Implementing IT to support Laboratory Services in a Large Hospital in India

Joy Mammen MD
Christian Medical College Vellore
India
Disclosures

- None
Where are we?
### Personnel

<table>
<thead>
<tr>
<th>Position</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administrative Staff and Clerks</td>
<td>899</td>
</tr>
<tr>
<td>Chaplains</td>
<td>16</td>
</tr>
<tr>
<td>Doctors</td>
<td>1,413</td>
</tr>
<tr>
<td>Engineering Staff &amp; Artisans</td>
<td>64</td>
</tr>
<tr>
<td>Housekeeping Staff and Attenders</td>
<td>1,556</td>
</tr>
<tr>
<td>Library Staff</td>
<td>21</td>
</tr>
<tr>
<td>Nurses</td>
<td>2,390</td>
</tr>
<tr>
<td>Pharmacists</td>
<td>220</td>
</tr>
<tr>
<td>Social Workers</td>
<td>39</td>
</tr>
<tr>
<td>Teaching Staff (Non-Medical) and Technical Staff</td>
<td>2,027</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>8,645</strong></td>
</tr>
</tbody>
</table>

### Daily in CMC

<table>
<thead>
<tr>
<th>Category</th>
<th><strong>Main Hospital and Peripherals</strong></th>
<th><strong>Main Hospital</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Outpatients</td>
<td>7,175</td>
<td>5,628</td>
</tr>
<tr>
<td>Inpatients</td>
<td>2,015</td>
<td>1,651</td>
</tr>
<tr>
<td>Operations</td>
<td>158</td>
<td></td>
</tr>
<tr>
<td>Bed Occupancy</td>
<td><strong>78.1%</strong></td>
<td></td>
</tr>
<tr>
<td>Births</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>Av. Length of Stay</td>
<td>5.9 days</td>
<td></td>
</tr>
<tr>
<td>Laboratory Tests</td>
<td><strong>30,303</strong></td>
<td><strong>1,970</strong></td>
</tr>
<tr>
<td>Radiological Tests</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Daily Running Expenses</td>
<td>Rs.2,01,10,260</td>
<td></td>
</tr>
</tbody>
</table>

* Main Hospital and Peripherals  ** Main Hospital
## Numbers of Patients

<table>
<thead>
<tr>
<th></th>
<th>Beds</th>
<th>Inpatients</th>
<th>Outpatients</th>
<th>Births</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main Hospital</td>
<td>2,122</td>
<td>1,064,233</td>
<td>17,445,297</td>
<td>13,867</td>
</tr>
<tr>
<td>Community Health and Development</td>
<td>135</td>
<td>10,601</td>
<td>83,356</td>
<td>3,191</td>
</tr>
<tr>
<td>Rural Unit for Health and Social Affairs</td>
<td>70</td>
<td>3,535</td>
<td>94,913</td>
<td>894</td>
</tr>
<tr>
<td>Schell Eye Hospital</td>
<td>100</td>
<td>7,063</td>
<td>1,059,377</td>
<td>-</td>
</tr>
<tr>
<td>Low Cost Effective Care Unit</td>
<td>46</td>
<td>1,753</td>
<td>67,290</td>
<td>220</td>
</tr>
<tr>
<td>Mental Health Centre</td>
<td>98</td>
<td>980</td>
<td>1,095,300</td>
<td>-</td>
</tr>
<tr>
<td>Nambikkai Nilayam</td>
<td>24</td>
<td>112</td>
<td>4,505</td>
<td>-</td>
</tr>
<tr>
<td>Rehabilitation Institute</td>
<td>83</td>
<td>557</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>2,678</td>
<td>1,310,244</td>
<td>22,10,060</td>
<td>18,172</td>
</tr>
</tbody>
</table>
## Revenue

<table>
<thead>
<tr>
<th>Major Expenses</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Running expenses 2013-2014</td>
<td>Rs. 734 crores</td>
</tr>
<tr>
<td>Cost for infrastructure development</td>
<td>Rs. 87 crores</td>
</tr>
</tbody>
</table>

### Important Areas of Subsidy (2013-2014)

<table>
<thead>
<tr>
<th>Area</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subsidised health care</td>
<td>Rs. 131 crores</td>
</tr>
<tr>
<td>Educational subsidy</td>
<td>Rs. 54 crores</td>
</tr>
</tbody>
</table>

### Sources of Income (2013-2014)

<table>
<thead>
<tr>
<th>Source</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient fees</td>
<td>97.98%</td>
</tr>
<tr>
<td>Student fees</td>
<td>0.78%</td>
</tr>
<tr>
<td>Contribution from supporting churches and other organizations</td>
<td>1.24%</td>
</tr>
</tbody>
</table>
Pre-analytics

- CPOE
- Sample collection – for most of the labs
- Barcoding
Laboratory

• Clinical Pathology
  – Middleware - Interfaces
  – Workflow management
  – Document management
  – Accredited 2 years
    • ISO 15189 – National Accreditation Board for testing and Laboratories, India (APLAC signatory)

CBC
Coagulation
ESR
Haemoparasites
Urine
Cavity fluids
Laboratory

• Anatomic Pathology
  – Workstation development
  – Barcoding
  – Structured Data Reporting
  – Voice recognition

• Immunogenetics
  – Workflow management
  – Interfaces

• Microbiology & Virology
  – Workflow management
  – Interfaces
Blood Bank

- Automation
- Computerization
- Regulatory standards
- ISBT 128 (ICCBBA) compliant
  - Donor management
  - Inventory management
  - Workflow (including interfaces)
  - Patient management
  - Haemovigilance
The ISBT 128 Standard compliant – Final label
CMC BLOOD BANK (Lic # 57/28C)
Christian Medical College Vellore
(To be pasted on patient chart)

Donation Id

Blood Bag Number

Patient Name

Patient Hospital Number

HNUM:

FIRM: RESP

Product: LDRC

Donor Blood Group: B POS

Patient Blood Group: B POS

Volume: 250(ml)

Issue Date & Time: 25/02/2015 04:18:17

Issued by: 51528

The BLOOD of the patient has been tested for compatibility with the designated material by ROUTINE cross matching with SATISFACTORY results.
Blood Donor Drives
New Workflow – bedside transfusion

- Blood Request + Sample (Labeled) – manual
- Sent to BB
- Register/Process/Crossmatch
- Bedside Verification PatID on Wristband vs PatID on Blood Bag
- Issue to Ward

- Location: ONLY bedside
- Wrist Band: Barcoded
- Blood Bag: Machine printed

Live /Single Source of Truth
Android Application

Haemovigilance: Has the transfusion been started/Completed/Reactions?
Institutional IT

- Policy
- Administration
- Design
  - New applications
  - Adding new functions
- New technology platforms –
  - RFID for staff attendance/access management
  - SMS for patient interaction
- Standards
  - SNOMED

Hospital Infection Surveillance
  * Multi Disciplinary Team Management
  * Pathology Biopsy Tracker
National

- National Knowledge Network
- National Haemovigilance Program
- National Blood Transfusion Service
  - PEPFAR grant
  - US Partner – CDC
    - Training and Capacity building
    - Quality management Systems
    - EQAS
    - Technology
- Important changes
Training & Education

- BSc Medical Lab Technology (3 year)
- Undergraduate Medical, Nursing and other allied health sciences students
- Postgraduates – Transfusion medicine, Pathology etc
- Subspecialty – Haematology etc
- Fellowship: Laboratory Haematology
- International: WFH and ISTH recognized training center
External Quality Assessment Schemes

Christian Medical College Vellore
External Quality Assessment Scheme for Haematology

HAEMATOLOGY RELATED EXTERNAL QUALITY ASSESSMENT PROGRAMS
OFFERED BY THE DEPARTMENTS OF HAEMATOLOGY & TRANSFUSION MEDICINE & IMMUNOHAEMATOLOGY
CHRISTIAN MEDICAL COLLEGE VELLORE, INDIA.

ABOUT CMC EQAS

Regular participation in an external quality assessment scheme (EQAS) is critical for ensuring acceptable laboratory performance facilitating optimal patient care. Participation is on a voluntary basis and is open to all testing laboratories. Utmost confidentiality is maintained by the program. Registration is usually for a minimum of one year with subscriptions payable in advance and are subsidized at present. The program also ensures convenient enrollment and participation for subscribers. CMC-EQAS program supports proficiency
Proficiency testing

• Haemostasis
  – National >500 participants
  – International – Sri Lanka, China, Philippines, South Africa, Algeria

• Immunohaematology
  – National
  – 250 participants
  – Discussion with national authorities to extend to all blood banks
Research

• Department of Computer Science, Madras Christian College, Chennai

• Imaging Informatics


Feminna Sheeba, Hannah Mary Thomas Thevarthundiyil, Joy John Mammen: Segmentation and reversible watermarking of peripheral blood smear images. BIC-TA 2010: 1373-1376
Research

• **NLP:**

  Classification and Prediction of Breast Cancer Data derived Using Natural Language Processing

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**Clinical Research**

• New haematology parameters to assist in prediction of clinical conditions – MDS, Sepsis
• Drug resistance in platelets
Acknowledgements

The Team
(we are 215 people in the department)
Association for Pathology Informatics