A.I. EVOLUTION

DATA TRENDS IN HEALTHCARE’S CURRENT MARKET

John Frownfelter, MD, FACP
CMIO, Jvion
“To Know, or Not to Know…”

• Demand for analytics is at an all-time high:

  • “How am I performing against quality standards?”
  • “How do we identify the patients who are going to die in the next 30 days?”
  • “How do we identify the patients with increasing risk for admission to the hospital?”
  • “How do we know our interventions are working?”
The Urgency for Knowing

- Value based purchasing/ACO Contracts
  - How can I mitigate the risk?

- Population Health Management
  - Assessing and intervening on rising risk

- CMS Penalties
  - Readmissions
  - Quality measures of “never” events like CAUTI, VTE

- MACRA
Maslow’s Hierarchy of Data

- **Collect**
  - Instrumental, Logging, Sensors, External Data, User Generated Content

- **Move/Store**
  - Reliable Data Flow, Infrastructure, Pipelines, ETL, Structured and Unstructured Data Storage

- **Explore/Transform**
  - Cleaning, Anomaly Detection, Prep

- **Aggregate/Label**
  - Analytics, Metrics, Segments, Aggregates, Features, Training Data

- **Learn/Optimize**
  - A/B Testing, Experimentation, Simple ML Algorithms

- **AI, Deep Learning**
What is AI: A Working Definition

- Artificial Intelligence (AI): computers perform tasks that are usually assumed to require human intelligence
- Accenture: Artificial Intelligence (AI): healthcare's new nervous system
  - “AI in health represents a collection of multiple technologies enabling machines to sense, comprehend, act and learn so they can perform administrative and clinical healthcare functions. Unlike legacy technologies that are only algorithms/tools that complement a human, health AI today can truly augment human activity.”
- An AI machine can accept information about a problem from its surroundings, generate insights based on this data, and determine the best course of action that will lead to a desired outcome
The Application of AI within Healthcare: Top 10

- Robot-Assisted Surgery $40B
- Virtual Nursing Assistants $20B
- Administrative Workflow Assistance $18B
- Fraud Detection $17B
- Dosage Error Reduction $16B
- Connected Machines $14B
- Clinical Trial Participant Identifier $13B
- Preliminary Diagnosis $5B
- Automated Image Diagnosis $3B
- Cybersecurity $2B
Perceptions and Challenges

• June 2018: The American Medical Association passed its first policy on so-called "augmented intelligence," encouraging the development of augmented intelligence tools that are free of bias and improve patient outcomes and physician satisfaction.

• Robert Pearl writes “the biggest barrier to artificial intelligence in medicine isn’t mathematics. Rather, it’s a medical culture....”
Pilot Outcomes—Northwest Medical Specialties

Applied AI for Oncology

Sibel Blau, MD, President/CEO, Quality Cancer Care Alliance
Medical Director, Oncology Division
Northwest Medical Specialties

Amy Ellis, Director, Quality and Value Based Care
Northwest Medical Specialties, PLLC
Composition of the Oncology Specialty Vectors

<table>
<thead>
<tr>
<th>Vector</th>
<th>Description</th>
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<tr>
<td>30 Day Mortality</td>
<td>Patients at risk of mortality within 30 days of prediction</td>
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<tr>
<td>30 Day Pain Management</td>
<td>Patients at risk of having severe/moderate pain within 30 days</td>
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<tr>
<td>6 Month Depression</td>
<td>Patients at risk of having a depression diagnosis within 6 months</td>
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<tr>
<td>6 Month Deterioration</td>
<td>Patients at risk of deterioration of ADL levels (at least 2 levels) within 6 months</td>
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<tr>
<td>30 Day Avoidable Admission</td>
<td>Patients at risk of an avoidable IP admission within 30 days</td>
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<tr>
<td>30 Day ED Visit</td>
<td>Patients at risk of an ED visit within 30 days</td>
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<tr>
<td>Readmission</td>
<td>Patients at multiple admissions within 3 months</td>
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Oncology Vectors Overview

Oncology Practice

Patient

Eigen Universe

Data Transposition
HL7, Extracts

AI Processing
Daily Propensities, Risk Factors, Recommendations

Machine Output

Data Transposition
HL7, Extracts

EMR Integration
HL7

Clinical Workflow

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Oncology Vectors: Operational to Direction of Impact

- **6-month Deterioration**
  - Up to 30% reduction in loss of function/ADLs (ECOG)

- **6-month Depression**
  - 22% increase in depression diagnoses

- **30-day Pain Management**
  - 33% reduction in moderate and severe pain
Start with the WHY...The Real Impact

CASE STUDY

Vector: Oncology 30 Day Pain Management

# of patients reporting severe to moderate pain

Baseline  Post-Jvion
3300  3400  3500  3600  3700

Average Percentage of Patients Reporting Severe Pain, High & Medium Risk Groups

Post-Jvion  Pre-Jvion
80  60  40  20

Reduction in Patients Reporting Severe Pain, Post-JVION

- **184** patients experienced improved pain management on average per month
- **552** total patients impacted post-JVION
Count of Patients with Severe Pain per Month at NWMS

- Jul-17: 709.7
- Aug-17: 664.5
- Sep-17: 635.7
Mortality Metrics
Hospice & Palliative Care Referrals

![Graph showing Hospice Referrals per 1,000 patients per month with a 225.0% increase in rate.]

![Graph showing Palliative Care Referrals and Supportive Care Consults per 1,000 patients per month with a 35.3% increase in rate.]

Pre Intervention
Post Intervention

0.1
0.5

8.4
11.3
Count of Patients with Depression per Month at NWMS

- Jul-17: 399.0
- Aug-17: 374.7
- Sep-17: 325.7
Pilot Outcomes—The Center for Cancer and Blood Disorders

Applied AI for Oncology

Ray Page, DO, PhD, President & Director of Research
The Center for Cancer and Blood Disorders
Oncology Vectors: Operational to Direction of Impact

- **6-month Deterioration**
  - 17% reduction in loss of function/ADLs (ECOG)

- **6-month Depression**
  - 33% increase in depression diagnoses

- **30-day Pain Management**
  - 28% reduction in moderate and severe pain
Start with the WHY... The Real Impact

CASE STUDY - CCBD

Vector: Oncology 30 Day Pain Management

- **71** patients experienced improved pain management on average per month
- **499** total patients impacted post-JVION
Count of Patients with Severe Pain per Month at TCCB

<table>
<thead>
<tr>
<th>Month</th>
<th>Count</th>
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<tr>
<td>Jul-17</td>
<td>635.0</td>
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<tr>
<td>Aug-17</td>
<td>613.5</td>
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<tr>
<td>Sep-17</td>
<td>510.3</td>
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Mortality Metrics
Averages per 1,000 patients per Month

Hospice Referrals per 1,000 patients per month
- Pre Jvion: 0.01
- Post Jvion: 0.03

Palliative Care Referrals per 1,000 patients per Month
- Pre Jvion: 0.03
- Post Jvion: 0.08

113.3% increase in rate
218.8% increase in rate
Count of Patients with Depression per Month at TCCB

- Jul-17: 85.0
- Aug-17: 94.8 excluding Dec. 2017
- Sep-17: 88.3
NWMS - Cardinal Health - 30 day Mortality

Weekly 
High/Medium 
Risk Band

PCC reviews patient, risk factors, and recommended interventions for high/medium risk patients

PCC review patient in Care Model (CCM) pt.

Consider any additional resource needs/barring? (hospice, alternative plans, etc.)

Document risk factors in Navigating Care

Supportive 
Care Visit

Yes

Scheduling/Planned?

No

Coordinate scheduling of palliative care visit

Susan to talk with patient and family about palliative care

Refer to collaboration

Primary Oncologist

Yes

No

Find next available time for supportive care visit.

Finalize next time for follow-up visit.

Collaboration - Amy to discuss with Palliative Care PA - Susan

Discuss with patient and family directly OR request Susan have discussion

Oncologist agrees?

Referral from primary oncologist (with agreement)
NWMS - Cardinal Health - Depression

Weekly
High/Medium
Risk Band

PCC access report through portal weekly
PCC reviews patient risk factors, and recommended interventions for high/medium risk patients
PCC review patient in Oncology Care Model (OCM) pt.
Consider any additional resource needs/barriers? hospice, alternative plans, etc.
Document interventions in portal

Wellness Screening Scheduled? Yes
Coordinate scheduling of wellness screening visit

With wellness screening visit placed on dashboard

Provider creates plan of care directly
Referral for psychological/behavioural health in consultation with primary oncologist as needed

Patient Navigator
Social Worker

SW call patient to schedule visit, initiate plan of care
Place-to-face visit, next steps based on telephonic assessment
CCBD – 30 day Mortality
CCBD – 30 day Depression

Weekly High/Medium Risk Band

- Psychotherapy Team to access report through portal weekly
- PT reviews patient, risk factors, and recommended interventions for high/medium risk patients
  - Patient already receiving counseling?
    - Yes
      - Documentation in portal of interventions completed
    - No
      - Yes
      - Review of PHQ 9 information, next steps determined by PT Assessment
      - No
      - PT reviews the most recent PHQ 9
      - No
      - PT interns next 24 days?
        - Yes
          - PT ensures PHQ 9 completed, chart review to determine any additional next steps
        - No
          - Patient remains on watchlist
          - Notification to attending physician if crisis occurs, or needs escalation for hospital admission/psychiatrist referral

- PT increases contact with patient - telephonic assessment
  - Yes
  - Patient already receiving treatment?
    - Yes
      - Documentation in portal of interventions completed
    - No
      - Review of PHQ 9 results
      - No
      - Positive
        - Counseling offered/scheduled
      - Patient remains on watchlist
      - Review of PHQ 9 results
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