The need for radiotherapy in low and middle income countries: the IAEA perspective

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DIRAC https://dirac.iaea.org/

Population density
http://www.fao.org/3/a0310e/A0310E06.htm
There is no natural text provided in the image.
Progress in low income countries over the past 20 years (Africa)

SAF example (all centres) DIRAC
25% population in Gauteng

SAF example (Gauteng) DIRAC
13.9 mi est. population in Gauteng (2019)
SAF example (Gauteng public sector)

Top 10 causes of death (WHO, 2018)

- Globally, “trachea, bronchus, lung cancers” was no. 9 in 2000, no. 6 in 2016
- Global data skewed by upper MIC and HIC
- In LIC and lower MIC, cancer not in the top 10 causes of death (37% deaths are due to NCDs, cf. 88% in HIC)

<table>
<thead>
<tr>
<th>No.</th>
<th>LIC</th>
<th>LOWER MIC</th>
<th>UPPER MIC</th>
<th>HIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lower respiratory infections</td>
<td>Ischaemic heart disease</td>
<td>Ischaemic heart disease</td>
<td>Ischaemic heart disease</td>
</tr>
<tr>
<td>2</td>
<td>Diarrhoeal disease</td>
<td>Stroke</td>
<td>Stroke</td>
<td>Stroke</td>
</tr>
<tr>
<td>3</td>
<td>Ischaemic heart disease</td>
<td>Lower respiratory infections</td>
<td>COPD</td>
<td>Alzheimer and other dementias</td>
</tr>
</tbody>
</table>

Lack of cancer care guidelines in LMICs

- Cites extension of cancer treatment to remote areas through a coordinated hub and spoke model (TMC)
- Use of tax revenue to subsidise national insurance funds for cancer coverage (Kenya)
- Economic downturns have led to many losing their health benefit (Brazil 2015)
- Availability of specialized professionals affects equity in access to multidisciplinary care e.g. surgeons.
Investment needed to address the gap

- Major difference in region (population dependent): UMIC needed the most costly intervention overall.
- Taking into account the income setting and the need for additional radiotherapy services.
- Adjusted to the case mix.
- Costing includes human resources, facilities as well as equipment procurement and sustainability.

Radiotherapy capacity

- The size of the dot/circle (a country) represents the annual number of fractions delivered (assuming an 8h working day) as a function of GNI 2013.
- Coverage > 1 means capacity is available.
- Coverage = 1 means that access is theoretically near perfect.
- Since information on personnel and workload are not reliable, DIRAC data alone were used to calculate capacity and the cancer burden was used to estimate demand.

The future?


Model using mean surface air temperature, precipitation, humidity, net radiation and wind speed.

Aiguo, Dai, National Center for Atmospheric Radiation, USA, Jan/Feb 2011
Way forward

• Uptime data analysis is sparse and reliable data is ‘difficult’ to obtain
• Recognize and promote sustainable access
• I ≠ intellect, interest, intelligence or inspiration…
• What should the indicators for a successful project be? It is clear that counting only installed “operational” radiotherapy units is not the solution.
• Quality indicators for radiotherapy efficacy and efficiency are not widely available.

Way forward

• Ethical issues
• “Global Radiology” sub-specialty
• World Health Imaging System Radiographic system; Lodox scanner
• A good example could be small islands or countries with low population density on large tracts of land – can we consider cross training staff and a completely non-traditional solution, e.g. operate 3 hours per day, use clinical oncologists, use technologists that are dual-trained, remote oversight, etc.?

Way forward

• “Non-HIC” inter-regional twinning is currently not a popular approach despite mechanisms, e.g. BRICS. How to link MICs or LICs with each other?
• MIC partnership with LIC
• Investigate (reward) innovative indigenous solutions that are developed together with experienced, indigenous, local professionals. Some regions are no longer reporting brain drain and this could be an opportunity.