Current status and potential for medical electronics in India

DECEMBER 2010
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This report has been made possible with the support of Infotech Enterprises Ltd.
Healthcare is one of the most important industries in the world directly influencing the lives of billions of people. It is estimated that this global industry is in excess of 5 trillion US$, employing millions and growing at rates in excess of world GDP growth rates.

In India, like in elsewhere, this industry is shaped by three key dimensions of Affordability, Accessibility and finally Awareness for preventive measures. Compared to worldwide healthcare consumption, Indian healthcare expenditure constitute only 1% of global healthcare spending, but it is home to 17% of world’s population. This obviously brings forth huge growth potential for the industry here. Therefore, these three dimensions offer a great opportunity for the development of this industry which not only have business growth potential but at the same time is among those select industries which directly improve the lives of millions.

The advent of new technologies and devices, for example nano technology and motion sensors, are opening new vistas of applications. The power of semiconductors, in driving down the costs and at the same time miniaturization and robustness of devices, is at the forefront to offer new possibilities e.g. Frugal Innovation. This can significantly change the Affordability scenario. Healthcare Insurance is another important factor to drive Affordability.

In the past decade, Accessibility to healthcare has improved multifold, however, quality and specialized healthcare is still confined to large cities, with rural India still living without access to decent healthcare. Here again, new technologies, for example, telemedicine can help bridge this wide gap with remarkable speed and effectiveness.

India is fast developing, with a burgeoning middle class powering this growth. Rapidly rising incomes and changing lifestyles are giving rise to many lifestyle related diseases, where prevention holds the key. This means opportunities in Preventive healthcare which is very much dependent on enhanced Awareness. Once again, technologies like tele-education, media and homecare products like blood glucose meters and such can play a significant role in prevention.

The “Current status & potential for medical electronics in India” is both timely and is meant to provide a comprehensive view to the reader with the focus on medical equipment/electronics. It begins with the overview of the healthcare delivery structure in India and particularly highlights the huge potential lying latent in primary care affecting the masses, where further enabling of primary healthcare centers with innovative devices like cost effective portable Ultrasound Scanners, blood glucose monitors, Digital X-rays etc. can have defining impact. Next, the report focuses on medical equipments, its classification and relative market sizes as well as on equipment manufacturers and suppliers.

Imaging equipment, which today constitutes more than half of local consumption, is used mostly at tertiary and secondary healthcare centers. The high potential of portable and homecare products need to penetrate into primary healthcare centers and homes for preventive care. The report further details each medical equipment segment with their import and export status. While touching briefly on semiconductors, it highlights the factors which can influence the development of this industry in India for Strategy Makers. The report concludes with future projections and some general indices related to healthcare.

We sincerely hope that the report will provide critical insights to the key stakeholders who will drive this critical industry that will affect the lives of millions of people in India in a most positive way.

Vivek Sharma
ISA EC Member & Convener, ISA Medical Electronics Segment
Semiconductor technology lies at the heart of the amazing revolution across areas like energy, medical, industrial, communications, consumer and automotive. This revolution is enabled by designing and building successive generations of chips that perform an ever increasing number of functions, run faster, use lesser power and cost less. To sustain this pace of technology, it is necessary to push the technological limits of semiconductor design and manufacturing even further.

The healthcare sector offers unique opportunities in India, which has the need as well as the capability to address it. Healthcare in rural areas has provided an opportunity to the semiconductor industry to innovate products that consume very little battery power or even no power at all. From traditional applications such as ultrasound machines, magnetic resonance imaging and computed tomography scans to emerging ones such as home health monitoring, ECG machines with easy and common interfaces with computers and other devices, automated pathology equipment, India offers tremendous growth opportunities.

This study is to understand the status of and the prospects for medical electronics in the context of the Indian semiconductor industry. The study will serve as a useful guide to semiconductor companies, trade promotion bodies and industry associations in India and outside it.

Our special thanks to Infotech Enterprises who have supported us. Our thanks to all ISA members who have participated in the study and the research team at Feedback Consulting- A.Ravichandar, IV Rajashree, Arthi Pichaiya, Deepak H and Manoj Kumar who put it together. Dr. Devi Shetty, Cardiac Surgeon, Founder Narayana Hrudayalya and Dr. V. Raja, President & CEO, GE Healthcare India, as Advisors, have provided us with their valuable inputs and support. Vivek Sharma, STMicroelectronics, as the Convener of the ISA Medical Electronics Segment, has driven this report with support from its members- Dr. Anand Anandkumar, Cellworks, Bhanuprakash Cherukuri, Infotech Enterprises, Poornima Mohanachandran, i2i Telesolutions, Mahesh Sanzgiri, L&T Infotech, Sridhar Perepe, MindTree, K Krishna Moorthy, NatSem India, Jayalakshmi, NXP Semiconductors, Vivek Pawar, Sankalp Semiconductors, Deepak Bhardwaj, Texas Instruments, Padmanabha Gowda, Osram Opto Semiconductors and Manimaran Rajakannu, Wipro Technologies. Chandrika Anil and Dr. Vidya Mulky from the Secretariat coordinated the process.

Poornima Shenoy
President - ISA

Dr. Biswadip (Bobby) Mitra
Chairman - ISA
# Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Charts</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>1-8</td>
<td>9-12</td>
</tr>
<tr>
<td>Healthcare delivery structure</td>
<td>9-10</td>
<td>13</td>
</tr>
<tr>
<td>Medical equipment market</td>
<td>11-23</td>
<td>14-21</td>
</tr>
<tr>
<td>Semiconductor and allied products sourcing practices</td>
<td>24-27</td>
<td>21-23</td>
</tr>
<tr>
<td>Factors influencing the growth of the healthcare delivery industry and Government regulation</td>
<td>28-43</td>
<td>23-31</td>
</tr>
<tr>
<td>Future projections and conclusion</td>
<td>44-55</td>
<td>32-38</td>
</tr>
<tr>
<td>Annexure</td>
<td>56-61</td>
<td>39-41</td>
</tr>
</tbody>
</table>
### Medical equipment: Definitions

<table>
<thead>
<tr>
<th>Terminology</th>
<th>Definitions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthcare market</td>
<td>Healthcare market includes healthcare delivery, pharmaceuticals, health insurance, medical equipment, medical consumables and medical IT</td>
</tr>
<tr>
<td>Healthcare delivery</td>
<td>Includes the primary, secondary and tertiary healthcare segments</td>
</tr>
<tr>
<td>Medical equipment</td>
<td>In this report, medical equipment refers to all electronic devices and equipment used in the diagnosis, treatment and monitoring of patients. Does not include surgical devices, consumables like gloves, reagents, and non-electronic implants used in orthopedic, dental treatments, etc.</td>
</tr>
<tr>
<td>Imaging</td>
<td>Electronic equipment used to measure recording data for diagnostic applications</td>
</tr>
<tr>
<td>Patient monitoring system</td>
<td>Electronic medical device that measures a patient’s vital signs and displays the data so obtained</td>
</tr>
<tr>
<td>Therapeutics</td>
<td>Includes electronic machine, instrument or implants used in the treatment of any ailment</td>
</tr>
<tr>
<td>Handheld / homecare products</td>
<td>Electronic devices which enable personal health monitoring</td>
</tr>
<tr>
<td>Cath labs</td>
<td>A cath lab is an examination room in a hospital or a clinic with diagnostic imaging equipment used to support the catheterization procedure. A catheter is inserted into a large artery, and various wires and devices can be inserted into the body via the catheter, which is inside the artery</td>
</tr>
<tr>
<td>Mammography</td>
<td>A diagnostic and screening tool used in the detection of breast cancer. It is the process of using low-dose amplitude-X-rays to examine the human breast</td>
</tr>
<tr>
<td>Maternal Health</td>
<td>Maternal health refers to the health of women during pregnancy, childbirth and the postpartum period. Major direct causes of maternal morbidity and mortality include haemorrhage, infection, high blood pressure, unsafe abortion, and obstructed labor</td>
</tr>
</tbody>
</table>

### Glossary of terms

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Expansion</th>
</tr>
</thead>
<tbody>
<tr>
<td>EEPROM</td>
<td>Electrically Erasable Programmable Read-Only Memory</td>
</tr>
<tr>
<td>GP</td>
<td>General Practitioner</td>
</tr>
<tr>
<td>PHC</td>
<td>Primary Health Centre</td>
</tr>
<tr>
<td>USFDA</td>
<td>US Food and Drug Administration</td>
</tr>
<tr>
<td>PMS</td>
<td>Patient Monitoring System</td>
</tr>
<tr>
<td>ECG</td>
<td>Electrocardiography</td>
</tr>
<tr>
<td>SAMEER</td>
<td>Society for Applied Microwave Electronics Engineering &amp; Research</td>
</tr>
<tr>
<td>EEG</td>
<td>Electroencephalography</td>
</tr>
<tr>
<td>MNC</td>
<td>Multinational Company</td>
</tr>
<tr>
<td>HIS</td>
<td>Healthcare Information System</td>
</tr>
<tr>
<td>PAC</td>
<td>Picture Archiving &amp; Communication System</td>
</tr>
<tr>
<td>ISO</td>
<td>Indian Standard Organization</td>
</tr>
<tr>
<td>IEC</td>
<td>International Electrotechnical Commission</td>
</tr>
<tr>
<td>₹</td>
<td>Indian Rupee</td>
</tr>
</tbody>
</table>
Objectives

- Outlook of healthcare delivery in India
  - To assess the market, the challenges & opportunity in healthcare delivery in India
- Understanding the overall dynamics of the medical electronics industry in India
  - Current status and future prospects
- Regulatory issues facing the medical electronics industry
  - Policy initiatives and incentives
- Relevant drivers for the medical electronics industry in India
- To assess opportunity in the semiconductor space, with the growth of the medical electronics industry

Scope

Indian healthcare delivery

- Overview of the Indian healthcare delivery
- Healthcare indices – Comparison of Indian health indices with global indices
- Investments in healthcare delivery
- Challenges & opportunities in healthcare delivery
- Role and influence of insurance companies in the medical equipment industry
- Growth of healthcare system in India

Medical equipment industry

- Overview of the medical equipment industry
- Trends in medical equipment manufacturing
- Regulations & policies governing the medical equipment industry
- Future outlook of the medical equipment industry
  - Innovations and low cost product development

Medical electronics industry

- Estimated size of the medical electronics industry
- Sourcing & usage of semiconductors
  - Reasons for a specific type of sourcing
- Trends in semiconductor sourcing that could impact the industry

Overall dynamics of medical equipment industry and the opportunities it holds for semiconductor manufacturers
Methodology

Focus

Interviews with key stakeholders the primary route to establish market dynamics and opportunity assessment

Sources

Medical equipment manufacturers, hospitals, physicians
Others: Govt. Depts., industry experts
Annual reports, publications and websites

Primary
Secondary

Methodology

- Primary interviews were conducted across respondents in the healthcare segment to understand the usage and purchase practices of medical equipment
- Manufacturers of medical equipment were met to understand the usage and purchase of medical equipment
- Secondary research to understand the Indian healthcare indices, trends, growth and opportunities
- Annual reports and other sources were checked to validate information obtained from primary sources
- Multiple interviews conducted across industry experts to gain key insights

Structure of the Indian healthcare delivery system

Healthcare service providers (Medical facilities)

Administration
Payments
Insurance
Others

Diagnostics (Pathology, Radiology)
Pharmacies, Blood banks
GPs / Polyclinics
Wellness clinics
Individual / Corporate firms
Regulatory bodies

Third Party Administrators
Medical Insurance Providers

Source: ISA-Feedback 2010
Healthcare delivery (hospitals) accounts for close to 70% of the healthcare market

Healthcare market (FY '09)*

Value: ₹ 300,000 cr. (USD 63 bn)

Note:
1. Market of wellness clinics, general practitioners and polyclinics included in the healthcare delivery segment
2. Alternative medical verticals like siddha, ayurveda are accounted under pharmaceutical market

* Financial year 2009

Source: ISA-Feedback 2010

Structure of the healthcare delivery

Government

117 tertiary medical colleges and hospitals
1,200 ESI and PSU hospitals
4,400 district hospitals
3,000+ Community health centres
23,000 Primary health centres, 135,000+ Sub-centres
1,200 ESI and PSU hospitals
1500 urban health posts
Rural

Private

Super specialty hospitals
Specialty hospitals
Large private trusts
Nursing homes
Community healthcare centers
6,83,680 - General practitioners, polyclinics, dispensaries
40,000+ - Diagnostic centers & path labs

Source: ISA-Feedback 2010
Secondary and tertiary care drive the medical equipment market

<table>
<thead>
<tr>
<th>Health care delivery market - FY2009</th>
<th>Primary care</th>
<th>Secondary care</th>
<th>Tertiary care</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brief</td>
<td>Primary care refers to “First contact” care as provided by physicians</td>
<td>Refers to specialized medical care or surgery. Service provided by specialist and not by general practitioner</td>
<td>Offer highly sophisticated medical care</td>
</tr>
<tr>
<td></td>
<td>Service could be offered in polyclinics, nursing homes, hospitals</td>
<td>Services might be provided in a hospital or nursing homes</td>
<td>Offer treatment in specialty, super-speciality &amp; surgical areas</td>
</tr>
<tr>
<td></td>
<td>Services include health maintenance, screening for infectious and communicable diseases, treatment for minor injuries, etc</td>
<td>Generally a continuation of primary care treatment</td>
<td>Private hospitals &amp; institutes dominate the tertiary healthcare market</td>
</tr>
<tr>
<td>Treatment</td>
<td>Offer outpatient treatment</td>
<td>Offer both inpatient and outpatient services</td>
<td>Offer both inpatient and outpatient services</td>
</tr>
<tr>
<td></td>
<td>Basic prevention services</td>
<td>Offer basic medical specialties including internal medicine, pediatrics, obstetrics &amp; gynaecology</td>
<td>Offer basic and specialty treatment</td>
</tr>
<tr>
<td></td>
<td>Consulting and referrals</td>
<td>Limited coverage of other specialties</td>
<td>Specialize in verticals like cardiology, neurology, oncology, and orthopaedics</td>
</tr>
<tr>
<td>No of beds</td>
<td>No inpatient treatment</td>
<td>&lt; 150</td>
<td>&gt; 150</td>
</tr>
<tr>
<td>Regional focus</td>
<td>Government – Mainly rural areas</td>
<td>Government – Mainly rural areas</td>
<td>Currently metros, tier 1 cities</td>
</tr>
<tr>
<td></td>
<td>Private – Metros, tier 1, tier 2 and other cities</td>
<td>Private – Metros, tier 1, tier 2 and other cities</td>
<td>Shifting focus to tier 2 cities as well</td>
</tr>
<tr>
<td>Investment cost per bed</td>
<td>NA</td>
<td>₹ 25-30 lakh</td>
<td>₹ 50-75 lakh</td>
</tr>
</tbody>
</table>

Source: ISA-Feedback 2010

Medical equipment: Classification

<table>
<thead>
<tr>
<th>Medical equipment</th>
<th>Imaging</th>
<th>Patient monitoring system</th>
<th>Therapeutic</th>
<th>Handheld / homecare products</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equipment used to measure recording data for diagnostic applications</td>
<td>Electronic medical device that measures a patient’s vital signs and displays the data so obtained</td>
<td>Includes machine, instrument or implants used for the treatment of any ailment</td>
<td>Electronic devices that enable personal health monitoring</td>
<td></td>
</tr>
<tr>
<td>Key products</td>
<td>Key products</td>
<td>Key products</td>
<td>Key products</td>
<td></td>
</tr>
<tr>
<td>Ultrasound scan</td>
<td>Bedside monitors</td>
<td>Ventilator</td>
<td>Glucometer</td>
<td></td>
</tr>
<tr>
<td>X-Ray</td>
<td>Electro Cardio Gram</td>
<td>Syringe pump</td>
<td>Digital Thermometer</td>
<td></td>
</tr>
<tr>
<td>CT Scan</td>
<td>EEG, ENG</td>
<td>Infusion pump</td>
<td>SDB Equipment</td>
<td></td>
</tr>
<tr>
<td>MRI</td>
<td>Others</td>
<td>Dialysis equipment</td>
<td>Others</td>
<td></td>
</tr>
<tr>
<td>Gama Camera</td>
<td>Others</td>
<td>Sleep Lab</td>
<td>Others</td>
<td></td>
</tr>
<tr>
<td>Pulmonary Function Test</td>
<td>Others</td>
<td>CRT (Continual Renal Replacement Therapy)</td>
<td>Others</td>
<td></td>
</tr>
<tr>
<td>Cath Lab</td>
<td>Others</td>
<td>Diathermy</td>
<td>Others</td>
<td></td>
</tr>
<tr>
<td>Holter Recorder</td>
<td>Others</td>
<td>Heart Lung Machine</td>
<td>Others</td>
<td></td>
</tr>
<tr>
<td>Echo Color Doppler</td>
<td>Others</td>
<td>Anticoagulation Timer</td>
<td>Others</td>
<td></td>
</tr>
<tr>
<td>C- Arm X-Ray</td>
<td>Others</td>
<td>Warmer/ Incubator</td>
<td>Others</td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td>Others</td>
<td>Bubble Scraper</td>
<td>Others</td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td>Others</td>
<td>Others</td>
<td>Others</td>
<td></td>
</tr>
</tbody>
</table>

Portable model of an equipment is considered as a variant of that specific equipment

Source: ISA-Feedback 2010
### Medical equipment market (FY’09)*

#### Medical equipment – market by segment

- **Imaging**: 57%
- **Patient Monitoring**: 9%
- **Therapeutic**: 26%
- **Homecare / Handheld products**: 8%

**Base**: ₹ 3850 cr. (USD 820 mn)

#### Medical equipment – market by suppliers

- **Wipro GE**: 17%
- **Siemens**: 18%
- **Philips**: 10%
- **Allenger**: 1%
- **Others**: 45%

*Financial year 2009

Source: ISA-Feedback 2010

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### Medical equipment: Stakeholders in the business

<table>
<thead>
<tr>
<th>Component suppliers</th>
<th>Suppliers</th>
<th>Intermediaries</th>
<th>User segments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Original design manufacturers</td>
<td>Category A (3 suppliers)</td>
<td>Direct Sales</td>
<td>Hospitals</td>
</tr>
<tr>
<td>Engineering manufacturing &amp; service providers</td>
<td>Category B (~35 suppliers)</td>
<td>Dealers/distributors</td>
<td>Large (2,000+ large hospitals)</td>
</tr>
<tr>
<td>Electronics component suppliers</td>
<td>Category C (~200 suppliers)</td>
<td>Service providers</td>
<td>Small (25,000 small hospitals)</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Influencers</strong></td>
<td>Diagnostic centres &amp; laboratories (~40,000)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hospital consultants</td>
<td>General practitioners &amp; PHC (~8,45,000)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Insurance companies</td>
<td></td>
</tr>
</tbody>
</table>

*Medical equipment certifying agencies: USFDA, ISO, IEC*

Source: ISA-Feedback 2010
## Categories of suppliers: A brief overview

<table>
<thead>
<tr>
<th>Type</th>
<th>Category A</th>
<th>Category B</th>
<th>Category C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turnover range</td>
<td>₹ 300 - 1000 cr. (USD 65 - 210 mn)</td>
<td>₹ 50 - 300 cr. (USD 10 - 65 mn)</td>
<td>₹ &lt;50 cr. (&lt; USD 10 mn)</td>
</tr>
</tbody>
</table>

**Profile**
- GE, Wipro, Philips, Siemens are the key companies
- Category A companies position themselves as integrated solution providers
- Help hospitals in medical equipment planning

**Profile**
- Domestic manufacturers and a few foreign companies operate in this segment

**Profile**
- Small scale suppliers who cater to select products
- Largely import components and assemble in India
- Clustered across select cities

**Products offered**

<table>
<thead>
<tr>
<th>Infrastructure</th>
<th>Category A</th>
<th>Category B</th>
<th>Category C</th>
</tr>
</thead>
<tbody>
<tr>
<td>• 1 - 3 manufacturing plants across India</td>
<td>• 1 - 2 manufacturing plants</td>
<td>• Domestic manufacturers have 1 - 2 manufacturing plants</td>
<td></td>
</tr>
<tr>
<td>No. of branch offices: 8 - 12</td>
<td>• Foreign companies import and sell equipment in India</td>
<td>• No. of branch offices: 3 - 5</td>
<td></td>
</tr>
<tr>
<td>• Have small manufacturing/assembly unit inside the office premises</td>
<td>• Domestically manufactured equipment by the manufacturer</td>
<td>• Have small manufacturing/assembly unit inside the office premises</td>
<td></td>
</tr>
</tbody>
</table>

**Segments catered to**

<table>
<thead>
<tr>
<th>Category A</th>
<th>Category B</th>
<th>Category C</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Focus on tertiary and secondary care</td>
<td>• Focus on tertiary, secondary and primary care</td>
<td>• Focus on secondary and primary care</td>
</tr>
<tr>
<td>- Target metros &amp; tier I cities</td>
<td>- Target metro, tier I &amp; tier II cities</td>
<td>- Target hospitals within the region</td>
</tr>
<tr>
<td>- Slowly moving towards tier II cities</td>
<td>- Cater to export markets</td>
<td></td>
</tr>
</tbody>
</table>

**Component sourcing**

<table>
<thead>
<tr>
<th>Category A</th>
<th>Category B</th>
<th>Category C</th>
</tr>
</thead>
<tbody>
<tr>
<td>• 70 - 80% of the components are imported through Indian representatives of the manufacturer or directly through the importer</td>
<td>• 70 - 80% of the components are imported</td>
<td>• Largely act as assembly units</td>
</tr>
<tr>
<td>• Electronic manufacturing service provider of the company purchase components from shortlisted vendors</td>
<td>• Electronics components are imported through Indian representatives of the manufacturer or directly through the importer</td>
<td>• 90% imports</td>
</tr>
<tr>
<td>• 70 - 80% of the components are imported</td>
<td></td>
<td>• Import components from Taiwan, China, US through import agents</td>
</tr>
</tbody>
</table>

**Future plans on domestic manufacturing vs. imports**

<table>
<thead>
<tr>
<th>Category A</th>
<th>Category B</th>
<th>Category C</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Category A companies are expanding their manufacturing base in India</td>
<td>• Setting up Mediparks – common manufacturing zone for medical equipment, is expected to increase the manufacturing activity of category B suppliers</td>
<td>• Will continue to import components and assemble in India, to benefit from low cost components</td>
</tr>
<tr>
<td>• India to be positioned as an export hub</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: ISA-Feedback 2010
Category A & category B manufacturers dominate the medical equipment market

[Chart 14]

Medical equipment – market by category

- **Category A**
  - Base: ₹ 1725 cr. (USD 367 mn)
  - Siemens 37%
  - GE Wipro 41%
  - Philips 22%
  - Others 94%

- **Category B**
  - Base: ₹ 1685 cr. (USD 360 mn)
  - L&T 9%
  - Drager 6%
  - BPL 5%
  - Allenger 3%
  - Others 77%

- **Category C**
  - Base: ₹ 440 cr. (USD 93 mn)
  - Manthan 2%
  - Clarity Medical 2%
  - Systronics 1%
  - Midas 1%
  - Electromedical 0%
  - Others 94%

**Indicative market**

Source: ISA-Feedback 2010
Medical equipment: Estimation of total market

**Chart 15**

- Production $2,450$ cr (USD $520$ mn)
- Exports $350$ cr (USD $75$ mn)
- Imports $1,750$ cr (USD $370$ mn)

**Indicative market split**

- Domestic market $3,850$ cr (USD $820$ mn)

**Domestic market is estimated at around $3,850$ cr (USD $820$ mn)**

**Chart 16**

**Imaging equipment – Few fast moving products**

- MRI 23%
- CT Scan 23%
- Colour Doppler 17%
- BW Ultrasound 3%
- X-Ray 10%
- Others 17%

**Base:** $2,195$ cr (USD $470$ mn)

- CT Scan & MRI are high value, low volume equipment used in tertiary care and high end diagnostic labs
- X-Ray is the largest selling imaging equipment in terms of volume
- X-Rays are used in primary, secondary and tertiary care
- Used even in smaller cities

**Indicative market split**

<table>
<thead>
<tr>
<th>Brands encountered</th>
<th>MRI</th>
<th>CT Scan</th>
<th>Colour Doppler</th>
<th>X-Ray</th>
<th>BW Ultrasound</th>
</tr>
</thead>
</table>
| Current product growth rate | 15% | 10% | 13% | 5% | 7%

**Source:** ISA-Feedback 2010
High technology requiring high precision - major hindrance for domestic manufacturing of imaging equipment

<table>
<thead>
<tr>
<th>Local manufacturing - Export</th>
<th>Import</th>
<th>Local manufacturing - Domestic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>High</td>
<td>Medium</td>
</tr>
</tbody>
</table>

**Reasons:**
- Indian manufacturers do not have the capacity to manufacture high technology equipment
- Global market is currently addressed by well-established companies
- MRI, CT scan are largely imported
- Products largely imported from US, Germany, Japan
- X-rays, Ultrasound scanners, ECG are being manufactured in India
- A few large and a few medium suppliers manufacture imaging equipment domestically

**Bedside monitors account for around 55% of the patient monitoring systems market in India**

**Patient monitoring systems – Few fast moving products**

- Patient monitoring systems is a mature market
- Current market is largely driven by replacement sales
- Bedside monitor is available with various features depending on the number of parameters displayed
- ECG is an integral component of the diagnostic testing suite for hospitals worldwide

**Patient monitoring system market:**
- **₹ 345 cr (USD 70 mn)**

**Brands encountered**
- ECG: BPL India, Concept Integration, GE Healthcare, L&T - Medical, Medion, Philips
- Patient monitor: Arjo-huntleigh, BPL India Limited, GE Healthcare, L&T - Medical, Mindray, Philips, Schiller Healthcare

**Current product growth rate**
- ECG: 15%
- Patient monitor: 15%

*Based on the sample covered*

Source: ISA-Feedback 2010
Patient monitoring system market catered both by domestic production & imports

Patient monitoring systems - Preference for imported products

<table>
<thead>
<tr>
<th>Local manufacturing - Export</th>
<th>Import</th>
<th>Local manufacturing - Domestic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>Medium</td>
<td>Medium</td>
</tr>
</tbody>
</table>

Reasons:
- Domestic manufacturers concentrate on the domestic market
- Patient monitoring system is characterized by the presence of both domestically manufactured and imported equipment
- High end patient monitoring systems are largely imported

Reasons:
- Patient monitoring systems are high volume products, which are mandatory in secondary & tertiary care market
- Relatively less complex products (with basic features) are manufactured by category B and C suppliers

Based on the sample covered

Source: ISA-Feedback 2010

Ventilators and dialysis equipment together account for around 50% of the therapeutics market

Therapeutics – Few fast moving products

<table>
<thead>
<tr>
<th>Infusion pump</th>
<th>Defibrillator</th>
<th>Ventilators</th>
<th>Dialysis</th>
<th>Nebulizer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Akas Medical, B Braun, Biomed, East Coast, Emco, Fresenius Kabi</td>
<td>BPL India, Philips, Schiller Healthcare, Zoll Medical Corporation</td>
<td>Draeger Medical, Maquet Medical, GE Healthcare, Tyco Healthcare and Trivitron Healthcare</td>
<td>Baxter (India), Biogenuix Medsystems, Biotique Corporation (Taiwan), B.Braun Medical, Cosmos Medical Appliances</td>
<td>Infi (Represented by Infinity Mediquip), MRK Healthcare, Nidek Medical, Omron Healthcare</td>
</tr>
</tbody>
</table>

Indicative market split

Therapeutic market: ₹ 1,000 cr (USD 215 mn)

Based on the sample covered

Source: ISA-Feedback 2010
## Therapeutics market – Equal contribution from domestic manufacturing & imports

<table>
<thead>
<tr>
<th>Therapeutic equipment - Preference for imported products</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Local manufacturing - Export</strong></td>
</tr>
<tr>
<td>Low</td>
</tr>
<tr>
<td>Reasons:</td>
</tr>
<tr>
<td>• Very few players like Allengers are focusing on the export market</td>
</tr>
<tr>
<td>• Equipment suppliers are focusing on the thriving domestic market</td>
</tr>
<tr>
<td>• For example, biphasic defibrillation is relatively new technology, the equipment is mainly supplied by import</td>
</tr>
</tbody>
</table>

Based on the sample covered

Source: ISA-Feedback 2010

## Glucometers contribute to around 57% of the handheld/homecare equipment market

### Handheld/Homecare equipment – Few fast moving products

- **Glucometer** 64%
- **Digital hearing aid** 26%
- **Digital thermometer** 6%
- **Others** 4%

- Increasing number of diabetes cases and awareness driving the blood glucose monitor market

**Handheld/Homecare equipment market:** ₹ 310 cr (USD 65 mn)

### Brands encountered

<table>
<thead>
<tr>
<th>Brands encountered</th>
<th>Digital hearing aid</th>
<th>Glucometer</th>
<th>Digital thermometer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phonac India, Siemens, Starkey, Widex</td>
<td>Arkray Piramal, Bayer, B.Braun, Johnson &amp; Johnson, Roche Medical</td>
<td>Hicks Thermometer, Lifeline Surgicals, Prabaah Medicare</td>
<td></td>
</tr>
</tbody>
</table>

| Current product growth rate | 15% | 18% | 10% |

Indicative market split

Based on the sample covered

Source: ISA-Feedback 2010
Handheld/Homecare equipment market is highly import driven

<table>
<thead>
<tr>
<th>Handheld/Homecare market - Preference for imported products</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local manufacturing - Export</td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td>-----</td>
</tr>
</tbody>
</table>

Reasons:
- Very nascent market in India.
- Global market dominated by US and Chinese products

Reasons:
- Very few domestic players in India
- Sold as over the counter products
- Hence focus on marketing rather than manufacturing
- Companies like Arkray tied up with Piramal for easy product distribution

Reasons:
- Digital thermometers and hearing aids are being manufactured by unorganized players in a very small scale
- Components are largely imported from China

Based on the sample covered
Source: ISA-Feedback 2010

Semiconductor usage

Usage of semiconductor is critical from power supply to the display in medical equipment
- Semiconductors are an integral part of most medical equipment, starting from high end imaging to small handheld devices
- The role of a semiconductor supplier becomes more critical as the medical equipment devices move towards portable and smaller medical devices

<table>
<thead>
<tr>
<th>Product / segment</th>
<th>Widely used semiconductor components</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical imaging</td>
<td>Microcontroller, microprocessor, amplifiers, data converters, Digital Signal Processors (DSP), Application Specific Standard Products (ASSP) and Application Specific Integrated Circuits (ASIC)</td>
</tr>
<tr>
<td>Patient monitoring systems</td>
<td>Microcontroller, sensors, zigbee modules, ASIC, rectifiers, amplifiers, controllers, EEPROM</td>
</tr>
<tr>
<td>Digital hearing aids</td>
<td>Microcontroller, EEPROM, linear accelerometers, comparators, amplifiers, audio processor ICs and other ASIC</td>
</tr>
<tr>
<td>Infusion pumps</td>
<td>Microcontroller, regulators, transistors, rectifiers, comparators, amplifiers, sensors</td>
</tr>
</tbody>
</table>

Source: ISA-Feedback 2010
Sourcing of electronic components -
Electronic component cost for select products

### INDICATIVE

<table>
<thead>
<tr>
<th>ECG</th>
<th>EEG</th>
<th>Bed side monitor</th>
<th>Cath lab</th>
<th>Mammography</th>
<th>Digital hearing aid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost of the product</td>
<td>₹ 25,000 – 1,25,000 (USD 530 – 2660)</td>
<td>₹ 1,25,000 (USD 2660)</td>
<td>Upto ₹ 200,000 (USD 4255)</td>
<td>₹ 1,00,00,000 (USD 0.2 Mn)</td>
<td>₹ 10,00,00,000 – 15,00,000 (USD 21,000 – 31915)</td>
</tr>
<tr>
<td>% cost of electronic components*</td>
<td>25%</td>
<td>25%</td>
<td>35%</td>
<td>25%</td>
<td>35%</td>
</tr>
<tr>
<td>% of imports</td>
<td>80% - 90% of the electronic components are imported</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Key import locations</td>
<td>United States, Germany, France, China, Singapore, Hong Kong and Korea</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Includes semiconductor cost

- Semiconductors are imported due to unavailability of Indian suppliers
  - A couple of manufacturers expressed interest in domestic sourcing, if components are manufactured in India
- Semiconductors are either directly imported or sourced through an import agent
  - Category C manufacturers tend to source from the import agent as they purchase low volumes and cannot meet the minimum order quantity

**Total market for semiconductors is estimated at around ₹ 71 cr* (USD 15.20 mn)**

The TM volume for a particular end use product represents the total sales units for a specific year, i.e. TM represents the total local consumption of a said product in that year. It includes imports; basically volume of local sales irrespective of whether it was manufactured in India or not. This TM is multiplied with the eBoM to arrive at the semiconductor TM.

*Source: ISA-Frost & Sullivan, 2010*

---

**Future trends in the semiconductor sourcing pattern**

- Imaging equipment accounts for close to 50% of the medical equipment market
  - Imaging products are high value, low volume products
- Investment in domestic manufacturing & sourcing of electronic components is profitable if equipment volumes increase
- Even the industrial segments in which the products are sold in large volumes(such as IT, Telecom, Consumer durables) rely on imports for semiconductor sourcing
  - Given the condition, medical equipment industry also largely rely on import for sourcing of semiconductor
- The sourcing pattern for medical electronics is expected to continue on similar lines for at least the next three to five years
  - However, growth of the Indian electronics manufacturing sector is expected to drive electronics components & semiconductors manufacturing

*Source: ISA-Feedback 2010*
Future growth of medical electronics market

Growth in the medical equipment market
Growth of medical electronics
Growth in healthcare delivery

Source: ISA-Feedback 2010

Medical equipment market growth depends on the growth of healthcare delivery

1. **Changing demographics**
   - Government’s initiatives towards population stabilization

2. **Changing age profile**
   - Increase in middle age population group, which is prone to spend more on healthcare

3. **Changing lifestyle**
   - Alarming rise in the number of people affected by lifestyle diseases

4. **Booming healthcare market**
   - Increasing awareness has lead to the growth of preventive healthcare market

5. **Gap in healthcare infrastructure**
   - Large scale investment required to meet the rising demand

6. **Growing public private partnership in healthcare space**
   - Large gap in healthcare infrastructure and India’s diverse landscape mandates private partnership

7. **Health care insurance boom in India**
   - Growth in healthcare insurance is expected to increase healthcare spend

8. **Growth in medical tourism**
   - Lavish healthcare cities are being established to attract medical tourists

9. **Leading corporate firms enter healthcare delivery**
   - Huge potential in healthcare infrastructure attracting corporate firms

Source: ISA-Feedback 2010
1. Changing demographics (1/9)

India is in the middle of a slow but steady population stabilization

- Mortality and morbidity rates are gradually declining throughout the country to achieve population stabilization
  - Given the size and diversity of the Indian population, the achievement is commendable
- Government focusing on establishing family welfare programs and proper healthcare infrastructure to achieve population stabilization

Source: Central Intelligence Agency (CIA) World Factbook

2. Changing age profile (2/9)

The 15-64 age group is prone to lifestyle diseases in India

Source: U.S. Bureau of the Census, IPC, International Database
3. Increasing middle class population and changing lifestyles (3/9)

**Growing urban middle class**

**Rise in urban middle class income**

Source: NCAER

---

**Growth income levels and subsequently changing lifestyle is driving the incidence of lifestyle related diseases**

**Trends in disease burden**

**Past (1990)**

Maternal, Child and Communicable Disease: 15%
Non-Communicable Diseases: 56%
Injuries: 29%

**2008**

Cardiac related, oncology and diabetes collectively accounted for 13.8% of the total hospitalization cases.

Maternal, Child and Communicable Disease: 18%
Non-Communicable Diseases: 55%
Injuries: 27%

**Future (2013 P)**

Cardiac related, oncology and diabetes are expected to account for 17.4% & 20.0% of hospitalization cases in 2013 & 2018 respectively.

Maternal, Child and Communicable Disease: 19%
Non-Communicable Diseases: 59%
Injuries: 22%

*Trends in disease burden* (Source: WHO, Feedback Estimates, CRISIL)

**Maternity Injuries Lifestyle Diseases**

*Average cost per treatment (₹) (2001)*

In 2010, cardiac related, oncology and diabetes accounted for 39% of the in-patient revenues.

Maternity: 5,800
Injuries: 9,700
Lifestyle Diseases: 29,600

*Source: NSSO*
**4. Preventive healthcare (4/9): A booming market**

- Increasing occurrences of lifestyle diseases have led to increased awareness among the middle aged population, especially among people in the 40-50 age group.
- Awareness has led to the growth of preventive healthcare market in India.
  - Executive or complete health check up market has drastically increased in the last five years.
- Preventive healthcare brings future business to hospitals.
  - “If routine tests are conducted on 100 patients, you can be sure that at least seven per cent of them will be borderline cases who require advanced tests, such as the stress test or even an angiography or CT scan,” - Brig. Joe Cunian.
- Preventive healthcare market is booming in metros and tier I cities.
  - Market in Tier II cities is slowly catching up.
  - Key cities: Mumbai, Delhi, Hyderabad, Bangalore, Chennai, Kolkata, Pune, Nagpur, Jaipur, Cochin, Coimbatore, Bhubaneswar, Cuttack, Agartala.

Source: Times of India
5. Gap in healthcare infrastructure (5/9)

Comparison of indices with global indices

<table>
<thead>
<tr>
<th></th>
<th>India</th>
<th>Under developed</th>
<th>Developing</th>
<th>Developed</th>
<th>World - Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beds</td>
<td>1.5</td>
<td>1.5</td>
<td>4.3</td>
<td>7.4</td>
<td></td>
</tr>
<tr>
<td>Nurses</td>
<td>0.9</td>
<td>1.6</td>
<td>1.9</td>
<td>3.3</td>
<td></td>
</tr>
<tr>
<td>Physicians</td>
<td>1.2</td>
<td>1.8</td>
<td>1.8</td>
<td>1.5</td>
<td></td>
</tr>
</tbody>
</table>

- India accounts for 20% of the global disease burden and 6% of the world's hospital beds
- While there was a 66% increase in reported ailments between 1995-96 and 2004-05, the bed density went down to 0.86 from 0.93 (per 1000 people) during this period
  - Large scale investment is required to increase the hospital bed density to two per 1,000 population by 2025

Source: ISA-Feedback 2010

Trends in bed to population ratio

Current bed per thousand population is estimated at 1.04 (all types) & 0.78 (only allopathic)

Source: India Stats, Feedback Estimates

Note:
- Figures between 2003 - 2008 estimated, based on yearly addition of beds
- Beds in allopathic establishments account for 75% (approx) of the total bed type
- Figures of number of beds (all types) relate to allopathic establishments - Hospitals, dispensaries, DHCs, PHCs and sub centres, sanatorium and TB clinics and other health establishments
- Total number of hospitals and hospital beds reduced (from 2000) due to heavy decrease in Madhya Pradesh figures and non-reporting by newly formed states.
- Year 2008 = April 2007 - 2008

Source: ISA-Feedback 2010
6. Public-Private Partnerships in healthcare (6/9)

- The main objectives of public-private partnerships are improvement in quality, accessibility, availability, acceptability, and efficiency of healthcare services
- While different states in India have had different levels of success with the implementation of such initiatives, it is expected that the private sector will continue to play an increasing role in India’s healthcare system
- Few examples
  - Trivitron, a Chennai based healthcare service provider, has tied up with the Government of Uttarakhand to set up renal care centers across the state; the state will provide the land, while Trivitron will supply men and equipment, offer training to handle the equipment and maintain it for a period of five years
  - The Government of Andhra Pradesh & New India Assurance Company offer the Arogyashree Scheme – the project is funded by the government, operational management by New India Assurance and service delivery by private health service providers
  - Gandhinagar General Hospital which was built by the government, has been handed over to the Adani Group for operation & management

Source: ISA-Feedback 2010

7. Healthcare insurance boom in India (7/9)

- Only 14% of the Indian population is insured using any form of health insurance (2% contributed by private health insurance)
- With the entry of MNC health insurance service providers in the market, the market is expected to aggressively grow at a CAGR of 33% over the next five years
- Health insurance industry is expected to reach ₹ 51,200 cr by 2013
- Growth of health insurance is in turn expected to increase the healthcare spend, thereby reducing the burden on the individual
- In recent times, Government programs for the poor are supported by health insurance companies
  - For example, the “Kalaigamar Kaapeedu Thittam” scheme has been launched by the Tamil Nadu Government, in order to finance the tertiary healthcare expense of the economically backward class
  - Star Health Insurance mandates that the healthcare service provider possesses select medical equipment, in order to be considered under the specific scheme

Source: ISA-Feedback 2010
8. Growth of medical tourism (8/9)

- In 2006-07, India was able to attract approximately 150,000 patients into the country, up from 10,000 patients about five years back
- Low cost treatment, less waiting time, expertise, quality of service and technological advancement make India a preferred destination for healthcare
- Seen as a major revenue generator by both the government and private hospitals
- Key destinations in India include
  - New Delhi, Gujarat - Cardiac care
  - Chennai - Eye care
  - Kerala, Karnataka - State of the art Ayurvedic healing
  - Others include Delhi, Mumbai, Goa
- Ministry of Tourism (MoT), Government of India has extended the Mvisa and MXvisa (Medical Visa) to three years from 6 months

Source: ISA-Feedback 2010

<table>
<thead>
<tr>
<th>Procedure</th>
<th>India</th>
<th>US</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart Surgery</td>
<td>315</td>
<td>1,350</td>
</tr>
<tr>
<td>Bone Marrow Transplant</td>
<td>1,350</td>
<td>1,1250</td>
</tr>
<tr>
<td>Liver Transplant</td>
<td>1,800</td>
<td>22,500</td>
</tr>
<tr>
<td>Orthopaedic Surgery</td>
<td>90</td>
<td>900</td>
</tr>
<tr>
<td>Cosmetic Surgery</td>
<td>31</td>
<td>135</td>
</tr>
<tr>
<td>LASK</td>
<td>22</td>
<td>247</td>
</tr>
</tbody>
</table>

Value in `000
9. Leading corporate firms entering healthcare delivery (9/9)

Investments
- 15-20 health cities are expected be established in India over the next five years
- Lavish health cities are mushrooming across India with a view to attract medical tourists
- Service providers offer personalized treatment and spa like facilities at a higher cost
- Leading real estate players are looking at new business areas such as hospital properties to maximize amenities in their integrated townships
  - DLF is inking a 26:74 joint venture with Fortis Healthcare to set up hospitals in its 200-acre-plus integrated townships across country, at an investment of around ₹5,875 cr (USD 1,250 mn)
  - The joint venture (JV) plans to set up a chain of 200-450 bed hospitals across 31 cities in India, in three to five years
  - Fortis’s Lucknow MediCity is being set up in Ansal’s 1,500 acre upcoming mega township
  - Hinduja Group and Limitless LLC, the realty arm of Dubai World, are each contributing about ₹5,170 cr (USD 1100 mn) in their 51:49 JV, to build hospitals and Medicare cities
  - Ambuja Realty Development Ltd (ARDL), which had formed a joint venture - Neotia Elbit Hospital Venture Ltd - with the Elbit Group of Israel, plans to develop a couple of feeder hospitals in West Bengal, for its proposed multi-specialty hospital in Kolkata

Note: This is indicative and based on details available currently.

Few upcoming projects

Source: ISA-Feedback 2010

Note: This is indicative and based on details available currently.
Regulatory framework

- The Indian medical equipment market is largely unregulated
- There is no special regulatory body present for medical technology
- Regulatory bodies of other product categories regulate different aspects of healthcare
  - Drugs Control General of India
  - Bureau of Indian Standards
  - Nuclear Medicine Board of Atomic Regulatory Commission (BARC)
- However, Central Drugs Standard Control Organization (CDSCO) is the principal authority

- Medical equipment is freely imported into India
- Import procedure:
  - The importer has to pay ₹ 70,500 (USD 1500) towards registration of the manufacturer
  - and an additional fee of ₹ 40,000 (USD 1000) for the import of every equipment
  - The importer does not need any certification for the quality of products imported
- A well-informed buyer checks for CE and FDA certification while buying, while the smaller buyers are largely influenced by cost
- A price-sensitive Indian market, coupled with the lack of regulations, is driving large scale imports from China
- This has a huge impact on the growth of the domestic manufacturing sector

Source: ISA-Feedback 2010

Government initiatives

- Red tapeism in the government and slow progress in the process of setting up manufacturing plants in India is placing China ahead of India as the preferred destination for manufacturing by a few MNCs
- Government’s move towards setting up a regulatory authority to stop the import of unreliable medical devices and encourage manufacture of standard medical equipment
  - The regulatory framework is expected to be different from the pharma companies, as advocated by many medical equipment suppliers
  - Initiative to set up medical parks to promote joint ventures between Indian and foreign companies to promote domestic manufacturing
- However, the government has reduced the duty on medical imports to 9.34% for most of the medical equipment to promote free flow of medical equipment to people
  - Customs duty concession given to 111 types of medical devices

Source: ISA-Feedback 2010
Indian healthcare industry to grow at twice the rate of the Indian GDP* over the next 5 years

![Graph showing the growth of the Indian healthcare industry from FY 08 to FY 15. The CAGR is 16%.](chart44)

* - GDP estimates at current market prices
** - Based on the estimated growth of 7.8% of GDP

Source: ISA-Feedback 2010

Lifestyle disease is the leading cause for death among 25-69 years, which requires secondary & tertiary care

![Graph showing leading causes of death by age group](chart45)

Source: ISA-Feedback 2010
Estimated infrastructure spend on medical equipment - Based on population and growth of healthcare infrastructure

To achieve a bed to population ratio of 3 by 2015

- No. of beds required: 3,500,000
- Total investment required: USD 367 bn
- Estimated spend on medical equipment: USD 110 bn

To achieve a bed to population ratio of 3 by 2026

- No. of beds required: 4,200,000
- Total investment required: USD 405 bn
- Estimated spend on medical equipment: USD 120 bn

Source: ISA-Feedback 2010

Medical equipment market is estimated to grow at a CAGR of 17% over the next five years

Growth of medical equipment market

<table>
<thead>
<tr>
<th>Year</th>
<th>Value in Cr.</th>
<th>Homecare/handheld devices</th>
<th>Therapeutics</th>
<th>Patient Monitoring</th>
<th>Imaging</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY 2009</td>
<td>310</td>
<td>100</td>
<td>2195</td>
<td>3850</td>
<td></td>
</tr>
<tr>
<td>FY 2010</td>
<td>378</td>
<td>1170</td>
<td>2546</td>
<td>4490</td>
<td></td>
</tr>
<tr>
<td>FY 2011</td>
<td>461</td>
<td>1369</td>
<td>2954</td>
<td>5240</td>
<td></td>
</tr>
<tr>
<td>FY 2012</td>
<td>563</td>
<td>1602</td>
<td>3426</td>
<td>6115</td>
<td></td>
</tr>
<tr>
<td>FY 2013</td>
<td>687</td>
<td>1874</td>
<td>3974</td>
<td>7140</td>
<td></td>
</tr>
<tr>
<td>FY 2014</td>
<td>838</td>
<td>2192</td>
<td>4610</td>
<td>8335</td>
<td></td>
</tr>
<tr>
<td>FY 2015</td>
<td>1022</td>
<td>2565</td>
<td>5348</td>
<td>9735</td>
<td></td>
</tr>
</tbody>
</table>

Segment growth rate:
- Imaging: 16%
- Therapeutics: 17%
- Homecare/handheld devices: 22%
- Patient monitoring: 15%

Source: ISA-Feedback 2010
Market segment attractiveness for electronic component manufacturing

Despite high volume sale with a higher growth rate, homecare market is import driven

With active manufacturing and high volume sales, the therapeutics & patient monitoring system market is the market to focus on

Ease of accessibility for the component supplier

Market attractiveness: Estimation based on the growth, extent of volume sales and level of imports
Feasibility: Willingness to source from domestic supplier and extent of Chinese imports
Size of bubble indicates the market size

Source: ISA-Feedback 2010

Future scenario - Domestic manufacturing & imports

- With huge demand for healthcare infrastructure, domestic manufacturing of medical equipment is expected to increase
- Promotion of medical technological parks – a key initiative to attract overseas medical equipment manufacturers
  - Trivitron Healthcare has created a first-of-its-kind, world class manufacturing facility in India, on a sprawling 20-acre land near Chennai
  - Aloka Co Ltd from Japan, is setting up a manufacturing plant in Chennai
- With the establishment of a regulatory framework under progress, import regulations are expected to be more stringent, thereby bringing down medical equipment imports

Source: ISA-Feedback 2010
Initiatives in telemedicine (1/2)

- Apollo Hospitals’ Apollo Telemedicine Foundation has tied up with CISCO, to offer desktop based healthcare solutions
  - The initiative is expected to be user friendly for doctors and cost effective for Apollo
  - With this facility, the doctor will be able to examine the patient using a laptop, webcam and internet connection
- Medicine systems and Research in Motion (RIM), (makers of Blackberry phones) together have made mobile ECG application, eUNO R10 possible
  - This application enables doctors to monitor the performance of their patient’s heart through their Blackberry
  - This has been implemented in Nanavathi Hospital, Mumbai
  - This application not only saves the doctor’s time, but also helps in quick diagnosis & treatment
- India has launched a telemedicine project in Ethiopia, by linking hospitals in Ethiopia with Hyderabad based Care Group
  - It enables doctors in Ethiopia to get expert guidance from doctors in Hyderabad
- Department of Information Technology, Ministry of Communications & Information Technology, has identified telemedicine as one of the thrust areas for executing R&D projects through various institutions and agencies like SAMEER, C-MET, etc.

Note: This is indicative and based on details available currently. Source: ISA-Feedback 2010
Initiatives in telemedicine (2/2)

- ISRO's Telemedicine Networks has enabled 382 hospitals with the telemedicine facility
  - 306 rural hospitals and 16 mobile telemedicine units are connected to 51 super specialty hospitals
  - Around 1.5 lakh patients are benefiting from telemedicine every year
  - ISRO is planning on a dedicated healthcare satellite

**Key challenges facing telemedicine**

- Need for training and advertising to familiarize the doctors with the technology and to reduce fear among patients due to unfamiliarity
- Lack of basic amenities:
  - Power disruptions, poor network connectivity in terms of bandwidth are the major hindrances to telemedicine
- Lack of standardization:
  - To move towards better telemedicine facilities, there is a need to standardize the procedures, data transfer and technology
  - With various stakeholders operating and investing in their own areas, the development is limited; standardization will lead to rapid overall development

"India needs special medical equipment to suit its health care environment.”

Note: This is indicative and based on details available currently.

Future scenario - Need for a high level of Research and Development (R&D) to offer special medical equipment for India

**Gap in medical infrastructure**

**Demand for affordable, accessible, easy to use medical equipment**

**Recent momentum in the R&D of medical electronics**

**R&D in medical electronics**

- Offer various courses on medical electronics, or as a paper in graduation
- Offer degrees and post graduation courses in medical electronics
- Students undertake academic projects with companies in the field of medical electronics

**Medical equipment suppliers**

- A majority of the large and medium sized manufacturers invest a considerable amount on R&D of new products & technologies
- Foreign companies invest on customizing products to suit the Indian healthcare environment

**Colleges & universities**

**Government initiatives**

- Government has taken up major initiatives either directly or through various agencies (like SAMEER, ISRO) to encourage R&D in the field of medical electronics
- Government agencies tie-up with experts of other nations, to implement R&D on medical electronics

Source: ISA-Feedback 2010

Note: This is indicative and based on details available currently.
## Research projects of Government of India

Following are some of the major ongoing projects under Medical Electronics & Telemedicine Division of Department of Information Technology, Ministry of Communications & Information Technology

<table>
<thead>
<tr>
<th>Project</th>
<th>Executed by</th>
</tr>
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<tbody>
<tr>
<td>Deployment of indigenously developed 6 MeV medical linac for cancer treatment - Jai Vigyan Phase - II</td>
<td>• SAMEER Mumbai</td>
</tr>
<tr>
<td>Design and development of Electronic Portal Imaging Device (EPID) for radiation Therapy</td>
<td>• CSIO, Chandigarh and TSG, Integration, New Delhi</td>
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<tr>
<td>Establishment of facility for batch fabrication of Linear Accelerator (LINAC) tube and Linear Accelerator machines</td>
<td>• SAMEER Mumbai</td>
</tr>
<tr>
<td>Design &amp; development of 2.6 MW S-Band Tunable Pulse Magnetron</td>
<td>• CEERI, Pilani (Rajasthan)</td>
</tr>
<tr>
<td>Design &amp; development of dual photon energy and multiple electron energy integrated oncology system</td>
<td>• SAMEER Mumbai</td>
</tr>
<tr>
<td>Design and development of Multileaf Collimator (MLC) for use in Medical Linear Accelerator machine</td>
<td>• SAMEER Mumbai</td>
</tr>
<tr>
<td>Development of High Speed Interpoint Braille Embosser</td>
<td>• WML, Kolkata and CMERI, Durgapur</td>
</tr>
<tr>
<td>Design &amp; development of Cost-Effective Bio-Signals Controlled Prosthetic Hand</td>
<td>• Tezpur University</td>
</tr>
<tr>
<td>Technology development for building distributed, scalable, and reliable Healthcare Information Store</td>
<td>• CDAC, Pune</td>
</tr>
<tr>
<td>Development of Medical Image Analyser for Cervical Cancer (Cervi SCAN)</td>
<td>• CDAC, Thiruvananthapuram, IIT, Kharagpur and RCC, Thiruvananthapuram</td>
</tr>
<tr>
<td>Virtual Reality based Minimally Invasive Surgical Simulator (VR-MISS) with Haptics Feedback</td>
<td>• IIT, Chennai and CMC, Vellore</td>
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<tr>
<td>Development of a Web-enabled e-Healthcare System for Neonatal Patient Care Services (eNPCS)</td>
<td>• IIT Kharagpur, SSKM Hospital Kolkata and WECS Kolkata</td>
</tr>
<tr>
<td>Web enabled medical information access using handheld devices in a wireless environment for telemedicine applications</td>
<td>• IIT, Kharagpur and WECS, Kolkata</td>
</tr>
<tr>
<td>Development of telemedicine at Remote CHC/PHC in Tripura</td>
<td>• WECS, Kolkata</td>
</tr>
<tr>
<td>Development and Implementation of ICT based mobile tele-oncology system for extending the coverage of ONCONET, Kerala</td>
<td>• CDAC, Thiruvananthapuram</td>
</tr>
<tr>
<td>National Resource Centre for Telemedicine &amp; Medical Informatics</td>
<td>• SGPGI, Lucknow</td>
</tr>
<tr>
<td>Society for Applied Microwave Electronics Engineering and Research</td>
<td>• SAMEER</td>
</tr>
</tbody>
</table>

**Note:** This is indicative and based on details available currently.

**Source:** ISA-Feedback 2010
Steps to be taken by ISA

- Promote policies and initiatives to encourage domestic manufacture of medical equipment
- Promote export based medical equipment market
- Support and influence government to discourage import of medical equipment
- Support and sponsor research and development of medical equipment which will suit the Indian healthcare environment, in terms of accessibility, affordability and ease of usage
- Work towards a holistic approach to promote domestic sourcing of electronic components across various industrial segments

Source: ISA-Feedback 2010
Medical IT: Industry classification

Healthcare Information System (HIS)
- Caters to the administrative needs of the hospital
- Need driven by the hospital management
- Addresses both financial as well as resource management
- Either serviced as a complete set or as modules
  - Some modules are basic and come with the base module
  - Patient registration, billing, scheduling etc
  - Some optional modules are OT, blood bank, pharmacy, etc

Picture Archiving & Communication System (PACS)
- To capture, store, display and distribute medical images
- PACS finds utility at the diagnosis, treatment as well as recovery stages
- Advantages of PACS are better resource sharing, archiving, access and the ability to handle more patients at a time
- PACS can be integrated into the HIS through work flows - RIS

Source: ISA-Feedback 2010

Overview of HIS suppliers in India

Health IT Solution Providers (HIS)

MNCs
- 2 players in the market
- Med track, Siemens
- Some firms like Cemer, iSoft are yet to make their presence felt in the Indian market
- Good quality products - own developed software
- High price tag
- Cater to the private and public standalone specialty and private multi entity hospitals

Large Indian firms
- 7 - 10 players in the market
- CMC, Karishma, Novella, Sobha, Srishti, TCS, Wipro
- Also offer integrated solutions
- All India presence
- Cater to the private standalone specialty, private multi entity and private large general hospitals

Small Indian firms
- 25 -30 players in market
- Some players work on project basis
- Accurate Info Technologies, Centum Techno, Infolife Technologies, Swift Medical, Zensoft,
- Presence in HIS
- Regional presence
- Proprietary firms
- Cater to the private general smaller and medium hospitals

Source: ISA-Feedback 2010
Overview of PACS suppliers in India

MNCs
- 4 players in the market
- AGFA, GE, Siemens, Vepro
- All India presence
- Predominantly into PACS
- Good quality products - In house developed software and R&D facility
- High price tag
- Cater to private and public standalone specialty and private multi entity hospitals

Indian large/ medium firms
- 4 - 5 Indian players
- Imed, Infometry, Karishma, Sobha
- Mostly into mini PACs
- Strong regional presence
- Cater to private standalone specialty, private multi entity and private large general hospitals

Geographical presence of key HIS, PACS suppliers

- Accurate
- Annanya
- Med track
- Swift
- XO
- CMC
- Karishma
- TCS
- Wipro
- Centum Techno
- Imed
- Medi Infotech

- 50+ players clustered in metros and key cities
  - Higher proportion of suppliers in HIS
  - MNCs in PACs
  - 30+ small players spread across the regions

- Indian Vepro

Source: ISA-Feedback 2010
With higher private spending on healthcare, insurance companies are expected to play a major role in the healthcare system in future.

Stakeholders in the industry

- ICICI Lombard
- National Insurance company
- New India Assurance
- Star Health Insurance
- 25+ companies
- 30+ TPA service providers
  Few e.g: MD India, MediAssist, TTK

- India does not have a national community health insurance model in place
- Indian health insurance industry is estimated at ₹ 5,125 cr, with only a small section of the total population (around 2%) being covered so far
- Entry of overseas western insurance companies has contributed to the sector’s rapid growth in the last few years
- CAGR of around 35% (FY 2002-08); expected to grow at a CAGR of around 41% during FY 2010-2013

Source: ISA-Feedback 2010

Indian government’s spend on healthcare is among the lowest in the world

Healthcare expenditure as a percentage of GDP

- After the economic reforms in 1986, public health expenditure has remained more or less stagnant between 0.9% and 1.2% of GDP

State governments contribute to a larger portion of healthcare spend
  - Huge disparity is observed among states in terms of healthcare spend, due to various factors like initiative to spend, funding capacity, efficiency in planning and implementation, etc.


Source: ISA-Feedback 2010