

UPMC
LIFECHANGINGMEDICINE

**Clinical Decision Support in Obstetrics:
Relating to EMR**

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August 4, 2012

Magee-Womens Hospital of UPMC



Overview

- Definition of Decision support (DS)
- Functionalities of DS
- Elements of DS
- Outcomes with DS
- Scope of DSS
 - EMR elements
 - EMR functionality – rules
 - EMR reporting
 - Analytics/Business Intelligence

What Really is Decision Support?

- Decision support is really just a **reminder** that the care for this patient has gone off track from an accepted standard.
 - Absence of Quality=Error=Negligence

What is Safety?

- Quality is the goal
 - Quality is global
- Safety is the path
 - Safety is local
- How do we stay on the path/reach the goal?

Too Much Information



Right information, Right person, Right time



This is decision support

Decision Support Functionality

- Real Time
- Visual Design
- Context sensitive
- Escalating levels of guidance
- Adjustable
 - By level of intervention
 - By timing

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Visual Display of Information

- **Colors**, **FONTS**, **bold**, *etc.*
- Alerts
 - Alert fatigue
 - Hard vs. soft stops
- Pop-ups vs. drill downs
- Dashboards

Colors and Annotations

| | | | | | | |
|---------|--|-------------------------------------|----------------------------------|----------------------------------|----------------------------------|--|
| 5:07 AM | 92 | | | | | |
| 8:42 PM | 124 | | | | | |
| 4:24 PM | 152 | | | | | |
| 2:01 AM | | nc 74 | nc 489 | nc 15 | n 25 | |
| m | <input type="checkbox"/> Glucose Tol. 50 | <input type="checkbox"/> Glucose To | <input type="checkbox"/> Glucose | <input type="checkbox"/> Glucose | <input type="checkbox"/> Glucose | |
| 8:20 AM | | | | 179 | | |
| 7:20 AM | | | 194 | | | |

Word Cloud

Native system

Other systems

Sure Rx

Font size is number of Rx's

Font **BOLD** is number **filled**



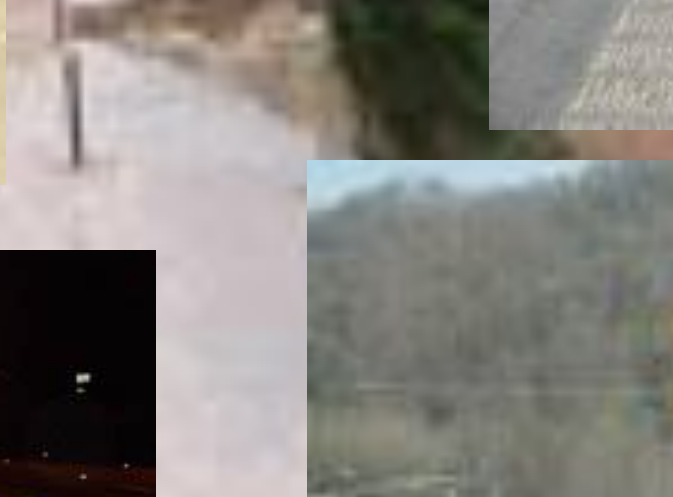
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Escalating Levels of Protection



Levels of Decision Support

- **Available**
 - Clinician is able to seek out specific desired actions
- **Presented**
 - Clinician is presented with an item such as routine admission orders
- **Suggested**
 - Clinician is presented with a suggestion and direction of care based on best practices
- **Recommended**
 - Clinician is prompted to follow a particular course of care
- **Compliance adherence mechanism (CAM)**
 - Alert is hard stop, and attention increased to include notification at the central monitoring system/chain of command

Decision Support Functionality

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Decision Support Elements

- What else do we need to know?
- What other Dx should we consider?
- What actions should we take?
- What drugs might we give?
- What should we watch out for?
- What should we really not do?

GAPS

- What you don't know is more important than what you do know
- GBS results are not just POS or NEG
- In L+D, the most important GBS result is NO RESULT

Paradigm Change

- If it's not documented, it's not done
- If it's not recorded in a coded, structured field, it doesn't exist

This is the new paradigm,

and defines the EMR tension

between the STORY, and the DATA

Sources of Protocols

- Clinical content
 - Traditional
 - Literature
 - EBM

What We Know Now: Information Growth Trends

The Biomedical Literature



MEDLINE:

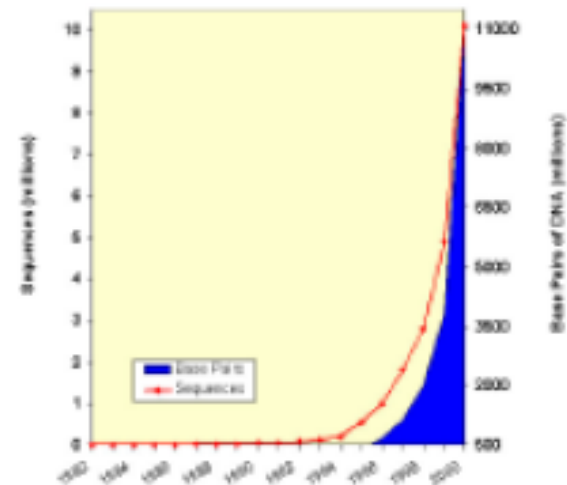
11.7 Million citations

Growing at 400,000 new articles per year

National Library of Medicine

Molecular Life Sciences

Growth of GenBank



GENBANK:

11.1 Billion DNA base pairs

Sources of Protocols

- Clinical content
 - Traditional
 - Literature
 - EBM
- Accreditation
- Payors
 - Government
 - Insurance
- Professional organizations
- Patient advocates
- Special Interest groups

Even MORE Protocols for DSS

- Protocols to augment the data
 - *Protocols to make this easy*
- Content of care
- Protocols to guide the execution of care
- Protocols for error recovery

- Protocols to present aggregated data

Decision Support Elements

- What else do we need to know?
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- What should we really not do?

Classifications of Protocol Deviations

28230 encounters, 21194 patients

| | | |
|----------------------|-----------|--------------|
| • Essentials/Gaps | 4,884,271 | 173/session |
| • Suggested problems | 659,723 | 23.3/session |
| • Suggested actions | 620,141 | 21.9/session |
| • Suggested drugs | 91,606 | 3.2/session |
| • Alerts | 219,406 | 7.8/session |
| • Contraindications | 22,195 | .78/session |

Results

- Does any of this really work?
 - Does it work in academia?
 - Does it work out of the box?
 - Does it work for clinical outcomes?
 - Does it work to improve documentation?

DVT Prevention

- Prospective , randomized study
- N=2600 at high risk for DVT/PE, half of providers got computer alerts, half control
- Intervention up to provider

| | Control | Intervention |
|-------------------|---------|--------------|
| – Mechanical | 1.5% | 10% |
| – Pharmacological | 13% | 24% |
| – DVT/PE | 8.2% | 4.9% |

Kucher N, Koo S, Quiroz R, et al. Electronic alerts to prevent venous thromboembolism among hospitalized patients. N Engl J Med. Mar 10 2005;352(10):969-977.

DSS Review

- Meta-analysis of 100 CDSS
- Practitioner performance improved in 64%
 - 40% of diagnostic systems
 - 76% of reminder systems
 - 62% of disease management systems
 - 66% of drug prescribing system
- 52 trials assessed clinical outcomes, 7 (13%) showed improvement
 - active v passive 73% v 47%
 - developer v independent 74% v 28%

Garg AX, Adhikari NK, McDonald H, et al. Effects of computerized clinical decision support systems on practitioner performance and patient outcomes: a systematic review. JAMA. Mar 9 2005;293(10):1223-1238.

Electronic Health Records and Clinical Decision Support Systems Impact on National Ambulatory Care Quality

- **Background** Electronic health records (EHRs) are increasingly used by US outpatient physicians. They could improve clinical care via clinical decision support (CDS) and electronic guideline-based reminders and alerts. Using nationally representative data, we tested the hypothesis that a higher quality of care would be associated with EHRs and CDS. **Methods** We analyzed physician survey data on 255 402 ambulatory patient visits in nonfederal offices and hospitals from the 2005-2007 National Ambulatory Medical Care Survey and National Hospital Ambulatory Medical Care Survey. Based on 20 previously developed quality indicators, we assessed the relationship of EHRs and CDS to the provision of guideline-concordant care using multivariable logistic regression.
- **Results** Electronic health records were used in 30% of an estimated 1.1 billion annual US patient visits. Clinical decision support was present in 57% of these EHR visits (17% of all visits). The use of EHRs and CDS was more likely in the West and in multiphysician settings than in solo practices. **In only 1 of 20 indicators was quality greater in EHR visits than in non-EHR visits** (diet counseling in high-risk adults, adjusted odds ratio, 1.65; 95% confidence interval, 1.21-2.26). Among the EHR visits, **only 1 of 20 quality indicators showed significantly better performance in visits with CDS compared with EHR visits without CDS** (lack of routine electrocardiographic ordering in low-risk patients, adjusted odds ratio, 2.88; 95% confidence interval, 1.69-4.90). There were no other significant quality differences.
- **Conclusions** Our findings indicate no consistent association between EHRs and CDS and better quality. These results raise concerns about the ability of health information technology to fundamentally alter outpatient care quality.

Romano MJ, Stafford RS. Electronic health records and clinical decision support systems: impact on national ambulatory care quality. *Arch Intern Med.* May 23 2011;171(10):897-903.

Importance of Customization

- Leapfrog CPOE testing
- Using the same vendor, scores ranged from 20% to 80%
- Out of the Box DOES NOT WORK
- All hospitals have their own cultures, workflows, roles, systems
- Constant goal: Quality
- Individualized process: Safety
- For DS to be effective, it must impact on the process, not the goal

Metzger J, Welebob E, Bates DW, Lipsitz S, Classen DC. Mixed Results In The Safety Performance Of Computerized Physician Order Entry. *Health Affairs*, 29, No. 4 (2010): 655-663.

Unpublished OB outcomes

- 5 minute Apgar score
 - Good proxy for quality in L+D process
 - National rate has been stable at 1.4% since 1993
- 414 low Apgars out of 21053 deliveries (1.97%) prior to DS
- 152 low Apgars out of 9909 deliveries (1.53%) after DS
- 22% decrease $p=0.008$, RR 0.78 (0.65-0.94)

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OB Trigger Project

- Safety Rounds
 - Every 4 hours, we run the board
 - Nursing, OBs, anesthesiologists, peds
 - Are we doing what we should be?
 - Who are we worried about?
 - Debrief and events of last 4 hours
- Can we leverage the EMR for this?
- Looking for errors of Omission
- Currently in production/evaluation phase at Magee

What Issues do We Want to Address?

- Management protocols, NOT Diagnostic protocols
- Hypertensive disorders of Pregnancy
- GBS
- Herpes
- Pitocin
- PPH
- Chorioamnionitis
- Errors of Omission, not Commission

Hypertensive Disorders

- Based on Problem list
- For all hypertensives
 - Is there a recent evaluation for proteinuria?
 - For platelet count?
 - AST (SGOT)?
 - Creatinine?
 - Are appropriately timed follow-up orders in place?
- For Pre-eclampsics
 - Is there Mag ordered?
 - Is Urine Output post delivery adequate?
- For severe Pre-eclampsics
 - Is there an anesthesia consult?

Production Report

Severe Pre-e: Patient without Magnesium in setting of pre-eclampsia; No Anesthesia Consult in setting of severe pre-eclampsia

GBS: No GBS documentation

GH: No recent proteinuria evaluation; No recent platelet result; No recent Creatinine result; No recent LFT result

PIT: Pitocin use in Setting of LGA

GBS: No GBS documentation

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Evaluation of the Tool

- In a perfect world.....
 - The flags would never fire, because we did everything correctly
 - True negative
 - But the purpose of this project is to find the GAPS in our care
 - Where are the situations where the care delivered does not meet our protocols for that care?
 - True positive
 - Where are the situations where the trigger report flags are inappropriate?
 - False positive
 - Where are the situations where the report missed the opportunity to point out a gap in care?
 - False negative

Evaluation

- Evaluation protocol currently underway to determine the characteristics of the tool
 - How often does the tool find a gap in our care? **True Positives**
 - How often, and WHY does the tool malfunction?
 - An element of care not documented, leading to a **false negative, or a false positive**
 - PIH not on problem list leads to **false neg**, HSV/No lesions seen not documented leads to **false positive**.
 - Or an element mischarted, leading to a **false neg/positive**
 - Or a protocol exception, based on clinical judgment **false positive**

Evaluation

- Analysis of the tool will help us understand:
 - The operating characteristics of the test
 - How well we actually deliver care
 - How well we document in the EMR
 - Since the triggers draw from multiple sources of information (problem lists, CPOE, Nursing assessment, H+P's), this will give us valuable information on what aspects of the EMR are the most reliable sources of decision support substrate.

Aggregated data

- Generate periodic or real-time reports out of the database
- Documentation
- Problem lists
- Orders
 - Quality measures
 - Costs
- EMR usage
 - Verbal orders
 - Dictations vs. paper vs. electronic charting
 - Review of meds/problems/Allergies/etc.

What is Crimson?

- Web-based business intelligence platform
- Performance analysis
 - CMS core clinical performance measures
 - Standard charge (RCC) and quality metrics
 - Specialty-specific measures
- Visually intuitive data displays to engage physicians
 - Provides a complete picture of physician performance – clinical and financial
- Automatically creates physician profiles, effectively manage physician performance, while delivering quantifiable financial and quality results
- Designed profiles for physicians
 - Aggregates the performance of individual to examine group performance (e.g. hospitalists, employed physicians, etc.)
- Severity-Adjustment Methodology
- Benchmarking ability to local peers and national standards
- 15% of all patients in USA hospital covered in database

Statistical Models Define Crimson Functionality

- Applying Severity-Adjusted Methodology
- Ensuring Fair Practice Comparisons
- Assessing Performance Against Variation

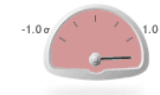
- Clinical and coding data is analyzed and categorized
 - Each inpatient case is assigned to:
 - APR-DRG
 - Severity level
 - Risk of mortality level
 - Levels of severity and risk of mortality
 - **1** – minor
 - **2** – moderate
 - **3** – major
 - **4** – extreme
- Outpatient analysis by ICD-9 procedure code



– Green: below ½ standard deviation above the average



– Yellow: between ½ - 1 standard deviation above the average: Possible outlier



– Red: greater than 1 standard deviation above the average: Outlier performance

The Need: Mounting Pressure to Drive Clinical Practice Change and Need for Structured OPPE/FPPE

- Growing margin pressure and external scrutiny
 - Unnecessary clinical practice variation which leads to increased costs and variable clinical quality
- New Regulatory Mandates
 - Joint Commission's Ongoing and Focused Professional Practice Evaluation (OPPE) hold hospitals accountable for physicians' more rigorous and regular evaluation of peers' clinical practice
 - Regular collection and review data is onerous
 - Joint Commission Intent
 - Increase the frequency of physician assessment
 - Improve the accuracy of credentialing and privileging decisions
 - Expand the scope of physician assessment
 - Raise physician awareness of and engagement in own clinical performance

Screenshots of the Crimson Tool

PhysLast, PhysFirst 5548 Focus > Feb2010 - Jan2011 Discharging DRGs Excludes [Print Report](#)

Physician Overview **Quality** Utilization Charges ED Observation Guidelines OPPE Recredentialing Clinical Integration

% 30 Day Readmissions (Any APR-DRG)

12.52%
11.12%
Cases: 76 / 607

% 3 Day Readmissions (Any APR-DRG)

3.95%
2.58%
Cases: 24 / 607

% 30 Day Readmissions (Same MS-DRG)

2.64%
2.07%
Cases: 16 / 607

% 30 Day Readmissions (Same MDC)

5.27%
3.94%
Cases: 32 / 607

% Complications of Condition

5.77%
5.58%
Cases: 35 / 607

% Complications of Care

5.77%
5.58%
Cases: 35 / 607

Mortality Rate

3.46%
3.68%
Cases: 21 / 607

Mortality Observed/Expected Ratio

0.63
0.63
Cases: 21 / 597

Core Measures

Discharges

| MEASURE | CASES | RESULT | NATIONAL | | SYSTEM | | CHART |
|---|-------|---------|----------|--------|-------------|------------|-------|
| | | | TOP10 | AVG | HIGH TARGET | LOW TARGET | |
| JCAHO Measures | | | | | | | |
| Aspirin at arrival (AMI-1) [Zvnx] | 4 | 100.00% | 100.00% | 96.18% | 100.00% | 96.00% | |

Top Complications of Care

| DESCRIPTION | CASES |
|-----------------------------------|-------|
| Hemorrhage Comp Px (998.11) | 7 |
| Oth Spec Postop Comp Nec (998.89) | 7 |
| Hematoma Complicating Px (998.12) | 5 |
| Infect D/T Vasc Device (996.62) | 5 |

Business Intelligence/Analytics

- COGNOS, and other vendors
- Aggregates data across multiple databases, allows sophisticated query and reporting functions
- Central financial function
- Quality reporting
- Managers ask “Are we getting all the \$ that we can?”
- Doctors need to ask “Are we giving the best care that we can?”

In Conclusion

- DS spans all levels of HIT
- DS may improve clinical outcomes
 - But is fundamental to current practice/documentation
- As Patient Safety is local, so must be DS
- Doctors must engage in HIT/DS
 - So go to your Hospital's HIT/EMR meetings and be an advocate for your patients.



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