Clinical pathology: Leveraging the EHR for Patient Outcomes

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DISCLOSURE

In the past 12 months, I have not had any significant financial interest or other relationship with the manufacturers of the products or providers of the services that will be discussed in my presentation.
LIS to the EHR?

- EHRs does not = static data repositories
- Need to present actionable, relevant, timely data to providers
- Machine Learning, Deep Learning - real-time analytics capability like never before
- Scalability of predictive and prescriptive analytics
The Vision

• Clinical Laboratory generates enormous amounts of data.

• Lab Data-Is directly feeding the massive EHR innovation- predictive analytics

• Pathology informaticians are uniquely poised to contribute meaningfully to this innovation by leveraging their expertise in laboratory data
The Time is Now!

- Combining the lab data with clinical data will exponentially increase our ability to provide high-quality cost-effective healthcare
  - Improved patient outcomes
- New opportunities for the pathology informatics in an ERA of integrated/enterprise EHRs.
- Blurring of lines between pathology informatics and clinical informatics
Why Now?

- Current healthcare environment demands a dramatic transformation in the quality and cost of delivering care.
Analytics
Healthcare Analytics:

Gartner Analytic Ascendancy Model

- Descriptive Analytics
- Diagnostic Analytics
- Predictive Analytics
- Prescriptive Analytics

Value

Difficulty

Optimization

Insight

Hindsight

Information

How can we make it happen?

What will happen?

Why did it happen?

What happened?
Predictive Analytics:

• "a set of techniques such as data mining, statistics, modeling, and machine learning to analyze current data and make predictions about future events."

- Predictive Analytics to Support Real-Time Management in Pathology Facilities  [https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5333280/](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5333280/)

• Ex. Analyzing in real-time the patient's' vital signs, comorbidities and laboratory values to calculate a patient’s risk for cardiac arrest.

• Ex. Predicting patient's risk of re-admission – allocation of resources for high risk
Prescriptive Analytics

• The next step - not just predicting, but providing the capability to do something about it

• Eg. Despite implementing CDS during CPOE for appropriate ordering of C.Diff testing, your hospital still has unusually high rates of C Diff infections.
  – Predictive analytics may flag patients at risk for C Diff infection in the ICU based on their symptoms, vital signs etc.
  – Prescriptive analytics would automatically identify the nurse taking care of those patients who may be involved in spreading the infection and assign the nurse appropriate education to complete re: C Diff infection control.
CPOE with Intelligent CDS

• Remote ordering for doctors, standardized order sets, decrease variation in clinical practice, support best practices, support quality and regulatory reporting (enhancing reimbursements $$)
Sepsis Alert

- EHR based predictive algorithms alert ED and Inpatient nurses to a possible Sepsis case.
  - The various EHR vendors use different criteria
  - If X out of X criteria are met, alert fires.
  - Alert prompts nursing and they initiate Sepsis protocol/order sets
  - HER (or nurse) notifies MD who place sepsis orders and initiate aggressive sepsis care.
  - EHR continues to assess patient at X hours intervals. Abnormal or worsening vitals prompt reassessment of patient
  - Earlier diagnosis and decreased sepsis related mortality
Simple Scenario:

- PF4/Heparin Antibody Elisa Test- Screening test used in patients with suspected diagnosis of HIT
  – Should be ordered after calculating a 4T score (pre-test likelihood score predicting clinical HIT)
- SRA- "gold" standard confirmatory test
- Cessation of heparin($) and place on newer anticoagulants, ie direct thrombin inhibitors ($$$$)
- Neg result: can switch patient back to heparin anticoagulation
Multiple Opportunities for intervention

• LIS: Remove SRA as an orderable, and create PF4 with reflex to SRA.
  – Saved thousands of $ by removing shotgun ordering of SRA
  – Test naming: serotonin level but erroneously ordered SRA assay.
• CPOE CDS: Build in the 4T score calculator into your order entry screen. Display patient platelet results. Display meds list.
• Still a gap: patients not being switched back to heparin anticoagulation
  – Can be a big $$, ICU patients with long LOS
• So, lets take this scenario further.....
Multiple Opportunities for intervention

Interruptive Alert
Neg Pf4 result, next time MD opens the chart gets an alert that pops-up prompting you to

Create a non-interruptive alert
A worklist que that goes to a Pharmacist of all new Negative PF4/Heparin antibody results. Pharmacist contacts physician to switch patient back to heparin.

--> Financial savings, better patient care, supports best practice
Multiple Opportunities for intervention

Phone call: Why don’t we have follow up on a subset of the patients. You look into their charts. "Indeterminate" test result.
LIS/EHR for Chronic Disease Management & Population Health

- Regulatory Reporting, Compliance and Transparency
- Gathering and reporting this data anyway
- You and your health system are already being judged based on these outcomes
- Why not have EHRs help clinicians satisfy those requirements
Improving chronic disease management: Diabetes

• **HEDIS** - Healthcare Effectiveness Data and Information Set (HEDIS)
  
  • includes standard measures that are used to evaluate a health plan’s performance.
  
  • can use performance on measures as an opportunity to identify areas for improvement in care
Effectiveness of care Measures

• Comprehensive Diabetes Care – HbA1c, Retinopathy Screening, Blood pressure, Nephropathy Screening
  – % members who had an HbA1c test during the year and demonstrate good control.
  – Retinal or dilated exam: document date and result
  – BP <140/90 mmHg
Kidney disease monitoring

• Description: Measures the percentage of plan members with diabetes who had a nephropathy test during the measurement year or evidence of nephropathy during the year.
• Urine microalbumin test
• But any would work: 24 hour urine for microalbumin, timed urine for microalbumin, spot urine for microalbumin, urine for microalbumin/creatinine ratio, 24-hour urine for total protein and/or random urine for protein/creatinine ratio.
Opportunity - Analytics and Population Health

• Create a *diagnosis* based clinical decision support interruptive alert that uses LIS data

• This patient has not had a HbA1C, or urine microalbumin or LDL measurement in the past 13 months. Select if you would like to order:
  - HbA1c
  - LDL
  - Spot urine for microalbumin,
  - Urine for microalbumin/creatinine ratio
  - Etc
• Even better: *Develop clear standing orders empowering staff to recommend care, order or collect any tests which are lacking (without a new order from the practitioner)*

• Now, you've moved that from a physician task to a support staff task- happier doctor = less burnout!
LIS/EHR: Accurate billing, Increased Reimbursement

- Tarush Kothari at Northwell Health
- AKI: often underdiagnosed and under-recognized, up to 15-20% of hospitalizations
- Goal: proactive earlier detection of AKI and capture appropriate billing
- Intervention: Implementation of a real-time laboratory generated electronic AKI alert using a delta checking algorithm
- Improving clinical documentation of AKI severity
- HUGE $$ additional revenue due to more accurate billing, esp if you are a multi hospital system, triggered by a laboratory abnormality
LIS/EHR: Improved monitoring of patient data

### Daily Inpatient Sepsis Screen Analysis

**Patients Admitted/Transferred or had Monitoring BPA Trigger on 10/10/2012**

**Snapshot**

<table>
<thead>
<tr>
<th></th>
<th>Count of Admit/Transfers</th>
<th>Sepsis Screening Completed on Admit/Transfer to Unit</th>
<th>% Sepsis Screening Questions Completed on Admit/Transfer to Unit</th>
<th>Mean Time to First Sepsis Screening in Hours</th>
<th>Number having Sepsis Screening within 1 Hour</th>
<th>Admission Call MARS BPA Fired (3 of 8 criteria with 6 hours)</th>
<th>Admission BPA Accepted/Action Taken</th>
<th>Monitoring BPA Criteria Met Time (2 of 5 qualifying vitals)</th>
<th>Monitoring BPA Accepted/Action Taken</th>
<th>Sepsis Screening Completed After Monitoring BPA</th>
<th>% Sepsis Screening Completed</th>
<th>Post Admission Call MARS BPA Fired (3 of 8 criteria net)</th>
<th>Post Admission BPA Accepted/Action Taken</th>
<th>Primary MARS Team Called</th>
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<td><strong>Patients Admitted/Transferred to Unit</strong></td>
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*This section counts only the Monitoring BPA timestamps.*

Questions?