Clinical Information Systems
CIS Conference – Doha, Qatar.
20th April 2013

Steven Yeo
CONTENT

• Challenges to modern healthcare
• Benefits of Informatics Enabled Care Delivery
• Benefits of Nation-Wide EMR
• Singapore Hospitals EMR Journey
• Summary
3 FUNDAMENTAL HEALTHCARE ISSUES

- Cost
- Quality of Care
- Access to care
A COMMON GLOBAL PROBLEM

• Safety
• Privacy
• Engagement
  » Clinicians
  » “Consumers”
• Maturity
• Paper
  ‘Management’
THIS LOOKS FAMILIAR?
THE SKY IS FALLING..

Ageing Population
2001 – over 60s > than under 18s
2050 – 4 times as many needing care
At 4 times the current cost
Remember hidden costs

Source: OPCS 2003
CONTENT

- Challenges to modern healthcare
- **Benefits of Informatics Enabled Care Delivery**
- Benefits of Nation-Wide EMR
- Singapore Hospitals EMR Journey
- Summary
LITERATURE SEARCH

• 92% of the recent articles on health information technology reached conclusions that were positive overall relating to*:
  » Clinical outcomes
  » Quality
  » Efficiency
  » Provider satisfaction

• Smaller organizations are also beginning to derive benefits

• However, challenges remain and more knowledge needs to be shared for those who are still resisting investment in information technology
GETTING ROI OUT OF CLINICAL SYSTEMS -- KAISER PERMANENTE

• Kaiser Permanente serves 8.6 million members across nine states.
• ROI has been demonstrated across a variety of metrics:
  » Reduced the rate of medication errors by 57 percent one hospital site using barcode scanning
  » Trimmed by 12 percent outpatient lab utilization two years after the implementation
  » Vacated more than 22,000 square feet at 15 medical facilities when medical records centralized in one region with estimated savings between $0.4 and $3.3 million
  » 54 percent reduction of archival storage space
CLOSED LOOP MEDICATION ADMINISTRATION
A KEY ELEMENT OF PATIENT SAFETY IMPROVEMENT

![Bar chart showing error rates in medication administration]

GETTING ROI OUT OF CLINICAL SYSTEMS

• “Hard costs”
  » Reduction of duplicate medical orders
  » Reduction in paper based costs
  » Reduction of Adverse Drug Events (ADEs)
  » Reduction in length of stay, preventable readmissions
  » Shift to outpatient and Home Care
  » Health Plan savings

• “Soft costs and benefits”
  » Reduction in errors, reduces potential losses
    • Will eventually reduce liability insurance costs, including Medical Staff’s
  » Increase in employee staff satisfaction reduces turnover costs
    • Increase in direct patient care time is a staff “satisfier”
  » Increase in medical staff satisfaction
  » “ED exit cycle time” improvement
  » Increase in family and patient satisfaction with CLMA
    • Hard to quantify “confidence”
<table>
<thead>
<tr>
<th>Stage</th>
<th>Cumulative Capabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 7</td>
<td>Complete EMR; CCD transactions to share data; Data warehousing; Data continuity with ED, ambulatory, OP</td>
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<tr>
<td>Stage 6</td>
<td>Physician documentation (structured templates), full CDSS (variance &amp; compliance), closed loop medication administration</td>
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<tr>
<td>Stage 5</td>
<td>Full R-PACS</td>
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<tr>
<td>Stage 4</td>
<td>CPOE, Clinical Decision Support (clinical protocols)</td>
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<tr>
<td>Stage 3</td>
<td>Nursing/clinical documentation (flow sheets), CDSS (error checking), PACS available outside Radiology</td>
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<tr>
<td>Stage 2</td>
<td>CDR, Controlled Medical Vocabulary, CDS, may have Document Imaging; HIE capable</td>
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<tr>
<td>Stage 1</td>
<td>Ancillaries - Lab, Rad, Pharmacy - All Installed</td>
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<tr>
<td>Stage 0</td>
<td>All Three Ancillaries Not Installed</td>
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</table>

<table>
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<th>Stage</th>
<th>2006</th>
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<td>0.3%</td>
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<td>0.8%</td>
<td>0.5%</td>
<td>1.6%</td>
<td>3.2%</td>
<td>5.2%</td>
<td>8.2%</td>
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<td>Stage 5</td>
<td>0.5%</td>
<td>1.4%</td>
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<td>3.8%</td>
<td>4.5%</td>
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<td>Stage 4</td>
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<td>2.2%</td>
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<td>Stage 2</td>
<td>40.0%</td>
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<td>31.4%</td>
<td>16.9%</td>
<td>14.6%</td>
<td>12.4%</td>
<td>10.7%</td>
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<td>Stage 1</td>
<td>17.4%</td>
<td>14.0%</td>
<td>11.5%</td>
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<tr>
<td>Stage 0</td>
<td>20.4%</td>
<td>19.3%</td>
<td>15.6%</td>
<td>11.5%</td>
<td>10.1%</td>
<td>9.0%</td>
<td>8.4%</td>
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Data from HIMSS Analytics® Database © 2012 HIMSS Analytics

Tracking EMR adoption assists in the creation of policies and strategies that drive EMR adoption and improve patient care

Source: HIMSS Analytics® Database
## Cross Country EMRAM Score Distribution (Q4, 2012)

| Stage   | United States | Canada | Australia | Malaysia | Singapore | United Arab Emirates | Saudi Arabia | *Germany | *Italy | *Poland | *Portugal | *Spain |
|---------|---------------|--------|-----------|----------|-----------|----------------------|--------------|----------|--------|---------|----------|---------|--------|
| Stage 7 | 1.9%          | 0.0%   | 0.0%      | 0.0%     | 0.0%      | 0.0%                 | 0.5%         | 0.0%     | 0.0%   | 0.0%    | 0.0%     | 0.0%    |
| Stage 6 | 8.2%          | 0.5%   | 0.0%      | 0.5%     | 66.7%     | 4.3%                 | 3.7%         | 0.0%     | 2.3%   | 0.0%    | 0.0%     | 2.6%    |
| Stage 5 | 14.0%         | 0.3%   | 3.7%      | 4.8%     | 0.0%      | 21.3%                | 14.8%        | 9.9%     | 1.2%   | 0.0%    | 23.1%    | 40.7%   |
| Stage 4 | 14.2%         | 2.4%   | 0.9%      | 2.9%     | 0.0%      | 2.1%                 | 5.6%         | 4.4%     | 9.0%   | 0.6%    | 3.4%     | 5.1%    |
| Stage 3 | 38.3%         | 33.9%  | 0.5%      | 0.5%     | 0.0%      | 4.3%                 | 33.3%        | 7.9%     | 5.7%   | 0.0%    | 20.3%    | 9.4%    |
| Stage 2 | 10.7%         | 24.8%  | 51.6%     | 1.5%     | 33.3%     | 31.9%                | 3.7%         | 17.7%    | 9.8%   | 10.5%   | 6.8%     | 11.2%   |
| Stage 1 | 4.3%          | 15.0%  | 4.6%      | 1.0%     | 0.0%      | 23.4%                | 9.3%         | 2.3%     | 24.4%  | 10.8%   | 1.7%     | 6.8%    |
| Stage 0 | 8.4%          | 23.2%  | 38.7%     | 88.9%    | 0.0%      | 12.8%                | 29.6%        | 57.3%    | 47.5%  | 78.1%   | 44.7%    | 24.2%   |

* Europe data last updated Nov 2012.
* Data from HIMSS Analytics Database.
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What are common in a Nation’s HIE strategy?

• Define the end goal and expected outcomes
  » Well integrated quality healthcare
  » Cost effective healthcare services
  » Greater ability of public to manage their health
  » Strong clinical and health services R&D
Key Benefits of HIE

- Improve quality and safety of patient care - reducing medication and medical errors
- Stimulates consumer education and patients' involvement in their own health care
- Increases efficiency by eliminating unnecessary paperwork
- Provides caregivers with clinical decision support tools for more effective care and treatment
- Eliminates redundant or unnecessary testing
- Improves public health reporting and monitoring
- Creates a potential loop for feedback between health-related research and actual practice
- Facilitates efficient deployment of emerging technology and health care services
- Provides the backbone of technical infrastructure for leverage by national and State/City-level initiatives
- Provides a basic level of interoperability among electronic medical records (EMRs) maintained by individual physicians and organizations
- Reduces health related costs
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THE JOURNEY OF A SINGAPORE STAGE 6 HOSPITAL
Singapore is a small vibrant country ...

- **5.18** million people on **707.1** sq km (6,489/km²)
- Ethnically diverse:
  - Chinese: 75%
  - Malays: 14%
  - Indians: 9%
  - Others: 2%
- **35,000+** healthcare providers
- **11,580** hospital beds
- **~450,000** hospital admissions
- Public sector out-patient visits
  - Specialist Outpatient Clinics: **~3.6m**
  - A&E: **~800k**
  - Polyclinics: **~4m**
Singapore’s Healthcare Delivery Eco-system

Patients have freedom of choice to choose any provider of care in various sectors.

- **Primary Healthcare**
  - 18 Polyclinics (20%)
  - Private GP Clinics (80%)

- **Secondary & Tertiary Specialist Care**
  - 8 Private Hospitals (20%)
  - 7 Public Hospitals & 8 specialty centers (80%)

- **Step-down & Long Term Care**
  - Private Healthcare Organisations (30%)
  - Voluntary Welfare Organisations (70%)

- **Public sector**
- **Private sector**
- **People sector**
The EMR Journey

- Cluster EMR Roadmap
  - Application Landscape
  - EMR Building Blocks

- Implementation Strategies

- EMR Capabilities Highlights:
  - CLMM
  - CPOE
  - Clinical Document
  - Coding Standardization
  - Statistics

- Benefits

- Challenges & Lessons Learnt
## Reasons for Adopting HIMSS EMRAM Benchmark

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<thead>
<tr>
<th>Stage</th>
<th>Capabilities</th>
<th>Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 7</td>
<td>Medical record Fully electronic, Able to contribute CCD as by product of EHR/EMR, Data Warehousing</td>
<td>Paperless environment for better care &amp; medical outcomes. Clinical analytics derived from EMR data used to improve outcomes by inputs back to operational EMR. Rich analytics due to ability to capture data at every point.</td>
</tr>
<tr>
<td>Stage 6</td>
<td>Physician Documentation, Full CDSS</td>
<td>Higher level of Patient Safety, Patient Care, Enhanced Effectiveness of Care</td>
</tr>
<tr>
<td>Stage 5</td>
<td>Closed Loop Medication Administration</td>
<td>Patient Safety, 5 Rights</td>
</tr>
<tr>
<td>Stage 4</td>
<td>CPOE, CDSS</td>
<td>Patient Safety</td>
</tr>
<tr>
<td>Stage 3</td>
<td>Clinical Documentation (Flow sheets), CDSS</td>
<td>Allow Team-Based Care</td>
</tr>
<tr>
<td>Stage 2</td>
<td>Clinical Data Repository</td>
<td>Force Standardisation. Single source of Truth</td>
</tr>
<tr>
<td>Stage 1</td>
<td>Ancillaries</td>
<td>Automation of Departmental Workflow. Basis for Electronic Orders</td>
</tr>
<tr>
<td>Stage 0</td>
<td>--</td>
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</tr>
</tbody>
</table>
The future of Healthcare IT in Singapore

1. Connectivity of every Patient Record
2. One Patient, One Record via NEHR
3. Better Clinical Analytics for better Health outcomes
4. Better Patient Relationship management through Telecare
5. Patient Participation through Mobile Healthcare applications and Telehealth
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• Challenges to modern healthcare
• Benefits of Informatics Enabled Care Delivery
• High level introduction benefits of Nation-Wide EMR
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IN SUMMARY

• Government and hospitals are investing in IT to deliver better patient care – safety, quality and access.

• Clinical Information Systems and HIE brings tremendous benefits to patients and healthcare organizations.

• HIMSS Analytics EMRAM (EMR Adoption Model) provide a good framework for government to baseline and track hospital’s IT capability.
  » Creation of policy and strategy
  » Drive EMR adoption and patient care
IN SUMMARY

• Government and hospitals are investing in IT to deliver better patient care – safety, quality and access.

• HIMSS Analytics EMRAM (EMR Adoption Model) provide a good framework for government to baseline and track hospital’s IT capability.
  » Creation of policy and strategy
  » Drive EMR adoption and patient care

• Vendor needs to continue to invest in R&D on capabilities in their solutions to meet customer’s needs.

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