Using “Big Data” in Cancer to Improve Care and Accelerate Learning

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Former ASCO CEO  
Board Member of CancerLinQ
Three diseases

Multiple molecular drivers—and more to be discovered

Lung cancer: from one cancer to many

1986

2014

KRAS
EGFR
BRAF
PIK3CA
AKT1
HER2
EML4-ALK
Unknown
The Oncology Knowledge Base

Only 3% enroll in clinical trials.

1.7 MM people diagnosed with cancer in the US
Current State of CLQ

- 1,600,000 individual patient records
- 73 participating institutions
- > 2000 Oncologists
- > 100 institutions in the pipeline
- **Onboarding one health system per week**
- Collaborations with major health systems
  - UVA Health System
  - Intermountain Healthcare
  - Vanderbilt University Medical Center
  - Case Western
  - Rush University Medical Center
  - Catholic Health Initiatives
  - Sanford Health
Current State of CLQ

Interfaces with a wide variety of EHR systems:
1. MosaiQ
2. Varian
3. Epic via Data Warehouse
4. Epic via CDA
5. I Know Med via CDA
6. IntrinsiQ
7. GE Centricity
8. All Scripts – Sunrise Clinical Manager (SCM)
9. OncoEMR

Interfaces in development:
- Next Gen
- MosaiQ Hosted
- Varian Hosted
- Cure MD
Proportion of Breast Cancer Patients by Gender (2006-2015)

- Female, 98.8%
- Male, 1.2%


- 0-49: 1,000
- 50-59: 4,000
- 60-69: 5,000
- 70-79: 3,000
- 80-89: 2,000
- 90 and Over: 1,000

N = 18420 Patients
Data Quality

• Just over 1M reported patients have >800M reported clinical events (observations, lab, imaging, medication orders, medication administration, etc.)

• Yet there are numerous missing data elements
  • Example: Estrogen receptor status in breast cancer is reported ~100% when we use manual chart abstraction and barely 50% when we look for it as a structured data element

• There are key pieces of data sitting in unstructured data (notes, reports, PDFs, etc)

• Digging these data elements out is going to be a key challenge for us
CancerLinQ Collects PHI

- Resolve the identity of individual patients to create a longitudinal patient record.
- Develop clinically relevant quality analytics capable of determining which individual patients are “actionable”.
- Collect unstructured data to capture insights from clinical notes, pathology reports, imaging studies, etc.
- Display individual patient records in a manner not currently available in current EHR systems.
- The PHI is then de-identified and can be used to accelerate our learning about what works and what doesn’t.
CLQ is First and Foremost a Quality Program
More Than a “Gotcha” Quality Program

Color Colonoscopy
Colonoscopy before or within 6 months of curative colorectal resection or completion of primary adjuvant chemotherapy

365 days measurement period 8 of my patients included in this measure

75% potential high current potential low

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Improving Care Through Data Presentation

[Diagram of timeline with events]

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Timeline  Overview  Related Documents

2
DIAGNOSIS
Disease - Primary Diagnosis - Colon
Mar 30, 2012

Disease - Secondary
Mar 30, 2015

5
PATHOLOGY
Pathology - Disease - Stage Group, Disease - Pathology - Results, Disease - Mar 20, 2012 - May 3, 2012

Pathology - Disease - Stage Group, Disease - Pathology - Results
Jan 5, 2015

3
PROCEDURE
Procedure - Treatment - Procedure, Treatment - Procedure
Mar 30, 2012 - May 5, 2012

Treatment - Procedure
Location: Mercy Hospital Columbia MD
Jan 5, 2015

0
RADIOThERAPY

20
SYSTEMIC THERAPY
Treatment - Systemic Therapy, Treatment - Systemic Therapy, Treatment - Systemic Therapy, Treatment - Systemic Therapy - Jul 5, 2012 - Dec 3, 2012

Systemic Therapy - Treatment - Systemic Therapy, Treatment - Systemic Therapy, Treatment - Systemic Therapy, Treatment - Systemic Therapy - Jan 19, 2015 - Mar 27, 2015

2
REGIMEN
Treatment - Regimen
Jul 5, 2012 - Dec 3, 2012

Treatment - Regimen
Jan 19, 2015 - Mar 27, 2015

Outcome - Toxicities
Summary

- CancerLinQ is launched and running.
- Well over 1M cases have been accessioned into our system to date.
- The response of the physician community as well as the patient community has been very gratifying.
- The multiplicity of EHR systems and their lack of interoperability costs us lots of time and many dollars to overcome.
- Data quality is an issue that we will wrestle with for a long time.
- We are excited to continue this journey.