, and musculoskeletal and lumbar pain
- Anorexia, nausea and vomiting
- Initial examination is usually nonspecific with scleral injection, generalized lymphadenopathy and bradycardia relative to fever.

# WHAT IS THE TREATMENT FOR DENGUE FEVER?



# DENGUE TREATMENT

- No specific treatment.
- Treat symptoms with rest, fluids, and analgesics. Aspirin and nonsteroidal anti-inflammatory drugs (NSAIDs) should not be used.
- Severe dengue fever requires close monitoring and aggressive fluid and blood product replacement as needed to maintain blood pressure and urine output.



Bleeding From Dengue Hemorrhagic Fever

# HOW IS DENGUE FEVER PREVENTED?



# DENGUE PREVENTION

- Limited use vaccine
- Control of mosquito vectors and protection from mosquito bites.
- Eliminate mosquito breeding sites
- Apply larvicides to larger bodies of water
- Indoor spraying with mosquito adulticides
- Personal protection: clothing insect repellent with DEET, mosquito nets

# QUESTION

Which ONE statement about dengue fever is NOT true?

- A. Dengue antiserum is highly effective.
- B. Vector for dengue is the *Aedes aegypti* mosquito.
- C. Dengue most commonly occurs in Southeast Asia and Latin America.
- D. Treatment is supportive with attention to hemodynamic status.
- E. May progress to hemorrhage and shock.

# ANSWER

Which ONE statement about dengue fever is NOT true?

- A. Dengue antiserum is highly effective.
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# WHAT ARE PRINCIPLES TO DETERMINE WHAT TECHNOLOGY IS APPROPRIATE?



# IS IT RELIABLE?



# IS IT SUSTAINABLE?



# IS IT ACCEPTABLE?



**CAN YOU  
SOLVE THIS  
CASE OF  
RESPIRATORY  
DISTRESS?**



# HISTORY



Five-year old male in southern Africa with three months of weight loss and intermittent diarrhea. Over the last one month he has developed dry cough. For one week he has been breathing rapidly.

# WHAT ARE YOUR QUESTIONS ABOUT THE HISTORY?



# PHYSICAL EXAM



Child is alert and coughing frequently. Temperature is 38 degrees, pulse 100, respirations 30 and labored, capillary refill 2 seconds.

# WHAT ARE YOUR QUESTIONS ABOUT THE PHYSICAL EXAM?



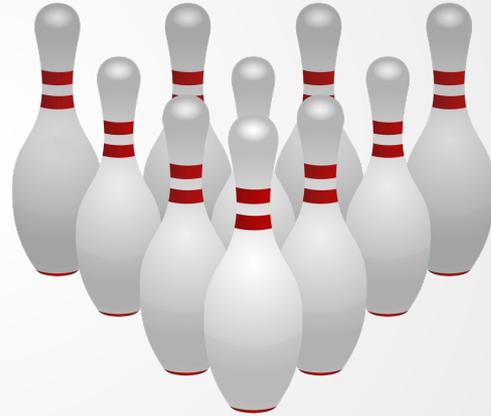
# WHAT IS YOUR DIFFERENTIAL DIAGNOSIS?



# PROGRESSIVE PEDIATRIC RESPIRATORY

Consider:

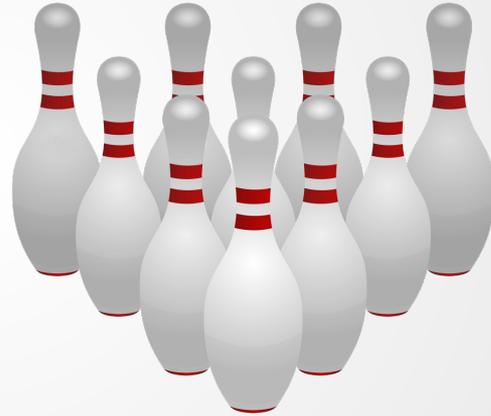
- Pneumonia
- Bronchitis
- Influenza
- Tuberculosis
- Pneumocystis pneumonia (PCP)



# HOW CAN YOU NARROW THIS DIFFERENTIAL?

Consider:

- Pneumonia
- Bronchitis
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# FIRST CONSIDER GEOGRAPHY & EPIDEMIOLOGY

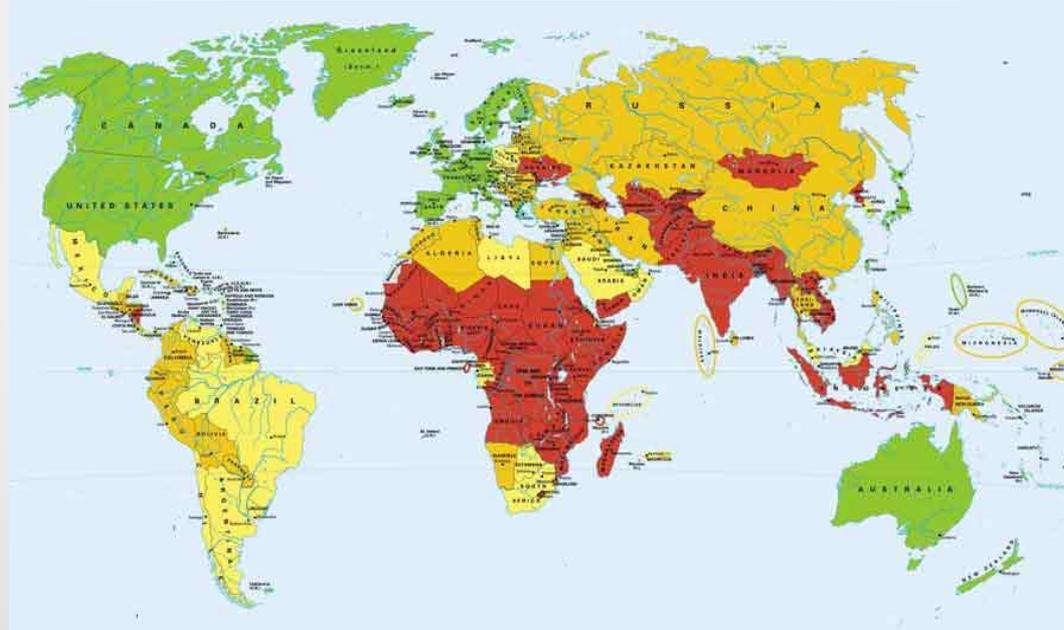


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# WHAT IS THE EPIDEMIOLOGY OF PNEUMONIA & BRONCHITIS?



# WHAT IS THE LEADING CAUSE OF DEATH IN THE DEVELOPING NATIONS?



# LEADING CAUSES OF DEATH – DEVELOPING NATIONS

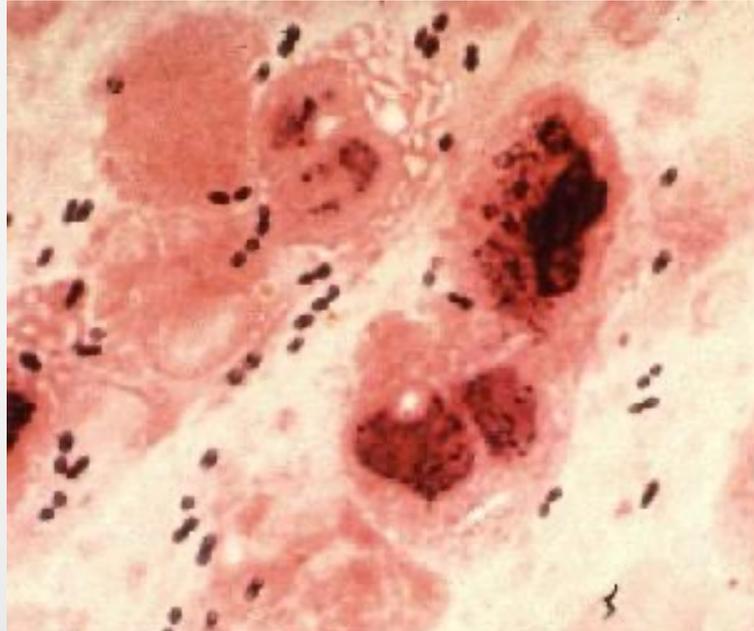
Cause Of Death By Numbers	Deaths In Millions	% of deaths
Pneumonia	2.94	11.2
Coronary heart disease	2.47	9.4
Diarrheal diseases	1.81	6.9
HIV/AIDS	1.51	5.7
Stroke	1.48	5.6
COPD	0.94	3.6
Tuberculosis	0.91	3.5
Neonatal infections	0.90	3.4
Malaria	0.86	3.3
Prematurity a low birth weight	0.84	3.2

# PEDIATRIC PNEUMONIA & BRONCHITIS

Pneumonia and bronchitis are the leading cause of death for children up to age 5 years.



# WHAT ORGANISMS CAUSE PNEUMONIA & BRONCHITIS IN DEVELOPING NATIONS?

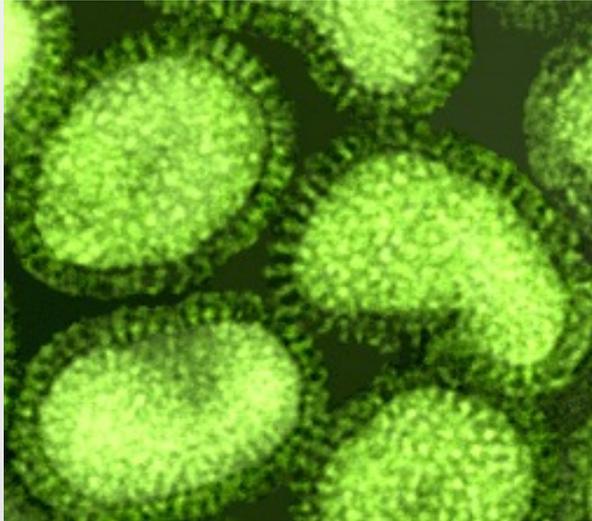


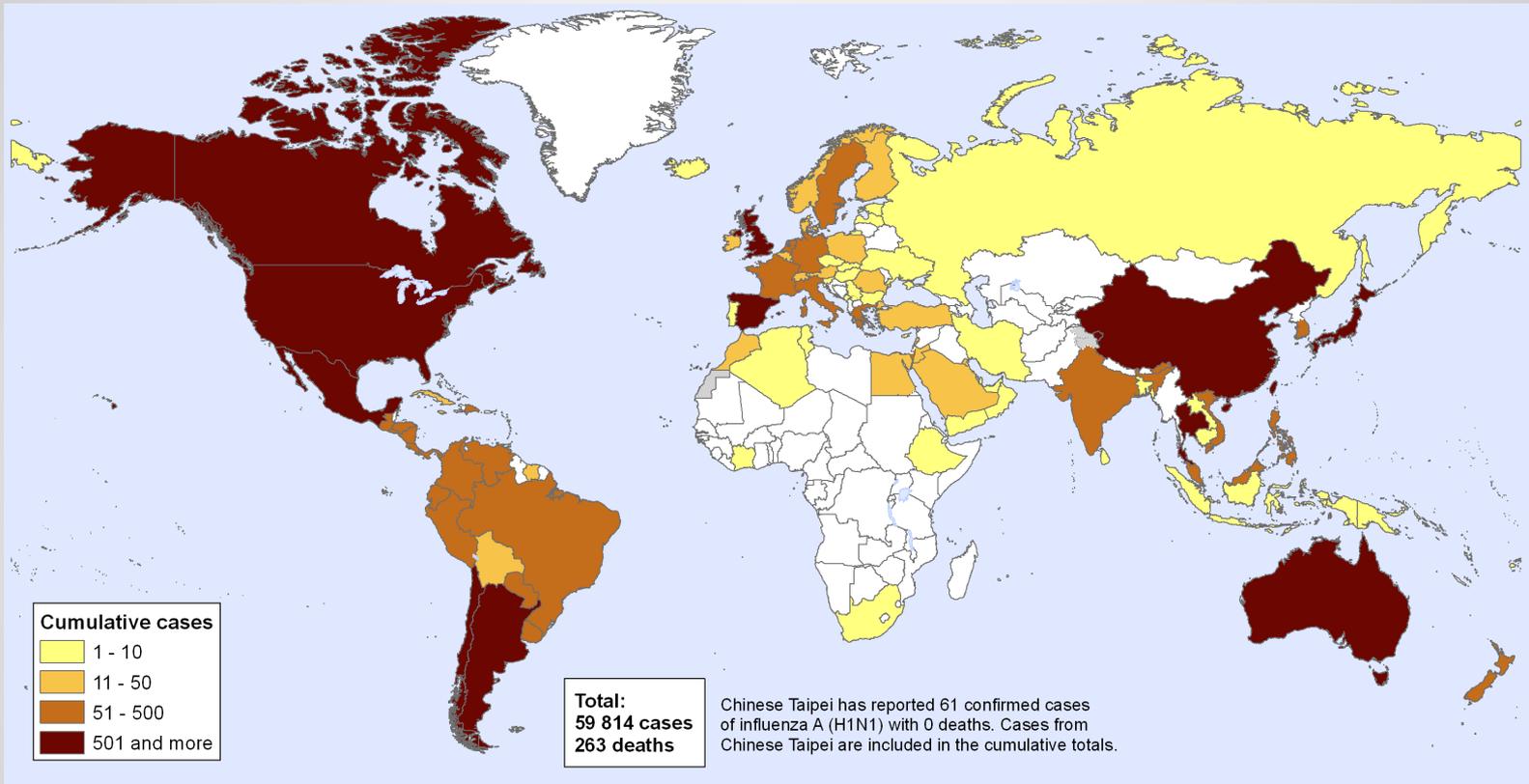
# ORGANISMS CAUSING PNEUMONIA & BRONCHITIS

- Leading Bacteria:  
*Streptococcus pneumoniae*, *Haemophilus influenzae*,  
*Staphylococcus aureus*
- Leading Viral: Influenza,  
parainfluenza, *respiratory syncytial virus*,  
adenovirus



# WHAT IS THE EPIDEMIOLOGY OF INFLUENZA?





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# INFLUENZA

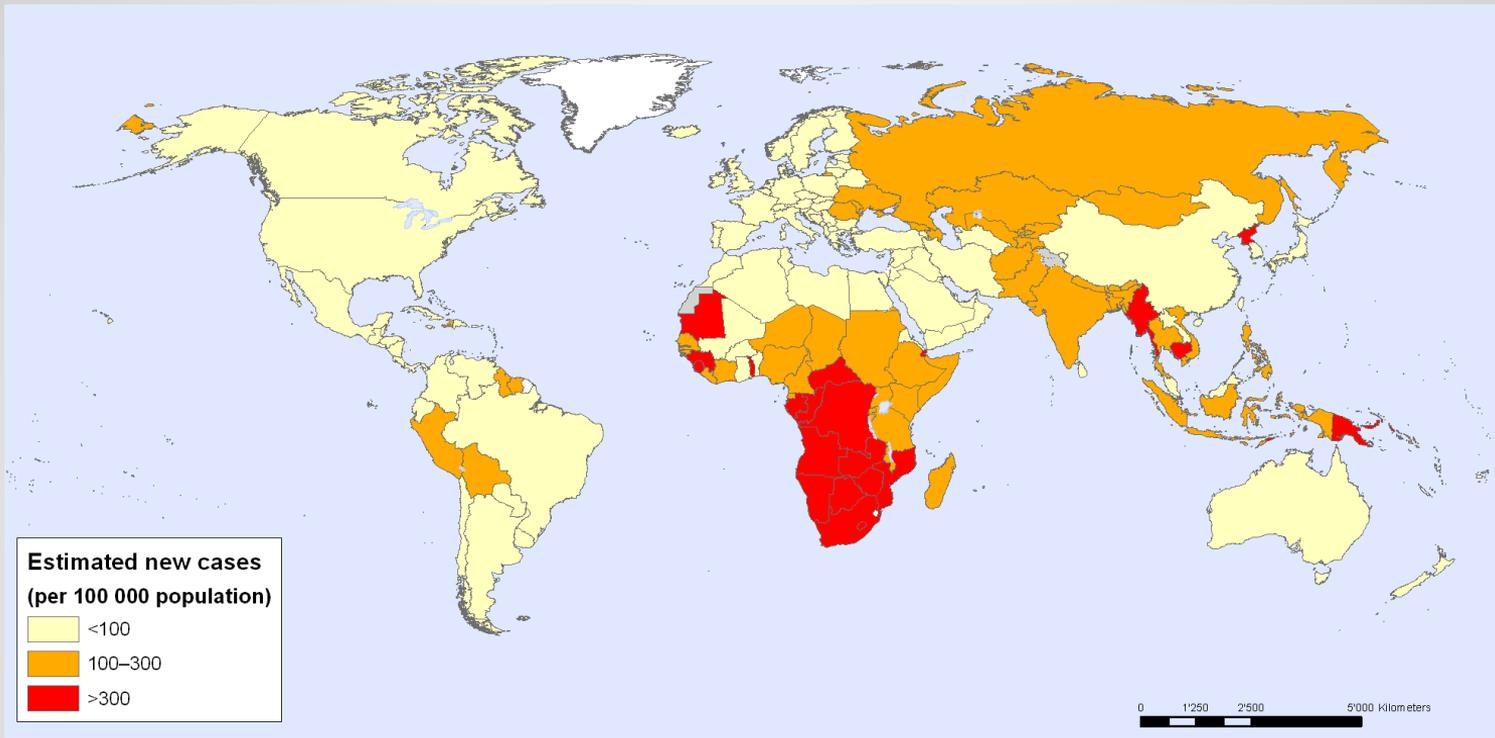
# INFLUENZA PNEUMONIA

- Influenza pneumonia is a lethal complication of generalized influenza infection.
- Vaccination against influenza is critical to prevention.



# WHAT IS THE EPIDEMIOLOGY OF TUBERCULOSIS?





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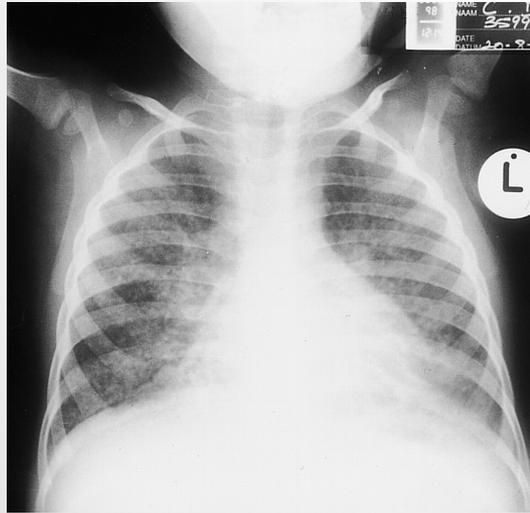
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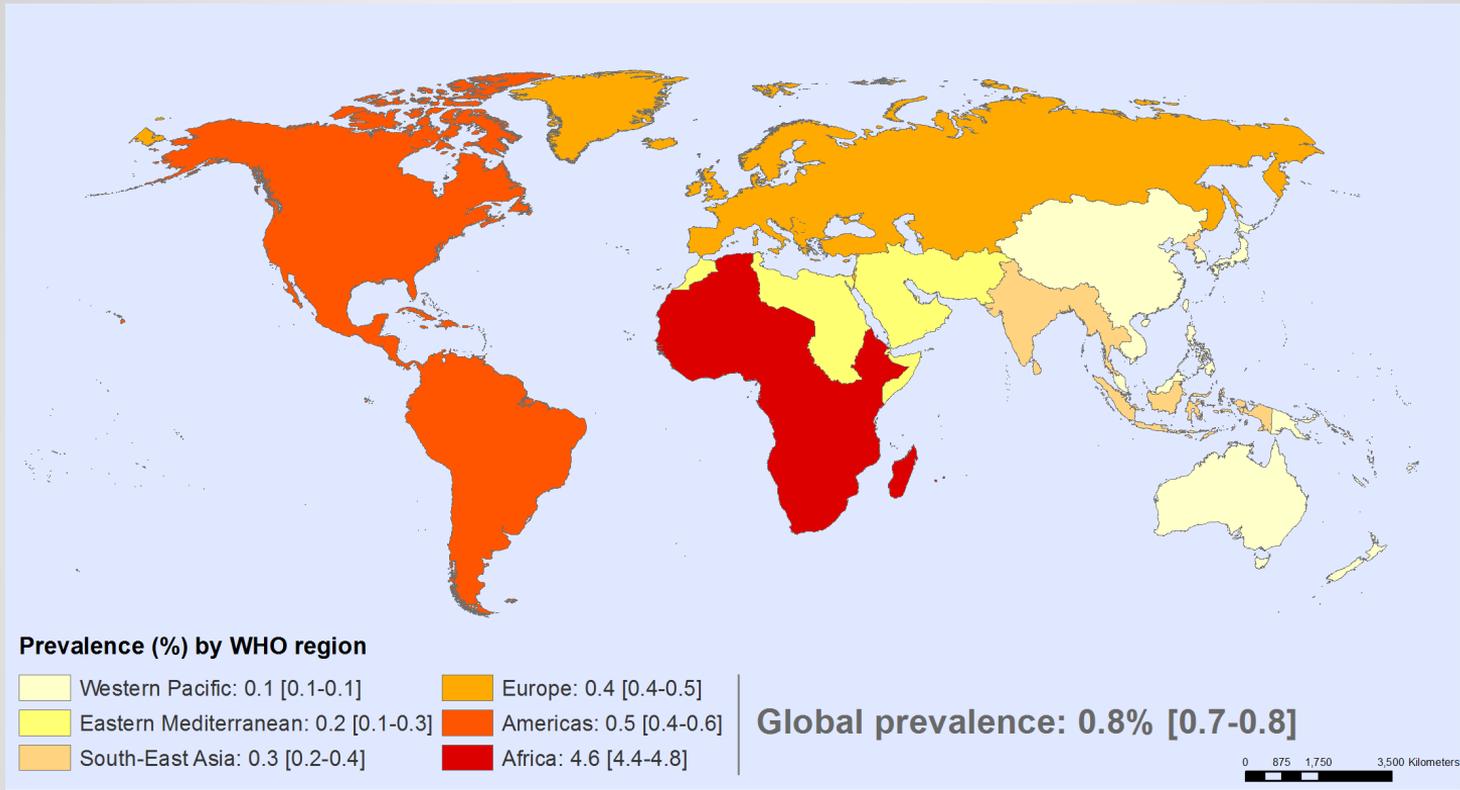
# TUBERCULOSIS INCIDENCE

# TUBERCULOSIS IN CHILDREN

- TB is among the top 10 causes of death among children worldwide.
- Pediatric TB is a low priority in most health programs.
- BCG vaccine is safe and protective in infants and children against TB meningitis and miliary TB.
- TB is especially virulent in HIV-positive children.

# WHAT IS THE EPIDEMIOLOGY OF PNEUMOCYSTIS CARINII PNEUMONIA (PCP-PCJ)?





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# HIV PREVALENCE

# PNEUMOCYSTIS CARINII PNEUMONIA

- A leading infection among those with immunodeficiency.
- Caused by a fungus *pneumocystis jirovecii*.
- Findings include fever, non-productive cough, shortness of breath, weight loss, night sweats, and minimal sputum.
- CXR shows diffuse pulmonary infiltrates.
- Diagnosis is by histological identification of the organism in bronchio-alveolar lavage.

# HOW TO FURTHER NARROW THE DIAGNOSIS?

Consider:

- Pneumonia
- Bronchitis
- Influenza
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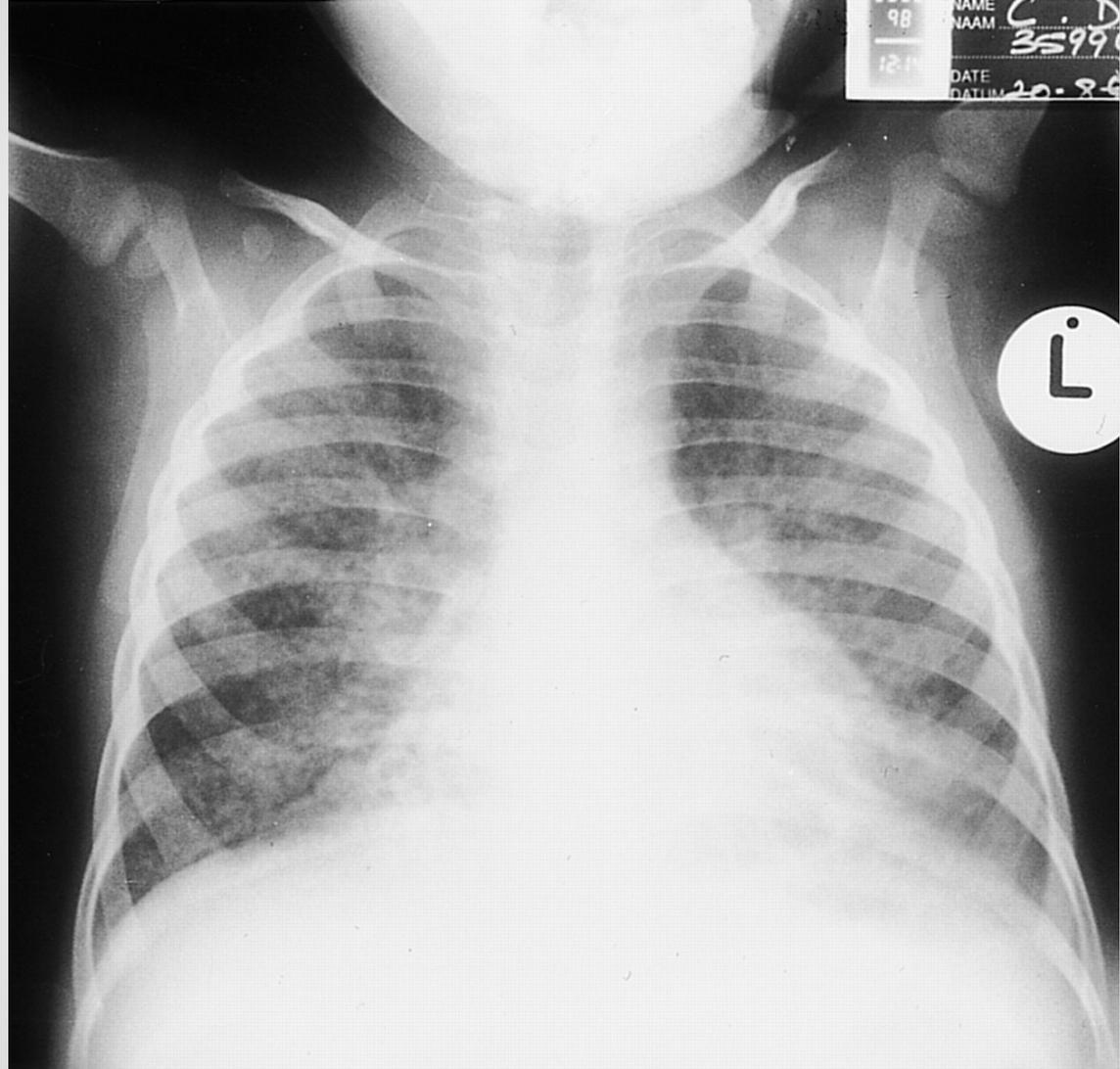


# WHAT BASIC TESTS WOULD YOU RECOMMEND?

Consider:

- Pneumonia
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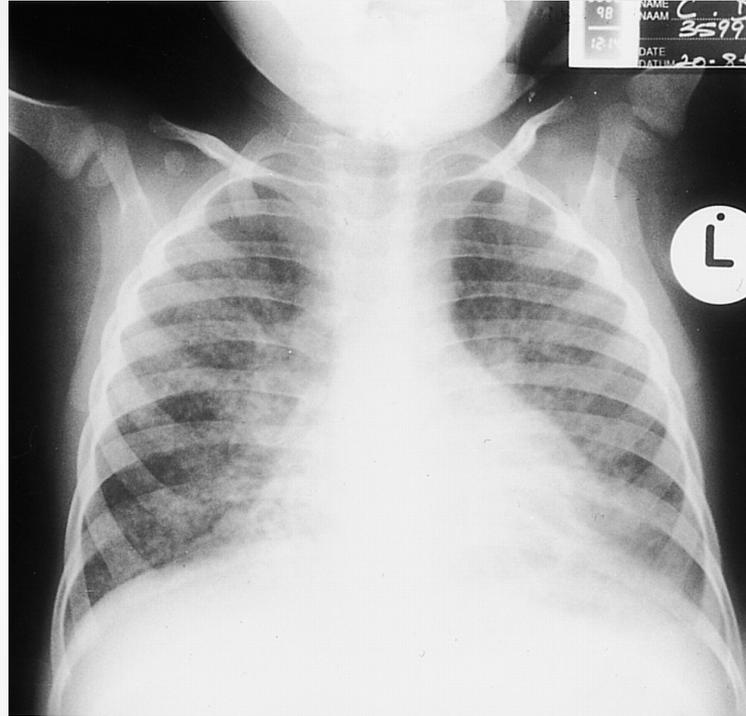
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# LABORATORY TESTS



- Hemoglobin 9, White blood cells 10,000 (Bands 5, Polys 50, Lymph 40, Eos 5)
- HIV antibody test positive
- Sputum sample is unobtainable
- PCP lab testing is not available

**WHAT DO  
YOU KNOW  
ABOUT  
PEDIATRIC  
HIV  
INFECTION?**



# PEDIATRIC HIV INFECTION

- 2.3 million children worldwide are living with HIV, 90% in Sub-Saharan Africa.
- During 2019 160,000 children became newly infected with HIV
- 90% of all HIV-infected children acquired the disease from their mothers during pregnancy, at birth, or through breastfeeding.

# HOW TO PREVENT HIV MOTHER-TO-CHILD- TRANSMISSION?



# PREVENTION OF MOTHER-TO-CHILD HIV

Without intervention, what is the risk a baby will become HIV-infected during pregnancy, at birth, or through breastfeeding?

# PREVENTION OF MOTHER-TO-CHILD HIV

Without intervention:

HIV pos mother has 20% chance of passing HIV to infant in pregnancy or at delivery. 40% if she breast feeds her infant.

# PREVENTION OF MOTHER-TO-CHILD HIV

- Identify and treat HIV positive mothers.
- If not identified earlier, treat mother while in labor and newborn after delivery.
- Reduces risk of newborn infect down to 2-8%.

# QUESTION

Which ONE of the following statements about HIV prevention is TRUE?

- A. Orphans of AIDS victims are at no increased risk of becoming HIV infected.
- B. Barrier contraceptives are nearly 100% effective in reducing risk of acquiring HIV infection.
- C. Prophylaxis of HIV-positive pregnant women greatly lowers risk of mother-to-child transmission.
- D. Treatment of other Sexually Transmitted Infections (STIs) has no influence on the risk of acquiring HIV.
- E. Without treatment, HIV infection has a 47% fatality rate.

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# WHEN TO INITIATE ART IN CHILDREN?



# WHEN TO INITIATE ART IN CHILDREN?

- Infants and children: Start ART immediately upon diagnosis of HIV
- *Especially* in WHO clinical stage 3 or 4 or at onset of first opportunistic infection

# HOW TO TREAT PCP IN CHILDREN?



# HOW TO TREAT PCP IN CHILDREN?

- Maintain adequate oxygenation and hydration
- Benefit from corticosteroid therapy
- First line: trimethoprim-sulfamethoxazole (TMP-SMX) for 21 days
- Second line: pentamidine

## QUESTION

An infant is born to an HIV positive mother, who wants to know whether her child is infected with HIV. Which ONE of the following is TRUE?

- A. A HIV antibody test make a reliable diagnosis
- B. A CD4 count of less than 25% confirms HIV.
- C. PCR testing is reliable in adults but not in children
- D. All of the above
- E. None of the above

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***EVERY PERSON  
CARED FOR  
IS ALSO AN  
OPPORTUNITY  
TO IMPROVE  
YOUR SKILLS***



***POLISH YOUR SKILLS TO  
SERVE FORGOTTEN PEOPLE***



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