TATA CONSULTANCY SERVICES

TATA

# Technology Innovation in Healthcare

Dr.Sumanth C Raman



Experience certainty. IT Services
Business Solutions
Outsourcing

# Principles of Healthcare Delivery Systems

- The Primary Driver of Healthcare Delivery Systems globally is Revenue
- Technology has many answers but the Healthcare Industry does not want to ask the questions
- Use of Technology benefits patients more than the Healthcare Providers
- Patient Empowerment results in demands and often fulfillment of better delivery systems
- A Paradigm shift in the management of Care from disease management to Health Maintenance is underway

# Principles of Healthcare Delivery Systems

- Hospitals are predominantly Disease Treatment Centers and NOT health maintenance centers
- The Entire Healthcare Industry is constantly in Search of Disease as its existence depends upon it. (If there is not enough of it can we create it?)
- There is no incentive to use Revenue Neutral technology even if its benefits for Patients are demonstrable
- Simply put, the greatest of Technology will be used only if someone finds a way to make money out of it.

# Health care Trends

**Drivers**

***Global:***

- Reduction of preventable medical errors
- The need for collaboration and documentation
- Compliance with government regulations
- Cost reduction and operational efficiency
- Shortage of healthcare delivery staff
- Direct investment in healthcare by government-led projects
- Digital diagnostic imaging
- Large-scale data storage devices and software that manages the life cycle of data
- Universal access, personal health record and patient empowerment

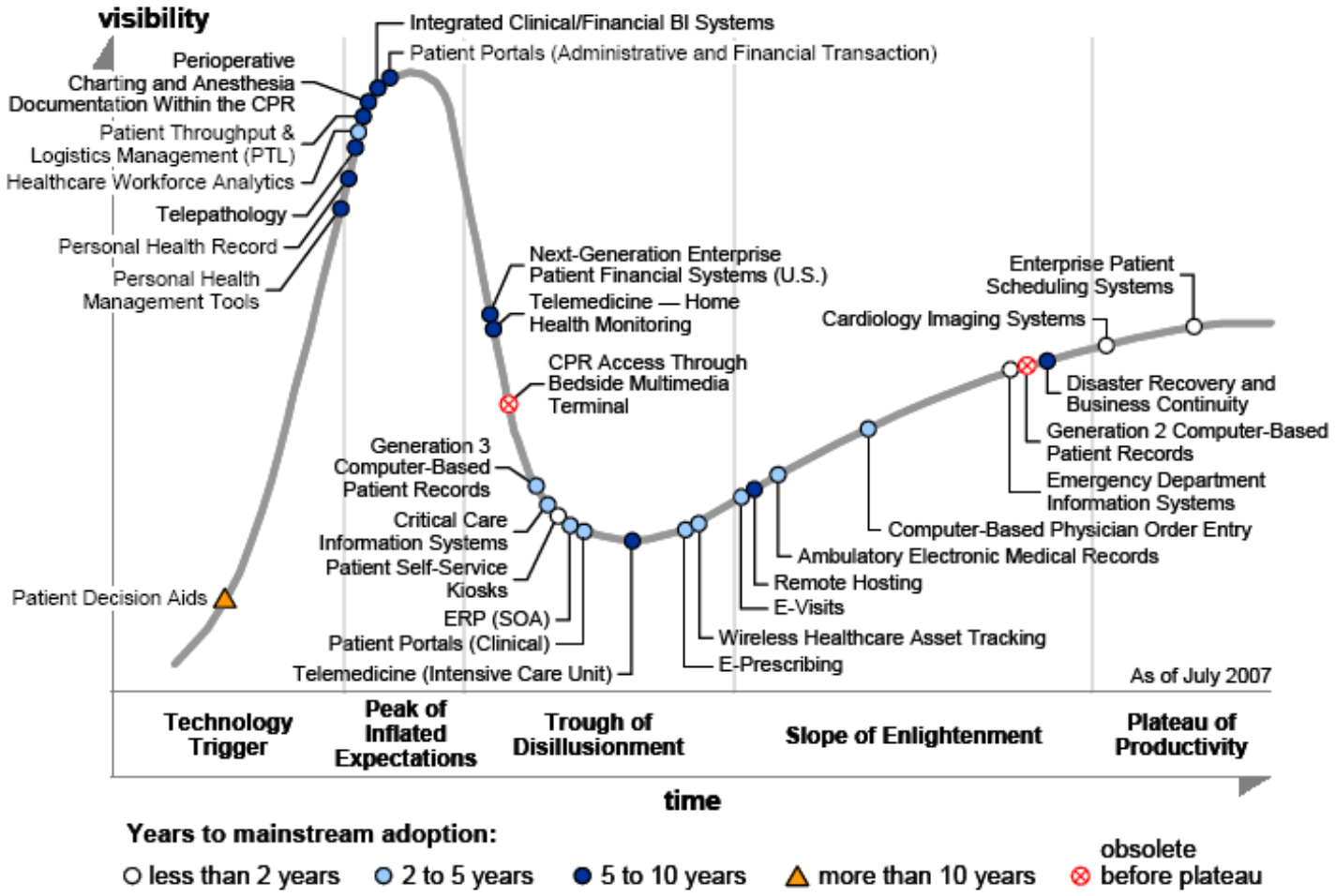
# Health care Trends

**Inhibitors**

- Healthcare staff reluctant to take on new software
- Lingering skepticism of the business benefits or return on investment of technology
- The role of trusted advisor fragmented among many departments or filled by an outside agent
- IT staffing level facing further reductions
- Growing liability issues
- Capital investment for IT projects and initiatives constrained
- Increasingly complex regulatory environment surrounding issues of patient privacy, data security and compliance
- Evolving technology standards
- Misaligned economic incentives

# Gartner Healthcare Hype Cycle

Figure 1. Hype Cycle for Healthcare Provider Applications and Systems, 2007




Source: Gartner (July 2007)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# Health care Trends (Gartner)

**At the Peak**

- Personal Health Record
- Telepathology
- Healthcare Workforce Analytics
- Patient Throughput & Logistics Management (PTL)
- Pre-operative Charting and Anesthesia Documentation Within the CPR.
- Integrated Clinical/Financial BI Systems
- Patient Portals (Administrative and Financial Transactions

**Sliding Into the Trough**

- Next-Generation Enterprise Patient Financial Systems (U.S )
- Telemedicine — Home Health Monitoring
- CPR Access Through Bedside Multimedia Terminal
- Generation 3 Computer-Based Patient Records
- Critical Care Information Systems
- Patient Self-Service Kiosks
- ERP (SOA)
- Patient Portals (Clinical)
- Telemedicine (Intensive Care Unit)
- E-Prescribing
- Wireless Healthcare Asset Tracking

# Health care Trends (Gartner)

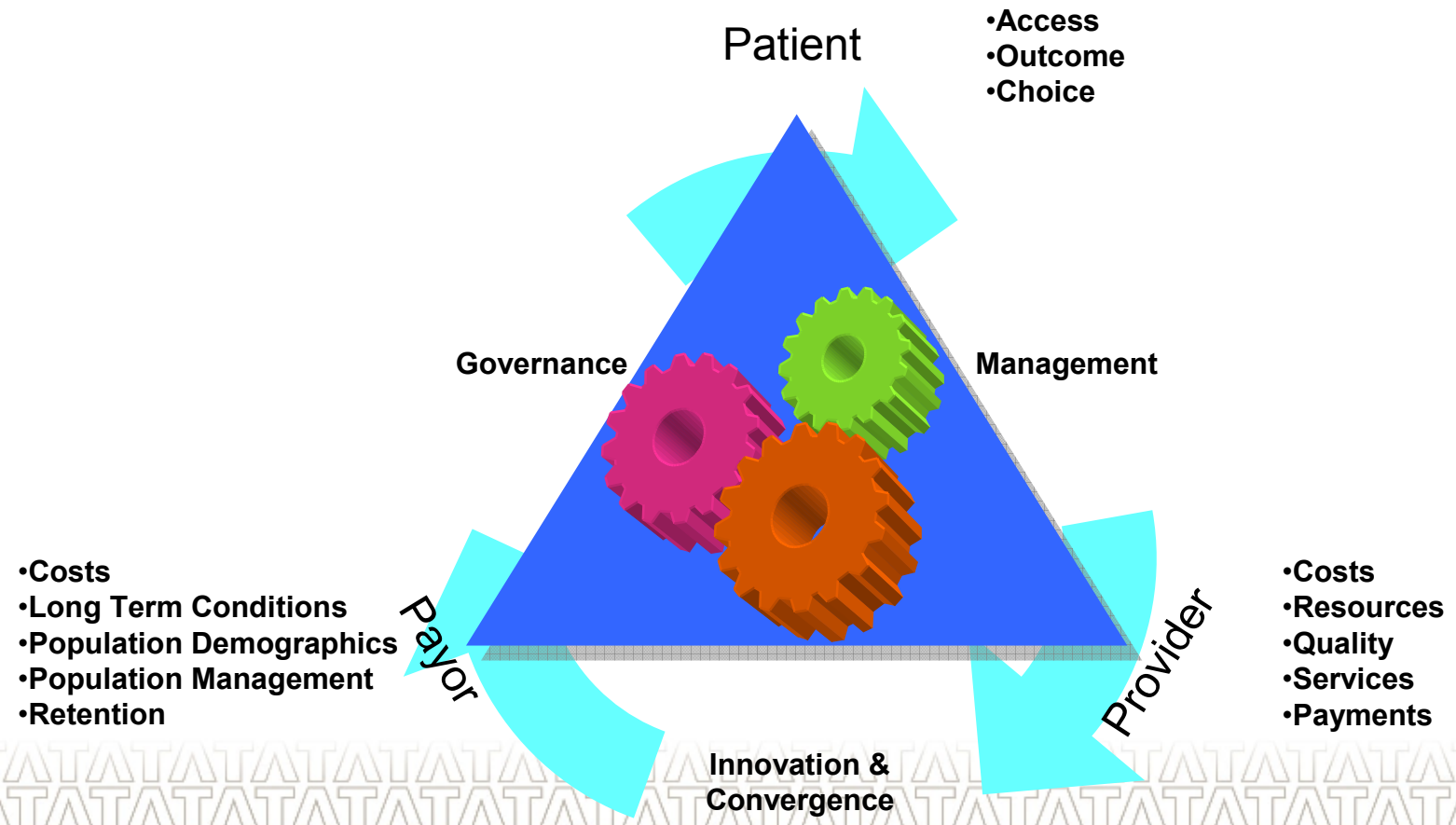
**Climbing the Slope**

- E-Visits
- Remote Hosting
- Ambulatory Electronic Medical Records
- Computer-Based Physician Order Entry
- Emergency Department Information Systems
- Generation 2 Computer-Based Patient Records
- Disaster Recovery and Business Continuity

**Entering the Plateau**

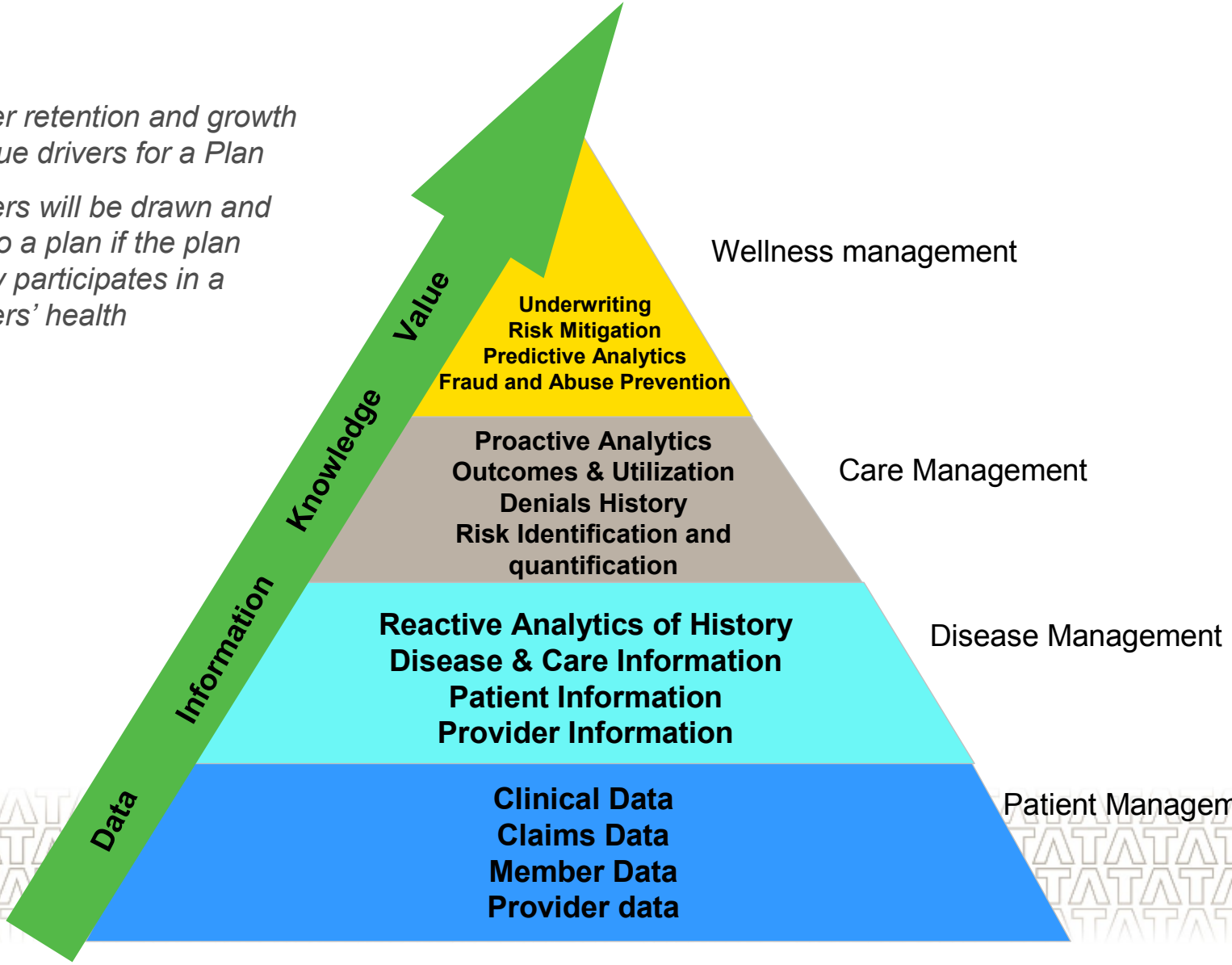
- Cardiology Imaging Systems
- Enterprise Patient Scheduling Systems

# Key Components in the Healthcare Systems



# Retention, Growth and the Wellness Continuum

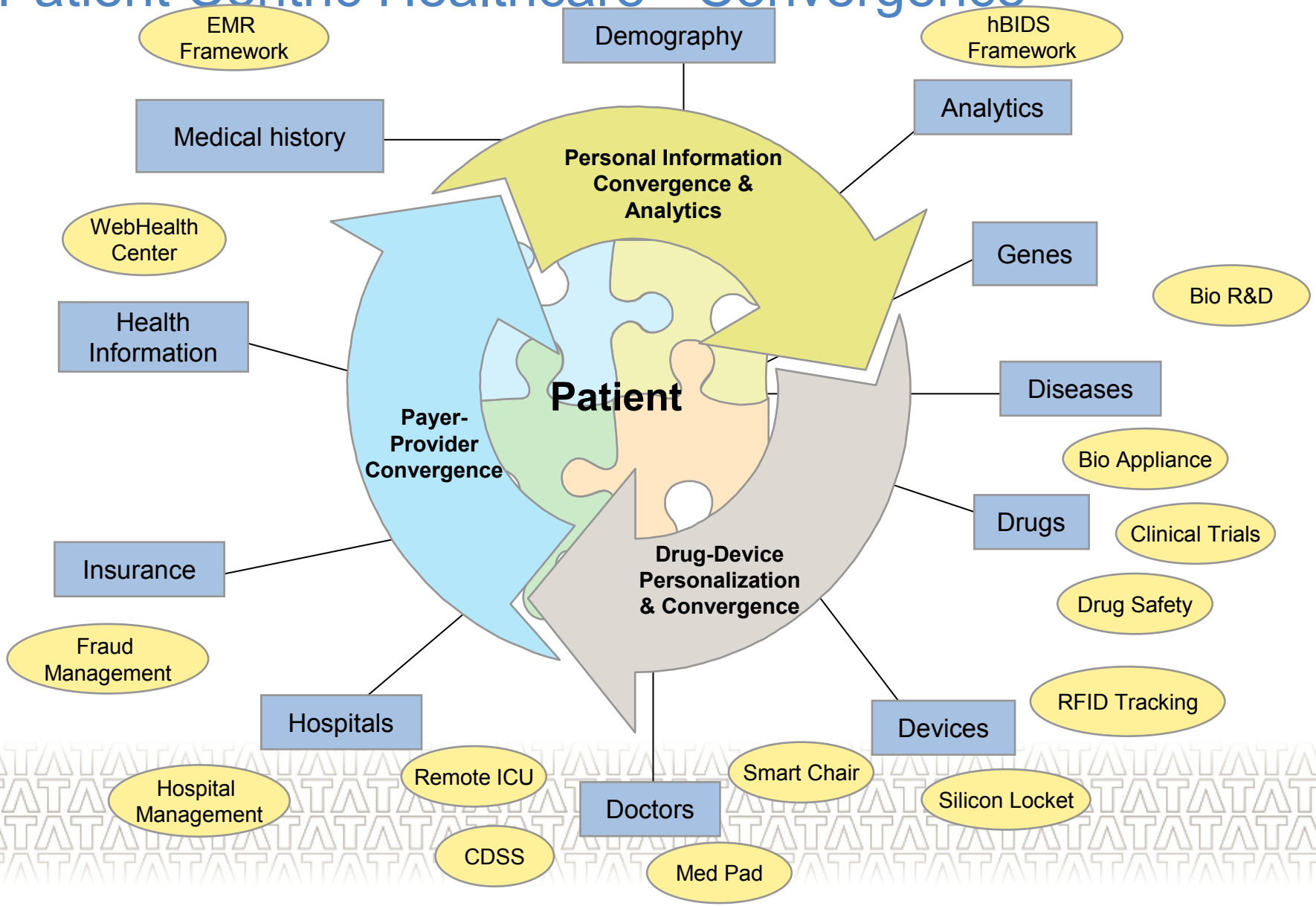
- *Member retention and growth are value drivers for a Plan*
- *Members will be drawn and glued to a plan if the plan actively participates in a members' health*



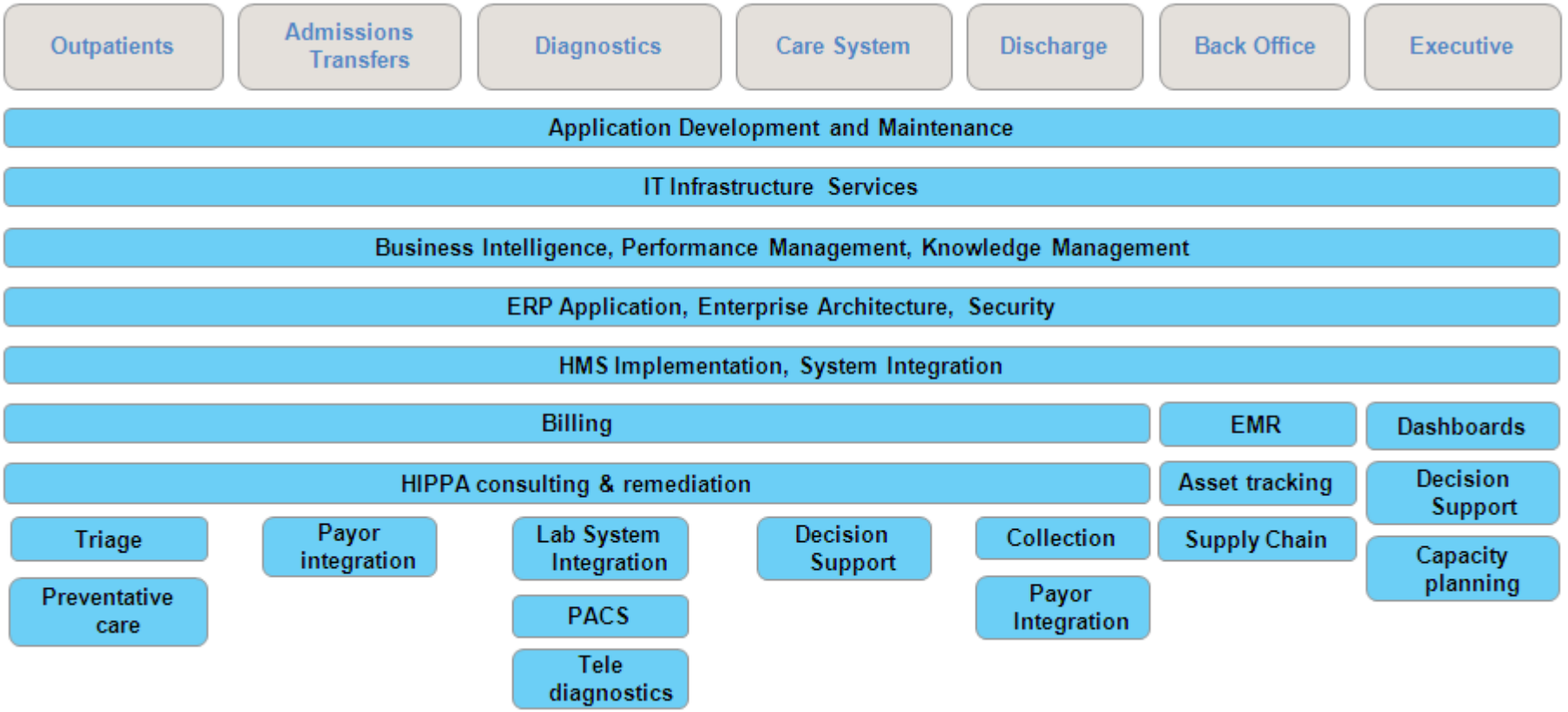
# Healthcare Themes

- Wellness Management
  - Move customers for reactive to predictive care / disease management
  - Preventive spend vs. curative spend
- Operationalzing Policy & Strategy
  - Tools to Enable the Implementation of Policy and Strategy within The Healthcare Management Tier and Measuring its Effectiveness
    - Business Intelligence
    - Analytics
    - Decision Support
- Technology Enabled Care
  - Creative use of Smart Technologies to support the Patient Care Process and Improving Outcomes
- Cost Predictability
  - Predict and manage cost of care
  - Continuous Risk assessment and mitigation
  - Fraud and abuse prevention and management
  - Self-Service enabled customer directed health plans

# Patient Centric Healthcare - Convergence



# Healthcare Provider



# LSHC Solutions Focus

- Increase access to care
- Decrease cost of care
- Improve outcomes by enhancing quality and optimizing services
- Decrease medical errors
- Make care provision patient friendly
- Empower patients

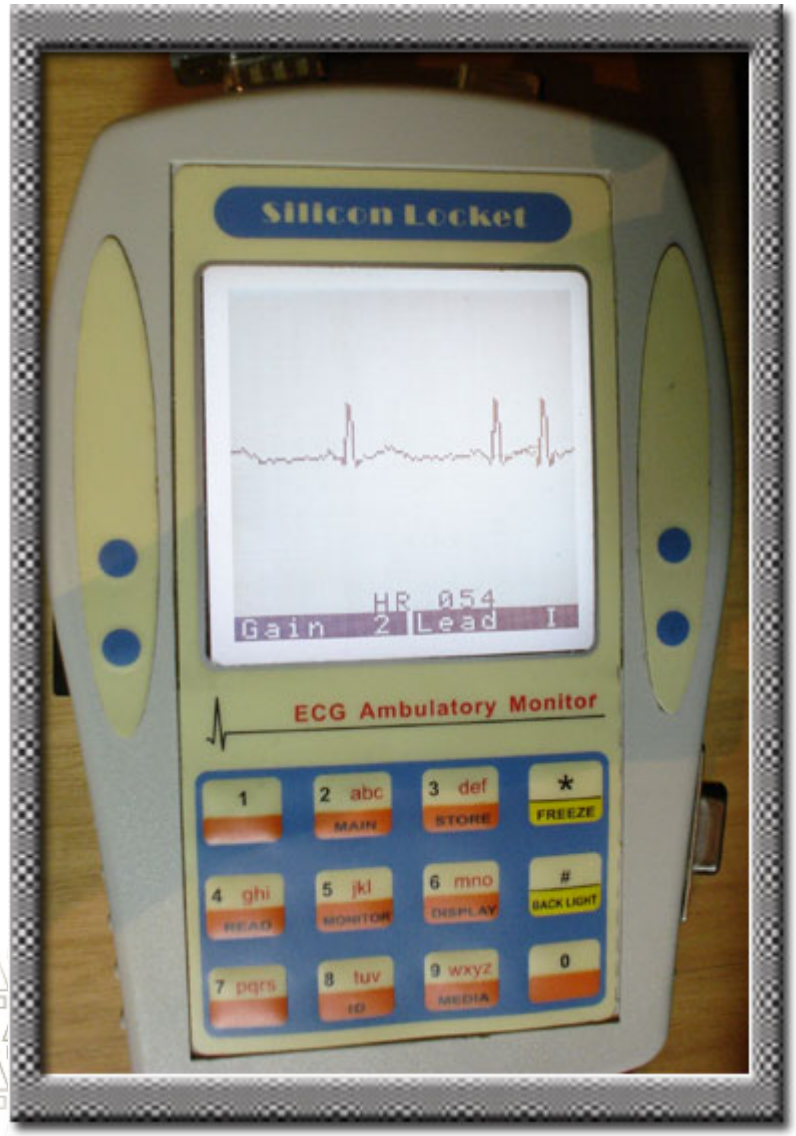
- Analytics, Data warehousing and BI
- Dashboards and portals
- EHR, HMS, CDSS, etc.
- Service orientation and quality processes implementation
- Fraud and abuse management
- Integrated HIS and inter-operability

**Enhancing *patient-centric* Healthcare is one of the top 10 outcomes oriented themes that TCS will focus on**

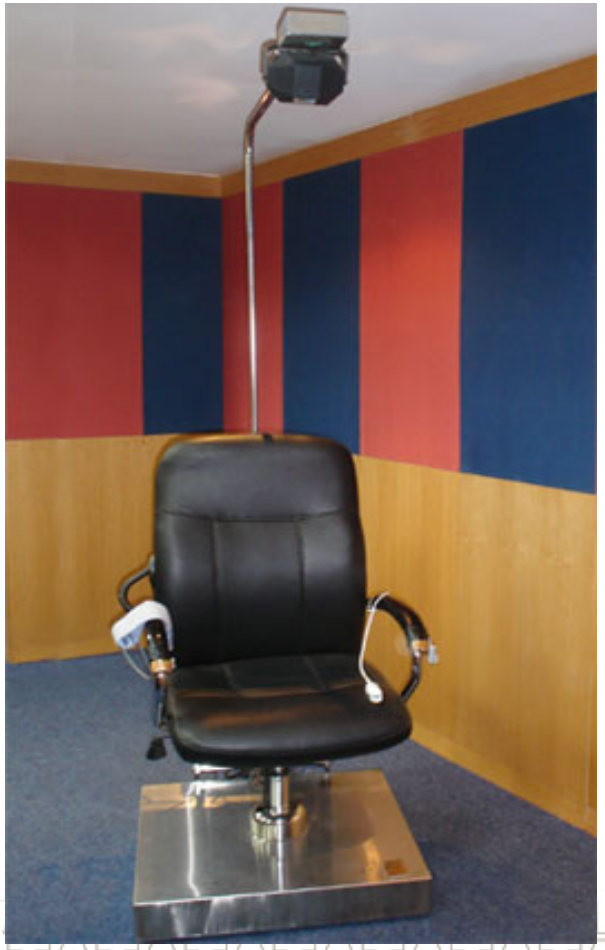
# Devices

- Medical devices with remote monitoring capability
  - ECG (single, three and twelve lead)
  - Smart Chairs
  - Glucometers

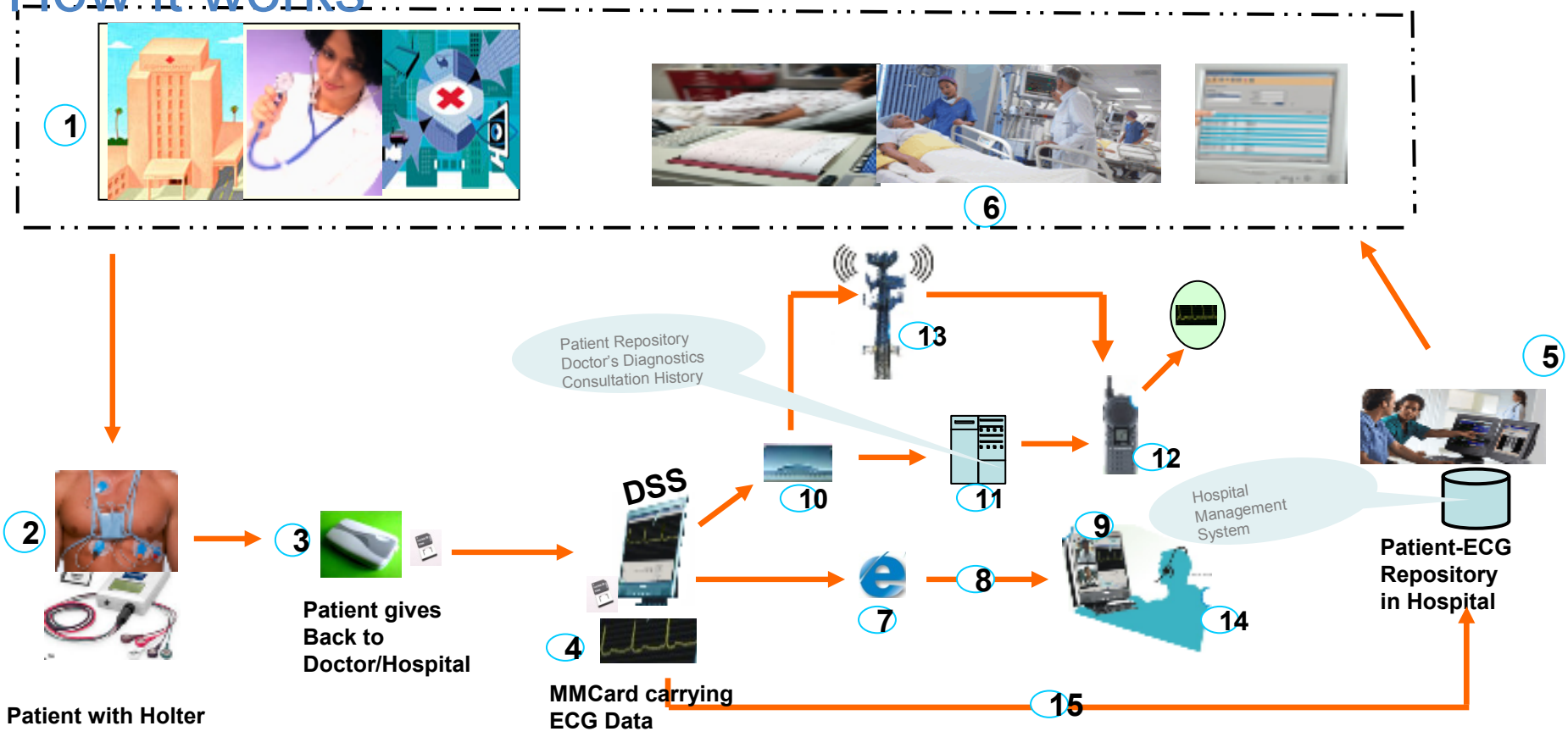
# Ambulatory Patient Care Services – Silicon Locket



# Ambulatory Patient Care Services - SmartChair

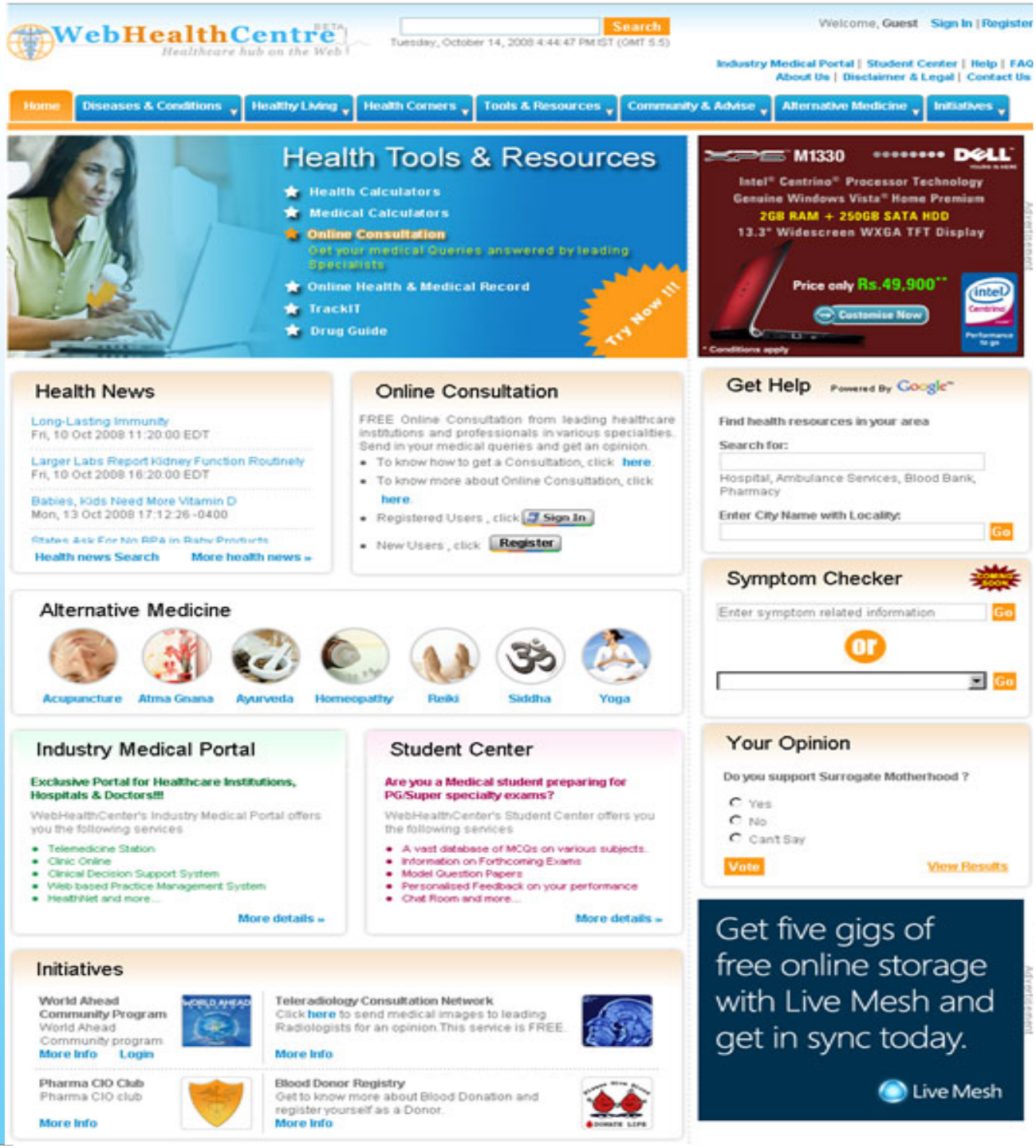


# How it works




1. Hospital/Nursing Home/Doctor's
2. Holter given to Patient for ECG recording
3. ECG recording 24 hrs
4. ECG viewer s/w & DSS annotation
5. Hospital Administrator
6. Diagnostic & Medication
7. Internet
8. Remote Video Consultation
9. Doctor PC
10. GSM Modem
11. Consultation Server
12. Doctor's Mobile
13. GSM Tower
14. Doctor
15. Ethernet

## WebHealthCentre.com



# WebHealthCentre

- Telemedicine( supported by Audio/Video Conferencing facility)
- Online consultation
- Clinic Online
- Health and Medical Record management
- Online Health Parameters tracking system
- DICOM Viewer and Converter for handling medical images
- Online Appointment scheduler
- Online Lab Reports viewer
- Student Center

The Site also offers elaborate information on

- Health topics like Alzheimer's disease, Alcoholism, Beauty disease, Diet & Nutrition, Eye care, First aid, Oral care, Insurance etc
- Acupuncture, Siddha Medicine, Homeopathy, Yoga, Ayurveda etc
- Health Directories, Appliances and Appliance Directories, Drug Information
- Blood Donation and stock management
- Health and Medical Calculators
- Health centres like Acidity, Allergy, Chicken pox, dengue etc
- AIDS, Cancer, Cardiac, Diabetes, Mental Health , Neurology etc

- Web site is India's first Multi -Speciality , Multi-Institution participation online consulting facility where doctors and patients can access some of the leading medical institutions in India for medical advise
- Site Launched on 1/25/2000
- Exceeds 3 million hits/month
  - 40,000 unique visitors each month.
  - Approximately 700,000 pages viewed per month
  - has completed more than 26,000 Tele consultations
  - currently stores more than 45,000 Medical records online.
- First Indian & Healthcare portal to be Microsoft passport based Authentication enabled.
- Global "Implementation"
  - Usage Data spans 16 countries
  - U.S., India, Canada, UK
- Key modules like Appointment scheduler and Lab tool functions in *.Net* environment

# Internet Interface – Webhealthcenter.com

# CLINICAL DECISION SUPPORT SYSTEM

Healthcare Solutions

- Comprehensive tool that would provide support to the Medical professionals to make their Clinical Decisions more quickly, correctly and accurately.
- Knowledge base with a full set of diseases in a particular specialty with the associated symptoms, History, Physical Examination, investigations and medication
- A set of symptoms, history questions, Physical Examination findings, investigations reports and medications are mapped to one or more Diseases with a priority factor, which suggests the possibility of the disease for the defined set of parameters

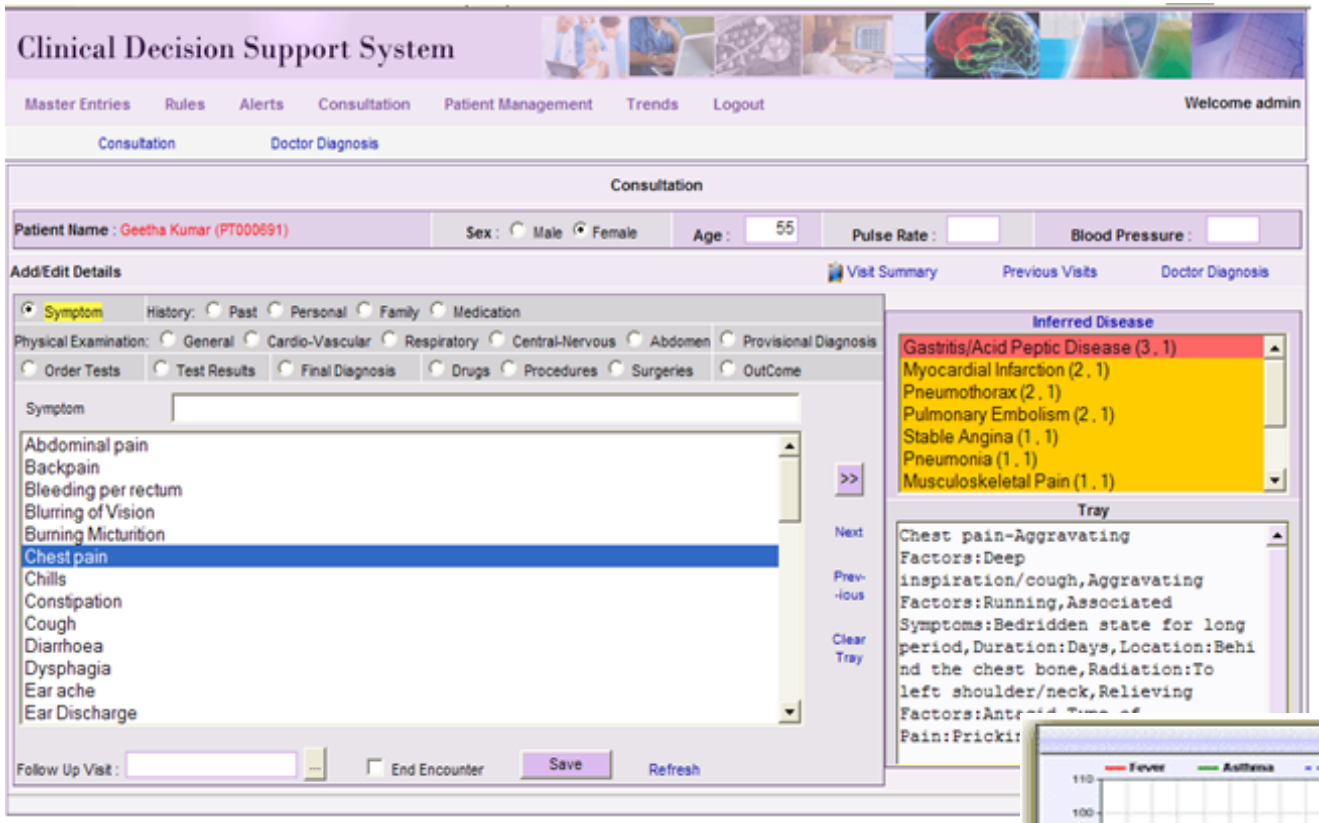
- **COMPONENTS**
  - Administration
    - Rule Building , Master data management
  - Consultation and Patient Management
  - Reporting services and Trend Analysis

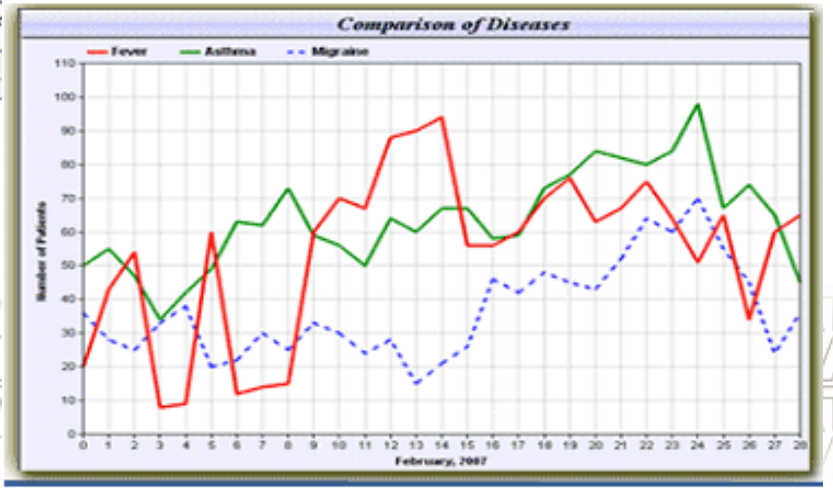
- **FEATURES**
  - Allow users to build their own rules and view them against inferences
  - Self Learning as Volume of the data in the Data store increases
  - Encompasses the complete patient flow until outcome
  - Linked to an Alert Engine and Trend Analyzer
  - Supports Multi level Drill down
  - Supports Linkage to Electronic Medical Records
  - Web based Application – Anywhere / Anytime access
  - Could be envisaged as a Knowledge Management tool
  - Can be Configured to handle specific disease states
  - Can be used as a diagnostic tool for screening Large Populations
  - Can be used as a Trend Analyzer tool and a Net Doctor!!!

- **CHALLENGES**
  - No Universally accepted CDSS System in the Market
  - Most Systems stop at Diagnosis stage
  - Most systems do not allow the users to build rules
  - Many are not self learning
  - Not linked to Alert Engines

# CLINICAL DECISION SUPPORT SYSTEM

## Healthcare Solutions



# Trend Analysis and Pattern Recognition

- The CDSS facilitates Disease Trend Analyses and also complex multi parameter correlation studies to be performed.

- CDSS enables the search for patterns among Clinical Data and this is an area that could substantially aid medical research in finding clues to the treatment for a multitude of conditions.

# BI Solution Demo - Operational

River North Health

Operational | Performance

## Operational

Royal Hospital
All Service Lines

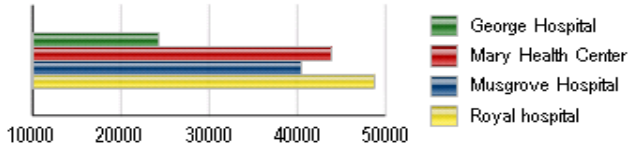
| Metric Name | Current | Previous | MTD Actual | MTD Budgeted | Variance (%) |
|---|---|---|---|---|---|
| Inpatient Admissions | 21 | 24 | 595 | 605 | -1.65% |
| Oupatient Registrations | 45 | 48 | 1075 | 1085 | -0.92% |
| ED Visits | 20 | 23 | 575 | 585 | -1.71% |
| Total Surgeries | 15 | 18 | 475 | 485 | -2.06% |
| Revenue | 3500 | 3400 | 48620 | 47620 | 2.10% |
| Midnight Census | 35 | 38 | 799 | 809 | -1.24% |
| Avg LOS | 2.1 | 2.1 | 3 | 4 | -24.39% |

December 2, 2008 9:45 AM

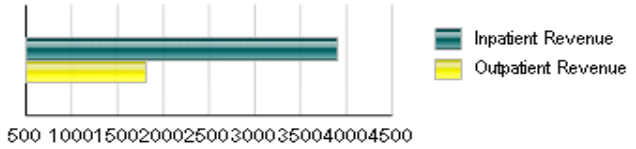
Facility
Royal Hospital

Service Line
All Service Lines
All Service Lines

### Peer Comparison (MTD)

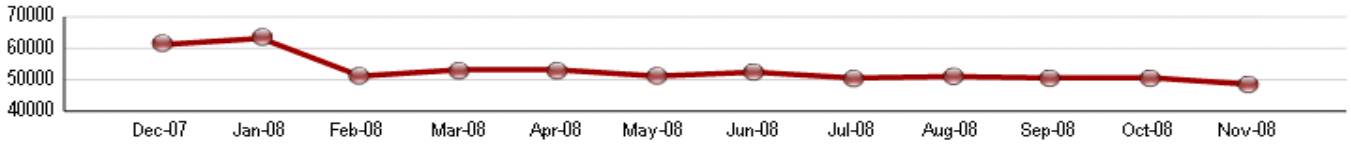



### Revenue: By Type

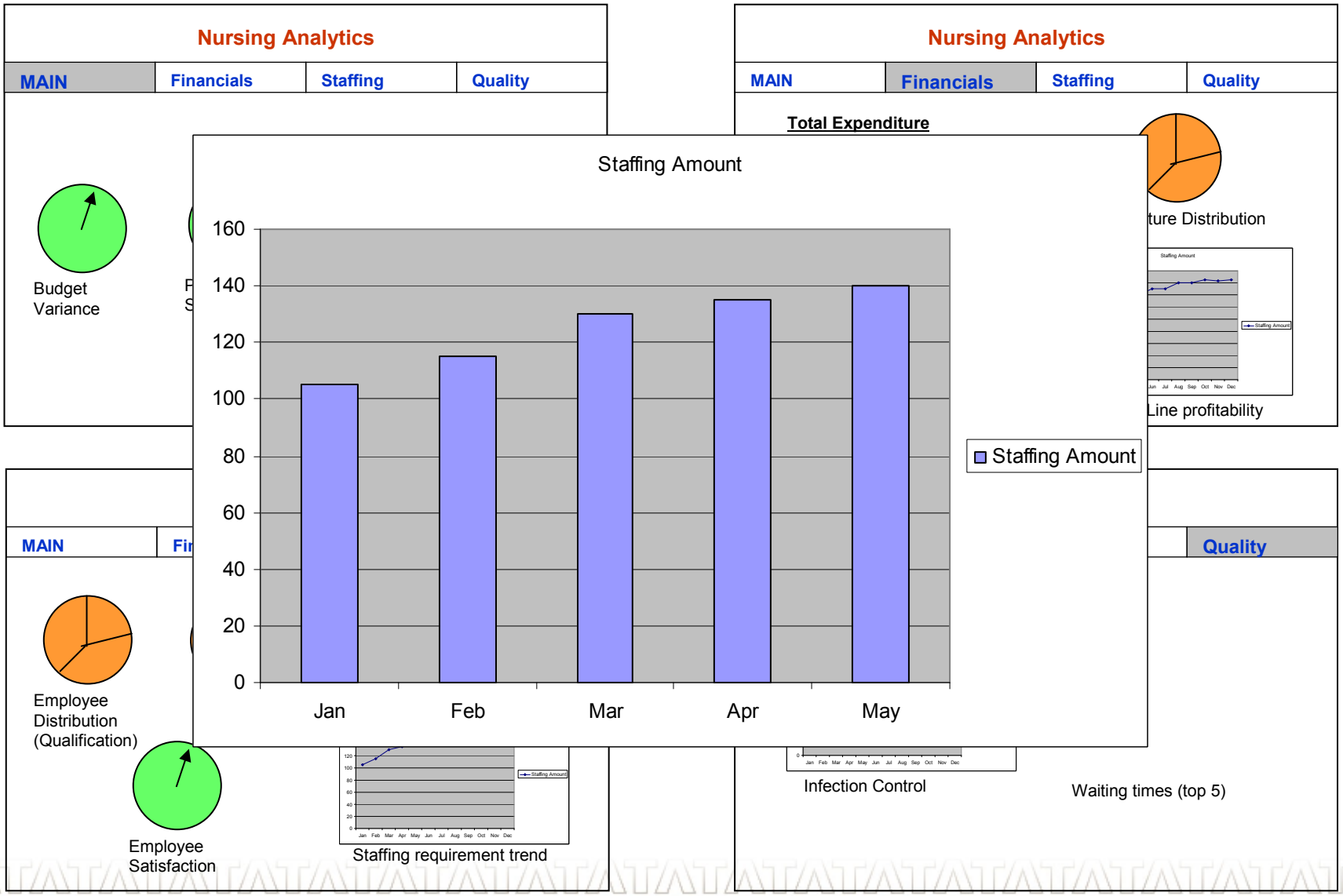



Revenue

### Trend: Last 12 Months



hospital in bottom 5% of trusts - Western Morning News ‘Tough going’ ahead for AVH, but no fiscal crisis - Aspen Times


Nursing Analytics
MAIN
Financials
Staffing
Quality
Budget Variance
Nursing Analytics
MAIN
Financials
Staffing
Quality
Total Expenditure
ture Distribution
Line profitability
Staffing Amount
160
140
120
100
80
60
40
20
0
Jan
Feb
Mar
Apr
May
Staffing Amount
MAIN
Quality
Employee Distribution (Qualification)
Employee Satisfaction
Staffing requirement trend
Infection Control
Waiting times (top 5)

# DISEASE SURVEILLANCE SYSTEM

## Healthcare Solutions

- Wide variety of reports are available in the system which favor the authorities a speedy and accurate decision making process
- A full fledged GIS System provides information down to the Village Level and a concentration map gives an immediate idea on where the fresh cases are occurring from.
- The Dynamic Reporting Engine permits instant decision making and facilitates data analysis and mining to an extent not generally possible with simple MIS systems.
- Over 1100 Centers across the State of Tamil Nadu have been brought on to a unified platform at minimal cost and the results are an example of what is possible in E-Governance.
- The Internal Messaging system facilitates instantaneous communication between the various stake holders, mgmt (TANSACS) and other entities who are involved in this mission.
- The system is supplemented with an interactive feedback / grievance redressal system where in the stakeholders or users could escalate the issues pertaining to the data collection, collation, reporting and other general issues.
- Detailed Audit trail is being maintained by the system.

# DISEASE SURVEILLANCE SYSTEM

# Healthcare Solutions

## Tamil Nadu State AIDS Control Society

Health & Family Welfare Department
Government of Tamil Nadu

Administrator : TANSACS admin — Organization: TANSACS

Counseling | STD | Blood Bank | NGO TI | GFATM NGO | ACSR | NGO CS | User Management | Master Management | Messages | Reports | Logout

### Monthly Technical Report for Counseling and Testing Centers - Entry Screen

Name of the reporting unit: Tuticorin, Government Hospital, Vilathikkulam — Unique ID. 556

Address of the unit: , Vilathikkulam , Tuticorin — Officer In-charge: Dr.Kannan

Reporting Period: Full Month | 5 | 2006 — Phone: 04638-233179

Remarks:

```
No. of ANC Mothers - 34
No. of Spouses     - 0
No. of VCTC        - 0

34 ANC mothers counselled and tested in Vilathikulam ANC Blood Test
```

Couns. Services | Positive Women details | Delivery/Follow-up/Testing | Age Distribution of Voluntary clients | Transmission modes | Discordant couples/Quality/Samples

Referral | NGO Referral | Material Management | Infection control/Equipments | Out reach activities/media | Positive People Mapping | HIV-TB Co-Infection

:: Counseling Services

| Clients | No. attended | No. counseled | No. accepted for testing | No. positive | Collected results: Positive | Collected results: Negative | Post test counseling: Positive | Post test counseling: Negative | Follow up counseling: Positive | Follow up counseling: Negative |
|---|---|---|---|---|---|---|---|---|---|---|
| Ante natal mothers (ANC) | 34 | 34 | 34 | 0 | 0 | 34 | 0 | 34 | 0 | 20 |
| Emergency mothers (Labor) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spouses positive mother | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spouses negative mother | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Walk-in male | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Walk-in female | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Referred male | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Referred female | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other clients | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

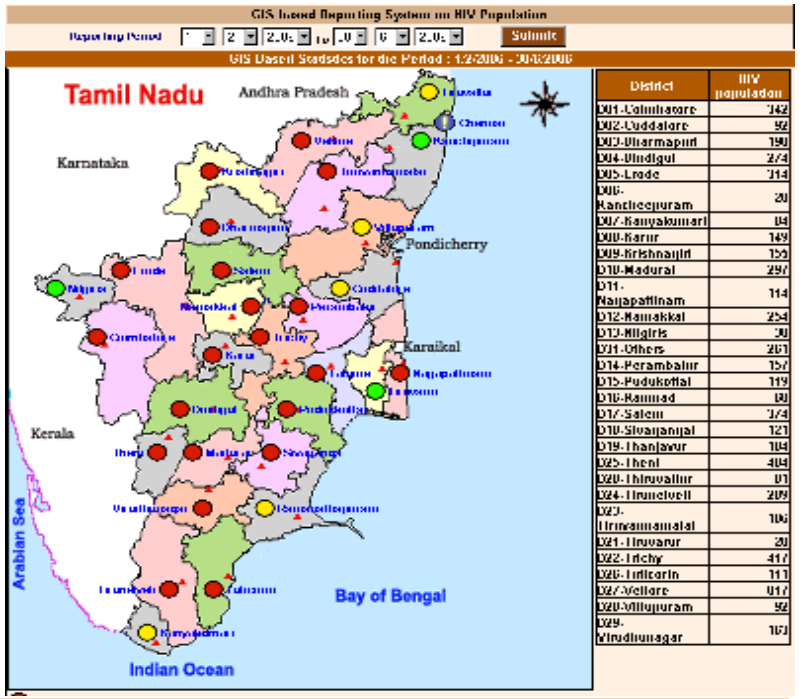
## Tamil Nadu AIDS Control Society

### Dynamic Reports - Parameterwise

Period: 1/1/2006 To 31/5/2006 — Report Taken By: TANSACS admin — Date & Time: 7/13/2006 4:32:53 PM

| Institution | Ante natal mothers (ANC)-No. attended | Blood bank refrigerator-Status |
|---|---|---|
| Chennai,Corporation Health Post,Puliyanthope | 1058 | - |
| Chennai,Corporation Health Post,Vadapalani | 265 | - |
| Chennai,CSI Rainy Multi Speciality Hospital,Tondiarpet | 539 | - |
| Chennai,Corporation Health Post,Saidapet | 1474 | - |
| Chennai,Government Siddha Medical College,Arumbakkam | 0 | - |
| Chennai,Govt. Kasthuribai Gandhi Hospital For Women & Children,Triplicane | 2464 | WO |
| Chennai,Govt. Raja Sir Ramasamy Mudaliyar Lying In Hospital, | 3923 | - |
| Chennai,Govt. Stanley Hospital, | 0 | WO |
| Chennai,Institute Of Obstetrics And Gynaecology & Govt. Hospital For Women & Children, | 5468 | - |
| Chennai,Kilpauk Medical College Hospital, | - | WO |

Print | Cancel




| District | HIV population |
|---|---|
| 001-Coimbatore | 742 |
| 002-Cuddalore | 92 |
| 003-Dharmapuri | 190 |
| 004-Dindigul | 274 |
| 005-Erode | 214 |
| 006-Kancheepuram | 20 |
| 007-Kanyakumari | 84 |
| 008-Karur | 149 |
| 009-Krishnagiri | 153 |
| 010-Madurai | 297 |
| 011-Nagapattinam | 114 |
| 012-Namakkal | 254 |
| 013-Nilgiris | 30 |
| 014-Others | 261 |
| 015-Perambalur | 157 |
| 016-Pudukottai | 119 |
| 017-Ramnad | 80 |
| 018-Salem | 374 |
| 019-Sivaganga | 121 |
| 020-Thanjavur | 184 |
| 021-Theni | 404 |
| 022-Thiruvallur | 91 |
| 023-Thiruchirapalli | 209 |
| 024-Tirunelveli | 106 |
| 025-Tiruvarur | 20 |
| 026-Trichy | 417 |
| 027-Tuticorin | 111 |
| 028-Vellore | 417 |
| 029-Villupuram | 92 |
| 030-Virudhunagar | 167 |

## Tamil Nadu AIDS Control Society

### NACO Report for Blood Banks

Period : 1/1/2006 To 31/1/2006 — Report Taken By : TANSACS admin — Date & Time: 7/13/2006 4:43:50 PM

Unique ID. of Blood Bank: N/A

#### Monthly Input Format for Blood Banks

| | | | | | |
|---|---|---|---|---|---|
| Name of Blood Bank | | | TamilNadu State AIDS Control Society | | |
| Address of the Blood Bank | | | 417, Pantheon Road, Egmore | | |
| City | Chennai | | Pin Code | 600008 | |
| Reporting Period | Month | | January | Year | 2006 |
| Name of Officer In-Charge | | | M&E Section | | |

#### (I) Status of Availability of Equipment and Consumables

| Availability & Functionality of: | Whether Functional and Available in Adequate Quantity(encircle response) | If, No List the ones not available in adequate quantity/not functional |
|---|---|---|
| Critical Equipment | N/A | N/A |
| Critical Consumables | N/A | N/A |

#### (II) Stock Position of Testing Kits and Blood Bags

| Items | Balance at the beginning | Number Received | Number Used | Damaged/Wasted | Balance |
|---|---|---|---|---|---|
| HIV ELISA Kits | 8331 | 9328 | 8799 | 15 | 8845 |
| HIV Rapid Test Kits | 11785 | 5645 | 5350 | 10 | 12070 |
| Hepatitis B ELISA Test Kits | 13185 | 5410 | 8139 | 13 | 10443 |
| Hepatitis B Rapid Test Kits | 20381 | 6235 | 5881 | 18 | 20719 |
| Hepatitis C ELISA Test Kits | 7606 | 7336 | 8365 | 6 | 6571 |
| Rapid Hepatitis C Test Kits | 16247 | 4010 | 5174 | 46 | 15047 |
| VDRL Test Kits | 14679 | 11168 | 11921 | 11 | 13915 |
| Blood Bags | 18404 | 11901 | 12544 | 146 | 17615 |
| Others (specify) | 255 | 102 | 45 | 0 | 312 |

Note: Mention the stock position for each of the items in terms of Nos. of tests that each kit can undertake, that is multiply number of tests tha each kit can undertake with the numbers of kits available. For example; for HIV ELISA Kits, if a kit can undertake 96 tests and 10 such kits are available as opening balance in the beginning of the month then specify 96x10 = 960 as the balance in the beginning of the month. Follow this pattern for all the items in this table.

#### (III) Status of Testing of Blood Units

| Tests Conducted | Voluntary Collection Units: Tested | Voluntary Collection Units: Positive | Replacement Collection Units: Tested | Replacement Collection Units: Positive | Total Units: Tested | Total Units: Positive |
|---|---|---|---|---|---|---|
| HIV | 13123 | 15 | 3179 | 5 | 16302 | 20 |
| Hepatitis-B | 13122 | 110 | 2999 | 15 | 16121 | 125 |
| Hepatitis-C | 13120 | 21 | 2999 | 5 | 16119 | 26 |
| VDRL | 13117 | 5 | 2999 | 1 | 16116 | 6 |
| Malaria | 13148 | 1 | 3027 | 0 | 16175 | 1 |

#### (IV) Details of Blood Units Collected and Voluntary Donation Camps Organized

| Type of Donors | No. of Donors: Male Donors | No. of Donors: Female Donors | No. of Donors: Total Donors | Details |
|---|---|---|---|---|
| Voluntary Donors | 11906 | 1353 | 13259 | |
| Replacement Donors | 2878 | 85 | 2963 | |

# Summary

Technology has many of the answers.

The Healthcare Industry needs to start using the available Technology

Models need to be developed to make the use of patient friendly Technologies in Healthcare profitable.

Thank you *!*