Establishing and Expanding Nuclear Medicine Programs

Dr. Rodolfo Núñez-Miller
Nuclear Medicine and Diagnostic Imaging Section
Division of Human Health
IAEA – Vienna (AUSTRIA).
Outline

• Current Status of Nuclear Medicine in LMIC.

• Establishing Nuclear Medicine Programs in LMIC.

• Expanding Nuclear Medicine Programs in LMIC.

• Mechanisms of Support from the IAEA.
Current Status of Nuclear Medicine in LMIC.

- The worldwide distribution of Nuclear Medicine resources is very **heterogeneous**. Not only at the regional level but also in within the same country.

- Africa is the continent with the biggest disparities.

- There are many challenges that need to be overcome for establishing NM programs in LMIC.

- However, overall the situation is improving/growing.

- In this regard the support provided by the IAEA is vital.
Shadows/ Challenges

- Difficult to cope with training needs of the involved multidisciplinary team of professionals (physicians, medical physicists, radiographers, radiochemists).

- Lack of proper assessment of the impact of introducing novel high cost health technologies and their sustainability.

- High cost:
  - Equipment
  - Increased health cost (if not appropriately used)

- Equitable access for all patients in all countries, not limited to wealthy individuals and countries

- Difficulty to comply the international standards in particular in LMIC due to the lack of adequate infrastructure, machinery, quality assurance culture, qualified human resources
Current Status of Nuclear Medicine in LMIC: Asia

Report on the Current Nuclear Medicine Status of the Asian Member States from the Initial Cooperative Project Meeting (RAS6061/9001/01) of International Atomic Energy Agency/Regional Cooperative Agreement (IAEA/RCA)

Austral - Asian Journal of Cancer ISSN-0972-2556, Vol. 12, No. 3, July 2013 pp 133 -143
## Current Status of Nuclear Medicine in LMIC: Asia

<table>
<thead>
<tr>
<th>Country</th>
<th>Population in millions</th>
<th>NM Departments</th>
<th>Physicians</th>
<th>Gammacameras</th>
<th>SPECT/CT</th>
<th>PET/CT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bangladesh</td>
<td>161</td>
<td>20</td>
<td>90</td>
<td></td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Mongolia</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>China</td>
<td>1371</td>
<td>875</td>
<td>2700</td>
<td>386</td>
<td>169</td>
<td>133</td>
</tr>
<tr>
<td>Indonesia</td>
<td>258</td>
<td></td>
<td></td>
<td></td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Malaysia</td>
<td>30</td>
<td></td>
<td>17</td>
<td></td>
<td>2</td>
<td>11</td>
</tr>
<tr>
<td>Nyanmar</td>
<td>54</td>
<td>6</td>
<td>7</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Pakistan</td>
<td>189</td>
<td>45</td>
<td></td>
<td></td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>Philippines</td>
<td>100</td>
<td>36</td>
<td>79</td>
<td>48</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>South Korea</td>
<td>50</td>
<td>155</td>
<td>314</td>
<td>235</td>
<td>148</td>
<td></td>
</tr>
<tr>
<td>Singapore</td>
<td>5.5</td>
<td>155</td>
<td>17</td>
<td>16</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>Sri Lanka</td>
<td>21</td>
<td></td>
<td></td>
<td></td>
<td>8</td>
<td>7</td>
</tr>
<tr>
<td>Thailand</td>
<td>68</td>
<td>22</td>
<td></td>
<td></td>
<td>8</td>
<td>7</td>
</tr>
<tr>
<td>Vietnam</td>
<td>92</td>
<td>23</td>
<td></td>
<td>27</td>
<td>1</td>
<td>5</td>
</tr>
</tbody>
</table>
Current Status of Nuclear Medicine in LMIC: Asia

Fig. 1 The number of PET/CT apparatuses installed in each of the Member States.
Current Status of Nuclear Medicine in LMIC: Asia

Fig. 2 The number of SPECT/CT apparatuses installed in each of the Member States.
Current Status of Nuclear Medicine in LMIC: Asia

Fig. 3 The number of cyclotrons installed in each of the Member States.
Africa is the world's second-largest and second-most-populous continent.
Gamma Cameras per million

Data source: OECD Health Data 2009.
Doctors per Continent

The map shows the distribution of doctors per continent, with different colors representing varying numbers of doctors. The bar graph below the map indicates the number of countries with different ranges of nuclear medicine practitioners.
Functioning Cameras

Estimated number of functioning gamma cameras in Africa

4400

< 30 SPECT/CT

46; 31%

112, 69%

Planar G.Cameras or SPECT almost used as planar G camera

SPECT, G.Cameras
Type & No of studies

Number of scintigraphies

- >14
- 8--12
- 6--8
- 4--6
- 0-4

number of countries
PET/CT in Africa

- Egypt: 1=public & 1=private 15 PET/CT
- Libya: 1 public institution ?
- Algeria: 1=public 2 other projects exist in military and private hospital
- Morocco has some projects of PET/CT in public hospitals and/or private hospital 2 PET/CT
- Tunisia: to implement one soon 2 PET/CT

* SA: 10 - 12 PET/CT

According to recommendations → 1100 PET/CT
Establishing Nuclear Medicine Programs in LMIC.

• Challenging process.

• Requires **excellent and realistic planning** for the project to establish a Nuclear Medicine facility. Including, but not limited to, stakeholder analysis, determining the best partners, understanding the background situation on each country. Risk analysis.

• **Several years project** (minimum 4 years).

• It may require to develop a project in **different phases**.

• Needs **strong and fully committed support** from the national government, specially the Ministry of Health.
Establishing Nuclear Medicine Programs in LMIC.

- Infrastructure/physical plant/location

- **Training of a multidisciplinary team of professionals**, including Nuclear Medicine physicians, Radiologists, medical physicists, radiopharmacists, technologists, nurses, IT support, engineers.

- **Complex and highly sophisticated equipment**, SPECT, SPECT/CT, PET/CT, laboratory equipment for the radiopharmacy and for QC.

- Supplies.

- **Sustainability.**
Expanding Nuclear Medicine Programs in LMIC.

- The support from the IAEA to Member States, can be grouped in three main areas:
  1. Upgrading to hybrid Imaging (SPECT/CT and PET/CT)
  2. Evolving to 68Gallium PET radiopharmaceuticals.
  3. Establishing a cyclotron and associated GMP radiopharmacy facility

- At the IAEA it is done through Technical Cooperation projects, normally involving several IAEA sections.

- Again, needs strong and fully committed support from the national government, specially the Ministry of Health.
Expanding Nuclear Medicine Programs in LMIC.

- Support from the IAEA given through:
  1. Design of projects
  2. Capacity building, fellowship training, expert missions, scientific visits
  3. Training courses at the national and regional level
  4. Providing equipment and supplies
  5. Auditing QM.
  6. All the necessary steps can be contemplated, provided it is part of the initial design and project
The Mission of the IAEA is to accelerate and enlarge the contribution of atomic energy to peace, health and prosperity throughout the world. Guided by the interests and needs of Member States.
Our role in the **Division of Human Health** is to strengthen the capabilities of MS to address the needs related to the prevention, diagnosis and treatment of health problems through the application of **nuclear techniques**.
Nuclear Medicine and Diagnostic Imaging Section, the focus is on supporting the MS to improve their capabilities in these medical fields through enhancing safety and quality of practice.
We Are Here To Help
Thank You