Electronic Medical Record in Turkish Hospitals

Findings from the Public Sector
INTRODUCTION TO HIMSS
... AND IT’S ANALYTICS BRANCH IN EUROPE
HIMSS GLOBAL
... non-profit, member-based, mission-driven

>50,000 individual members
565 corporate members
327 organization affiliates

Hospital Databases:
>5,000 US and >700 Canada
>8,000 Europe
>5,000 Asia-Pacific

Conferences & Exhibitions (examples)

RIGA, LATVIA
11 – 13 May 2015

4–5 JUNE 2014 | ISTANBUL, TURKEY
Think New
Think Big
Think Turkey

SAVE THE DATE:
15 - 18 September 2014
Marina Bay Sands, Singapore

Organised by:
HIMSS ANALYTICS IN EUROPE

… Mission: Benchmarking & Best Practice

… Methods:

Data collection

*from acute care hospitals*

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Data

Structured Questionnaire

Information

Statistical analyses and reports

Benchmarking & EMRAM Score

Intelligence

Conclusions

Decisions

Strategies & Consulting

Goal

Improving Healthcare through IT

Health-IT Vendors

Healthcare Providers

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4–5 JUNE 2014
ISTANBUL, TURKEY

Organised by:
## THE EUROPEAN EMR ADOPTION MODEL

... in 7 Stages to Highest Quality in Patient Care

<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 feeding outcomes reports, quality assurance, and business intelligence; Data continuity with ED, ambulatory, OP.</td>
</tr>
<tr>
<td>Stage 6</td>
<td>Physician documentation interaction with full CDSS (structured templates related to clinical protocols trigger variance &amp; compliance alerts) and Closed loop medication administration.</td>
</tr>
<tr>
<td>Stage 5</td>
<td>Full complement of PACS displaces all film-based images.</td>
</tr>
<tr>
<td>Stage 4</td>
<td>CPOE in at least one clinical service area and/or for medication (i.e. e-Prescribing); may have Clinical Decision Support based on clinical protocols.</td>
</tr>
<tr>
<td>Stage 3</td>
<td>Nursing/clinical documentation (flow sheets); may have Clinical Decision Support for error checking during order entry and/or PACS available outside Radiology.</td>
</tr>
<tr>
<td>Stage 2</td>
<td>Clinical Data Repository (CDR) / Electronic Patient Record; may have Controlled Medical Vocabulary, Clinical Decision Support (CDS) for rudimentary conflict checking, Document Imaging and health information exchange (HIE) capability.</td>
</tr>
<tr>
<td>Stage 1</td>
<td>Ancillaries – Lab, Radiology, Pharmacy – All Installed OR processing LIS, RIS, PHIS data output online from external service providers.</td>
</tr>
<tr>
<td>Stage 0</td>
<td>All Three Ancillaries (LIS, RIS, PHIS) Not Installed OR Not processing Lab, Radiology, Pharmacy data output online from external service providers.</td>
</tr>
</tbody>
</table>

“Paperless” patient record environment for highest quality of care, data continuity & full HIE

- Full electronic clinical decision support, and highest medication safety
- Completely electronic diagnostic image management
- Electronic order entry with decision support and result reporting
- Clinical ordering and documentation – especially nursing care
- A patient-centered electronic data repository
- Electronic diagnostic and pharmacy department information
EMRAM EVALUATION IN TURKEY
METHODOLOGY

The project is managed in close co-operation between the Turkish MoH, the Public Hospital Agency (Kamu Hastaneleri Kurumu) and HIMSS Europe

➢ Research objectives
  o Evaluate the current status of EMR adoption in public hospitals in Turkey
  o Support strategic decisions from public authorities, hospitals and the industry with regard to investments, staffing, budgets etc. → goal: digital hospital
  o Identify best practice examples, innovators and thought leaders in terms of health IT

➢ Approach
  o Collect EMRAM data from public hospitals (several waves planned, currently 1st wave done)
  o Structured questionnaire with questions about hospital demographics, IT department demographics, SW applications, processes and standards used in the hospital
  o Workshop with representatives from >140 hospitals, (in Ankara, March 2014)
  o Quality Assurance (March / April 2014)
  o EMRAM scoring (May 2014) and Gap Analysis (provided selectively to vendors)
  o Sending out EMRAM scores to participating hospitals → after conference (in June)
STATUS OF EMR ADOPTION
EMR ADOPTION IN TURKEY, EUROPE AND THE US
... based on HIMSS Analytics EMR Adoption Model

EMR Adoption Model Scores, Means per Country
(data from 4/13 – 5/14 (Turkey), 4/12 – 3/14 (Europe), 4/13 – 3/14 (US), no weighting etc. applied)

- Turkey¹ (143)
  EMRAM Score (Means) 3.0

- Europe² (1,427)
  EMRAM Score (Means) 2.2

- Germany (383)
  EMRAM Score (Means) 1.8

- Netherlands (68)
  EMRAM Score (Means) 4.0

- USA³ (5,449)
  EMRAM Score (Means) 4.1

---

1) Only public hospitals, of those 90% with >200 beds
2) Excl. Turkey; incl. Austria (42), Belgium (1), Denmark (16), Finland (3), France (17), Germany (383), Ireland (2), Italy (524), Netherlands (68), Norway (3), Poland (83), Portugal (29), Slovenia (2), Spain (220), Sweden (1), Switzerland (8), UK (25)
3) The EMRAM algorithm between Europe and the US differs in some degrees in order to reflect HIT implementation of that particular region

Source: HIMSS Europe Database (05/2014)
EMR ADOPTION IN TURKEY, EUROPE AND THE US
... based on HIMSS Analytics EMR Adoption Model

EMR Adoption Model Scores, Means per Country
(data from 4/13 – 5/14 (Turkey), 4/12 – 3/14 (Europe), 4/13 – 3/14 (US), no weighting etc. applied)

- Turkey (134): 3.0
- Europe\(^1\) (659): 2.6
- Germany (193): 2.3
- Netherlands (63): 4.1
- USA\(^2\) (1,310): 5.0

1) Excl. Turkey; incl. Austria (14), Belgium (1), Denmark (15), Finland (3), France (16), Germany (193), Italy (178), Netherlands (63), Norway (3), Poland (55), Portugal (13), Slovenia (1), Spain (79), Sweden (1), Switzerland (4), UK (20)
2) The EMRAM algorithm between Europe and the US differs in some degrees in order to reflect HIT implementation of that particular region

Source: HIMSS Europe Database (05/2014)
EMR ADOPTION IN TURKEY, EUROPE AND THE US

... differences by EMRAM Stage

<table>
<thead>
<tr>
<th>Stage</th>
<th>Turkey</th>
<th>Europe</th>
<th>Germany</th>
<th>Netherlands</th>
<th>USA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 7</td>
<td>0.0%</td>
<td>0.1%</td>
<td>0.3%</td>
<td>0.0%</td>
<td>3.1%</td>
</tr>
<tr>
<td></td>
<td>2.8%</td>
<td>2.2%</td>
<td>0.0%</td>
<td>13.2%</td>
<td>13.3%</td>
</tr>
<tr>
<td></td>
<td>9.8%</td>
<td>16.3%</td>
<td>9.9%</td>
<td>36.8%</td>
<td>24.2%</td>
</tr>
<tr>
<td>Stage 4</td>
<td>23.1%</td>
<td>3.2%</td>
<td>3.4%</td>
<td>2.9%</td>
<td>15.7%</td>
</tr>
<tr>
<td>Stage 3</td>
<td>4.2%</td>
<td>3.6%</td>
<td>6.8%</td>
<td>1.5%</td>
<td>27.7%</td>
</tr>
<tr>
<td>Stage 2</td>
<td>51.0%</td>
<td>30.0%</td>
<td>34.5%</td>
<td>44.1%</td>
<td>7.2%</td>
</tr>
<tr>
<td>Stage 1</td>
<td>0.7%</td>
<td>16.7%</td>
<td>0.3%</td>
<td>1.5%</td>
<td>3.2%</td>
</tr>
<tr>
<td>Stage 0</td>
<td>8.4%</td>
<td>27.9%</td>
<td>44.9%</td>
<td>0.0%</td>
<td>5.6%</td>
</tr>
<tr>
<td>N</td>
<td>143</td>
<td>1,427</td>
<td>383</td>
<td>68</td>
<td>5,449</td>
</tr>
<tr>
<td>Mean</td>
<td>3.0</td>
<td>2.2</td>
<td>1.8</td>
<td>4.0</td>
<td>4.1</td>
</tr>
<tr>
<td>Median</td>
<td>2.5</td>
<td>2.1</td>
<td>2.1</td>
<td>4.8</td>
<td>4.3</td>
</tr>
</tbody>
</table>

Key challenge in Turkey and Europe

1) Only public hospitals, of those 90% with >200 beds
2) Excl. Turkey; incl. Austria (42), Belgium (1), Denmark (16), Finland (3), France (17), Germany (383), Ireland (2), Italy (524), Netherlands (68), Norway (3), Poland (83), Portugal (29), Slovenia (2), Spain (220), Sweden (1), Switzerland (8), UK (25)
3) The EMRAM algorithm between Europe and the US differs in some degrees in order to reflect HIT implementation of that particular region

Source: HIMSS Europe Database (05/2014)

4–5 JUNE 2014
ISTANBUL, TURKEY
EMR ADOPTION IN TURKEY, EUROPE AND THE US

... differences by EMRAM Stage

EMR Adoption Model Scores, % of Hospitals
(data from 4/13 – 5/14 (Turkey), 4/12 – 3/14 (Europe), 4/13 – 3/14 (US), no weighting etc. applied)

<table>
<thead>
<tr>
<th>Stage</th>
<th>Turkey¹</th>
<th>Europe²</th>
<th>Germany</th>
<th>Netherlands</th>
<th>USA³</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 7</td>
<td>0.0%</td>
<td>0.3%</td>
<td>0.5%</td>
<td>0.0%</td>
<td>6.2%</td>
</tr>
<tr>
<td>Stage 6</td>
<td>1.5%</td>
<td>3.3%</td>
<td>0.0%</td>
<td>14.3%</td>
<td>26.6%</td>
</tr>
<tr>
<td>Stage 5</td>
<td>9.7%</td>
<td>21.4%</td>
<td>15.0%</td>
<td>36.5%</td>
<td>27.6%</td>
</tr>
<tr>
<td>Stage 4</td>
<td>26.6%</td>
<td>2.9%</td>
<td>4.7%</td>
<td>3.2%</td>
<td>16.1%</td>
</tr>
<tr>
<td>Stage 3</td>
<td>4.5%</td>
<td>4.6%</td>
<td>11.4%</td>
<td>1.6%</td>
<td>20.9%</td>
</tr>
<tr>
<td>Stage 2</td>
<td>50.7%</td>
<td>34.6%</td>
<td>36.8%</td>
<td>42.9%</td>
<td>2.3%</td>
</tr>
<tr>
<td>Stage 1</td>
<td>0.7%</td>
<td>14.0%</td>
<td>0.0%</td>
<td>1.6%</td>
<td>0.2%</td>
</tr>
<tr>
<td>Stage 0</td>
<td>8.2%</td>
<td>19.0%</td>
<td>31.6%</td>
<td>0.0%</td>
<td>0.1%</td>
</tr>
<tr>
<td>N</td>
<td>134</td>
<td>659</td>
<td>193</td>
<td>63</td>
<td>1,310</td>
</tr>
<tr>
<td>Mean</td>
<td>3.0</td>
<td>2.6</td>
<td>2.3</td>
<td>4.1</td>
<td>5.0</td>
</tr>
<tr>
<td>Median</td>
<td>2.5</td>
<td>2.3</td>
<td>2.2</td>
<td>5.2</td>
<td>5.1</td>
</tr>
</tbody>
</table>

1) Only public hospitals, of those 90% with >200 beds
2) Excl. Turkey; incl. Austria (14), Belgium (1), Denmark (15), Finland (3), France (16), Germany (193), Italy (178), Netherlands (63), Norway (3), Poland (55), Portugal (13), Slovenia (1), Spain (79), Sweden (1), Switzerland (4), UK (20)
3) The EMRAM algorithm between Europe and the US differs in some degrees in order to reflect HIT implementation of that particular region

Source: HIMSS Europe Database (05/2014)
KEY MISSING SOFTWARE APPLICATIONS
TOP AND BOTTOM SW APPLICATIONS

... missing or not yet fully implemented applications from Turkish hospitals

Top 5 least frequently deployed SW applications

- O-TB: Oncology - Tumor Board
- D-S/R: Dictation with Speech Recognition
- O-RT: Oncology - Radiation Therapy
- C-PACS: Cardiology PACS
- O-DCCR: Oncology - Distributed Cancer Care Record

Top 5 most frequently deployed SW applications

- ADT: Admission/Discharge/Transfer
- MPI: Master Patient Index
- LIS: Laboratory Information System
- PHIS: Pharmacy Management System
- EPR/CDR: Electronic Patient Record/Clinical Data Repository

Source: HIMSS Europe Database (05/2014, n = 143)

0% 20% 40% 60% 80% 100%

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4–5 JUNE 2014
ISTANBUL, TURKEY

* excluding Radiology and Cardiology PACS modalities
CLINICAL DECISION SUPPORT

... 3 levels – from error checking to pathway optimization

<table>
<thead>
<tr>
<th>Level</th>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Level 1:</strong> conflict checking during order entry</td>
<td><strong>System:</strong> low – electronic order entry&lt;br&gt;<strong>User:</strong> low</td>
</tr>
<tr>
<td><strong>Level 2:</strong> rules engine firing during order entry</td>
<td><strong>System:</strong> medium - CPOE with rules engine&lt;br&gt;<strong>User:</strong> medium – user friendliness; “alert fatigue”</td>
</tr>
<tr>
<td><strong>Level 3:</strong> rules engine triggered by physician / clinical documentation proposes pathways</td>
<td><strong>System:</strong> high – CPOE, structured documentation, controlled medical vocabulary (CMV) tools, Evidence-based medicine / knowledge management, medical device integration, rules and workflow engines support predictive alerts, order sets and clinical pathways&lt;br&gt;<strong>User:</strong> high – trust, involvement, process design</td>
</tr>
</tbody>
</table>
THE STATUS OF CDSS

... Clinical Decision Support is a complex framework and often still an unclear concept to many CIOs

Adoption of key components, based on the installed base in acute hospitals, % of institutions

- Turkey: 76% ePrescribing, 58% CPOE, 24% CDSS, 22% CDSS with pathway support
- Europe: 47% ePrescribing, 42% CPOE, 14% CDSS, 8% CDSS with pathway support
- Germany: 27% ePrescribing, 29% CPOE, 19% CDSS, 8% CDSS with pathway support
- Netherlands: 94% ePrescribing, 78% CPOE, 30% CDSS, 30% CDSS with pathway support
- USA: 80% ePrescribing, 91% CPOE, 54% CDSS, 54% CDSS with pathway support

Source: HIMSS Analytics Europe Database
Data collection periods: 04/13 – 05/14, TR (n = 143); 05/12 – 05/14, Europe (n = 1284), DE (n = 351), NL (n = 69); 2012 US (n = 5415).
CLOSED LOOP MEDICATION ADMINISTRATION
... key components and challenges

Medication Order
(by authorized clinician)
Medication order entered into CPOE/ePrescribing system, pass CDS and flow to Pharmacy and/or Ward

Validation & Dispense
(by Pharmacy/Nurse)
Validation of order and dispensing of Unit Doses (e.g. by ADM) with bar code or complete prescription information

POC Administration
Secure identification of nurse, patient and medication at POC by
→ bar code scanning or RFID
→ POC registration in eMAR
→ 4-eye principle (+signature)

ADM
optional

Documentation
Update and available in eMAR for review, override management and future CDSS interactions
THE STATUS OF CLMA

... large differences between hospitals in different countries

Adoption of key components, based on the installed base in acute hospitals, % of institutions

<table>
<thead>
<tr>
<th>Component</th>
<th>Turkey</th>
<th>Europe</th>
<th>Germany</th>
<th>Netherlands</th>
<th>USA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pharmacy available</td>
<td>100%</td>
<td>96%</td>
<td>89%</td>
<td>99%</td>
<td>98%</td>
</tr>
<tr>
<td>Pharmacy IS</td>
<td>😒</td>
<td>100%</td>
<td>87%</td>
<td>65%</td>
<td>100%</td>
</tr>
<tr>
<td>ePrescribing (with CDS)</td>
<td>76%</td>
<td>47%</td>
<td>27%</td>
<td>😊</td>
<td>94%</td>
</tr>
<tr>
<td>eMAR, of which</td>
<td>63%</td>
<td>42%</td>
<td>33%</td>
<td>😊</td>
<td>80%</td>
</tr>
<tr>
<td>available at PoC</td>
<td>25%</td>
<td>43%</td>
<td>😊</td>
<td>85%</td>
<td>n/a</td>
</tr>
<tr>
<td>ADM for Unit-Doses</td>
<td>n/a</td>
<td>15%</td>
<td>4%</td>
<td>39%</td>
<td>😊</td>
</tr>
<tr>
<td>Barcode / RFID, of which</td>
<td>😨</td>
<td>55%</td>
<td>88%</td>
<td>84%</td>
<td>94%</td>
</tr>
<tr>
<td>for medication administration</td>
<td>😨</td>
<td>29%</td>
<td>39%</td>
<td>44%</td>
<td>65%</td>
</tr>
<tr>
<td>CLMA</td>
<td>17%</td>
<td>14%</td>
<td>😊</td>
<td>4%</td>
<td>37%</td>
</tr>
</tbody>
</table>

Source: HIMSS Europe Database
MARKET INTELLIGENCE

- INVESTMENT PLANS
- KEY VENDORS
- HOSPITAL IT INDICATORS
### KEY HIT VENDORS BY COUNTRY

... Top 5 vendors by market shares

<table>
<thead>
<tr>
<th>Turkey</th>
<th>Germany</th>
<th>Netherlands</th>
<th>USA</th>
</tr>
</thead>
<tbody>
<tr>
<td>AKGÜN</td>
<td>AGFA</td>
<td>CHIPSOFT</td>
<td>MEDITECH</td>
</tr>
<tr>
<td>SISOFT</td>
<td>SIEMENS (incl. SAP)</td>
<td>MCKESSON</td>
<td>MCKESSON</td>
</tr>
<tr>
<td>FONET</td>
<td>CSC</td>
<td>CSC</td>
<td>EPIC</td>
</tr>
<tr>
<td>KARDELEN</td>
<td>NEXUS</td>
<td>SAP</td>
<td>CERNER</td>
</tr>
<tr>
<td>PROBEL</td>
<td>TELEKOM HEALTHCARE SOLUTIONS</td>
<td>PHILIPS</td>
<td>CPSI</td>
</tr>
</tbody>
</table>

Turkey: Preliminary results, sample might not reflect whole country; displayed in random order.

Please note: Market shares are based on SW applications evaluated in HIMSS EMRAM survey.

Source: HIMSS Europe Country Comparison Report 2013, eHospital Census Turkey 2014
HOSPITAL IT EXPENDITURES

Based on overall Hospital Budget Dutch Hospitals spend most for IT. Based on HIT spend per capita, US hospitals spend most (81€/person), and Turkish ones least (8€/person).

Exchange rates: 1.33 US$ = 1 EUR, 2.85 TRL = 1 EUR
Data for Turkey: based on assumption that public hospital IT spending is 65% of the total hospital IT spend, i.e. private hospitals make up the remainder (2.9€ out of the 8.4€).

Source: HIMSS Europe Country Comparison Report 2013, eHospital Census Turkey 2014
## CLINICAL IT SUPPORT METRICS

Turkish Hospitals compared to selected countries (mean values)

<table>
<thead>
<tr>
<th></th>
<th>Turkey</th>
<th>Germany</th>
<th>Netherlands</th>
<th>USA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>User / IS Staff</strong></td>
<td>122</td>
<td>117</td>
<td>56</td>
<td>88</td>
</tr>
<tr>
<td><strong>Workstations / Hospital FTE</strong></td>
<td>0.4</td>
<td>0.6</td>
<td>1.0</td>
<td>1.1</td>
</tr>
<tr>
<td><strong>IS Operating Expense / User (in €)</strong></td>
<td>241</td>
<td>1,193</td>
<td>2,956</td>
<td>1,909</td>
</tr>
</tbody>
</table>

Exchange rates: 1.33 US$ = 1 EUR, 2.85 TRL = 1 EUR
Source: HIMSS Europe Country Comparison Report 2013, eHospital Census Turkey 2014

4–5 JUNE 2014
ISTANBUL, TURKEY
BEST PRACTICE HOSPITALS IN TURKEY
EMR ADOPTION MODEL AWARDS

... Stage 6 & 7 awarded hospitals (June 2014)

2 hospitals identified across Europe so far:
- Hospital de Dénia Marina Salud S.A., Spain
- University Hospital Hamburg Eppendorf, Germany

46 hospitals identified across Europe so far, of which:

<table>
<thead>
<tr>
<th>Country</th>
<th>Count</th>
<th>European Stage 6 Hospitals by Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spain</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>Netherlands</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>France</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Turkey</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Switzerland</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Italy</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Sweden</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Finland</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Denmark</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Belgium</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

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4–5 JUNE 2014
ISTANBUL, TURKEY
Which Turkish hospital will be the first Stage 7?
CONCLUSIONS
CONCLUSIONS

… what has been learned so far?

• Turkey is ahead of many European countries in terms of EMR maturity
• Turkish hospitals and vendors use EMRAM to improve their IT capabilities
• EMRAM assessments bring educative benefits to IT managers and users
• Best practice hospitals have been identified
• Groundwork for in-depth benchmarking focused on IT usage, process maturity, benefits realization etc. (additional tools can be brought in, e.g. Continuity of Care Model, IT CMF, etc.)

• The work has just begun...
  o >80 of public hospitals have not yet been evaluated
  o Data quality needs to be improved
  o Re-evaluation after 24 months
  o Development and execution of strategies
Thank you!

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