University of Colorado - University of Zimbabwe Medical Education Partnership
View of the Visiting Professor

David Cohn, MD
Global Health Lecture Series

October 2, 2013
Outline and Objectives

• Case Presentation
• Overview of University of Colorado-University of Zimbabwe medical education partnership
• Historical and demographic information about Zimbabwe
• Epidemiology of HIV and TB situation
• Spectrum of disease on Medicine wards and outpatient clinics of Parirenyatwa Hospital
• Visits to Wilkins TB and Beatrice Road Infectious Diseases Hospitals
• Selected travel pics
• Summary and Questions
Case presentation - 1

- 35 yo male with HIV infection referred to KS Clinic at Parirenyatwa Hospital for biopsy and confirmation of suspected diagnosis, management
- 4 month history of sores in left leg and groin, increasing in size and pain, swelling of leg and scrotum
- CD4 cell count 269/uL, on ART (?d4T/3TC/NVP - Triviro)
- PE Wheeled into exam room on a gurney, foul-smelling pervasive odor, wasting of face and upper body, flies around the bed sheet
- Next slide, please
Contiguous plaque-like necrotic lesions with tissue maceration and exudate of left upper thigh, penile and scrotal edema
Brawny induration of entire left leg
Chest X-ray - Bilateral infiltrates
Case presentation - 2

- Diagnosis of extensive Kaposi’s sarcoma with lymphatic involvement and lymphedema, no need for a biopsy; ?pulmonary KS, r/o TB
- Admission considered to Parirenyatwa Hospital, but head matron said patient needed to be returned to referring hospital, otherwise wards would be packed with similar patients from all over the country
- Sent back to Gweru District hospital with recommendation for debridement, oral clindamycin, topical metronidazole powder, and icing sugar to lesions to decrease the odor
- Chemotherapy regimen doxorubicin and vincristine, provided from Dr. Borok’s supply (from ZATA Project donations)
- Pharmacy student whispers to me “Why did he let this get so bad before he came in?”
Medical Education Partnership Initiative (MEPI)  
Fogarty International Center, NIH

• For institutions in Sub-Saharan African countries which receive PEPFAR support and their partners
• To develop or expand and enhance models of medical education in Sub-Saharan Africa
• Models are intended to:
  – Support PEPFAR goal of increasing the number of new health care workers by 140,000
  – Strengthen medical education systems in the countries
  – Build clinical and research capacity in Africa as part of a retention strategy for faculty of medical schools and clinical professors
• Linked awards that focus on diseases and priority health areas related to and/or beyond HIV/AIDS (e.g., maternal and child health, cardiovascular disease and stroke, injury, mental health)
Medical Education Partnership Initiative (MEPI) programs
University of Zimbabwe College of Health Sciences
University of Colorado School of Medicine
Stanford University School of Medicine

Novel Education Clinical Trainees and Research Program (NECTAR)
Cerebrovascular, Heart Failure, Rheumatic Heart Disease Intervention Strategies (CHRIS)
Improving Mental Health Education and Research Capacity in Zimbabwe (IMHERZ)
In 2010, 39% of faculty positions were filled (n=122/314)

Only 33% of govt. doctor posts filled

Only 19% of Intern Med "residency" spots filled

Had to decrease Med Student Enrollment by 49%

- Only 33% of govt. doctor posts filled
- No. docs ↓ 45%
Zimbabwe MEPI Strategy

1. Train more doctors
   - Improve curriculum
   - Update technology
   - Improve faculty teaching skills

2. Keep doctors in Zimbabwe
   - Train and support medical educators
   - Retain students in Zimbabwe
   - Improve community-based learning

3. Encourage research
   - Mentor researchers
   - Develop research skills
   - Support researchers
Visiting Professors and Lecturers Program

• Collaborate with UZCHS faculty in:
  – Teaching, mentoring
  – Curriculum development and implementation
  – Patient care in Zimbabwe

• Corps of trained U.S. faculty in internal medicine, pediatrics, obstetrics/gynecology, surgery and basic sciences

• Decompress teaching burden of UZCHS faculty to allow their participation in NECTAR training programs

• Develop relationships between UZCHS faculty and faculty at U.S. institutions outside the specialty of infectious diseases
  – Support multidisciplinary teaching and mentoring
  – Foster future research collaborations and grant applications related to health priorities in Zimbabwe

• Phase-out of U.S. faculty over time, with maximum participation in 1st 2 years, limited in 5th year
My activities as a visiting professor and lecturer

- Assisted with development of draft curriculum on TB
- Lectures to MMeds and OI Clinic clinicians on TB and TB/HIV, Pulmonary complications of AIDS
- Lectures to 5th year medical students on TB and TB/HIV; case presentations; chest x-ray conference
- Taught pulmonary exam to 3rd year medical students at bedside
- Ward rounds on Medicine Service at Parirenyatwa Hospital
- Kaposi’s sarcoma and Medicine clinics
- Visits to Wilkins and Beatrice Road Infectious Diseases hospitals, research and central TB laboratory facilities
- Meetings with public health officials from Zimbabwe and Harare to discuss TB situation, and educational activities with NECTAR
- Meeting with CDC Country Director to discuss joint educational opportunities, including STD/HIV prevention
Faculty development workshop
The Great Zimbabwe National Monument
UNESCO World Heritage site
Zimbabwe - 1

• Former British crown colony of Southern Rhodesia. Population 12.5 million

• Life expectancy: 61 years 1990, 37 years 2006
  Infant mortality rate: 53/1000 1990, 81/1000 2009

• HIV prevalence: 27% in 1997, 24% in 2001, 18% in 2005, 14% in 2009

• Gross national income per capita: $170
  Expenditure on health per capita in 2001: $56

• Exodus of doctors and teaching staff: 2008 - 62% of posts for doctors nationally, 73% of central hospital consultant posts were vacant.
  2010 - 39% of UZCHS faculty positions filled
  2006 to 2009: 49% decrease in medical student enrollment

• Adult literacy rate 90% (highest in Africa)
Zimbabwe

- Economy in tatters with rampant inflation, critical food and fuel shortages, endemic poverty and unemployment, political strife and repression
- Was a major tobacco producer, and a potential bread basket for surrounding countries
- Downward spiral of the economy due to mismanagement and corruption of the Mugabe regime; eviction of more than 4,000 white farmers in controversial land redistribution of 2000
- Lucrative mining sector, with some of the world's largest platinum reserves. Marange diamond fields, discovered in 2006, biggest diamond find in over a century. Most revenues disappear into the pockets of army officers and politicians
- 60% of Zimbabwe's wildlife has died since 2000 due to poaching and deforestation
Protesters against the Mugabe regime abroad
Protests are "discouraged" by police in Zimbabwe

President Mugabe “re-elected” in 2013 at age 89
Hyperinflation 2003-2009

• Inflation rose from an annual rate of 32% in 1998, to an official estimated high of 11,200,000% in August 2008; Central bank introduced a new Zim$100 billion note

• November 2008 - Annual inflation rate at 516 quintillion%, with prices doubling every 1.3 days (second only to the hyperinflationary crisis of Hungary in 1946, in which prices doubled every 15.6 hours)

• January 2009 - Central bank introduced a new Zim$100 trillion banknote

• January 29, 2009 - Finance Minister announced that other more stable currencies (U.S. dollar, euros, South African rand and British pound) could be used alongside Zim$

• February 2, 2009 - 12 zeros were to be taken off the currency, with 1,000,000,000,000 (third) Zim$ being exchanged for 1 new (fourth) Zim$. New banknotes were introduced with a face value of Z$1, Z$5, Z$10, Z$20, Z$50, Z$100 and Z$500. Legal tender until June 30, 2009

• 2011 - U.S. dollar and South African rand used as currency
Who wants to be a Millionaire?  A Billionaire?  A Trillionaire?
Nah, it ain’t worth 2 bucks
Pics from Harare
Main Causes of Death, Zimbabwe - 2008

Diagnosis

- Signs, Symp & ill-defined conditions
- Nutritional Deficiencies
- Malaria
- Meningococcal & other Meningitis
- Cer. Conditions orig. Per period
- HIV related/AIDS
- Intestinal Infections
- Pulmonary TB
- Other viral Diseases
- ARI

Number of Deaths

Source: National Health Profile 2008
# HIV and AIDS Estimates

## Zimbabwe, 2001 and 2009

<table>
<thead>
<tr>
<th>Variable</th>
<th>2001</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total no. living with HIV</td>
<td>1,700,000</td>
<td>1,200,000</td>
</tr>
<tr>
<td>HIV prevalence (15-49 yo), %</td>
<td>23.7</td>
<td>14.3</td>
</tr>
<tr>
<td>Women (&gt;15 yo) living with HIV</td>
<td>890,000</td>
<td>620,000</td>
</tr>
<tr>
<td>Children (0-14yo) living with HIV</td>
<td>160,000</td>
<td>150,000</td>
</tr>
<tr>
<td>Incidence rate (15-49 yo)</td>
<td>1.94</td>
<td>0.84</td>
</tr>
<tr>
<td>Total newly infected with HIV</td>
<td>--</td>
<td>62,000</td>
</tr>
<tr>
<td>AIDS-related deaths</td>
<td>130,000</td>
<td>83,000</td>
</tr>
<tr>
<td>Orphans (0-17 yo) due to AIDS</td>
<td>760,000</td>
<td>1,000,000</td>
</tr>
</tbody>
</table>

WHO/UNAIDS Global Report 2010
Proportionate Mortality due to HIV-related Disease (including TB) in persons 15-44 years old Bulawayo and Harare Zimbabwe, 1988-2008

Dlodlo, et al. JAIDS 2011; 14 (Suppl 1): 52
Antiretroviral Therapy
Making a difference

Lamivudine-Stavudine-Nevirapine “Triviro”
Most common regimen
But, Tenofovir moving in…
## Use of Antiretroviral Therapy
### Zimbabwe, 2009

<table>
<thead>
<tr>
<th>Variable</th>
<th>Number</th>
<th>Coverage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Receiving ART</td>
<td>218,589</td>
<td>--</td>
</tr>
<tr>
<td>37% men, 63% women</td>
<td></td>
<td></td>
</tr>
<tr>
<td>90% adults (&gt;15 yo), 10% children</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Needing ART based on 2006 WHO guidelines (AIDS, CD4 &lt;200)</td>
<td>450,000</td>
<td>49%</td>
</tr>
<tr>
<td>Needing ART based on 2010 WHO guidelines (AIDS, CD4 &lt;350)</td>
<td>640,000</td>
<td>34%</td>
</tr>
<tr>
<td>Pregnant HIV+ women needing ART to prevent MTCT</td>
<td>50,000</td>
<td>56%</td>
</tr>
<tr>
<td>Pregnant women tested for HIV</td>
<td>175,223</td>
<td>46%</td>
</tr>
<tr>
<td>Infants born to HIV+ mothers who received ART</td>
<td>17,331</td>
<td>35%</td>
</tr>
</tbody>
</table>

WHO/UNAIDS Global Report 2010
Crude Death Rate in Bulawayo and Harare, Zimbabwe, 1979-2008

Dlodlo, et al. JAIDS 2011; 14 (Suppl 1): 52
Parirenyatwa Hospital - University of Zimbabwe
College of Health Sciences
Medical Wards C7 and C8
Long, long hallways
Jake and Tendayi
Talking care of business
Teaching Rounds - Medicine Service
Teams of 1 attending, 1 MMed, 4 JRMOS, 5th year medical students
HIV-related

Cryptococcal meningitis
Tuberculosis: pulmonary and extrapulmonary
Kaposi’s sarcoma: cutaneous, lymphatic, pulmonary
Bacterial pneumonia and empyema
Herpes zoster
CNS mass lesions: toxoplasmosis, lymphoma, tuberculoma
Myelopathy, Guillain-Barre syndrome
Wasting
Seborrheic dermatitis
Prurigo nodularis
Lactic acidosis
Medical conditions on wards and clinics
of Parirenyatwa Hospital - 2

With or without HIV

Rheumatic heart disease
Hypertension
Congestive heart failure
Stroke
Seizures
Renal failure: acute and chronic
Nephrotic and nephritic syndrome
Cirrhosis
Diabetes mellitus
Malaria
Typhoid fever
Pellagra

Meningitis
Schistosomiasis with bladder obstruction, stones, cancer, portal hypertension
Anemia - B12 deficiency with neuropathy
Iron deficiency with hookworm
Addison’s disease
Lymphoma, Hodgkin’s disease
Acute leukemia
SLE with nephritis
Organophosphate overdose
8kg weight loss, 1 week Hx abnormal mental status to coma, Cr 12, K 9.0 - New Dx HIV, CD4 116
Recovered after peritoneal dialysis, ART

Peritoneal dialysis set-up on the wards
61yo HIV Dx 2006 on TDF/ZDV/3TC, Hx prior TB
Leg weakness, wasting, r/o CNS TB, on re-treatment Rx

Scarification for prior illness? Tribal ritual?
New Dx AIDS, seizures
Cryptococcal meningitis, India Ink positive
On floor mattress as seizure precaution, fall risk
31 yo HIV CD4 104; Lt nodular infiltrate, ?hilar adenopathy, AFB smear-negative; Presumptive TB

Rx co-trimoxazole, anti-TB Drugs
25 yo with superior vena cava syndrome
Mediastinal mass on CXR, HIV negative, LDH >4,000

Lymph node biopsy - lymphoma
44 yo rheumatic heart disease, cardiomegaly, congestive heart failure

ECHO - aortic insufficiency, mitral regurgitation
Pulmonary systolic BP 50mm Hg
79 yo Hx hypertension, Right hemiparesis

CT scan - Left basal ganglia hemorrhagic CVA
35 yo with pellagra - History of carbohydrate diet only

“Casal necklace”
CCU - 43 yo rheumatic heart disease, atrial fibrillation, cardiogenic shock, severe CHF; Rx dobutamine, digoxin, furosemide, enoxaparin. Delirium ? due to digoxin, Na 161

She walked out of the hospital

ECHO - severe mitral stenosis, mitral and tricuspid regurgitation
MICU - 14 yo organophosphate poisoning, Rx atropine - Nursing notes

Plan:
1. CT Ventilation
2. Chase ENT surgeons
3. Diazepam 10mg IV per fit
4. Fit Chart
5. Sedation to 2mls 1hr
6. Stop Inotropes
7. Chat physiotherapy
8. Fluids to 125mls/hr
9. Consult General Surgeons
10. Repeat UTES

We treat and God heals Bed No 1
The Inn at Great Zimbabwe and Lake Kyle Game Reserve
Kaposi’s Sarcoma Clinic
A busy place every Thursday morning

Dr. Margaret Borok
Clinic Director
3 Students
Justice, Johnson and Warning
29 yo new HIV Dx, CD4 197 Rx d4T/3TC/NVP
KS lesions on gingiva (after ART), nose, toe
Cough for 3 months

CXR - Left lung nodules
KS vs TB
15 yo orphan, perinatal transmission, HIV Dx 9 yo
KS Dx 13 yo; Rt leg edema, residual KS after prior Rx
Out of care, CD4 count 3/uL
Wilkins Hospital Clinic Complex
Wilkins Hospital MDR-TB Clinic
28yo HIV, Hx hemoptysis, neuropathy, wasting, 39kg
Failed prior anti-TB Rx twice, *M.tb* resistant to HRSE

Start Levofloxacin, Kanamycin, Cycloserine, Ethionamide, PZA (standard MDR-TB Rx for Zimbabwe)

CXR multiple cavities
RUL volume loss
Beatrice Road ID Hospital TB Ward

3rd floor being remodeled to be MDR-TB isolation ward
## Epidemiology of Tuberculosis in Zimbabwe 2011 Estimates

<table>
<thead>
<tr>
<th>Metric</th>
<th>Value</th>
</tr>
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<tbody>
<tr>
<td>Population (thousands)</td>
<td>13,000</td>
</tr>
<tr>
<td>Incidence (all cases/100,000/yr)</td>
<td>603</td>
</tr>
<tr>
<td>Trend in incidence rate 2009-2011 (%/yr)</td>
<td>-4.9</td>
</tr>
<tr>
<td>Prevalence (all cases/100,000/yr)</td>
<td>547</td>
</tr>
<tr>
<td>Mortality (deaths/100,000/yr)</td>
<td>47</td>
</tr>
<tr>
<td>Of new TB cases, % HIV tested</td>
<td>88</td>
</tr>
<tr>
<td>Of TB patients tested for HIV, % HIV+</td>
<td>60</td>
</tr>
<tr>
<td>New TB cases, % MDR</td>
<td>1.9</td>
</tr>
<tr>
<td>Previously treated TB cases, % MDR</td>
<td>8.3</td>
</tr>
</tbody>
</table>

*WHO Global Tuberculosis Report, 2012*
Estimated TB Incidence Rates, 1990-2011
Africa and Zimbabwe

Green lines estimated incidence rates; Red lines rates in HIV-positive TB
Shaded areas represent uncertainty bands
Co-trimoxazole prophylaxis and ART in patients with HIV-related TB
Zimbabwe, 2003-2011

WHO Global Tuberculosis Report, 2012
Beatrice Road ID Hospital
Isolation ward for other communicable disease outbreaks
Suspected to have typhoid fever: Stool, urine, blood cultures pending; Rx Ciprofloxacin
MEPI Teaching Program Activities
January 2011 - July 2013

• Guided UZCHS faculty in development of a competency-based curriculum for MMed
• 66 faculty from partner institutions spent time at UZCHS as visiting professors, mentors, evaluators, and program leaders (several with multiple visits)
  – Conducted 15 workshops (172 contact hours)
  – 1,266 contact hours of didactic and bedside teaching
Why should one consider being a Visiting Professor and Lecturer?

- Observe a broad spectrum and/or severity of pathology and clinical entities not seen in Colorado
- Challenge your diagnostic skills in the absence of some laboratory and radiographic tests; enhance knowledge
- Gain cultural competence as a physician and teacher in a resource-limited setting
- Teach students, residents and faculty who are eager to learn and appreciate your expertise
- Make a small but meaningful contribution in tackling a huge problem
- May participate in other projects or activities (e.g., TB, STD)
- Do the right thing, and do it well
- Will actually palpate PMI in anterior axillary line and hear an S3
- Go on a safari and/or see Victoria Falls
Zimbabwe MEPI - Early Progress

- UZCHS faculty ↑29% (120→155)
- Undergraduate student enrollment ↑19% (725→865)
- Students planning to practice in Zimbabwe after graduation 54%→68%
- Medical practitioners in Zimbabwe ↑63% (998→1628)
- New student intake
  - ↑200% for undergrads
  - ↑38% for MMeds
A Bit of Perspective on Zimbabwe
The Good, the Bad and the Ugly

• **The Ugly**: Downtrodden economy, enormous morbidity and mortality, ravages of the land and property, wasting of resources, disregard for human rights

• **The Bad**: Notorious head of state, corrupt politicians, social and economic disparities, history of one oppressive government after another, setbacks in health

• **The Good**: Great people with amazing attitude and fortitude, stabilization of economy, high level of education, sound infrastructure (or potential to rebuild), reversals in disease trends, new programs like NECTAR designed to restore and improve

• **The Uncertain**: Future leadership, sustainability of current efforts, foreign aid and future alliances
Acknowledgements

• University of Colorado School of Medicine
  – Tom Campbell, Principal Investigator, NECTAR
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  – Suzanne Brandenburg, Visiting Professors and Lecturers program
  – Nancy Madinger, Mentored Clinical Scholars program
  – Eva Aagaard, Faculty Development program
  – Ed Havranek, Principal Investigator, CHRIS
  – Suzanne Fiorillo, Project Coordinator

• University of Zimbabwe College of Health Sciences
  – James Hakim, Principal Investigator, NECTAR
  – Margaret Borok, Mentored Clinical Scholars program
  – Andrew Reid, Clinical Research Center
  – Frances Cowan, Principal Investigator, IMHERZ
  – Taririro Makadzange, OI Clinic Director
  – Jonathan Gandari, UZCHS Coordinator
  – Stanley Mungofa, Director of Health Services, City of Harare
  – Peter Kilmarx, Country Director, CDC
  – Tendayi Maunganidze and Caroline Tazvivinga, Administrative staff
Thank you!
Victoria Falls - One of the Seven Natural Wonders of the World

Zimbabwe side

Zambia side

Thank you!