WINNING THE ED THROUGHPUT BATTLE: TENET HEALTHCARE’S EMERGENCY DEPARTMENT FLASHBOARD
Speakers

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About Tenet Healthcare

- **47** States
- **130K** Employees
- **35K** Active Physicians
- **38K+** Nurses
- **80** Hospitals
- **20** Short Stay Surgical Hospitals
- **470** Outpatient Centers
- **50** Health System Partners
- **28** Teaching Hospitals
- **18** Accountable Care Organizations
- **98K** 2016 Babies Delivered
- **11.3M** Patient Care Encounters
- **#140** Fortune 500 Ranking
- **$19.6B** 2016 Revenue
About Process Analytics

Data Integration, Exchange, & Reporting
- Data Access (DAAC)
- Patient Data (PDR)
- Cost Accounting
- Data Lake
  - Interface
  - Cleaning
  - Statistics
  - Reconciliation
  - Patient Reporting
  - Data Transformation
  - eCDM (Charge Master)
  - Development Services
  - Notreza

Advanced Analytics & Business Intelligence (BI)
- Self-Service (Ad Hoc)
- Cognos Insight Analytics (Custom Reporting)
- Core Analytics
- Patient Tracking
- Governance
  - Tableau
  - Predictive Modeling
  - Big Data
  - Clinical Operations
  - Hospital Operations
  - Patient Safety
  - Physician Relations
  - Meaningful Use
  - eTEMPO
  - EMPI

Business Process Workflows
- Dashboards
- Workflow Management (SMART/CONNECT)
  - eCAQ / Legal
  - Physician Activity Log
  - CERS / Finance
  - Compliance
  - MRRS / Marketing
  - Confer
  - Accounting
  - HR
  - PMI
  - ACI
  - TPR
  - Contracting
  - IS Security
  - Adobe Forms
  - Adobe Sign

PEGAWORLD2017
Information Driven Healthcare

Hindsight
- Reporting
  - Operational Reports
  - Adhoc Reports
  - Basic Quality Reports

Insight
- Visualization
  - Emergency Dashboard
  - Readmission Rates
  - HAI Trends

- Inferences/Exceptions
  - Gaps in Care
  - Physician Scorecards and benchmarking
  - Labor forecasting

Foresight
- Predictive Analytics
  - Population Risk Stratification
  - Disease based risk models
  - Readmission Prediction
- Optimization
  - Prescriptive Analytics
  - Patient Flow Optimization
  - Network Leakage and Design

Model Development
- Change Mgmt.

Master Data Management/ Governance

Enterprise Data Warehouse

Data Integration and Management
Business Challenges – The Emergency Department

1. Eliminate Data Delays
   – Can we condense data delays to ‘zero’?
   – Is it possible to access real-time (RT) ED data?

2. Transform Data into Information
   – Is it possible to apply a process perspective to RT data?
   – Is it possible to contrast RT data against SLAs?

3. Deliver Information in Context
   – Without additional burdens to staff

4. Provide Governance Structure when Necessary
   – Alerts
   – Next Best Actions

5. Improve the ED Patient Experience
Link to Production Version of ED Flashboard

Click here
Real-Time ED Dashboard

ED Stats
- ED Waiting Census: 45 Mins
- ED Census: 39
- CEDECS Score: 54
- GEDocs Score: 0
- Acuity: 0
- Not Traged: 23

ED Discharge & Transfer Holds
- Disch: > 20 mins: 4
- Transfer: > 60 mins: 8
- ED Admit & ED Bed Demand
- Inpatient Census
  - 3 North: 4
  - 6 South: 0
  - 6 North: 1
  - 6 South: 4
  - 6 North: 1
  - Labor & Delivery: 8
  - Rehab: 7
  - Medical ICU: 4
  - Surgical ICU: 2
  - NICU: 8
  - Obstetric: 0
  - Pediatrics: 6
  - Other: 7

ED Arrivals & Departs
- ED Arrivals: 149
- ED Departs: 160
- ED LOS: 215 Mins
- ED LOS - Admits: 226 Mins
- ED LOS - Departs: 150 Mins

ED Throughput Milestones (Rolling 4-Hour)
- Door to Depart: 259
- Door to Triage: 186

Laboratory Orders and Processing Milestones
- Order to Collect: 76
- Collect to Receive: 54
- Receive to Result: 54

Radiology Orders and Processing Milestones
- Order to Start: 54
- Start to Complete: 54
- Complete to Fail: 54

Redacted hospital information
Arrival Trends, Acuity, CEDOCS Score

- Waiting census
- ED Census
- Average Wait Time
- CEDOCS Score
  - Range: 0 to 200
  - Six color scales between range
- Average Wait Time
- Four Hour Arrival Trend
- Acuity
Admission, Discharge and Transfer Activity

- Blue-colored values never change their background color
- Green-colored values are within their target
- Red colored values have exceeded their target
Visit Milestones

• Door to Depart wheels measure start-to-finish performance
• Chevrons measure milestones within the overall visit
• Enables staff to identify and correct the pressure points
Drill-down Graphs Are “One Click Away”
Lab and Radiology Order Processing Milestones

- Color Wheels denote overall, start-to-finish performance
- Chevrons denote milestone performance as the order progresses through the caregiving process
Inpatient Census and Bed Availability

- Inpatient total census – for areas tracked by EDFB
- Number of free beds per care area – the info most useful to a busy emergency department team
- Background color denotes developing pressure point
- Snapshot of “now, versus future state: predicting the future
Targeted Statistics: Today vs. Prior Day

- Numbers reset at midnight
- Helps to define a sense of teamwork and collaboration
- Useful to spot developing trends as the day moves forward

<table>
<thead>
<tr>
<th>ED Arrivals &amp; Depart</th>
<th>Today</th>
<th>Prior Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>ED Arrivals</td>
<td>79</td>
<td>195</td>
</tr>
<tr>
<td>ED Depart</td>
<td>83</td>
<td>182</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ED LOS</th>
<th>Today</th>
<th>Prior Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>ED LOS - Admits</td>
<td>160 Mins</td>
<td>203 Mins</td>
</tr>
<tr>
<td>ED LOS - Depart</td>
<td>117 Mins</td>
<td>130 Mins</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>ED Depart Dispo</th>
<th>Today</th>
<th>Prior Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Admit</td>
<td>9</td>
<td>27</td>
</tr>
<tr>
<td>AMA</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Discharge</td>
<td>35</td>
<td>130</td>
</tr>
<tr>
<td>Emitted</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Expired</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Labor and Delivery after receiving ED treatment</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Labor and Delivery only</td>
<td>1</td>
<td>11</td>
</tr>
<tr>
<td>LWOT</td>
<td>1</td>
<td>0</td>
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<tr>
<td>NULL</td>
<td>32</td>
<td>1</td>
</tr>
<tr>
<td>RCRP</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Transfer</td>
<td>2</td>
<td>6</td>
</tr>
</tbody>
</table>
EDFB: Makes Data Actionable

Real-Time ED Dashboard

ED Stats
- ED Waiting Census: 39
- ED Census: 4
- Average Wait Time: 45 Mins
- GEOCS Score: 54

ED Discharge & Transfer Hold
- Discharge: 4
- Transfer: 2
- Admission: 8
- Observation: 0

ED Admit Hold & ED Bed Demand
- Level of Care: Critical Care, Adult: 1, Pediatric: 0
- Acuity: 6
- Not Triage: 0

Inpatient Census & Bed Availability
- 3 North: 4
- 4 South: 8
- Labor and Delivery: 6
- Rehab: 6
- Medical ICU: 4
- Surgical ICU: 2
- Mother Baby: 23
- Women's Surgical: 0

ED Throughput Milestones (Rolling 4-Hour)
- Admit: 259
- Discharge: 186
- Door to Triage: 259
- Door to Bed: 186
- QMP to Care Comp: 54

Laboratory Orders and Processing Milestones
- Order to Collect: 76
- Collect to Receive: 0
- Receive to Result: 54

Radiology Orders and Processing Milestones
- Order to Start: 0
- Start to Complete: 0
- Complete to Final: 0

Redacted hospital information
EDFB: Improves Communication
EDFB: “Do What You Always Do”
EDFB: Some Lessons Learned

• Psychiatric / behavioral health patients in the ED
• Shortcuts in documentation may negatively impact accuracy of EDFB data
• Radiology milestone “correction factors”
EDFB: Version Optimized for Smart Phone
TENET’S PE TEAM

WOW! YOUR CHOLESTEROL HAS ME REALLY WORRIED!

GACK!

Uh...you might want to actually look at the patient...
PE: What We Do

- PE: Performance Excellence
- Key Strategy: Identify or create best practices to improve,
  - Patient Throughput
  - Quality
  - Service
  - Cost Performance
  - Compliance
  - “It’s all about the patient”
- In support of these goals, PE develops an effective methodology and infrastructure to document, disseminate and train Tenet teams on these best practices

To help people live happier, healthier lives
PE: Areas of Focus

- Inpatient Throughput
- Emergency Department
- Peri-Operative
- Case Management
- IT Solutions and Innovation

- Labor Productivity
- Health Information Management
- Lean Daily Management
- Procurement
- Cost Accounting
PE: ED Flashboard Initiative

• ED throughput has impact upon
  – Patient Satisfaction
  – Patient Quality of Care
  – Caregiving Excellence
  – Resource Management
  – Bottom line and Growth

As things bog down in the ED, all of these factors are negatively impacted. The ED Flashboard is Tenet’s solution to identify and mitigate factors that negatively impact patient throughput.
PE: Contributions to EDFB Initiative

• PE bridged the gap between the technical teams and the front line ED staff members

• PE provided the target values used to level-set the performance targets across Tenet ED’s
  – Patient throughput milestones
  – Lab Metrics
  – Radiology metrics

• PE set design requirements. Identified critical design elements for initial design, and has provided the road map as each successive enhancement is scoped, programmed and introduced

• Reviewed and endorsed rollout and training schedules
ED Flashboard’s Platform

- Back end database: MS-SQL
- Front end presentation layer: .NET
- Middleware: Pega
ED Flashboard’s Platform: MS-SQL 2012

• Database tables store raw data used for calculations and presentation

• Distinct DEV, QA, MODEL, and PROD databases

• Depending upon metric, some data is aggregated across the past 15 minutes, or past 4 hours accordingly

• Database performs all calculations, e.g.,
  – CEDOCS score
  – Color Backgrounds
  – Average wait time
  – 24 hour summaries
  – Self-purging
ED Flashboard’s Platform: .NET

• IBM Cognos -> .NET
  – Significant tool set
  – Current resource availability
  – Works on all major browser platforms
  – Data refresh independently, on a five minute schedule
  – Future state: Change from “Pull” to “Push” architecture
  – In development: .NET web input form
ED Flashboard’s Platform: Pega

• Repository for all query-based data extractions
• Data is extracted across six Cerner Oracle “Hubs”
• 39 sites LIVE with EDFB today
• Written to the MS SQL tables
• Query sets run every four minutes
• Pega Rules and Alerts to trigger actions based upon pre-determined EDFB values, such as a high CEDOCS score
ED Flashboard’s Platform: Pega Rule-Based Alerts

- Pega’s powerful flexibility for rule-based alerting is ideally suited to the fast-paced ED environment

ED Flashboard Alert: CEDOCS Score High

To  Dekle, Dave - NTT

This message was sent with High importance.

The CEDOCS score is currently 182 for site XX.

<table>
<thead>
<tr>
<th>CEDOCS Score</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>00 to 20</td>
<td>Not busy</td>
</tr>
<tr>
<td>21 to 60</td>
<td>Busy</td>
</tr>
<tr>
<td>61 to 100</td>
<td>Extremely busy but not over-crowded</td>
</tr>
<tr>
<td>101 to 140</td>
<td>Over-crowded</td>
</tr>
<tr>
<td>141 to 180</td>
<td>Severely over-crowded</td>
</tr>
<tr>
<td>181 to 200</td>
<td>Dangerously over-crowded</td>
</tr>
</tbody>
</table>
Pega Rule Example: CEDOCS score > 180

• Trigger criteria:
  1. CEDOCS value between 181 and 200
  2. Score persists across at least two consecutive data collection points
  3. Alert is sent once hourly, provided score remains between 181 and 200

• Recipients defined by the hospital

• Alert delivery method is email delivery

• Multiple alerts can be defined as Global, or hospital-specific

• Future state: Able to configure active versus inactive hours per recipient, per day

• Future state: Site configuration of recipients via .NET web form
Why Not Use Pega for All Facets of EDFB?

• The initial thrust of this project was to develop an alerting capability based upon our ED Dashboard (not Flashboard) setup

• Pega was selected due to its robust alerting capability

• As the alerting capability was explored, we became aware a visually appealing status board, based upon real time metrics (even if the metrics were “good job”), had merit

• We turned to our usual presentation layer solution, Cognos, for that aspect
ED Flashboard: A Multi-platform Solution

• We found using programming talent across several platforms was more feasible than using a single solution approach.

• Pega’s ability to integrate with other solutions and platforms helped us to realize this vision, while keeping to an aggressive development timeline.
Q&A