Consideration for a building design

Understanding the landscape

Dr. Aravind Srinivasan
Emerging Paradigms in Healthcare
India’s transformation span

**Economic Transformation**
- Per capita income had risen from $281-1991 to $1,942 - 2016
- India’s share in global GDP doubled from 2.5% in 1980 to 7.0% in 2014-15

**Demographic Transformation**
- Urbanization
- Fragmented family system
- Ageing

**Social Transformation**
- Change in lifestyle
- Change in food habits
- Youth - renewed appetite for knowledge and information
Improvement in healthcare over the years.....

- More health awareness
- Better educated citizens
- Higher proportion of babies born under medical supervision
- Decrease in life threatening and crippling Communicable diseases
- Higher child immunization rates
Has this transformation touched every one in our society?
## Number of people living on less than $1.25$/days (millions)

<table>
<thead>
<tr>
<th>Region</th>
<th>1990</th>
<th>2005</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>East Asia &amp; the Pacific</td>
<td>873.3</td>
<td>316.2</td>
<td>137.6</td>
</tr>
<tr>
<td>China</td>
<td>683.2</td>
<td>207.7</td>
<td>84.3</td>
</tr>
<tr>
<td>Europe &amp; Central Asia</td>
<td>9.1</td>
<td>17.3</td>
<td>9.8</td>
</tr>
<tr>
<td>Latin America &amp; the Caribbean</td>
<td>49.6</td>
<td>45.1</td>
<td>30.6</td>
</tr>
<tr>
<td>Middle East &amp; North Africa</td>
<td>9.7</td>
<td>11.0</td>
<td>8.8</td>
</tr>
<tr>
<td>South Asia</td>
<td>579.2</td>
<td>595.6</td>
<td>403.9</td>
</tr>
<tr>
<td>India</td>
<td>435.5</td>
<td>455.8</td>
<td>313.2</td>
</tr>
<tr>
<td>Sub Saharan Africa</td>
<td>297.5</td>
<td>388.4</td>
<td>356.4</td>
</tr>
<tr>
<td>Total</td>
<td>1,818.5</td>
<td>1,373.5</td>
<td>947.2</td>
</tr>
</tbody>
</table>

The Elderly need comprehensive care to address Chronic conditions

India Age wise population (2011)

8% (~100 million) people in India are 60+ years old

<table>
<thead>
<tr>
<th>Country</th>
<th>% Pop 60+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Japan</td>
<td>25%</td>
</tr>
<tr>
<td>US</td>
<td>17%</td>
</tr>
<tr>
<td>Australia</td>
<td>15%</td>
</tr>
<tr>
<td>China</td>
<td>12%</td>
</tr>
</tbody>
</table>

Acute care will only restore stability, but improving quality of life needs comprehensive care
Non-communicable diseases are growing in India

- Communicable Diseases
- Injuries
- Non-Communicable Diseases

**Per capita Income (Development)**

- Africa: 40%
- India/Pakistan: 60%
- China/Vietnam: 75%
- USA, Japan/W Europe: 89%

**Increase in Non-communicable Diseases**

Major non-communicable diseases: Cardiovascular Diseases, Diabetes, Cancer and Chronic Respiratory disease, injuries

As India’s economy grows, age and life-style related diseases will increase
Most NCD patients lose mobility/occupational skills

- Acute care for cannot restore mobility and occupational skills in majority
Loss of Mobility and Occupational skills leads to economic loss

Direct costs
- Treatment

Indirect costs
- lost income
- carers
- Lower productivity

Illness

Direct impact
- no access to treatment

Indirect impact
- hygiene, diet
- Family looses earning member

Poverty

- lost income
- carers
- Lower productivity
Emerging trends

- Rapid progress in technology
  - Electronic Medical records
  - Changing treatment modality
- Increasing penetration of insurance
- Accreditation – Mandatory
- Changing Patient expectations
- Changing employee expectations
The Formidable Challenges...

- Rise in medical cost
- Increase in trauma and accidents
- Access to healthcare at some areas still being unsatisfactory
- Increase in non-communicable diseases
- Rise in the medical cost
### Singapore, Kerala, Tamil Nadu & Odisha Comparison

<table>
<thead>
<tr>
<th></th>
<th>Singapore</th>
<th>Kerala</th>
<th>Tamil Nadu</th>
<th>Odisha</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Area (sq km)</strong></td>
<td>712</td>
<td>38,863</td>
<td>130,058</td>
<td>155,820</td>
</tr>
<tr>
<td><strong>Population (m)</strong></td>
<td>5.18</td>
<td>33.38</td>
<td>72.14</td>
<td>41.97</td>
</tr>
<tr>
<td><strong>Literacy rate (%)</strong></td>
<td>92.5</td>
<td>93.91</td>
<td>80.33</td>
<td>72.87</td>
</tr>
<tr>
<td><strong>GDP per capita (US$)</strong></td>
<td>51,855</td>
<td>2,270</td>
<td>2,502</td>
<td>1,149</td>
</tr>
<tr>
<td><strong>Life expectancy at birth (years)</strong></td>
<td>82.14</td>
<td>75</td>
<td>66.2</td>
<td>59.6</td>
</tr>
<tr>
<td><strong>Infant mortality rate (per 1000 live-births)</strong></td>
<td>2.32</td>
<td>12</td>
<td>28</td>
<td>51</td>
</tr>
<tr>
<td><strong>Maternal Mortality Rate (per 100,000 live births)</strong></td>
<td>3</td>
<td>66</td>
<td>90</td>
<td>235</td>
</tr>
</tbody>
</table>

*Source: nrhm.gov.in, Indexmundi.com*
Factors that influence infrastructure

- Institutional setting
  - Need in the community
  - Determining the Scale
  - Tertiary/Secondary

- Private Setting
  - Single/Group practice
  - Capacity of doctors
  - Ability to invest

- Scope of services
  - Added surgical facility
  - Day-care/inpatient load

- Location of the hospital
  - Accessibility
  - Suitability of the land
Hospital Physical Infrastructure

- Vision
- Site selection
- Building layout
- Statutory requirements
- Equipment planning and procurement
Hospitals for the Future

As science and medicine progress, so should healthcare architecture and interior environments

• All Encompassing Infrastructure
  – Life enhancing designs: blend of art and science
  – Green buildings
  – Technologically advanced facilities
  – JCI and NABH accreditation standards
Vision for Physical Infrastructure

- Appreciating culture is key to understanding functional flow
- Building should project image of efficiency and friendliness, not extravagance
- Provide ideal layouts to partner to serve as guide
- Patients should be able to move in a logical flow with minimal assistance
- Allow for innovation in design to accommodate new geographic areas, cultures, and expectations
- State-of-the-art, energy-efficient facilities

Courtyard, Madurai Hospital
## Site Selection Considerations

<table>
<thead>
<tr>
<th>Physical Conditions:</th>
<th>Utilities:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soil</td>
<td>Electricity</td>
</tr>
<tr>
<td>Elevation</td>
<td>Sewage</td>
</tr>
<tr>
<td>Water Table</td>
<td>Telephone</td>
</tr>
<tr>
<td>Expandability (vertical and horizontal)</td>
<td>Water</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Accessibility and Availability:</th>
<th>Verification:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roads; Easements</td>
<td>Price assessment</td>
</tr>
<tr>
<td>Public Transportation</td>
<td>Lease or Buy decision</td>
</tr>
<tr>
<td>Manpower</td>
<td>Ownership documents for verification</td>
</tr>
<tr>
<td>Catchment</td>
<td>Mortgage Status</td>
</tr>
<tr>
<td>Comfortability (qualitative)</td>
<td></td>
</tr>
</tbody>
</table>
Building Planning Guidelines

Aravind Eye Hospital, Coimbatore

• Model new layout against proven successes:
• Design examples that contribute towards high productivity:
  – Separate entrances for paying and subsidized patients
  – Shared operating theaters
  – Separate OT for retina surgeries
  – Utilization of central investigation room
What we did

- General Units - Ground floor
- Below 40 in Unit 3
- Pre-OP clinic
- Cataract Clinic for post-op care

Specialized units

- All services under 1 roof
- Decreased waiting time
- Group related services
What we did

- Optical shops
- Medical shops
- Cash counters
- Counselling Units

DESIGN

Clinic Layout

- Separate flow
- Proximity to other clinics
- Minimize movement
Statutory Guidelines

- West Bengal (Birla Eye Hospital) serves as a stringent case example
- Three project phases each involve unique legal requirements:
Physical Infrastructure: Key Takeaways

- Understanding the functional flow
- Allow for future innovation when planning hospital
- Use local knowledge to plan for legal requirements
- Leverage the organization's relationships with vendors to secure competitive prices on equipment
“Intelligence & capabilities are not enough. 
There must be the joy of doing something beautiful.”

- Dr. V

Thank You!