Clinical Decision Support for a Transforming Health/Healthcare System

Robert A. Greenes, MD, PhD
Arizona State University and Mayo Clinic

Webinar – January 19, 2017
Disclosures

• Healthcare Services Platform Consortium, Executive Committee
• Inferscience, Advisory Board
• Celltrust, Advisory Board
• mWorks Health, Board of Directors
1. Highlight the status of progress – and lack thereof – in CDS adoption

2. Identify issues in our current environment that have contributed to this status

3. Explore changes in health/healthcare that both:
   • Create new needs for CDS and...
   • Provide new opportunities for ways to deliver CDS

4. Describe some potential approaches to CDS in the evolving environment
1. Clinical decision support – Where it has been & where it is going

- Oldest focus of biomedical informatics
- Benefits from CDS among the principal goals that drove EHR and CPOE adoption
- Yet poor penetration and adoption of CDS to date
- Still not full convergence on standards and interoperability
  - Topic of Dec 2016 Webinar
- Beyond standards – limited infrastructure to support dissemination, adaptation
- Lack of an “implementation science”
Many methods explored over past 50+ years

• Information retrieval
• Conditional logic evaluation
• Probabilistic & data-driven classification or prediction
• Artificial intelligence
• Calculations, algorithms, and multi-step processes
• Visualization and cognitive support methods
• Groupings based on associative relationship
The case for broad adoption of CDS

• We know what works and how to do it... in the right circumstances
  • Alerts, & reminders
  • CPOE
    • medication/dosing support
    • drug interaction checks
  • Order sets
  • Structured data entry forms/templates
  • Infobutton manager

• Efficacy shown!
  • Accepted, used, time imposition modest or low ... in selected settings
  • Reduced errors, improved quality, cost savings
Cost-effectiveness studies

- 55% decrease in serious medication errors
- Decreased redundant labs
- More appropriate renal dosing
- No reduction in inappropriate x-rays
  - Harpole, JAMIA, 1997
- Minimal effect of charge display
  - Bates, Archives of Internal Medicine, 1995
- More appropriate dosing, substitutions accepted
  - Teich, Archives of Internal Medicine, 2000
- Decreased vancomycin use
  - Sojania, JAMIA, 1998

Positive effect on process and short-term outcomes
Mainly in academic centers

- Experience not replicated and disseminated widely
- Still only <30% (?) penetration
- Only scratching surface of potential uses

- Pace of adoption barely changing
  ... although HITECH Act, EHR adoption, and MU requirements have helped somewhat

*Why so slow?*
2. Why so slow?

- Lag time
- Poorly designed CDS
- Negative press
- Limited interoperability and sharing
- Beyond standards
  - knowledge adaptation and management
Converting research to care

Original research

Negative results
- 18% Dickersin, 1987

Submission

Lack of numbers
- 46% Koren, 1989

Acceptance

Inconsistent indexing
- 35% Balas, 1995

Publication

50% Poynard, 1985

Bibliographic databases

Negative results
- 50% Poynard, 1985

Reviews, guidelines, textbook

9.3 years

Patient Care

6.0 - 13.0 years

Antman, 1992

expert opinion

Balas EA, Boren SA. Managing clinical knowledge for health care improvement. Yrbk of Med Informatics 2000; 65-70
Converting research to care

Original research

18% Dickersin, 1987

Submission

variable

46% Antman, 1992

17 years to apply 14% of research knowledge to patient care!

Bibliographic databases

6.0 - 13.0 years Antman, 1992

Reviews, guidelines, textbook

9.3 years

Patient Care

Balas EA, Boren SA. Managing clinical knowledge for health care improvement. Yrbk of Med Informatics 2000; 65-70
Doctors pull plug on paperless system

California's Cedars-Sinai turns off its computerized physician order entry system after physicians revolt, demonstrating that implementing new technology is easier said than done.


Information technology is often touted as the cure for all that ails the delivery of quality medicine, but some physicians say this cure can be worse than the disease.

Cedars-Sinai Medical Center in Los Angeles turned off its computerized physician order entry system in January, after hundreds of physicians complained that rather than speeding up and improving patient care, it actually slowed down the process of filling their orders -- assuming those orders didn't get lost in the system.
User pushback on EHRs

- Complexity of EHR
  - Multi-step processes
    - e.g., 36 clicks to enter an order!
- Ineffective CDS
- Clutter

- Growing chorus of complaints about EHR as interfering with work
Some of the recent screeds...


Rules as major focus – but have significant challenges:

- Different languages, limited sharing
- Poorly designed use has resulted in alert fatigue, useless alerts, etc.
- Need to adapt triggers and behaviors to workflows, settings, staffing
  - Time-consuming
  - Causes multiple variations on same rule even in single institution
- Has been major target for standards and sharing efforts
  - Some success, but still limited wide adoption
Multiple rules have similar intent

Differences relate to how triggered, how delivered, thresholds, process/workflow integration, etc.

Challenge is to identify core medical knowledge and to develop a process to capture differences in settings so that the knowledge can be adapted to them

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Analysis by Saverio Maviglia, Morningside Initiative, 2008
Setting-specific factors
How, When, Who, Where ... and Refinement of the What

- **Triggering/identification modes**
  - On chart open, on lab test result, on provider login, ...
  - Registry, periodic panel search, patient list for day, ...

- **Inclusions, exclusions**
  - To be more patient-specific

- **Interaction modes, users, settings**

- **Timing considerations**
  - Advance, late, due now, ...

- **Data availability/ sources/ entry requirements**

- **Thresholds, constraints**

- **Actions/notifications**
  - Message, pop-up, to do list, order, schedule, notation in chart, requirement for acknowledgment, escalation, alternate. ...

- **Exceptions**
  - Refusal, lost to follow up, ...
Rules - Long history, many projects

• Reminders and alerts first introduced
  • McDonald (1976)

• Incorporated in several systems
  • BWH, Columbia, Utah, ... (1980s)

• Subject of standardization efforts*
  • Arden Syntax, GELLO standards, many rules models (1989-present)
  • Decision Support as a Service
    ▪ HL7/OMG DSS Service

* See Dec 2016 webinar
• Knowledge sharing
  • OpenCDS, U of Utah
    • Kawamoto (late 2000s-present)
  • CDS Consortium
  • Morningside Initiative
    ▪ Consortium to develop progressive refinement model and public-private model for knowledge sharing, Greenes et al (2007-2010)
  • eRecommendations Project
    ▪ AHRQ-funded rule repository, Thomson Reuters, Osheroff, Greenes, et al (2010-2011)
  • SHARPC, project 2B
    ▪ Refinement via Setting specific factors, ONC-funded, U of Texas Houston, ASU subcontract with Intermountain, VA, and NHRC, Greenes et al (2009-2014)
• Health e-Decisions model and Clinical Quality Framework
  ▪ HeD 2012- ONC-initiated and adopted by HL7 as representation for best-practice CDS distribution
  ▪ CQF 2015- modification of HeD to include quality of care measures
The scale-up problem

- Consider the simple IF...THEN rule
  - IF {condition} THEN {action}
    - e.g.,

IF patient medication = digoxin AND serum $K^+$ < 3.3 meq/L
THEN alert the M.D.
The scale-up problem, cont’d

IF patient medication = digoxin AND serum $K^+$ < 3.3 meq/L
THEN alert the M.D.

• Could use this in:
  • CPOE – if about to order digoxin
  • a lab alert, if K+ result appears
  • a guideline
  • an adverse event monitoring app
Key findings

• Varied authoring approaches
• Representation varied accordingly
• Ease of update varied
• Process for updating not always explicit
• Multiple variations
  • e.g., 40+ diabetes-related rules

• Much reinventing of the wheel

<table>
<thead>
<tr>
<th>Title</th>
<th>Category</th>
<th>Status</th>
<th>Reference Protocol</th>
<th>Problem</th>
<th>Order Set</th>
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<th>Calculated Order</th>
<th>Other</th>
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<tr>
<td>Insulin drip rate - Increases or Decreases less than 50 mg/dl/h</td>
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<td>Insulin drip rate - keep admission rate</td>
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<td>Insulin drip - Decreases by 101-150 mg / dl / h</td>
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<td>Active</td>
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<td>Insulin 0.1 Units/kg - NICU</td>
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<tr>
<td>Insulin drip rate - Decreases by greater than 200 mg/dl/h</td>
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<tr>
<td>INSULIN Sliding Scales Protocol (Regular &amp; Agressive)</td>
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</tbody>
</table>
• **CDS managed differently in 4 sites** (one consisting of multiple practices and community hospitals, and by physicians, nurses, and pharmacists)

• Rules embedded in host systems, **much effort adapting each to specific use and workflow**

• More than 2,000 operational rules, more than 600,000 firings of rules per day

• **About 20-30% of effort** related to rule editing devoted to ongoing maintenance and update

• Recognized **need for central knowledge management**
Rules development and management (existing process)

1. **External rules**
2. **Evidence**
3. **Rule authoring or editing (human readable)**
4. **Experts (or QM / QI committees) identify rules (e.g., for an app/class)**
5. **Encoded for app (computer interpretable, interfaced)**
6. **Update**
7. **Periodic review**
8. **Export**
9. **Recoded for other versions/applications**

- **Rules**
- **Rules int.**
So the upshot is...

- What starts out as simple knowledge task (e.g., implementing a rule in an application
  - becomes a major challenge for an enterprise
  - requires a major commitment to knowledge management

- Yet there are not any generally accepted and available tools for KM
  - To manage the lifecycle from narrative to formal to executable
  - To track adaptations
  - To facilitate update
Enterprise-level adaptation

- Communal knowledge will continue to need to go through adaptation by and for the local site
  - incorporate business logic and constraints
  - reflect workflows
  - Integrate into proprietary EHRs
    - Unfortunate reality of current systems!
- Therefore, for the foreseeable future –
  - will need to have 2 coordinated internal processes:
    - to keep *human-readable knowledge* sync’d
    - with the *executable versions* embedded in vendor systems
Enterprise-level adaptation

• CDS as a service will not solve the problem
  • Much CDS won’t be executed through external services
    • will be embedded in EHR system
  • Still needs to be invoked at particular points by host
  • Context still needs to be provided by it to the service
  • The returned recommendation still needs to be made actionable
3. The current decade – some health system disruptors

- National stimuli
  - EHR adoption, Meaningful Use, MACRA, …
- Precision medicine
  - genomics, sensors, technology advances, knowledge explosion
- Aging population
  - increasing care complexity, need for care coordination
- Emphasis on wellness, disease prevention
- Runaway costs
  - Pay for value / outcomes
- Empowered consumer
- App culture and expectations
Health IT and CDS implications

Shifting emphasis from disease treatment focus to wellness/prevention/early intervention/“person-centeredness”

• Connected care
  • Multiple input sources
    • Sensors, wearables; genome; personal data; imaging
  • Integrated provider-patient interaction
  • Part of a community

• Multiple venues for care
  • No longer single healthcare enterprise focus
  • Need for continuity and coordination
  • Not just single systems or apps

• Integration of big data analytics
  • From EHRs, personal/devices, genomics, images, ...
  • For population health
  • For point of care
4. Some new ideas and approaches

- **Knowledge management**
  - Extensions of Health e-Decisions / CQF
  - Use of meta-tags for SSF adaptations as well as focus/purpose of rule, idea of rule primitives
  - Toward an implementation science
    - “Practices like mine”

- **Context awareness as a paradigm**
  - Infobutton as a model
  - HeD and CQF as base with metadata to reflect appropriate settings and contexts
  - Maintain context and use this to surface appropriate CDS – like GPS model

- **Cognitive support visualizations**
  - Relatedness of findings to diseases to goals to treatments to interactions

- **Cohorts/registries and data analytics**
  - Enroll patients in care pathways, plans – e.g., CHF, diabetes, afib, asthma management
  - Get dashboards on practice, panel, provider, patient levels

- **Maybe in the future ... a multi-tiered platform**
KM approaches

• Extension of HeD / CQF model
• Content augmented by SSF attributes – trigger types, action types, etc.
• Metadata tagging can be used to create richly indexed knowledge repository
Feasibility study of a Partners-wide rules engine. 2003*

- Explored requirements for knowledge services
- Particular focus on rules knowledge
  - Determine feasibility of a common representation
  - Assess implications for authoring/updating and execution
- Examined subsystems
  - BWH apps already studied in knowledge inventory project
  - MGH CPOE
- Identified common & unique needs
  - Context, explicit and implied, including triggering event classes
  - Classes of data/knowledge elements
  - Taxonomy of actions
  - Rule representation

### Modelled Primitives

<table>
<thead>
<tr>
<th>System</th>
<th>No. Rules</th>
<th>No. Primitives*</th>
<th>Primitives No.</th>
<th>%</th>
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<tbody>
<tr>
<td>Automatic Alerting</td>
<td>32</td>
<td>9</td>
<td>9</td>
<td>100</td>
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<tr>
<td>Outpatient Reminders</td>
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<td>14</td>
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<td>MGH CPOE</td>
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<td>9</td>
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<tr>
<td>BWH CPOE</td>
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<td>9</td>
<td>9</td>
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<tr>
<td>Results Manager</td>
<td>54</td>
<td>10</td>
<td>10</td>
<td>100</td>
</tr>
</tbody>
</table>

*Out 254 multi-clause rules, only 41 unique primitives used*
**Primitives**

- **41 rule relation-clause types**
  - Call these “primitives”
  - Used singly or in combination
  - Expressed in terms of 13 data classes
  - *e.g.*, from Brigham and Women’s Hospital CPOE:

<table>
<thead>
<tr>
<th>Condition</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>If <code>MedOrder MedName IS MEDICATION</code> then</td>
<td><code>ALTERNATE RX SUGGESTION</code></td>
</tr>
<tr>
<td>If <code>MedOrder MedName IS MEDICATION</code> then</td>
<td><code>request approval</code></td>
</tr>
<tr>
<td>If <code>MedOrder MedName IS in MedList CURRENT-MEDICATION</code> then</td>
<td><code>display message</code></td>
</tr>
<tr>
<td>If <code>MedOrder MedName IS MEDICATION</code> and any of the last 1 CREATININE results during the last 99 days is &gt; 1.5 then</td>
<td><code>suggest change dose based on patient's renal function</code></td>
</tr>
<tr>
<td>If <code>MedOrder MedName IS IN Patient Allergies</code> then</td>
<td><code>display message</code></td>
</tr>
</tbody>
</table>

- **Limited “action types” also**
Using primitives in building a rule: example

From http://wiki.siframework.org/file/history/open+house+_final_v2.pptx (New Mentor)
Model-driven HeD Visual Editor*

*Modeling and editing tools (Greenes, Haug, Sottara, 2013), Funded by ONC SHARPC grant through subcontract with U of Texas Houston (Zhang)
Model-driven HeD Visual Editor*

*Modeling and editing tools (Greenes, Haug, Sottara, 2013), Funded by ONC SHARPC grant through subcontract with U of Texas Houston (Zhang)
• Could index rules clauses by:
  • Medical domain
  • Setting
  • Type of primitive clause
  • Action type

• Ability to find all related knowledge for a situation
  • Could be basis for an “implementation science”
  • Enables situation-aware, context-aware knowledge access
Model-based knowledge repository tagging

<table>
<thead>
<tr>
<th>Knowl. Artifact</th>
<th>Problem</th>
<th>Setting</th>
<th>Provider type</th>
<th>Workflow step</th>
<th>Action</th>
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<tr>
<td>IF ...... THEN .......</td>
<td>XXXXX</td>
<td>YYYY</td>
<td>ZZZZ</td>
<td>N33</td>
<td>ABC</td>
</tr>
<tr>
<td>If ........ THEN ..........</td>
<td>XXXXXX</td>
<td>YYYY</td>
<td>ZZZZ</td>
<td>N27</td>
<td>DEF</td>
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<td>YYYY</td>
<td>ZZZZ</td>
<td>N118</td>
<td>GHI</td>
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<td>YYYY</td>
<td>ZZZZ</td>
<td>N6</td>
<td>JKL</td>
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<tr>
<td>DOC TEMPLATE ..........</td>
<td>XXXXXX</td>
<td>YYYY</td>
<td>ZZZZ</td>
<td>N20</td>
<td>MNO</td>
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</tbody>
</table>
Toward an “implementation science”

• Assume we want to know what works/doesn’t and how particular configurations/SSFs affect success

• Consider extensions to HeD/CQF metatags to include SSFs, primitive types, and action modes
  • Could find knowledge artifacts (KNARTs) with configurations that match your current workflow/operational view
    • “practices like mine”
  • If one also linked this to operational statistics, could determine which have worked best
    • No. of firings, overrides, focus groups, surveys, other measures
Context-awareness as an alternate paradigm

- We have all been hard at work building knowledge-based models, tools, services, apps
- But we are reaching limits and scalability issues for KM, update, adaptation
- Not just single systems such as EHR or an application
  - Lifetime record
  - Multiple encounters, providers, systems
  - Connected devices
  - Part of a community
- How do we create a framework for knowledge in a world where the whole ecosystem needs to share available knowledge?
A possible approach: Guidance à la GPS

- Goal/target specified
  - based on setting and context
  - can be explicit or implicit
  - can be modified
- Alternative approaches offered
- Tracking of data & actions
  - midcourse corrections
- Information resources offered
  - both along path & at destination
- Useful both off-line & on-line
What is different?

• CDS to date largely implemented by:
  • Embedding in workflow explicitly
  • Using event-driven triggers to invoke it when appropriate conditions arise

  • Both require much customization for SSF adaptation

• How context model can help
  • Maintain a repository of the knowledge artifacts indexed by metadata relating to appropriate context
    • Instead of pre-coordinating every possible variation of knowledge artifacts for every workflow and event trigger setting
  • Thus, if a system could maintain continually updated context for a user:
    • the system would be able to continually identify potentially relevant CDS to surface, based on the situation
The notion of context

• Infobuttons are a relatively simple idea with use of predefined context
  • Knows what app being used, type of user, what action selected
  • Provides context-specific retrieval parameters for protypical questions in those contexts

• But the idea can be extended to one in which we always dynamically maintain more detailed context
  • Patient/problems/status
  • Provider/specialization/role
  • Setting/type of encounter
  • ....
Some context parameters

- **User**
  - specialty, special interest, role, e.g., primary or consultant or support

- **Topic of interest**
  - the patient/consumer complaint or reason for interaction

- **Activity**
  - Interacting with patient, reading email, reviewing chart, ...

- **Setting**
  - home, office, clinic, hospital unit, ICU, remote telecare

- **Channel**
  - phone, tablet, desktop, glass, watch, ...

- **Filters**
  - Aspects of the problem(s) of relevance to user/specialty/expertise

- **Role**
  - Provider, consultant, ...

- **On a pathway or GL**
  - Registries/cohorts in which enrolled
  - Eligible registries
  - If enrolled, what state?
Support for cognitive processes

- **Enabling associations** among data and actions *to be dynamically explored*
  - e.g., goals related to conditions, interventions related to goals, findings related to condition or goal achievement status
  - Portrayed in a logic model

- **To retrieve contextually relevant knowledge** for a particular focus
  - To limit content display to those elements relevant to provider, role, and setting
  - To dynamically create visualizations of relationships, timelines, or other relevant groupings
  - To use logic model to also identify other elements that may indirectly impact on the focused area

- **To display context-relevant tasks**
  - Data needed
  - Possible interventions
    - Recommendations
Logic model*

*Courtesy of J. Nebeker, VA
An example*

*Vista Evolution future vision, VA, courtesy of J. Nebeker
Cohorts/registries and data analytics

• The notion of cohorts and registries
  • Many related activities can be managed in a consistent way
  • Track patients with specific statuses: registries
  • Enroll patients in care pathways, protocols, plans – e.g., CHF, diabetes, afib, asthma management

• Use data analytics to inform at multiple levels
  • Organization, practice, panel, provider, individual patient

• Periodic reports and on demand or real-time update

• Dashboards as a useful tool for active management
Population management

courtesy of M. Van Kooy, Aspen Advisors, and K.Bunkers

Physician Offices

Evidence-Based Standards

Peer and Reference Comparisons

Regulatory and Administrative Requirements

Findings/Decisions
Actions/Orders
Conditions/Outcomes

Evidence-Based Standards

Peer and Reference Comparisons

Regulatory and Administrative Requirements

Findings/Decisions
Actions/Orders
Conditions/Outcomes

Findings/Decisions
Actions/Orders
Conditions/Outcomes

- Physician Behavior Change
- Improved Outcomes
- Reduced Cost

Finding/Decision
Order/Action
Conditions/Outcome

Change Governance and Individual Physician Feedback

Disease Registry

Data Warehouse

Business Intelligence

Physician Offices

- Physician Behavior Change
- Improved Outcomes
- Reduced Cost
An example for home monitoring by protocol

- Coordinated care delivery from a shared plan
- Patient’s state and activity are tracked automatically and monitored
- Communication and feedback
- Patients receive relevant education
**Prompt**

- Shortness of breath

**Code**

- Dyspnea (SNOMED CT Code: 45238005)

**Response Type**

- List

**List Constraints**

<table>
<thead>
<tr>
<th>Prompt</th>
<th>Value</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breathless with strenuous exercise</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Short of breath when hurrying on the level or walking up a slight hill</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Walk slower than people of the same age due to breathlessness</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Stop for breath after walking about 100 yards</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Too breathless to leave the house, breathless when dressing</td>
<td></td>
<td>5</td>
</tr>
</tbody>
</table>

**Add**
Prompt:
Shortness of breath

Code:
Dyspnea (SNOMED CT Code: 45238005)

Response Type:
List

Title:
High diastolic blood pressure

Condition Editor:
Condition Type:
Observation with code (code_string) and code system (system_systemType) and name (name_string)
- code = 27158006
- system = SNOMED CT
- name = Diastolic blood pressure

When:

Then:
Send message to patient (subject_string) with body (body_string)
- subject = Your blood pressure is high
- body = Your last blood pressure was very high. Please record your blood pressure at least once a day for the next week.

Send patient one time reminder to group with end date (endDate_date) priority (priority_priorityType) and message (detail_string)
- endDate = 10/10/2015 16:00:00
- priority = HIGH
- detail = Please measure your blood pressure

Action Editor:
Action type:
Send message to patient (subject_string) with body (body_string)
- subject = Your blood pressure is high
- body = Your last blood pressure was very high
Patient app: Record an observation

Shortness of breath

Time
Nov 16, 2016 12:09:23 PM

Breathless with strenuous exercise

Short of breath when hurrying on the level or walking up a slight hill

Walk slower than people of the same age due to breathlessness

Stop for breath after walking about 100 yards

Too breathless to leave the house, breathless when dressing

SAVE
Provider tool: Monitor single patient
EASE Project – Mayo Clinic

- Courtesy of M. Burton, D. Sottara
- Perioperative management by care pathway
- Rounding tools – patient summary and action steps
EASE Project – Mayo Clinic

- Courtesy of M. Burton, D. Sottara

- Perioperative management by care pathway

- Rounding tools – patient summary and action steps
EASE Project – Mayo Clinic

-Courtesy of M. Burton, D. Sottara
-Perioperative management by care pathway
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!!!Conflicts with Enhanced Recovery Pathway
EASE Project – Mayo Clinic

- Courtesy of M. Burton, D. Sottara
- Perioperative management by care pathway
- Rounding tools – patient summary and action steps

Conflicts with Enhanced Recovery Pathway
Some functionality can be provided by app “plug-ins”
    - a model for launching focused apps from within EHRs to do specific things
  - CDS Hooks (Mandel, Harvard)
    - a means for invoking specific analytics or CDS from within an EHR application

This is relatively easy ... but big concern is scalability!
  - No underlying model or paradigm
  - Can easily lead to a CIO facing 1000s of such plug-ins!
Plug-in model

- Many one-offs
- Directly connect to data sources/hosts e.g., through FHIR interfaces
30,000 ft view of needed health IT system
Interoperable development and deployment initiatives

- OpenCDS project (Kawamoto, Utah)
- SMART on FHIR (Mandl)
- CDS Hooks (Mandel)
- VA next-generation architecture – VistA Evolution
- Healthcare Services Platform Consortium (HSPC)
- HII-C (ASU’s Health IT Innovation Collaboratorive)
Conclusions

• Healthcare landscape is undergoing transformation
  • Health IT is evolving with it – and enabling it
  • CDS needs are changing as a result
  • Not clear how quickly this will occur and what the forcing function will be

• Practitioners and leaders in the future need to prepare for and help bring about needed solutions
  • User groups, consortia, professional societies, enterprise health care systems leadership

• PCOR-CDS-LN challenges / opportunities
  • Can we develop consensus around useful approaches for broad adoption of best practice CDS?
  • Can we provide a basis for sharing of knowledge content as well as implementation experience?
  • Can we influence development of needed capabilities / evolution of the IT infrastructure?
Personal References


Questions, comments:

– Contact Bob Greenes  greenes@asu.edu
Upcoming Webinar

Date: February 16, 11 am EST

Presenter: Stijn Van de Velde, GUIDES project leader at the Norwegian Institute of Public Health

Title: An International PCOR CDS Perspective: The Guideline Implementation with Decision Support (GUIDES) project

For details, see: https://www.pcorcds-ln.org/
For updates on future events and activities of the PCOR CDS-LN please check out our website at www.pcorcds-ln.org

Project Team Contact Information:

- Principal Investigator: Barry Blumenfeld, MD, MS (bhb@rti.org)
- Environmental Scan: Joshua Richardson, PhD, MS, MLIS (jrichardson@rti.org)
- Collaboration Hub and Evaluation: Laura Marcial, PhD, MLIS (lmarcial@rti.org)
- Project Manager: Melissa Callaham, MS (mcallaham@rti.org)