MULTIPLE ASPECTS OF CHRONIC DISEASES IN THE AMERICAS

Master of Public Health Field Experience

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Kansas State University
April 28, 2011
Outline

• Internship overview

• Pan American Health Organization

• Core project - Dual threat of diabetes mellitus (DM) and tuberculosis (TB) in the Americas

• Additional activities
Internship overview
PAHO internship program

Purpose
• Realities of working at a large PH agency
• Pan American Health Organization (PAHO/WHO)

Specific goals
• Population-level analysis
• Strategic initiatives

Primary focus
• Chronic disease
PAHO internship program

- May 18 – August 13, 2010
- PAHO headquarters, Washington, D.C.
- Noncommunicable Disease Unit
PAHO internship program

Core project
- Cross-unit project
- Association of DM prevalence and the incidence of TB

Additional activities
- Health in the Americas
- Atlas of Diabetes Education in Latin America and the Caribbean
- Chronic Care Passport
- Grant proposal
- Economic evaluation of chronic diseases
Pan American Health Organization
PAHO

- Specialized organization for health of the Inter-American System (since 1902)
- Regional Office for the Americas of the World Health Organization (WHO) (since 1949)
- 35 member States and Territories
- 28 country offices
- 10 regional and subregional centers
Mission

- To lead strategic collaborative efforts among member states and other partners
  - To promote equity in health
  - To combat disease
  - To improve the quality of, and lengthen, the lives of the peoples of the Americas
Organizational Chart of the Pan American Sanitary Bureau

Director (D)
Mirta Roses Periago

Office of Legal Counsel (LEG)
Heidi Jimenez

Country Focus Support (CF8)
Marina Licha Salomón

Office of the Director (DIR)
Catherine Cocco

Internal Oversight and Evaluation Services (IEB)
David O’Regan

Deputy Director (DD)
Jon Kim Andrus

Assistant Director (AD)
Socorro Gross Galliano

Director of Administration (AM)
Guillermo A. Birmingham

Health Surveillance
Disease Prevention
and Control
Noncommunicable Disease Unit

• Established in 1995

• Special emphasis on cardiovascular disease, cervical cancer, and diabetes
Core project: Dual threat of DM and TB

Background
Burden of tuberculosis

- The Americas
  280,000 per year

- 2nd leading cause of death from an infectious disease

- 95% low- and middle-income countries
Burden of diabetes

The Americas

- 2010 – 55 million
- 2030 – 83 million
“Disease of affluence”? 

Top 10: Number of people with diabetes (20-79 years), 2010

<table>
<thead>
<tr>
<th>COUNTRY/TERRITORY</th>
<th>2010 MILLIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 India</td>
<td>50.8</td>
</tr>
<tr>
<td>2 China</td>
<td>43.2</td>
</tr>
<tr>
<td>3 United States of America</td>
<td>26.8</td>
</tr>
<tr>
<td>4 Russian Federation</td>
<td>9.6</td>
</tr>
<tr>
<td>5 Brazil</td>
<td>7.6</td>
</tr>
<tr>
<td>6 Germany</td>
<td>7.5</td>
</tr>
<tr>
<td>7 Pakistan</td>
<td>7.1</td>
</tr>
<tr>
<td>8 Japan</td>
<td>7.1</td>
</tr>
<tr>
<td>9 Indonesia</td>
<td>7.0</td>
</tr>
<tr>
<td>10 Mexico</td>
<td>6.8</td>
</tr>
</tbody>
</table>

Epidemiologic transition

Infections (TB) → Chronic conditions (DM)

Infections (TB) → Chronic conditions (DM)
Co-occurrence of TB and DM
TB and DM interaction

Chronic hyperglycemia → Defects in protective immunity → Enhanced susceptibility to infection

DM is a risk factor for TB
RR = 3.11

Core project: Dual threat of DM and TB

Study description
Goal

- To estimate the association of DM prevalence and the incidence of TB in countries across the Americas
Objectives

- To assess the proportion of incident cases of TB attributed to DM
- To assess the number of cases of TB that could be prevented with the elimination of DM
Methods and data

- Ecologic analysis

<table>
<thead>
<tr>
<th>Data</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incidence of TB (all forms)</td>
<td>World Health Organization, 2009</td>
</tr>
<tr>
<td>Prevalence of DM</td>
<td>Diabetes Atlas, 2009</td>
</tr>
<tr>
<td>RR of TB/DM</td>
<td>Kim et al., 1995</td>
</tr>
</tbody>
</table>
Data processing

- Age interval input data for the prevalence of DM and incidence of TB did not match
  - We applied prevalence of DM to single-year age populations
  - We regrouped data in similar age categories for both conditions

- Sex- and age-specific data for the incidence of all forms of TB were calculated based on statistics for smear-positive cases of TB
Data analysis

- TB incidence rate, number of cases per 100,000
- DM prevalence, %
- Population attributable fraction, PAF
  - Proportional reduction in the incidence rate of TB that would theoretically be achieved by eliminating DM in the population

\[
PAF = \frac{P_{DM} (RR - 1)}{1 + P_{DM} (RR - 1)}
\]

\[P_{DM} = \text{prevalence of DM}\]
\[RR = \text{relative risk for TB associated with DM}\]
Data analysis

- Incidence rate of TB related to DM
  \[
  \text{PAF} \times \text{TB incidence rate}
  \]

- Number of incident cases of TB related to DM
  \[
  \text{PAF} \times \text{number of TB incident cases}
  \]
Study Results
Results

- 26 countries from the Americas Region
- 520,318,334 population 25 – 79 years of age
Incidence rate of TB cases per 100,000 population

Puerto Rico

Canada

USA

Cuba

Jamaica

Costa Rica

Chile

Mexico

Uruguay

Trinidad & T

Argentina

Ecuador

Paraguay

Nicaragua

Panama

Brazil

El Salvador

Colombia

Venezuela

Argentina

Trinidad & T

Uruguay

Mexico

Chile

Costa Rica

Jamaica

Cuba

USA

Canada

Puerto Rico

Overall: 40.5
Sex distribution of TB cases
number of cases, %

- Male: 134,869 (64%)
- Female: 75,627 (36%)
Prevalence of DM, %

Overall: 9.7
# Sex distribution of DM cases

<table>
<thead>
<tr>
<th></th>
<th>Number of Cases</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males</td>
<td>27,790,048</td>
<td>55%</td>
</tr>
<tr>
<td>Females</td>
<td>22,682,368</td>
<td>45%</td>
</tr>
</tbody>
</table>

![Pie chart showing the sex distribution of DM cases.](chart.png)
PAF, % (Proportion of TB cases attributable to DM)

Overall: 16.5
Incidence rate of TB/DM cases per 100,000 population

Overall: 6.7
Incident cases of TB/DM by age and sex, number of cases

![Graph showing incident cases of TB/DM by age and sex, number of cases.](image-url)
### Incident cases of TB/DM by country, number of cases

<table>
<thead>
<tr>
<th>Country</th>
<th>TB/DM cases</th>
<th>Country</th>
<th>TB/DM cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Argentina</td>
<td>1,011</td>
<td>Haiti</td>
<td>2,495</td>
</tr>
<tr>
<td>Bolivia</td>
<td>1,042</td>
<td>Honduras</td>
<td>635</td>
</tr>
<tr>
<td>Brazil</td>
<td>9,696</td>
<td>Jamaica</td>
<td>29</td>
</tr>
<tr>
<td>Canada</td>
<td>273</td>
<td>Mexico</td>
<td>3,586</td>
</tr>
<tr>
<td>Chile</td>
<td>235</td>
<td>Nicaragua</td>
<td>369</td>
</tr>
<tr>
<td>Colombia</td>
<td>1,426</td>
<td>Panama</td>
<td>259</td>
</tr>
<tr>
<td>Costa Rica</td>
<td>78</td>
<td>Paraguay</td>
<td>242</td>
</tr>
<tr>
<td>Cuba</td>
<td>126</td>
<td>Peru</td>
<td>2,777</td>
</tr>
<tr>
<td>Dominican R</td>
<td>1,229</td>
<td>Puerto Rico</td>
<td>22</td>
</tr>
<tr>
<td>Ecuador</td>
<td>887</td>
<td>Trinidad &amp; T</td>
<td>64</td>
</tr>
<tr>
<td>El Salvador</td>
<td>322</td>
<td>Uruguay</td>
<td>2,693</td>
</tr>
<tr>
<td>Guatemala</td>
<td>1,177</td>
<td>USA</td>
<td>74</td>
</tr>
<tr>
<td>Guyana</td>
<td>151</td>
<td>Venezuela</td>
<td>1,010</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>31,909</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Conclusions

• DM is associated with the burden of TB in the Region of the Americas

• 16.5% of all incident cases of TB are attributed to DM

• 31,909 cases of TB could be prevented annually with the elimination of DM
Practical implications

• Cross-referral of TB and DM
  ▫ Screening for DM among TB patients
  ▫ Screening for active TB among people with DM

• Millennium Development Goals: “to have halted and begun to reverse incidence of TB” by 2015
  ▫ Strategies for DM control and prevention should be considered for inclusion in TB programs
Additional activities with PAHO during my internship
Health in the Americas

• Launched in 1954
• Published every 5 years
• Last edition – 2007

Content:
• General issues on health and human development
• Evolution of health systems and services
• Specific conditions and risk factors
Health in the Americas

As part of my internship:

• Contribution to the next edition, Health in the Americas 2012

• Literature review on epidemiological patterns of DM in the Americas

• Data varied largely in terms of their scientific validity and methodological approaches
Atlas of Diabetes Education in Latin America and the Caribbean

- Inventory of educational programs for people with DM
- First edition – 21 programs for type 2 DM in 19 countries; published in 2002
- Second edition – 46 programs for type 2 DM and type 1 DM in 23 countries; in press now
Atlas of Diabetes Education in Latin America and the Caribbean

As part of my internship:

- Contribution to the 2nd edition of the Atlas, Introduction section
  - Updates of scientific evidences about DM as a major public health problem in the LAC Region
  - Importance of self-management in DM control
  - Biomedical and psychological benefits of educational interventions in people with DM
  - Related economic aspects
Chronic Care Passport

- **CARIDIAH**: Caribbean Diabetes Project
- 10 Caribbean countries
- Quality improvement initiatives for DM care
- Systematic monitoring and evaluation of patients with chronic conditions
As part of my internship:

- Reviewed Chronic Care Passport and supplementing booklet for health care providers with instructions for its completion

- Provided my input from a clinical perspective
Grant proposal: Addressing the burdens of diabetes and tuberculosis in the Americas

- 2 sites – Brazil and Mexico
- 2 years project
- Goal – to improve the timely identification of DM and TB in people of the Americas
- Submitted to World Diabetes Foundation
- Funded; launched in April 2011

As part of my internship:
- Involved in reviewing the proposal
Inventory of studies: Economic evaluation of chronic diseases in the Americas

- Financial implications of health conditions and diseases
- Cost analysis
- Cost-effectiveness
- Based on extensive epidemiological data
- Lack of EE studies in developing countries
Inventory of studies: Economic evaluation of chronic diseases in the Americas

As part of my internship:

- Inventory of EE studies on chronic diseases in the LAC Region
- PubMed, LILACS
- 2000 – 2010
- CVD, DM, CR, CRD
- 27 studies
- Large variability of methodological approach
- Underreporting of validated models
General reflection

- Invaluable and rewarding experience
- Variety of training and professional development opportunities
- Daily work at PAHO, Organization’s mission
- It takes time to see progress
- Consolidated my professional goals
Acknowledgments

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- Dr. Mirtha del Granado
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