Costs of inpatient treatment for multi-drug resistant tuberculosis in South Africa

Kathryn Schnippel¹, Sydney Rosen¹,², Kate Shearer¹, Neil Martinson³,⁴, Lawrence Long¹, Ian Sanne¹,², Ebrahim Variava⁵,⁶

¹Health Economics & Epidemiology Research Office, University of the Witwatersrand, Johannesburg, South Africa
²Center for Global Health and Development, Boston University, Boston, USA
³Perinatal HIV Research Unit, University of the Witwatersrand, Johannesburg, South Africa
⁴Johns Hopkins, School of Medicine, Baltimore, USA
⁵Klerksdorp/Tshepong Hospital Complex, North West Department of Health, Klerksdorp, South Africa
⁶Department of Internal Medicine, University of the Witwatersrand, Johannesburg, South Africa
TB in South Africa

- High incidence of TB: 1% or 430,000 cases / year
- High rates TB/HIV co-infection
  - TB leading cause of death for PLWHA
  - 60% of TB patients are co-infected with HIV
- ‘High-burden MDR-TB’ country
  - 9,070 cases diagnosed in 2009

WHO Global TB Control, 2011
## Costs of TB and MDR-TB treatment

### Drug-sensitive TB
- Outpatient care by nurses
- 6-month regimen
- Total cost $437/case
- <$30 for full course of drugs
- No recent estimates for South Africa

### MDR-TB
- Inpatient care by doctors
- 18-24 month regimen
- Systematic review found 4 cost estimates globally; range $2,791 to $16,881/case
- No cost estimates for So. Africa
- **55%** of national TB control budget spent on MDR-TB

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Sinanovic et al 2003; Meyer-Rath et al 2012

Fitzpatrick & Floyd, 2012; WHO 2011
Objectives

- Estimate the cost of inpatient treatment for MDR-TB in South Africa
- Generate baseline for evaluating alternatives to inpatient model
Methods: Site and Sample

- M/XDR-TB Hospital in the North West Province of South Africa
- All admitted patients with MDR-TB
  - March 2009-February 2010
  - Excluded transfers in or out (incomplete costs)
- Reviewed medical records for resource utilization and outcomes
- Data collected up to 12 months from admission or until the earliest of discharge, abscondment, or death
Methods: Unit costs and Analysis

- Costs of hospital stay/day collected from hospital expenditure and assets records
- Costs for drugs, laboratory tests, radiography, and surgery collected from public sector databases
- Costs are reported in USD 2011 prices, ZAR 7.23:$1, 3% discount rate for buildings/equipment
- Cost per patient admitted estimated, stratified by sputum smear status and outcome
Results: Study Sample

- **N=128** (121 for cost estimates)
- **Median age 39; 45% female; 64% unemployed**
- **50% smear-, 50% smear+ at admission**
- **83% previous TB**
- **64% HIV infected**

**Recorded in hospital register Mar 2009-Feb 2010**
- 277

- **Initiated or completed MDR-TB treatment at another site**
  - 49

- **Non-MDR TB diagnosis**
  - 83

- **Not eligible (other criteria)**
  - 12

- **Enrolled in study**
  - 133
  - **Smear-status known**
    - 128
  - **Complete resource utilization records**
    - 121
Results: Average inpatient cost per patient

$17,164

- Hospital stay 'hotel costs'
- MDR-TB drugs
- TB laboratory monitoring
- Other costs

Health Economics and Epidemiology Research Office
## Results: Resource utilization and cost by smear status at admission

<table>
<thead>
<tr>
<th>Cost</th>
<th>All patients (n=121)</th>
<th>Smear positive (n=55)</th>
<th>Smear negative (n=61)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of days in hospital</td>
<td>105 [52]</td>
<td>125 [58]</td>
<td>95 [35]</td>
</tr>
<tr>
<td>Number of injections</td>
<td>52 [41]</td>
<td>57 [42]</td>
<td>52 [40]</td>
</tr>
<tr>
<td>Number of cultures</td>
<td>4.1 [1.9]</td>
<td>4.8 [2.0]</td>
<td>3.8 [1.4]</td>
</tr>
<tr>
<td>Number of drug sensitivity tests</td>
<td>6.7 [8.3]</td>
<td>12.2 [8.4]</td>
<td>2.3 [4.7]</td>
</tr>
<tr>
<td>Average cost/patient</td>
<td>$17,164</td>
<td>$20,440</td>
<td>$15,450</td>
</tr>
</tbody>
</table>

* Significant difference between smear-positive and smear-negative subjects at p-value < 0.05
Results: Average inpatient costs by patient outcomes

- Culture converted, discharged (86%)
  $17,327
- Absconded (3%)
  $5,837
- Died in hospital (8%)
  $12,623
- Still admitted at 12 months (2%)
  $41,749
Limitations

- Single site in one province, small sample
- Cost of MDR-TB inpatient phase only
  - Patients should be in outpatient care for 18-21 months following discharge
- Survivor bias
  - Treatment initiated a median of 99 days after patient tested for MDR-TB
  - 40% of MDR-TB patients die within 30 days of testing

Gandhi et al. 2010
Conclusions

• Average 12-month cost of inpatient treatment for MDR-TB: $17,164
  ▪ 40 x the full cost of treating drug-sensitive TB
  ▪ 25 x the annual cost of first-line ART

• Will new guidelines reduce cost?

Sinanovic et al. 2003; Meyer-Rath et al. 2012; Long et al. 2011
Now the hard part: implementation
- hiring and training new staff
- equipping clinics and hospitals
- managing drug supplies

Cost savings to be used for prevention of drug-resistant TB
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