The burden of TB Meningitis in children admitted to Modilon General Hospital

DCH
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INTRODUCTION

- TB Meningitis- lethal form of *Mycobacterium tuberculosis* infection
- TB bacilli: aerosol spread
- Local infection in lung parenchyma
- Dissemination- Haematogenous/lymphatic
- Rich foci- caseous lesions in meninges or brain parenchyma
- Meningitis: rich foci grows and ruptures into sub-arachnoid space

Figure 1: *Mycobacterium tuberculosis* (X1000 magnification) isolated from the CSF of a child who died of TB meningitis at Modilon Hospital.
BURDEN OF TB IN CHILDREN-2014

- Global Incidence: 9.6 million (estimated 1.0 million among children)
- Global Deaths: 1.5 million (140,000 deaths among children)
- Western Pacific Region: Population 1,845,184,000
  - TB MORTALITY: 88,000
  - PREVALENCE: 2,100,000
  - INCIDENCE: 1,600,000
- PNG: Population 7.5 million
  - NEW & RELAPSE CASES: 26,170 (6,959 new cases aged <15 years)
  - MORTALITY: 3,500

BURDEN OF TB IN CHILDREN- PHR 2014

- Children admitted with TB: 1,470
- Children died: 179 (CFR: 12.2%)
- Over 40% of children were diagnosed with EPTB which included TB Meningitis, Spinal TB, TB lymphadenitis, abdominal TB and Miliary TB
AIM

- To determine the in-hospital prevalence of TB meningitis in children admitted to Modilon General Hospital over the past 2 years (2014-2015)
- To document the risk factors of TB meningitis
- To document the case fatality rate of TB meningitis during the study period
METHODS

- **STUDY SITE/DESIGN:** This is a retrospective study, reviewing the number of children who were admitted to the Paediatric Ward of MGH with a final diagnosis of TB Meningitis (2014-2015)

- **DATA ANALYSIS:** Data was exported from the PHR System for the last 2 years and analysed using the Stata analysis program.

- **CLINICAL DEFINITIONS:**
  - TBM in MGH is diagnosed clinically
  - Adjunctive tests: CSF (WCC/Protein/Glucose)
  - Confirmatory tests: AFB Culture is unavailable.
  - CXR
  - TB Score >7

- **ETHICAL APPROVALS:**
  Modilon Hospital Ethics Committee and the School of Medicine and Health Sciences Ethics Committee (UPNG)
RESULTS

- 3125 paediatric admissions (Jan 2014 - Dec 2015)
- Females accounted for 44% (1373) of admissions
- Median age of all admissions:
  4 (IQR 0.25 - 12) months
- Neonates accounted for 34% (1073) of admissions
- Median age (excluding neonates):
  11 (IQR 5-36) months
- Prevalence of TBM: 3.7% (75/2052; [95% CI 2.9-4.6])
FREQUENCY OF VARIOUS FORMS OF PAEDIATRIC TB AT MODILON HOSPITAL

- Pulmonary: 115
- TB Meningitis: 75
- TBLN: 13
- TB Bone/Joint: 19
- TB Abdo: 7
- Miliary TB: 19
- Pericardial: 4
- Disseminated: 22

Total: 367
FREQUENCY AND MORTALITY DUE TO TB

- Pulmonary: Frequency 115, Deaths 7
- TB Meningitis: Frequency 75, Deaths 13
- TB Bone/Joint: Frequency 19, Deaths 19
- TB Abdo: Frequency 16, Deaths 2
- Miliary TB: Frequency 19, Deaths 7
- Pericardial: Frequency 1, Deaths 1
- Disseminated: Frequency 22, Deaths 4
# TBM Compared to Other Forms of TB

<table>
<thead>
<tr>
<th>Factors</th>
<th>TBM</th>
<th>TB Other forms</th>
<th>P-values</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Number</strong></td>
<td>75</td>
<td>199</td>
<td></td>
</tr>
<tr>
<td><strong>Female Sex</strong></td>
<td>33 (44)</td>
<td>82 (41)</td>
<td>0.68</td>
</tr>
<tr>
<td><strong>Median Age</strong></td>
<td>60 [24-84]</td>
<td>36 [11-96]</td>
<td>0.38</td>
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<tr>
<td><strong>Adopted</strong></td>
<td>2 (3)</td>
<td>3 (2)</td>
<td>0.62</td>
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<tr>
<td><strong>Comorbidities</strong></td>
<td></td>
<td></td>
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<tr>
<td>Moderate malnutrition</td>
<td>30 (40)</td>
<td>62 (31)</td>
<td>0.20</td>
</tr>
<tr>
<td>Severe malnutrition</td>
<td>14 (19)</td>
<td>59 (30)</td>
<td>0.09</td>
</tr>
<tr>
<td><strong>HIV</strong></td>
<td>2 (3)</td>
<td>11 (6)</td>
<td>0.36</td>
</tr>
<tr>
<td><strong>Anaemia</strong></td>
<td>24 (32)</td>
<td>97 (49)</td>
<td><strong>0.01</strong></td>
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<tr>
<td><strong>Readmission</strong></td>
<td>20 (27)</td>
<td>44 (22)</td>
<td>0.43</td>
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<td><strong>LOS (days)</strong></td>
<td>27 [10-50]</td>
<td>15 [7-39]</td>
<td><strong>0.01</strong></td>
</tr>
<tr>
<td><strong>In-hospital complications</strong></td>
<td>7 (9)</td>
<td>4 (2)</td>
<td><strong>0.01</strong></td>
</tr>
<tr>
<td><strong>Case fatality rate</strong></td>
<td>19 (25)</td>
<td>18 (9)</td>
<td><strong>0.001</strong></td>
</tr>
</tbody>
</table>
DISCUSSION AND CONCLUSION

- A TBM prevalence rate of 3.7% is higher than in most other countries
  - Africa (high HIV) - 2.2%, Africa (low HIV) - 2.0%, Southeast Asia - 1.9%
- Mortality was highest in patients with TBM (1 in 4 children with TBM died)
- Cost of inadequate BCG coverage
- Length of stay and in-hospital complications higher in children with TBM
- Anaemia was significantly higher in other forms of TB
LIMITATIONS

- This project utilised a retrospective study design
- Hospital-based study
- Prior to 2014, the data was not adequately entered
- Missing data
- Analysis of a large dataset was a challenge
RECOMMENDATION:

- Prevention of TBM:
  - Improve BCG coverage
  - Family screening
  - Early identification, effective treatment and follow up of TB cases

- Improve reporting (PHR)

- More research and trainings to improve on methods used to prevent, diagnose and treat childhood TB

- Paediatric society recommendations (Amini et al, 2012)
ACKNOWLEDGEMENT

- Prof Vince for your advise
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  - Dr Aipit
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  - Dr Rero
  - Dr Yarong
  - HEO’s
  - Residents and nurses
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