Cancer stage presentation in LMIC

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Background

• The burden of cancer in LMIC is increasing

• There is a need to estimate the requirement for radiotherapy in LMIC

• Radiotherapy utilization (CCORE data) = 48.3% of all cancer patients in developed world

• Stage at presentation for cancers may differ in LMIC
  – Differences in stage presentation compared to developed world will change utilization rates
Aims

1. Compile data on the stage at presentation for the main cancer subtypes in LMIC

2. Determine the effect of stage presentation on radiotherapy utilization rates for each main cancer subsite in LMIC

3. Determine how the different stage presentation in LMIC will influence survival benefit
Methods (1)

• Based on the existing CCORE model of optimal radiotherapy utilisation

• An indication for radiotherapy is defined as a clinical situation for which radiotherapy is recommended as *the treatment of choice*
  – radiotherapy has a superior clinical outcome compared to alternative treatment modalities (including no treatment) and where patient is suitable to undergo radiotherapy

• Indications for radiotherapy for each cancer site were derived from evidence-based treatment guidelines issued by major national and international organizations.

• Survival data was derived from highest level of evidence in the literature
Methods (2)

• TreeAge software version 3.5™ used to construct the RT utilisation trees

• For each branch a proportion of patients with that attribute was quantified (eg. stage, histology)

• Each branch of the tree ends in a “pay-off” of either ‘radiotherapy’ or ‘no radiotherapy’ as the final outcome

• Epidemiological data sourced from—
  – CCORE data based on Australian National or state databases or surveys where possible. Otherwise large citation databases
  – Staging data LMIC countries – literature search (pub med/Medline)

• In the survival model, each branch is assigned a survival benefit based on the literature
### Radiotherapy utilization - CCORE data

<table>
<thead>
<tr>
<th>SUBSITE</th>
<th>RADIOThERAPy UTILIZATION RATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bladder</td>
<td>47%</td>
</tr>
<tr>
<td>Brain</td>
<td>80%</td>
</tr>
<tr>
<td>Breast</td>
<td>87%</td>
</tr>
<tr>
<td>Cervix</td>
<td>71%</td>
</tr>
<tr>
<td>Head and Neck</td>
<td>74%</td>
</tr>
<tr>
<td>Liver</td>
<td>0%</td>
</tr>
<tr>
<td>Lung</td>
<td>77%</td>
</tr>
<tr>
<td>Lymphoma</td>
<td>73%</td>
</tr>
<tr>
<td>Prostate</td>
<td>58%</td>
</tr>
<tr>
<td>Rectum</td>
<td>60%</td>
</tr>
<tr>
<td>Stomach</td>
<td>27%</td>
</tr>
<tr>
<td>Uterus</td>
<td>38%</td>
</tr>
</tbody>
</table>
CERVIX CANCER STAGE AT PRESENTATION

- IARC - Costa Rica, India, Phillipines, Thailand
- Sudan
- India (Barshi registry)
- CCORE

Legend:
- Green: Distant
- Red: Regional
- Blue: Local

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BREAST CANCER STAGE AT PRESENTATION

The diagram illustrates the distribution of breast cancer stages at presentation across different locations. The stages are categorized as Distant, Regional, and Localised. The percentages for each stage are indicated for each location.

Locations include:
- IARC C:rica/India/Pohl/Saudi/Thai
- Brazil
- India (Chandigarh)
- India (Bangalore)
- India (Chennai)
- India (Thiruvanathapuram)
- India (Mumbai)
- CCORE

The Ingham Institute logo is present at the bottom right of the diagram.
UTERINE CANCER STAGE AT PRESENTATION

% of Local, Regional, and Distant stages in Thailand, Pakistan, and CCORE.
BLADDER CANCER STAGE AT PRESENTATION

IARC (India/Thailand)  Pakistan  CCORE

- Distant
- Regional
- Localised

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PROSTATE CANCER STAGE AT PRESENTATION
HEAD & NECK CANCER STAGE AT PRESENTATION

- IARC India/Pakistan/Thailand
- India (tata memorial)
- CCORE

Distant
Regional
Localised
STOMACH CANCER STAGE AT PRESENTATION

<table>
<thead>
<tr>
<th>Country</th>
<th>Distant</th>
<th>Regional</th>
<th>Local</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tanzania</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iran</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pakistan</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CCORE</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
NHL STAGE AT PRESENTATION

- **China**: IV: 70%, III: 30%
- **Mexico**: IV: 50%, III: 50%
- **CCORE**: IV: 60%, III: 40%
Cervix Cancer – CCORE RTU

RTU = 71%
CCORE stage distribution
Sudan – cervix cancer

N=197

RTU = 82%

Assumption that 1A : 1B-IIA = developed world, utilization rate would be 82% (If assume 1:10, would increase to 86%)
IARC (C.Rica/India/Phillipines/Thailand)

N=14536

RTU = 85%
India (Barshi)

N=252

RTU = 74%
Survival benefit RT - CCORE

Benefit = 28%
Survival benefit from RT
Sudan – survival benefit

N=252

Benefit = 14%
Sudan – survival benefit

Benefit = 14%
C Rica/India/Phillipines/Thailand – survival benefit

Benefit = 43%
India (Barshi) – survival benefit

Benefit = 36%
Challenges

• Scarcity and quality of data
  – L/R/M data vs TNM based CCORE data
  – ?staging investigations in LMIC

• Little/no data on low income countries

<table>
<thead>
<tr>
<th>Income</th>
<th>Base</th>
<th>High</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>CCORE</td>
<td>CCORE</td>
<td>CCORE</td>
</tr>
<tr>
<td>Medium (U)</td>
<td>IARC</td>
<td>CCORE</td>
<td>Lowest Lit</td>
</tr>
<tr>
<td>Medium (L)</td>
<td>IARC</td>
<td>CCORE</td>
<td>Lowest Lit</td>
</tr>
<tr>
<td>Low</td>
<td>IARC</td>
<td>CCORE</td>
<td>Local = 0</td>
</tr>
</tbody>
</table>
References


Discussion