Clinical Decision Support
Current State and Roadmap for Success
March 1, 2016

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Hosted by Eyal Ephrat, MD
medCPU
Conflict of Interest

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Have no real or apparent conflicts of interest to report.
Conflict of Interest

Eyal Ephrat, MD

Salary: medCPU
Royalty: medCPU Advisor, by medCPU
Receipt of Intellectual Property Rights/Patent Holder: medCPU Advisor, by medCPU
Consulting Fees (e.g., advisory boards): none
Fees for Non-CME Services Received Directly from a Commercial Interest or their Agents (e.g., speakers’ bureau): none
Contracted Research: none
Ownership Interest (stocks, stock options or other ownership interest excluding diversified mutual funds): medCPU
Other:
Agenda

Two Health Systems:
Froedtert and UPMC

Common Challenge:
Translating data into actionable insights at the point of care

Shared Strategy:
Clinical decision support (Froedtert and UPMC)

Operationalizing the Strategy – Intelligent CDS solution:
Froedtert and Radiology decision support
UPMC and future technology partnership
Learning Objectives

• Identify the challenges in achieving high compliance rates of physicians to real-time prompting

• Discuss opportunities for attaining high effectiveness with clinical decision support

• Analyze potential implications that precise normalized, comprehensive clinical data could have on improving healthcare delivery
An Introduction of How Benefits Were Realized for the Value of Health IT

Improving comprehensive data acquisition could help address multiple challenges we face today in healthcare IT. If we can improve care quality and healthcare delivery through highly accurate decision support solutions, we can help contain costs across the healthcare industry.

http://www.himss.org/ValueSuite
TWO HEALTH SYSTEMS
ACADEMIC-COMMUNITY PARTNERSHIP

Froedtert Hospital Campus
9200 W. Wisconsin Ave.
Milwaukee, WI 53226

Community Memorial Hospital Campus
W180 N8085 Town Hall Road
Menomonee Falls, WI 53051

St. Joseph's Hospital Campus
3200 Pleasant Valley Road
West Bend, WI 53095

Conveniently located health centers in Milwaukee, Washington and Waukesha counties connecting you to academic medicine at its best.
SE Wisconsin’s Only Academic Medical Center

<table>
<thead>
<tr>
<th>Statistics</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 Hospitals</td>
<td>784 Licensed beds</td>
</tr>
<tr>
<td>38,935 Admissions</td>
<td>104,629 Emergency Room visits</td>
</tr>
<tr>
<td>Emergency Room visits 104,629</td>
<td>Emergency Room visits 104,629</td>
</tr>
<tr>
<td>Physicians 2,665</td>
<td>Outpatient visits 931,078</td>
</tr>
<tr>
<td>Outpatient locations 39</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>$12 billion integrated global health enterprise</td>
<td>More than 20 academic, community, and regional hospitals 5,000+ licensed beds</td>
</tr>
<tr>
<td>---------------------------------------------</td>
<td>--------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Affiliated with the University of Pittsburgh</td>
<td>285,000+ inpatient admissions 185,000 surgeries performed annually</td>
</tr>
<tr>
<td>$1.5 billion invested in technology over the past five years</td>
<td>Western PA’s largest employer: 60,000 employees</td>
</tr>
</tbody>
</table>

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THE OPPORTUNITY:
How would outcomes change with intelligent clinical decision support in place?
CHALLENGES WITH CDS

Content
- Developing content via Consensus Model
- Eminence vs. Evidence
- Non-scalable

Design
- Poor Usability
- Disruptive to Workflow
- Too Simplistic an Approach
- Lacking Credibility

Technology
- Real-time data
- Interoperability
- Locked in EMRs / lack of interfaces
- Up to 80% of core data is unstructured
COMMON CHALLENGES: EXAMPLE
American College of Radiology (ACR) Appropriateness Criteria

Clinical Conditions Updated February 2015

- Occupational lung disease
- Breast pain
- Infertility
- Evaluation of the symptomatic male breast
- Cohn's disease
- Palpable abdominal mass
- Acute trauma to the foot
- Acute trauma to the knee
- Acute respiratory illness in immunocompromised patients
- Hematuria

- Acute onset of scrotal pain
- Recurrent lower urinary tract infections in women
- Blunt chest trauma – suspected aortic injury
- Upper extremity swelling
- Intensive care patients
- Assessment of the gravid cervix
- Vomiting in infants up to 3 months age
- Interventional radiology topics
- Radiation oncology topics
COMMON CHALLENGES: EXAMPLE

This is 1 of 9 pages concerning imaging for headache.

Providers can’t navigate these complexities without robust help.
SHARED STRATEGY:
Clinical Decision Support
CDS: CURRENT STATE

- No definitive comprehensive list of what can constitute CDS
- The ONC and CMS broadly interpret CDS as is stated in the 2012 final rule
  - allows a wide array of innovative ineffective CDS support tools available to providers
  - HIT functionality that builds on upon the foundation of an EHR chart to provide persons involved in healthcare processes with general and person specific information, intelligently filtered and organize, at appropriate times, to enhance health and health care
- The evidence of effectiveness of clinical decision support systems is mixed
CDS TAKES MANY FORMS

<table>
<thead>
<tr>
<th>Alerts &amp; Reminders</th>
<th>Documents</th>
<th>Order Sets</th>
<th>Monitors</th>
<th>Analytics</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Immediate: warnings and critiques</td>
<td>Parameter Guidance</td>
<td>Care Plans and Protocols</td>
<td>Multi-patient Dashboards</td>
<td>Retrospective Analytics</td>
<td>Filtered Reference/ Knowledge Resources</td>
</tr>
<tr>
<td>Event-driven alerts and reminders</td>
<td>Smart Documentation Forms</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Relevant Data Summaries (Single-patient)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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CDS EVIDENCE

Two separate 2005 systematic reviews concluded:

- CDS improve practitioner performance in 64% -68% of the studies
- Improve patient outcomes in 13% of the studies

Features associated with improved performance include:

- CDS is integrated into clinical workflow not a separate login/activation
- CDS is electronic, rather than paper based templates
- CDS must be real time, point of care, not prior to or after the encounter
- CDS provides (active voice) recommendations for care, not just assessments

Kawamoto K: BMJ 2005;330:765
10 COMMANDMENTS OF CDS

1. **Speed is everything** – expect sub-second latency
2. **Anticipate needs & deliver in real time** – e.g. show relevant labs with med orders
3. **Fit into the user’s workflow** – external tools not as good as those at POC
4. **Little things can make a big difference** – “make it easy to do the right thing”
5. **Physicians resist stopping** – don’t tell docs to not do something without offering an alternative
6. **Changing direction is easier than stopping**
7. **Simple interventions work best** – try to fit guidelines onto a single screen
8. **Ask for additional information only when you really need it** – “likelihood of success is inversely proportional to the number of extra data elements needed”
9. **Monitor impact, get feedback, and respond**
10. **Manage and maintain your knowledge-based systems**

(Bates, JAMIA 2003)
THE 5 R’s CLINICAL DECISION SUPPORT

- **Right Information**: Quality of knowledge base
- **Right Person**: Target of CDS
- **Right Format**: Implementation of CDS (speed, ease of use, comprehensibility)
- **Right Channel**: Mode of CDS
- **Right Time**: Workflow integration

(Osheroff et al)
SHARED STRATEGY: Decision Support at Froedtert
Organizations readily identify quality issues and developing solutions

Most organizations have difficulty “crossing” the Quality bar and driving robust process to all operational levels

- Medical error rates have not decreased from the initial IOM reports
- Preventable medical errors are 10 fold higher and stated to be the sixth most common cause of death in the US
  - Accounting for 400,000 patient lives at a cost to US taxpayers of 19.5 billion dollars in 2008
MODELING THE QUALITY CHASM

Quality Chasm:
- Inability to incorporate “Patient” and “Population” knowledge into every action
- Every action must occur at “Patient Level”.

Providers complete the majority of their work between “Information” and “Action”.

Model reveals
- Current workflows support (but do not automate) incorporating “Information” into each encounter
- “Knowledge” is provider dependent.
- Knowledge is a manual
RTDS closes the chasm by automating:

- Transition from “Information” to “Knowledge”
- Then incorporating both knowledge and action at the “Encounter”, “Disease”, and “Patient” level
SHARED STRATEGY: Support at UPMC/UPMC Enterprises
**Awareness**
Do you know what question to ask?

**Knowledge**
Can you recognize the answer when you see it?
Efficient
Credible
Integrated
Nuanced Corrective Quality-centric
OPERATIONALIZING THE STRATEGY: Froedtert and Radiology Decision Support
IMAGING CHALLENGES

Imaging is responsible for 14% of Medicare Part B expenditures

7 - 60% of high tech imaging may not be medically indicated

6x increase in medical radiation to the population over the last 25 years
  - Largely attributable to CT and Nuclear Medicine studies
  - Likely 2% of future cancers will result from current imaging use

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Evidence supporting better tactics for appropriate imaging

- Retrospective review

- Radiology benefit management company provided evidence-based appropriateness criteria review
  - Based on submitted clinical history at the time of interpretation
  - Radiology reports and subsequent clinic visits were analyzed for outcomes

- 459 examinations reviewed, 284 (62%) were CT and 175 (38%) were MRI
  - 341 (74%) were considered appropriate
  - 118 (26%) were not considered appropriate

- Examples of inappropriate examinations
  - Brain CT for chronic headache, lumbar spine MR for acute back pain, knee or shoulder MRI in patients with osteoarthritis, and CT for hematuria during a urinary tract infection

- 58% of the appropriate studies had positive results and affected subsequent management

- 24% of inappropriate studies had positive results and affected management

1. Full data acquisition
   - EMR
   - Dictations
   - Discharge Summaries
   - Labs
   - CPOE
   - ADT
   - Other ancillary systems

2. Medical Text Processor

3. Decision Support Engine
   - Best Practice Content Modules
   - Accurate & Complete Patient DB

Accurate Prompts at the Point-of-Care on Deficiency in Care Delivery

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Alert appears only when required

Alert will clear spontaneously:

- When documented in record
- Appropriate order placed
- Provider indicates not applicable
85% of patient information is found only in the typed text.

RTDS monitors:
- All notes (typed, dictated, templates)
- Radiology reports
- Pathology reports
- Labs
- Discrete fields (Prob list, meds, allergies)
REAL-TIME DECISION SUPPORT (RTDS) 
BACKGROUND AT F&M CW

1 of 8 National Centers of Excellence of Radiologic Imaging

More BEST Doctors than other organization in Wisconsin

Historically the chasm from pathway development to pathway adoption has been deep – our journey shows that:

- Leaders need to effectively sponsor the tools
- Front line providers need “at elbow” implementation support
- Process needs metrics to track success and provide “sustaining” feedback to the front line providers
Decline in prompts represented “subliminal” adoption of best practices. Increasing compliance despite fewer prompts.
FROEDTERT ED ACR PROMPTS
Froedtert ED Radiology

Total Cases Impacted 2015

<table>
<thead>
<tr>
<th></th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
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</thead>
<tbody>
<tr>
<td># of cases cancelled/a reason for test was documented following a medCPU prompt</td>
<td>18</td>
<td>27</td>
<td>24</td>
<td>32</td>
<td>51</td>
<td>55</td>
<td>40</td>
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<tr>
<td># of actions/order performed following a medCPU prompt</td>
<td>75</td>
<td>26</td>
<td>23</td>
<td>28</td>
<td>30</td>
<td>37</td>
<td>37</td>
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<tr>
<td>Total Cases Impacted</td>
<td>93</td>
<td>53</td>
<td>47</td>
<td>60</td>
<td>81</td>
<td>92</td>
<td>77</td>
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</table>
ONE MONTH SAFETY REPORT

1 patient: MRI cancelled, pacemaker documented only in past RN note

2 patients: CT with contrast cancelled - hx of anaphylaxis due to contrast

5 patients: CT with contrast cancelled - impaired renal function

25 patients: CT with contrast patients held in the ER until adequately hydrated

6 patients: Test was not indicated or justification was not documented
  ▪ 5 providers completed the required documentation
  ▪ 1 provider cancelled the requested test

3 patients: Recommended imaging for patient evaluation was not ordered
  ▪ Providers placed orders for all patients

18 patients: Serum creatinine was not ordered prior to imaging in patients
  ▪ Serum creatinine order placed for all patients
RESULTS ARE SUSTAINABLE ACROSS STRATEGIC AREAS

<table>
<thead>
<tr>
<th>Measure</th>
<th>Count (admission between 01/12/2015 &amp; 01/01/2016. Has admission done)</th>
<th>num/den</th>
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<tbody>
<tr>
<td>VBP Influenza Vaccine Denominator</td>
<td>1591</td>
<td></td>
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<tr>
<td>VBP Influenza Vaccine Numerator</td>
<td>1497</td>
<td>0.94</td>
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<tr>
<td>VBP Pneumococcal Vaccine Over 65 Denominator</td>
<td>1371</td>
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<tr>
<td>VBP Pneumococcal Vaccine Over 65 Numerator</td>
<td>1107</td>
<td>0.81</td>
</tr>
<tr>
<td>VBP Pneumococcal Vaccine Under 65 Denominator</td>
<td>878</td>
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</tr>
<tr>
<td>VBP Pneumococcal Vaccine Under 65 Numerator</td>
<td>767</td>
<td>0.87</td>
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</table>
## CDS FOR INPATIENT ONLY SURGERIES

<table>
<thead>
<tr>
<th>Date</th>
<th>MRN</th>
<th>Surgery</th>
<th>Surgery Time</th>
<th>Insurance Type</th>
<th>CPT Code(s)</th>
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</thead>
<tbody>
<tr>
<td>XXXXX</td>
<td>HIPAA</td>
<td>ARTHROPLASTY HIP REVISION</td>
<td>7:30am</td>
<td>Medicare</td>
<td>27130</td>
</tr>
<tr>
<td>XXXXX</td>
<td>HIPAA</td>
<td>INSERTION ROD ANTEGRADE LEFT SHORTENING OSTEOTOMY FEMUR</td>
<td>7:15am</td>
<td>Medicare</td>
<td>27450</td>
</tr>
</tbody>
</table>

Daily report identifying patients whose surgeries require an Inpatient Only Status
CURRENT INTELLIGENT CDS SOLUTION FUNCTIONALITY

- Radiology
- Value Based Purchasing
- Inpatient only surgeries
- ICD-10
- Immunizations
- Back pain
- Emergency Department
  - EKG ordering
  - Complex Gyn/Oncology patient triage
  - Restraints
- Sepsis
OUTCOMES SUMMARY

Adherence to the 10 Commandments:
- Confirmed that providers are motivated to “Do the right thing”
- Demonstrated that provider engagement can not be discounted

Robust processes that consistently deliver value provide a service to the organization that:
- Are reproducible, scalable and available
- Leverage adaptability to the maturation of guidelines and new healthcare technologies

Providers also recognized the heightened safety of RTDS:
- Engagement became trust
- Radiologist no longer protocol every high tech image order
TOMORROW: CREATE VALUE FOR PAYORS, PROVIDERS AND PATIENTS

<table>
<thead>
<tr>
<th>CONTENT</th>
<th>DESIGN</th>
<th>TECHNOLOGY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limitless clinical (and potentially non-clinical) module development</td>
<td>Sits on top of EMR, can be pushed to new channels</td>
<td>Aggregate data streams beyond the EMR</td>
</tr>
<tr>
<td>Leverage content and traction of UPMC Clinical Pathways team to scale module creation, create “Pathways Factory”</td>
<td>Delivers with right person, right place, right time</td>
<td>Expose data, and insights to payers and consumers</td>
</tr>
</tbody>
</table>
REFERENCES

A Summary of How Benefits Were Realized for the Value of Health IT

Improving comprehensive data acquisition could help address multiple challenges we face today in healthcare IT. If we can improve care quality and healthcare delivery through highly accurate decision support solutions, we can help contain costs across the healthcare industry.

http://www.himss.org/ValueSuite
Questions

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