The New Game in Healthcare: Keeping Patients Healthy and Out-of-Hospital
Precision Medicine; the Role Of Lab Testing

James M Crawford, MD, PhD
jcrawford1@northwell.edu

Executive Director and
Senior Vice President for Laboratory Services, Northwell Health
Professor and Chair, Pathology/Lab Medicine
Hofstra Northwell School of Medicine
Manhasset, NY
Disclosures

- ClaraPath (start up from Cold Spring Harbor Laboratories)*
  - Scientific Advisory Committee

- Northwell Health Genomics Alliance (with OPKO Health)
  - President of LLC
Northwell Health

- Reference laboratory (9% of ambulatory market)
- 21 Hospitals (27% of regional market)
- Free-standing Emergency Room
  
  450+ practice locations
  >4M patient encounters per year
  Network of SNFs, AmbSurg, UrgiCenters
  >28M billable lab tests per year
Northwell Health Laboratories

Plus: 32 Patient Service Centers, in-office phlebotomy, home draw, network support of POLs
Northwell: Hospital Laboratory Costs ($M)

- Sickle Cell Disease Program growth
- Cancer Services Growth
- growth in Cardiothoracic Surgery
- Hurricane Sandy
- Cardiothoracic Surgery growth in 2015
## Core Lab Growth

Since 2008, revenue has increased by 224% and total tests have increased by 117%.

### Revenue (in thousands)

<table>
<thead>
<tr>
<th>Year</th>
<th>Revenue</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>$72,816</td>
</tr>
<tr>
<td>2009</td>
<td>$85,067</td>
</tr>
<tr>
<td>2010</td>
<td>$95,993</td>
</tr>
<tr>
<td>2011</td>
<td>$113,230</td>
</tr>
<tr>
<td>2012</td>
<td>$135,151</td>
</tr>
<tr>
<td>2013</td>
<td>$152,599</td>
</tr>
<tr>
<td>2014</td>
<td>$176,919</td>
</tr>
<tr>
<td>2015</td>
<td>$206,308</td>
</tr>
<tr>
<td>2016</td>
<td>$235,889</td>
</tr>
</tbody>
</table>

### Total Tests* (in thousands)

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>-</td>
</tr>
<tr>
<td>2009</td>
<td>1,000</td>
</tr>
<tr>
<td>2010</td>
<td>2,000</td>
</tr>
<tr>
<td>2011</td>
<td>3,000</td>
</tr>
<tr>
<td>2012</td>
<td>4,000</td>
</tr>
<tr>
<td>2013</td>
<td>5,000</td>
</tr>
<tr>
<td>2014</td>
<td>6,000</td>
</tr>
<tr>
<td>2015</td>
<td>7,000</td>
</tr>
<tr>
<td>2016</td>
<td>8,000</td>
</tr>
</tbody>
</table>

*Total tests includes hospital reference testing, HHC testing and outreach/other testing.
Q: When is a Laboratory not a Laboratory?

A: When it is a leader in providing information. When it provides programmatic leadership.
Diabetes Wellness Care

A Successful Employer-Endorsed Program for Employees

Cynthia C. Bevis, JD, MBA, MS, June M. Nogle, PhD, Barbara Forges, MD, Philip C. Chen, MD, PhD, Deborah Sievers, MSN, RN, CDE, Karlene Ranghell Lucas, MBA, RRT, John J. Mahoney, MD, MPH, and James M. Crawford, MD, PhD

• A Pathology-led Diabetes Wellness program in Orlando, FL
  - Recruitment, Screening, Intervention (1y) = Education, Testing
  - Close coordination with PCPs, program Endocrinologists
  - 73 employees enrolled with pre-diabetes; 151 with diabetes
• Outcomes
  - Pre-diabetes: mean HbA1c decreased 6.1% to 5.4% (p<0.0001)
  - Diabetes: mean HbA1c decreased 9.0% to 7.5% (p<0.0001)
  - 12m before: 27 hospitalizations; 12m during/15; 12m after/27
  - Total PMPM costs: 1.2% rise year-of program; 8.3% rise yr after
• Conclusion: Pathology can provide leadership in wellness care
Five years of inpatient admissions examined
- Total admissions = 165,066
- Total “critical value” test results = 872,503
  \[ \text{K}^+, \text{Na}^+, \text{Hct}, \text{Hb}, \text{Glucose}, \text{Lactate}, \text{APTT}, \text{INR (high, low)} \]
- Mortality as a function of time after test result

Outcomes (selected)
- Current thresholds identified patients at risk for death: K^+
- Current thresholds too conservative: elevated Hct, Hb
- Current thresholds not conservative enough: elevated lactate

Conclusion: Pathology really \textit{can} save lives (measured in minutes)
High Lactate Plot:
Survival in the first 48 hours after lab test

Fraction Surviving

Hours

Low Near-Critical Group  High Near-Critical Group  Low Critical Group  High Critical Group

1.5 – 2.9 mM
3.0 – 3.9 mM
4.0 – 4.9 mM
≥5.0 mM
Data pull: [Lactate] and [Mortality]

Start of “Sepsis Bundle” → >50% reduction in mortality
Chronic Kidney Disease Management*

The 16,000 test results above 1.2 mg/dl, out of 1.2 M Creatinine tests over 12 months (July 2011 to June 2012)
Data pull: July 2012

→ Philanthropically-funded “early-CKD” program:
Northwell physician practices: GIM, Family Medicine
Nephrology as consultants and subspecialists
Pathology as monthly source of data (T Kothari)

*When our “Business Intelligence” became “Pathology Informatics”
Career Path (James M Crawford)

1974 NC/MA/CT 1999
Metabolic Physiology/Liver
→ Biliary Physiology

1999 FL 2008
“House of Pathology”/APC
“House of Medicine”/AAMC
Advocacy (PathPAC)/CAP
Patient-Centered Medical Home

2009 NY 2016ff
Valuation of Pathology/Lab Medicine
Pathology Informatics → Clinical Informatics
Building the evidence base for Precision Medicine
Healthcare Reform → Alternative Payment Models

1985
Gastrointestinal and Hepatobiliary Pathology
Acute Kidney Injury

- AKI affects 5-7% of all hospitalized patients; Majority of patients are cared for by non-nephrologists
- AKI is under-recognized and under-diagnosed:
  - 6 to 30 fold increase in in-hospital mortality
  - Average LOS is increased by 3 to 7 days
  - Hospitalization costs increased by $4,000 to $10,000/day/patient
  - $10B in annualized costs throughout the U.S.
- Lab instituted a “delta creatinine” Alert pilot program:
  - 50% relative rise OR 0.3 mg/dl rise: detects 99.8% of AKI patients
  - 7:00 AM daily notification to CMO → distributed to units
  - Pilot initiated at Forest Hills Hospital (250 beds) Jan 1, 2014
  - Alert triggered 5,185 times in 6m = 40 times per day
  - Clinical rounding identified 20 pts per day = 8% of admissions

*Tarush Kothari, MD, MPH
LQF Oct 20 Breakout Session – 1:10 – 2:00 PM
System-wide Identification of AKI

Percentage of all cases with a secondary DRG diagnosis of AKI
(Medicare FFS and HMO only)

After Lab Creatinine Alerting of AKI: From 8/2014 To 6/2015
Baseline period: From 3/2014 To 7/2014
Q: What does this teach us?

A: Any clinical problem is fair game. High-volume, high-impact problems are good. So are high-acuity (high or low volume). You have to work with clinical champions. You have to leverage your lab information.
Payer Use of Laboratory Data (ca. 2016)

• Laboratory Utilization Management (LUM)
  – Payment (may) require Evidence Base for test utilization
  – Laboratories not engaging in LUM are less desirable than those who are (e.g., esoterics/molecular)

• Laboratory Test Data Portability
  – Transmission of data to Payer
  – Fulfillment of HEDIS* requirements

• Patient Access to Laboratory Testing
  – “Patient Service Centers” (blood draw sites)
  – Physician Practice access to in-network lab draws

*Healthcare Effectiveness Data and Information
What Payers are Doing with Laboratory Data

- Risk Stratification of Covered Populations
- Supporting Actuarial Analysis of Total Cost of Care
- Reducing Leakage of Lab Testing to out-of-network Labs
- Assessment of Provider Performance on Quality Metrics
- **Aiming to:**
  - Work with Providers to support Coordinated Care
  - Close “Care Gaps”
  - Reduce/Manage Laboratory Test Utilization
  - Increase exclusivity of Laboratory Network(s)
  - Manage Costs
Data Across the Continuum of Care

What Payers Want: Data Across the Continuum

- Ambulatory
- In- and out-of-system
- Acute Care (Hospital)
- Post-Acute Care/SNF
- Results
- Billing Info
- Member ID
- Pt. Demographic
- Diagnosis Data

What Payers are Currently Getting

- Ambulatory
- Acute Care (Hospital)
- Post-Acute Care/SNF
Northwell “Division” of Pathology Informatics

- Est. in 2013; a “group”, not “division” (n = 9 and growing)
- Works intimately with LIS team (n = 50 and growing)
- CMIO and CIO for Laboratory Service Line
  - CMIO: works with clinical stakeholders throughout system
  - CIO: accountable to enterprise IT (CIO, OCIO)
- Design and build LDW*:  
  - architecture, programmers, analysts, project manager
- Data integration from multiple systems throughout enterprise  
  - “Owning” deliverables from laboratory environment
- Delivery platforms, both as internal and external builds
- Return-on-Investment: within first year – *but to health system.* (Benefit does not derive to Laboratory Service Line)
Northwell “Division” of Pathology Informatics

- Business Analytics*
  - Financial*
  - Operational*
  - Service*

- Clinical Analytics
  - Utilization Management*
  - Clinical Decision Support*
    - Physician Practices*
    - Hospitals – Inpatient/Outpatient*
  - Patient Outcomes†

*All from Laboratory Data Warehouse
†Requires data pulls from EDW or HIE
Northwell Health HHC Quality Metrics
January - December 2015

In-house Overall TAT%, 2015
Sendout Overall TAT%, 2015

* Critical Values not called within 15 minutes of result by month, 2015

Result Corrections by Month, 2015
YTD Rate (Result Corrections/Billable Tests) = 0.050%

Test Cancellations by Month, 2015
YTD Rate (Test Cancellations/Billable Tests) = 0.434%

Top 5 Reasons for Test Cancellation, 2015

Notes:
Inhouse % Turnaround Time (TAT) met = Inhouse met / Inhouse total
Sendout % Turnaround Time (TAT) met = Sendout met / Sendout total
* Critical values show count where TAT: Resulted to Time of 1st Call exceeded 15 min

Data Source: Core Lab
Copyright ©2016, Krasnoff Quality Management Institute
Data Date: February 3, 2016
Reference Hospital Utilization Heatmap by Site

Utilization Index = (provider test volume/provider total volume) / (total test volume/total volume)

e.g. for a given provider, Vitamin D 25 Hydroxy’s would be expected to constitute 12.0% of their overall test

<table>
<thead>
<tr>
<th>#</th>
<th>Test</th>
<th>Total</th>
<th>Test %</th>
<th>Cumulative %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td>Hospital 1</td>
<td>Hospital 2</td>
</tr>
<tr>
<td>1</td>
<td>Glycosylated Hemoglobin</td>
<td>59,787</td>
<td>15.8%</td>
<td>27.8%</td>
</tr>
<tr>
<td>2</td>
<td>Vitamin D 25 Hydroxy</td>
<td>45,212</td>
<td>12.0%</td>
<td>28.2%</td>
</tr>
<tr>
<td>3</td>
<td>LEAD</td>
<td>43,204</td>
<td>11.4%</td>
<td>39.6%</td>
</tr>
<tr>
<td>4</td>
<td>Quantiferon-TB Gold</td>
<td>39,205</td>
<td>10.4%</td>
<td>50.0%</td>
</tr>
<tr>
<td>5</td>
<td>HIV AG/AB Screen by CMIA</td>
<td>10,362</td>
<td>2.7%</td>
<td>32.7%</td>
</tr>
<tr>
<td>6</td>
<td>HPV HR M RNA</td>
<td>10,276</td>
<td>2.7%</td>
<td>35.4%</td>
</tr>
<tr>
<td>7</td>
<td>Viral Load</td>
<td>7,847</td>
<td>2.1%</td>
<td>37.5%</td>
</tr>
<tr>
<td>9</td>
<td>Benzo QuaNT Ur Confirm</td>
<td>6,760</td>
<td>1.8%</td>
<td>41.2%</td>
</tr>
<tr>
<td>8</td>
<td>Antinuclear AB</td>
<td>6,312</td>
<td>1.7%</td>
<td>42.9%</td>
</tr>
<tr>
<td>10</td>
<td>Vitamin D 1,25 Dihydroxy</td>
<td>5,528</td>
<td>1.5%</td>
<td>43.4%</td>
</tr>
<tr>
<td>11</td>
<td>Vitamin B1</td>
<td>4,604</td>
<td>1.2%</td>
<td>44.6%</td>
</tr>
<tr>
<td>12</td>
<td>Blood Culture</td>
<td>4,008</td>
<td>1.1%</td>
<td>45.7%</td>
</tr>
<tr>
<td>14</td>
<td>Hepatitis C RNA Quant</td>
<td>3,868</td>
<td>1.0%</td>
<td>46.7%</td>
</tr>
<tr>
<td>15</td>
<td>H.Pylori AG Stool</td>
<td>3,685</td>
<td>1.0%</td>
<td>47.7%</td>
</tr>
<tr>
<td>17</td>
<td>Vitamin B6</td>
<td>3,319</td>
<td>0.9%</td>
<td>51.6%</td>
</tr>
<tr>
<td>13</td>
<td>HPVGENO</td>
<td>3,272</td>
<td>0.9%</td>
<td>52.5%</td>
</tr>
<tr>
<td>16</td>
<td>Testosterone Free and Total</td>
<td>3,002</td>
<td>0.8%</td>
<td>53.3%</td>
</tr>
<tr>
<td>18</td>
<td>HLX CFTR Results</td>
<td>2,863</td>
<td>0.8%</td>
<td>54.1%</td>
</tr>
<tr>
<td>19</td>
<td>Hepatitis B Surface Antibody, Quant</td>
<td>2,789</td>
<td>0.7%</td>
<td>54.8%</td>
</tr>
<tr>
<td>20</td>
<td>Cyclic Citrullinated Peptide AB</td>
<td>2,410</td>
<td>0.6%</td>
<td>55.4%</td>
</tr>
</tbody>
</table>
**Hospital 6 Utilization by Provider**

Utilization Index = (provider test volume/provider total volume) / (total test volume/total volume)

E.g. for a given provider, Vitamin D 25 Hydroxy's would be expected to constitute 22.7% of their overall test volume.

<table>
<thead>
<tr>
<th>#</th>
<th>Test</th>
<th>Total</th>
<th>Test %</th>
<th>Cumulative %</th>
<th>From Hospital HM</th>
<th>Provider 1</th>
<th>Provider 2</th>
<th>Provider 3</th>
<th>Provider 4</th>
<th>Provider 5</th>
<th>Provider 6</th>
<th>Provider 7</th>
<th>Provider 8</th>
<th>Provider 9</th>
<th>Provider 10</th>
<th>Provider 11</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Vitamin D 25 Hydroxy</td>
<td>7261</td>
<td>22.7%</td>
<td>22.7%</td>
<td>1.92</td>
<td>0.60</td>
<td>0.91</td>
<td>0.00</td>
<td>2.40</td>
<td>0.57</td>
<td>0.22</td>
<td>0.00</td>
<td>3.20</td>
<td>0.01</td>
<td>0.00</td>
<td>0.84</td>
</tr>
<tr>
<td>2</td>
<td>Quantiferon-TB Gold</td>
<td>3408</td>
<td>10.7%</td>
<td>33.4%</td>
<td>1.04</td>
<td>0.00</td>
<td>0.00</td>
<td>9.33</td>
<td>2.10</td>
<td>0.00</td>
<td>2.06</td>
<td>1.81</td>
<td>0.20</td>
<td>7.78</td>
<td>2.08</td>
<td>0.00</td>
</tr>
<tr>
<td>3</td>
<td>LEAD</td>
<td>2548</td>
<td>8.0%</td>
<td>41.4%</td>
<td>0.71</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>3.00</td>
<td>2.38</td>
<td>0.00</td>
<td>0.00</td>
<td>0.05</td>
<td>3.20</td>
<td>0.00</td>
</tr>
<tr>
<td>4</td>
<td>HPVGENO</td>
<td>2079</td>
<td>6.5%</td>
<td>47.9%</td>
<td>7.61</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>3.60</td>
<td>4.83</td>
<td>0.00</td>
<td>0.00</td>
<td>3.28</td>
<td>0.00</td>
</tr>
<tr>
<td>5</td>
<td>Vitamin D 1,25 Dihydroxy</td>
<td>1502</td>
<td>4.7%</td>
<td>52.6%</td>
<td>3.29</td>
<td>0.00</td>
<td>0.00</td>
<td>2.88</td>
<td>1.61</td>
<td>0.00</td>
<td>2.69</td>
<td>0.00</td>
<td>0.15</td>
<td>0.04</td>
<td>0.00</td>
<td>0.08</td>
</tr>
<tr>
<td>6</td>
<td>Copper</td>
<td>1166</td>
<td>3.6%</td>
<td>56.2%</td>
<td>9.16</td>
<td>0.00</td>
<td>0.00</td>
<td>3.68</td>
<td>2.99</td>
<td>0.00</td>
<td>3.50</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>4.42</td>
</tr>
<tr>
<td>7</td>
<td>Vitamin A</td>
<td>1146</td>
<td>3.6%</td>
<td>59.8%</td>
<td>10.86</td>
<td>0.00</td>
<td>0.00</td>
<td>3.71</td>
<td>3.16</td>
<td>0.00</td>
<td>3.49</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>3.26</td>
</tr>
<tr>
<td>8</td>
<td>Vitamin B1</td>
<td>1105</td>
<td>3.5%</td>
<td>63.3%</td>
<td>2.57</td>
<td>0.00</td>
<td>0.00</td>
<td>3.90</td>
<td>3.22</td>
<td>0.00</td>
<td>3.65</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>1.35</td>
</tr>
<tr>
<td>9</td>
<td>Vitamin E</td>
<td>1063</td>
<td>3.3%</td>
<td>66.6%</td>
<td>10.87</td>
<td>0.00</td>
<td>0.00</td>
<td>3.98</td>
<td>2.64</td>
<td>0.00</td>
<td>3.76</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>3.45</td>
</tr>
<tr>
<td>10</td>
<td>HLX CFTR Results</td>
<td>628</td>
<td>2.0%</td>
<td>68.6%</td>
<td>2.56</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>8.87</td>
<td>9.28</td>
<td>0.00</td>
<td>0.10</td>
<td>8.04</td>
<td>0.00</td>
</tr>
<tr>
<td>11</td>
<td>Antinuclear AB</td>
<td>560</td>
<td>1.8%</td>
<td>70.3%</td>
<td>1.06</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.27</td>
<td>0.00</td>
<td>0.10</td>
<td>0.10</td>
<td>5.97</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>12</td>
<td>Hepatitis Be AG</td>
<td>532</td>
<td>1.7%</td>
<td>72.0%</td>
<td>5.34</td>
<td>0.00</td>
<td>0.00</td>
<td>1.89</td>
<td>2.41</td>
<td>0.06</td>
<td>3.79</td>
<td>2.39</td>
<td>0.32</td>
<td>0.00</td>
<td>0.87</td>
<td>0.23</td>
</tr>
<tr>
<td>13</td>
<td>Hepatitis Be AB</td>
<td>514</td>
<td>1.6%</td>
<td>73.6%</td>
<td>5.27</td>
<td>0.00</td>
<td>0.00</td>
<td>1.96</td>
<td>2.49</td>
<td>0.00</td>
<td>3.93</td>
<td>2.48</td>
<td>0.33</td>
<td>0.00</td>
<td>0.90</td>
<td>0.24</td>
</tr>
<tr>
<td>14</td>
<td>Testosterone Free and Total</td>
<td>400</td>
<td>1.3%</td>
<td>74.8%</td>
<td>1.60</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>2.48</td>
<td>0.00</td>
<td>0.70</td>
<td>3.17</td>
<td>0.14</td>
<td>0.30</td>
<td>2.68</td>
</tr>
<tr>
<td>15</td>
<td>Selenium Serum</td>
<td>388</td>
<td>1.2%</td>
<td>76.1%</td>
<td>10.26</td>
<td>0.00</td>
<td>0.00</td>
<td>2.61</td>
<td>5.47</td>
<td>0.00</td>
<td>3.28</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>4.20</td>
</tr>
<tr>
<td>16</td>
<td>Vitamin C</td>
<td>343</td>
<td>1.1%</td>
<td>77.1%</td>
<td>10.70</td>
<td>0.00</td>
<td>0.00</td>
<td>3.15</td>
<td>4.49</td>
<td>0.00</td>
<td>3.97</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>3.76</td>
</tr>
<tr>
<td>17</td>
<td>Vitamin B2</td>
<td>312</td>
<td>1.0%</td>
<td>78.1%</td>
<td>11.15</td>
<td>0.00</td>
<td>0.00</td>
<td>3.19</td>
<td>4.04</td>
<td>0.00</td>
<td>4.08</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>3.91</td>
</tr>
<tr>
<td>18</td>
<td>Vitamin B6</td>
<td>302</td>
<td>0.9%</td>
<td>79.0%</td>
<td>1.09</td>
<td>0.00</td>
<td>0.00</td>
<td>3.23</td>
<td>3.84</td>
<td>0.00</td>
<td>4.07</td>
<td>0.19</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>4.27</td>
</tr>
<tr>
<td>19</td>
<td>Hepatitis B Surface Antibody, Quant</td>
<td>274</td>
<td>0.9%</td>
<td>79.9%</td>
<td>1.18</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.11</td>
<td>0.00</td>
<td>0.41</td>
<td>0.21</td>
<td>0.21</td>
<td>1.33</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>20</td>
<td>KEPPRA</td>
<td>242</td>
<td>0.8%</td>
<td>80.7%</td>
<td>2.04</td>
<td>0.00</td>
<td>0.00</td>
<td>0.03</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
</tbody>
</table>

©2015 MFMER | slide-29
Adherence to Quality Standards

Blood Culture Fill Volume

Fill volume:  **Optimal** is 8 – 10 mL  
Maximum is 10 mL  
Minimum is 3 mL
Northwell Health System Quality Initiative
Blood Culture Fill Volumes

Education Campaign Begins

[Graph showing trends and data over time with various lines representing different locations: Lenox Hill, South Side, N-Westchester, LIJ-MC, NSUH Manhasset, Forest Hills, Franklin, Glen Cove, Huntington, Plainview, Syosset, Staten Island, and System.]
Northwell Health System Quality Initiative
Blood Culture Fill Volumes

Laboratory Leadership + Phlebotomy training →
Nursing Leadership → Education +
Hospital Leadership = Prioritization
Northwell Health System Quality Initiative
Blood Culture Fill Volumes

BLOOD VOLUME DISTRIBUTION HISTOGRAM: HOSPITAL SERVICE

For Period: 08/01/2016 - 08/31/2016 11:59:59 PM
Hospital:
Report Generated: 09/06/2016 03:13:36 PM
Northwell Health: Enterprise “Precision Medicine”

- **Cancer**: ~ 19,000 newly diagnosed cancer patients per year; >1% of United States (1.7M); 16,000 patients care for per year
  - Cancer Genomics: “actionable” gene variants
  - Cancer Genetics: screening and counseling

- **Prenatal Diagnosis**: 42,000 live births per year; >1% of all live births in the United States (3.96M)
  - Non-invasive perinatal screening (NIPS)
  - Carrier screening

- **Pediatric & Adult Genetics**
The Clinical Team: disciplined, coordinated care

- Patient identification
  - Genetic counseling: test selection, patient selection
  - Risk stratification
  - Timing

- Test resulting
  - Genetic counseling: test interpretation
  - Clinical management: action on the basis of test results
  - Genetic counseling: family of proband

- Knowledge generation
  - Was clinical care actually influenced by test results?
  - What were patient outcomes? Cost of delivering care?
  - How will such knowledge influence future care design?
Genomics: Key Elements

The Laboratory:

• State-of-the-art technologies
• State-of-the-art “Bioinformatics Pipeline”: data interpretation
• Genetic counseling: the role of the laboratory
• Informatics
  - Granular data: “good gene/bad gene” vs. detailed info
  - Linkage of [test results] to [clinical pre- and post- data]
Northwell Health Genomics Alliance: The Goal

- Enterprise-wide access to Precision Medicine
- Disciplined program of utilization and “action” upon results
- Prospective aggregation of [lab data] and [clinical data]
- Build the system Evidence Base for Genomic testing
Northwell Health partnerships

BioReference Laboratories
- Clinical-grade Database
- “Research” WES, WGS
- Clinical Genomics

Northwell Health
- Cancer Biobank
- Fresh Tissue
- First-in-Human Clinical Trials

Cold Spring Harbor Laboratories
- Clinical Data Analysis
- Tissue retrieval
- Molecular analysis
- Organoids
- Mouse “avatars”
  
In vitro testing for in vivo therapies

Northwell Health Genomics Alliance
But we are not yet done: “Risk Assessment”

Patients (“members”) are attributed to Risk-based programs
Actuarial Analysis of Risk: estimate cost of delivering care
Deliver Care: and document conditions-of-interest (HCCs)
*The documentation determines premium rate on HIE*
*(and hence, whether there is “up-side” or “down-side”)*
March 31, 2016, HHS-Operated Risk Adjustment Methodology Meeting

Discussion Paper

March 24, 2016

Centers for Medicare & Medicaid Services
Center for Consumer Information & Insurance Oversight
Figure 2.1
Hierarchical Condition Categories Aggregations of Diagnosis Codes

Diagnosis Codes

Diagnostic Groups (DXGs)

Condition Categories (CCs)

Hierarchical Condition Categories (HCCs)

Hierarchies Imposed

Selection for Payment Model

CMS-Hierarchical Condition Categories (CMS-HCCs)
Identify attributed patients on the basis of Lab data

Determine gaps-in-care for attributed patients

The key: “Conditions of Interest” (HCCs)

Insert patients into Coordinated Care pathways

*Document disease conditions properly*

2016 YTD opportunity at Northwell Health: ~1% of risk*

*It is only “early days” in this effort.*
<table>
<thead>
<tr>
<th>Lab 1.0</th>
<th>Lab 2.0</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>transactional</strong></td>
<td><strong>integrative</strong></td>
</tr>
</tbody>
</table>

### Sick Care
- Receive Test Sample
- Result Test Sample

### Disease Screening
- Protocol-driven
- Scheduled by Treating Physician
- Lab is derivative

### Wellness Programming
- Managed by Treating Physician
- Lab is derivative

### Payment Models
- Lab is a Commodity
- Value is Cost-per-Test

### Health Care
- Population Health using Lab data
- Total Cost-of-Care leveraging Lab data
  - Time-to-Diagnosis
  - Diagnostic Optimization
  - Care Optimization
  - Therapeutic Optimization
  - Monitoring Optimization
  - Screening Optimization

### Risk Management
- Identification of Risk
- Real-time tracking of Risk
- Escalation/De-escalation of Acuity

### Wellness Programming
- Gaps-in-Care closed using Lab data
- Outcomes of program using Lab data

### Predictive Analytics
- What will happen? When? Why?

### Payment Models
- Value of Lab for Total Cost-of-Care
jcrawford1@northwell.edu