Surgical Service delivery at Port Moresby General Hospital, Papua New Guinea: A cost effective intervention

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Port Moresby General Hospital
Papua New Guinea, 2016
- Largest Island Nation in the Pacific
- 22 provinces
- 800 different languages and cultures
- Population of 8 million
- 87 percent of which Mainly Rural
- Mountainous, Rough and rugged terrains
How do we Enhance Clinical Service Delivery??

How do we appropriately manage the available surgical resources in such area??

Is Surgery too expensive and that it should not be considered like TB, HIV/AIDS, IMR, MMR??
• Port Moresby

Almost 2 m population

1 Public Hospital, Port Moresby General Hospital

3 Private Hospital

13 Urban Health centers
Port Moresby General Hospital (PMGH)

- 735 Bed Hospital
- 150 surgical beds
- Surgery
  - General
  - Sub-Specialty
    - Orthopaedics
    - Trauma
    - Neuro-Surgery
    - Head and Neck
    - Interplast
    - Paediatric Surgery
    - Urology
    - Cardiothoracic
RESEARCH QUESTIONS

• What proportion of total PMGH costs are spent on surgical care?

• How much does it cost to manage trauma?

• What proportion of cost is spent on specialist surgery and general surgery care?

• What is the cost effective analysis of surgical services at PMGH?

• Is surgical service a cost effective intervention at all?
• **Retrospective Descriptive study** looking at data (Financial info & Patient chart) from January 01 – March 31 2014.

• CEA method originally described by McCord and Chowdhury, and overtime modified by Gosselin.

  • **Cost-effective analysis (CEA) = Cost/DALYs averted**
METHOD

\[ \text{CEA} = \frac{\text{COST}}{\text{DALY AVERTED}} \]
DALYs = DSS x TES x DLE
DALYs = DSS x TES x DLE

Table of Disease Severity Score and Treatment Efficacy score. From Gosselin 2006

Examples of Disability Weights per WHO approved was used

Results
TOTAL COST

K 3,006,790.68

K 102,969.86

K 1,615,638.60

K 4,725,399.14
TOTAL COST = K 4, 725, 399.14

TRAUMA = K 2, 126, 429.61 (45%)

Non-trauma = K 2, 598, 969.53 (55%)

Specialty care = K 2, 740, 731.50 (58%)

Orthopaedic Specialty care = K 1, 233, 329.18 (45%)
DALYs Averted
(Disability-adjusted life years)
### Disability Adjusted Life Years (DALYs)

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Operation/Treatment</th>
<th>Condition on Arrival (DSS)</th>
<th>Condition on Discharge (TES)</th>
<th>YLL</th>
<th>DALY</th>
</tr>
</thead>
</table>

**Total DALYs Averted**

\[
\text{DALYs Averted} = \text{Disease Severity Score} \times \text{Treatment Efficacy Score} \times \text{Disability Weight*} \times \text{Discounted Life Expectancy}
\]

\[
\text{Total DALYs averted} = 5683
\]
\[
\text{Result} \quad \text{CEA} = \frac{4,725,399.14}{\text{COST}} \quad \text{DAILY} \quad \text{AVERTED}
\]
Result

$\text{CEA} = K\ 831.50/\text{DALY}$

averted
# Cost-effectiveness of Sub-specialty Surgery Services

## Sub-specialty (58%)

<table>
<thead>
<tr>
<th>Specialty</th>
<th>Cases</th>
<th>Cost (Kina)</th>
<th>Cost US $</th>
<th>%</th>
<th>DALY Averted</th>
<th>CEA (Kina)</th>
<th>CEA US $</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orthopaedic</td>
<td>241</td>
<td>1,233,329.20</td>
<td>493,948.34</td>
<td>45%</td>
<td>1483.2</td>
<td><strong>217.02</strong></td>
<td>86.92</td>
</tr>
<tr>
<td>Head &amp; Neck/Cardiothoracic</td>
<td>77</td>
<td>383,702.41</td>
<td>153,672.82</td>
<td>14%</td>
<td>461.44</td>
<td>67.52</td>
<td>27</td>
</tr>
<tr>
<td>Neurosurgery</td>
<td>63</td>
<td>328,887.76</td>
<td>131,719.56</td>
<td>12%</td>
<td>395.52</td>
<td>57.87</td>
<td>23.18</td>
</tr>
<tr>
<td>ENT</td>
<td>60</td>
<td>301,480.45</td>
<td>120,742.93</td>
<td>11%</td>
<td>362.56</td>
<td>53.05</td>
<td>21.25</td>
</tr>
<tr>
<td>Urology</td>
<td>33</td>
<td>191,851.21</td>
<td>76,836.41</td>
<td>7%</td>
<td>230.72</td>
<td>33.76</td>
<td>13.52</td>
</tr>
<tr>
<td>Ophthalmology</td>
<td>29</td>
<td>164,443.89</td>
<td>65,859.78</td>
<td>6%</td>
<td>197.76</td>
<td>28.93</td>
<td>11.59</td>
</tr>
<tr>
<td>Paediatric</td>
<td>17</td>
<td>82,221.95</td>
<td>32,929.9</td>
<td>3%</td>
<td>98.88</td>
<td>14.47</td>
<td>5.8</td>
</tr>
<tr>
<td>OFM</td>
<td>12</td>
<td>54,814.63</td>
<td>21,953.26</td>
<td>2%</td>
<td>65.92</td>
<td><strong>9.65</strong></td>
<td>3.86</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>532</strong></td>
<td><strong>2,740,731.50</strong></td>
<td><strong>1,097,663</strong></td>
<td><strong>100</strong></td>
<td><strong>3296</strong></td>
<td><strong>482.27</strong></td>
<td><strong>193.12</strong></td>
</tr>
</tbody>
</table>
# Cost-Effectiveness of General Surgery Services

## General Surgery (42%)

<table>
<thead>
<tr>
<th>Specialty</th>
<th>Cases</th>
<th>Cost (Kina)</th>
<th>Cost (US$)</th>
<th>%</th>
<th>DALY Averted</th>
<th>CEA (Kina)</th>
<th>CEA (US$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head &amp; Neck/Cardiothoracic</td>
<td>113</td>
<td>575,553.6</td>
<td>230,509.22</td>
<td>29</td>
<td>692.23</td>
<td><strong>101.28</strong></td>
<td>40.56</td>
</tr>
<tr>
<td>Urology</td>
<td>94</td>
<td>476,320.22</td>
<td>190,766.25</td>
<td>24</td>
<td>572.88</td>
<td><strong>83.82</strong></td>
<td>33.57</td>
</tr>
<tr>
<td>Orthopaedic</td>
<td>89</td>
<td>456,473.55</td>
<td>182,817.66</td>
<td>23</td>
<td>549.01</td>
<td><strong>80.32</strong></td>
<td>32.17</td>
</tr>
<tr>
<td>Neurosurgery</td>
<td>83</td>
<td>416,780.2</td>
<td>166,920.47</td>
<td>21</td>
<td>501.27</td>
<td><strong>73.34</strong></td>
<td>29.37</td>
</tr>
<tr>
<td>ENT</td>
<td>10</td>
<td>59,540.03</td>
<td>23,845.78</td>
<td>3</td>
<td>71.61</td>
<td><strong>10.47</strong></td>
<td>4.19</td>
</tr>
<tr>
<td>Ophthalmology</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Paediatric</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>OFM</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>384</td>
<td><strong>1,984,667.64</strong></td>
<td><strong>794,859.38</strong></td>
<td>100</td>
<td><strong>2387</strong></td>
<td><strong>349.23</strong></td>
<td><strong>139.86</strong></td>
</tr>
</tbody>
</table>

**Note:** CEA = Cost-effectiveness analysis.
(K9.65-K217.02/DALYs)

US $ 3.86-86.92/DALY Averted
## Discussions

<table>
<thead>
<tr>
<th>Country</th>
<th>CEA</th>
<th>PMGH (Papua New Guinea, 2014)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haiti (2008)</td>
<td>US$172-$223 per DALYS averted</td>
<td></td>
</tr>
<tr>
<td>Cambodia (2006)</td>
<td>US$77 per DALYS averted</td>
<td></td>
</tr>
<tr>
<td>Sierra Leone (2004)</td>
<td>US$33 per DALYS averted</td>
<td></td>
</tr>
<tr>
<td>Bangladesh (2003)</td>
<td>US$10.93 per DALYS averted</td>
<td></td>
</tr>
<tr>
<td><strong>US$10.93-223/DALYs</strong></td>
<td><strong>US$3.86-86.92/DALYs</strong> (Comparable)</td>
<td></td>
</tr>
</tbody>
</table>
Discussion

• Limitations

  – Early part of the year where cases usually are low

  – Comparison of previous years need to be done to assess pattern

  – Do a prospective patient data collection for DALY calculation
Conclusion

• What proportion of total PMGH costs are spent on surgical care?
  • K 4, 725, 399.14
• How much does it cost to manage trauma?
  • K 2, 126, 429.61 (45%)
• What proportion of cost is spent on sub-specialist surgery and general surgery care?
  • K 2, 740, 731.50 (58%)
• What is the cost-effectiveness of surgical services at PMGH?
  – K9.65-K217.02/DALY averted (US$3.86-86.92/DALYs)
  – Surgical service is a cost-effective intervention
Recommendation

1) Inclusion of surgery as part of the basic public health armamentarium in the KRA (Key result areas) of 2020 onward NHP

2) Need for similar study looking at TB, immunization and anti-retroviral therapy interventions carried out at the hospital to make good comparison locally

3) NDOH policy planning arm to make policy guidelines basing on actual cost provided
Thank you.