Tales from Tenwek: Case studies from Bomet, Kenya

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Disclosures and disclaimers

- No financial disclosures.
- Will not discuss use of off-label medications.
- I am not:
  - An infectious disease specialist
  - A health economist
  - A practicing physician in a resource-poor environment

Objectives

- Recognize the impact of limited resources on health and clinical decision-making
- Describe differences in medical training between US and Kenya

Every patient you see is a lesson in much more than the malady from which he suffers.
- Sir William Osler

Content outline

1. Background
   - Kenya
   - The hospital setting
2. Medical education in Kenya
3. Overview of pediatric medicine in Kenya
   - Common conditions; immunizations; newborns
4. Case studies
5. Conclusions

Republic of Kenya (1963)

- Population: 44 million (2012)
- 69 languages
- 43% below internat.poverty line
- Adult HIV prevalence: 6%
- Infant mortality: 4%
- Under 5 mortality rate: 7%
- 16% children mod-sev underwt
- 35% mod-severe stunting
Paying for health care

National Hospital Insurance Fund (1998)
- Hospital insurance program
- Compulsory for formal sector workers in Kenya (25% of workforce); voluntary for others
- Premiums based on income
- Does not cover surgery

Self-pay
- 1 day in the ICU: 4,000 shillings (1 week's wages)
- CT scan: 8,000 shillings (2 week's wages)
- Patients are not discharged until bill resolved

Medical training in Kenya

Clinical officers:
- Two years post-HS education
- 1 year internship: medicine, surgery, Ob-Gyn, Pediatrics
- Future role: outpatient clinics; some inpatient

Medical officers:
- Medical school (4 years) or 6 years combined
- 1 year internship (as above)
- Future role: inpatient medicine
Differences in medical training

Compared to the US, in Kenya:
- Residents have to pay for their training
- Emphasis on clinical skills rather than technology (testing/treatment)
- Less access to print or electronic information; more reliance on notes, and rote memory
- Great variability in training environment
- No work hours; no vacations during internship

Strategies for improving health in low-resource environment

- Population perspective
  - Immunizations; sanitation; childbirth; HIV control
  - protocols
- Emphasis on clinical examination skills
- Presumptive diagnosis and treatment
- Increased awareness of impact of testing and treatment decisions on families
- Development of low-cost alternatives (ingenuity)

Medical care: Immunizations

- BCG: birth [84%]*
- OPV: birth-2wk, 6, 10, 14 wk [82%]*
- DTP/HepB/HIB: 6, 10, 14 wk [83%]*
- Pneumococcal: 6, 10, 14 wk
- Measles: 9 mos
- Yellow Fever: 9 mos

* Completion rates

Source: http://www.unicef.org/infobycountry/kenya_statistics.html

Common conditions

- Infectious diarrhea with dehydration
- Bacterial meningitis
- Tuberculosis
- Rheumatic fever
- Malnutrition
- HIV infection
- Trauma

Rounds: newborn special care
Newborn care: ingenuity and protocols

Protocols
- Hyper/hypoglycemia
- Hyperkalemia
- Hyperbilirubinemia
- Meconium-stained amniotic fluid
- Birth asphyxia
- TTN
- PDA
- Apnea
- Seizures
- Nutrition/feedings
- IV fluids
- PROM
- Neonatal tetanus
- Maternal syphilis exposure
- Maternal HIV

Cup feeding newborns

10 yr old : altered mental status

A previously healthy 10 year old boy is brought to the hospital following three days of progressive confusion. On arrival in the emergency department, he is disoriented and combative. He is afebrile; vital signs are normal. His neck is stiff with passive flexion and he has copious oral secretions.

One month ago, he was bitten on the hand by a village dog. The dog had been acting ill and attacked the boy without provocation. Following the attack, family members killed the dog. The family took the child to a local healer and he was given a single injection of unknown medicine.

What is your differential diagnosis?

Serum glucose = 80 mg/dL. Which of the following is the most appropriate next step in diagnosis?

A. CBC and blood culture
B. Urine screen for toxins
C. CT scan of the brain
D. Lumbar puncture
E. Chest radiograph

CT scan is not available. Intravenous ceftriaxone is administered and a lumbar puncture is performed.
Results: WBC=10/microL; RBC=10/microL; Glucose = 60 mg/dL; Protein= 100 mg/dL.

Which of the following is the most likely diagnosis?

A. Meningococcal meningitis
B. Cerebral malaria
C. Herpes Simplex meningoencephalitis
D. Human rabies
E. Mycobacterium tuberculosis meningitis

The presumptive diagnosis is human rabies infection. Several medical officers came into contact with the patient’s saliva on their ungloved hands.

True or false?:
All of the medical officers should receive rabies vaccine prophylaxis.
A 5 year old boy is brought to the emergency room for progressive difficulty breathing over the past week. He has intermittent non-productive cough and episodes of fast breathing that have kept him awake at night. On arrival, temperature is 37 degrees, respiratory rate 30/minute, and heart rate 140/minute. Oxygen saturation is 92% on 4L oxygen by nasal cannula. He is alert and in moderate respiratory distress. He has mild scleral icterus. On cardiac auscultation, he has tachycardia and no murmurs. Lung exam shows coarse inspiratory breath sounds bilaterally and increased work of breathing. His abdomen is distended. The liver is difficult to palpate because of abdominal distention, but seems to be enlarged. Skin is mildly jaundiced.

Which of the following is the most appropriate next step in management?

A. Abdominal ultrasound  
B. Chest radiograph  
C. Liver function studies  
D. Paracentesis

Which of the following is the most likely diagnosis?

A. Congestive heart failure  
B. Nephrotic syndrome  
C. Pneumococcal pneumonia  
D. Acute pericarditis

Echocardiogram shows a large pericardial effusion with tamponade. Which of the following is the most appropriate next step in management?

A. Intravenous furosemide  
B. Surgical drainage of effusion  
C. Nebulized albuterol  
D. Intravenous saline bolus

Pre/post pericardiotomy
• Surgery: large amount of purulent pericardial effusion was drained, followed by stripping of the pericardium.
• Histology of the pericardium: neutrophilic infiltration and no granulomas.
• treated with Vancomycin and Ceftriaxone, as well as anti-tuberculosis regimen and did well.

7 mo old: respiratory distress

Previously healthy 7 month old male infant is brought to the emergency department for difficulty breathing. Three days ago he started having difficulty breast-feeding and developed progressive respiratory distress.

On arrival, temperature is 37 degrees; blood pressure 70/50; heart rate 160; respiratory rate 60/minute. Oxygen saturation is 55% on room air. The lungs have coarse breath sounds bilaterally. Heart sounds are difficult to hear because of the breath sounds. Abdomen is mildly distended with normal bowel sounds and no organomegaly.

The child is intubated and ventilated with 100% oxygen with no improvement in oxygen saturation. Breath sounds are symmetrical and there is symmetrical chest rise with ventilation.

What is the most appropriate next step in management?
A. Chest radiograph
B. Nebulized albuterol
C. Intravenous ampicillin
D. Electrocardiogram
E. Complete blood count with differential
F. Intravenous normal saline bolus

7 mo old: respiratory distress

• What is your differential diagnosis?
• What is the next step in management?
10 mo old: altered mental status

A previously-healthy 10 month old boy is brought to the emergency department for altered mental status and seizures. He was well until 5 days ago, when he developed decreased activity, decreased oral intake and seemed sleepier than usual. These symptoms progressively worsened. One day prior to arrival, he had two generalized tonic-clonic seizures and was irritable alternating with sleepiness. He had intermittent “hotness of body” (subjective fever) and vomited twice the day prior to admission. No family members have been ill. In the emergency department, he is lethargic. Temperature is 38 degrees; heart rate 75/minute; respiratory rate 30/minute. Pupils are equal and sluggishly reactive to light. Anterior fontanel is bulging. When open, the eyes demonstrate downward gaze bilaterally.

What is your differential diagnosis?

Serum glucose is 90 mg/dL.

What is the most appropriate next step in evaluation?
A. Serum electrolytes
B. Chest radiograph
C. Blood culture
D. CT scan of brain
E. Complete blood count with differential

Which of the following is the most etiology for this patient’s hydrocephalus?
A. Cerebral malaria
B. Mycobacterium tuberculosis meningitis
C. Cysticercosis
D. Acute lead intoxication

Summary

- Medical decision-making is necessarily impacted by resources available (as well as culture and environment)
  - Shortage of health professionals
  - Health care financing issues
  - Access to technology
- Strategies for improving health in low-resource environment
  - Public health efforts
  - Training; building clinical skills
  - Innovation
  - Protocols
Our response

What can we do to make a difference?
• Educate ourselves
• Think critically/reflect
• Help build capacity through partnership

Thanks to: my family

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