Charting the Future: Implications and Insights for Informatics

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Conflict of Interest Disclosure

Dana Alexander RN

Has no real or apparent conflicts of interest to report.
Learning Objectives

• Describe the essentials for a knowledge based analytics solution framework
• Describe the need for data and analytics to determine evidence based and process driven best practices that drive outcomes
• Discuss the necessity of analytics and the role clinical informatics to support Population Health and Accountable Care
National Quality  Strategy & Priorities

Triple Aim

• Better Care
• Affordable Care
• Healthier Communities

Better Care

Priorities

Health and Well-Being
Prevention and Treatment of Leading Causes of Mortality
Person- and Family-Centered Care
Patient Safety
Effective Communication and Care Coordination
Affordable Care

Healthy People/Healthy Communities

Affordable Care
Cost, Quality and Access to Appropriate Care
The impact on U.S. Healthcare

The US spent
$2.6 trillion
on health in 2010¹

$432 billion
on heart disease and stroke

$212 billion
on diabetes²

Unintended variation in care leads to ⁴⁵% of patients failing to receive the recommended package of care.

30% of care delivered is not evidence-based and is not in accordance with the best clinical knowledge. ³

30% of the total annual US expenditure on healthcare spent on ineffective or redundant care. ³

Healthcare-associated infections kill more people every year than breast cancer and prostate cancer combined. ⁵

2. 2011 National Diabetes Fact Sheet
4. NEMJ “Care in US Hospitals” July 2005
Reimbursement Changes and Healthcare Reform
The Impact on Healthcare Organizations

Non-payment for never events and hospital-acquired conditions

Bundled Payment Program

- Single payment for inpatient, outpatient, and post-acute care services

Shared Savings Program

Utilization management and care management of at-risk patients enables organizations to realize 50% or more of shared savings

Hospital Readmissions Reduction Program

$280 M in payment penalties based on readmission rates for AMI, HF and pneumonia—added conditions in 2015

Value-Based Purchasing (VBP) imposes penalties and provides bonuses of 1 to 2 percent (2015) of Medicare inpatient revenue—funded by a payment withhold—depending on performance against a range of quality metrics.

Shifting Risk to Providers

The Impact on Healthcare Organizations

Challenges of Cost and Quality

Government Regulations and Initiatives

New Payment Methods

Provider Risk Models

Need for Population Health

Percentage of Providers with Risk Contracts

<table>
<thead>
<tr>
<th>Category</th>
<th>2011</th>
<th>2013</th>
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<tbody>
<tr>
<td>Total Cost of Care</td>
<td>14%</td>
<td>35%</td>
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<tr>
<td>Bundled Payment</td>
<td>16%</td>
<td>27%</td>
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</table>

Healthcare delivery organizations engaging in population health management face a high-level of financial risk. To survive/succeed, those organizations must have the healthcare analytics to understand that risk and guide decisions, and comprehensive care programs in place to manage that risk:

- Care management
- Patient engagement
- Healthcare surveillance
- Disease management
Role of Informatics in Improving Care through Analytics
Influencers Shaping Opportunities for Informatics
A WORLD OF BIG DATA

2015 will produce data equal to 120,000 times total of all written words for recorded history  (Accenture 2013)

“Too Much Data, Too Little time”
Why Are Analytics Not Used Routinely In Healthcare?

Technical Issues
- Too hard to aggregate data
- Too hard to interpret the data
- Not available in real time
- Not automated
- Not linked to interventions
- Not integrated with workflow

Social / Business Issues
- Providers & organizations suspicious about having performance measured
- Analysts concerned about having less than perfect analysis
Business And Clinical Intelligence & Analytics

…the next evolution in informatics

- Critical to *accountable, integrated, and coordinated* care
- Supports informed decision-making
- Must extend beyond EHR functionality
- Within, across and beyond provider organizations
- Data from EHRs, departmental & point solutions, revenue cycle, payers
- From individuals to populations
# Healthcare Analytics

## Business and Clinical Intelligence

<table>
<thead>
<tr>
<th>Retrospective Reporting</th>
<th>Performance reports and dashboards, e.g., quality measures, protocol compliance, utilization reporting, cost reporting, meaningful use and other business intelligence</th>
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<tbody>
<tr>
<td>Real-time Surveillance</td>
<td>Notifications to support quality management, e.g., adverse events, changes in status, healthcare events, updates to risk scores and events flagged for alerts</td>
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<tr>
<td>Predictive Analytics</td>
<td>Estimations of risk and predicted outcomes, e.g., cohort stratification, patient identification, risk modeling, readmissions management, and total cost of care</td>
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</table>
Flexibility to meet risk model needs

- Full risk
- Capitation
- Shared savings
- Bundled payment
- VBP
- Readmission penalties
- DRG
- U&C
- FFS

- Reporting
- Analytics
- Population Analytics
- Quality Improvement Analytics
- Patient Flow
- HAC Management
- Care Transitions Mgmt
- Chronic Disease Management
- Disease Management
- Population Health
- Risk Management
  - Care Management
  - Utilization Management
  - Wellness Management
Connecting the stakeholders is foundational...

- Primary Care Physician
  - EHR
  - Practice Mgmt
  - Referrals
  - Orders

- Labs
  - Orders
  - Pathology
  - Radiology

- Independent Health Facility
  - Clinical
  - Administrative
  - Financial

- Pharmacy / PBM
  - Rx
  - Claims

- Specialty Practice
  - EHR
  - Practice Mgmt
  - Referrals
  - Orders
  - Pathology
  - Radiology

- Academic Medical Center
  - In-patient EHR
  - Practice Mgmt
  - Clinical Trials
  - Care Plans

- Other HIE
  - IHE Profiles

- Patient
  - Self-report
  - Device
  - Messages

- Payers
  - Claims
  - Demographics
  - Benefits

- Government
  - CMS
  - Quality
  - Public Health

- Community Hospital
  - PACS
  - HIS
  - Revenue Cycle
  - Scheduling
  - Care Plans

- Document Repository
New IT-Enabled Roadmap

**Connect the Community**

- Connect disparate data sources
  - Document Exchange, Provider Portal

**Improve Quality & Efficiency**

- Transport data to the point of care
  - Referrals, Results, Patient Portal

**Improve Care Coordination**

- Access and discover opportunities
  - Cross-Community Exchange, Network Reporting

**Enable Innovation**

- Support accountable care
  - New generation of ACO analytics & applications

- Introduce workflow applications for new interventions
  - Care Management, Patient Engagement

- Deploy applications to address cost and quality
  - Cohort Management, Guided Analytics, Readmissions

- Measure impact and improve further
  - Creating a virtuous cycle

- Ongoing Care innovations
  - New workflows, use cases, applications

- Build data repository
  - Ingest, aggregate, normalize data, map to healthcare concepts
# Population Health Framework

Four Capabilities for Success

<table>
<thead>
<tr>
<th>Population Health</th>
<th>Data Control</th>
<th>Healthcare Analytics</th>
<th>Care Coordination and Management</th>
<th>Wellness and Patient Engagement</th>
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</thead>
<tbody>
<tr>
<td>Make information accessible where and when you need it.</td>
<td>Generate insights and drive better decisions.</td>
<td>Drive improved outcomes for patient populations.</td>
<td>Promote healthier lifestyles for your patients.</td>
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</tbody>
</table>

Enabling organizations to identify, take on and manage risk

Increasing quality of care by connecting analytics and care management

Providing transparency between care management, wellness and utilization programs

Activating patients to participate in their own care
Freeing Your Data from Information System Silos

Intelligence Platform

Longitudinal patient record to inform patient care

Data management and framework to build and inform applications

Healthcare entities

Patient

Encounter

Lab Results

Claims

Data formats

HL7

CCD

CSV

XML

Integrating healthcare systems

HIE

HOSPITAL

OUTPATIENT PRACTICE

PHARMACY

LAB

GOVERNMENT

HOME

PAYER
Tracking & Visualization Tools
Cohort Management
Empowering the Clinical Analyst

Flexible, rapid configuration of applications using aggregated data to manage populations of patients

Features

• Patient cohort wizards provide an easy-to-follow stepwise approach to define populations of interest
• Multi-patient view helps prioritize care by holistically viewing a population on a dashboard with relevant information
• Single-patient view provides a single integrated view of a patient’s care across the community
• Analytics views – graphs and charts – visualize key trends for the population, helping identify outliers and proactively reduce variation
• Shareable content allows portability of solutions across institutions using the intelligence platform

Manage cohorts of patients more effectively in order to enable a provider to drive efficiency, compliance and better outcomes
Congestive Heart Failure Surveillance

Healthcare analytics

Heart failure identification and stratification

- Identifies patients based on diagnoses
- Stratifies patients based on clinical indicators

Cohort management

- Proactively tracks cohort of heart failure patients and identifies outliers
- Identifies patients for enrollment in management programs

Diagnoses
- Cardiomyopathies
- Heart failure

Clinical Indicators
- BNP
- Potassium
- BUN
- Serum Creatinine
- ACE inhibitor / ARB therapy

CHF costs the U.S. $34.8 billion a year, and accounts for 5-10% of all hospital admissions.¹

SEPSIS/SIRS SURVEILLANCE

Identify patients at risk for sepsis or SIRS based on physiologic signs and sepsis risk score.

Enable timely care delivery to avert *Sepsis sequelae*

Manage cases of infection to analyze trends and risk factors for prevention, control and reporting

Manage and track interaction to enable more effective care management

Stratify patients as: ‘At Risk’, ‘High Risk’ or ‘Very High Risk’

Manage at-risk patients | Facilitate timely interventions | Optimize reimbursement
SEPSIS DETECTION ALGORITHM

Determining patients that are:                      Intervention:
At Risk for Sepsis.................................. Notify Nurse
At High Risk for Sepsis............................... Notify Nurse and Attending
At Very High Risk for Sepsis ........... Notify and consider RRT

1= Pulse: (NUR-P) is greater than 120 and Reported Date is in the last 1 Day
2= Resp: (NUR-R) is greater than 20 and Reported Date is in the last 1 Day
3= PaCO2 (PCO2) is less than 32 mmHg and Reported Date is in the last 1 Day
4= Temp: (NUR-T) is greater than 100.4 and Reported Date is in the last 1 Day
5= Temp: (NUR-T) is less than 96.8 and Reported Date is in the last 1 Day
6= WBC COUNT (WBC) is greater than 12 thou/uL and Reported Date is in the last 1 Day
7= WBC COUNT (WBC) is less than 4 thou/uL and Reported Date is in the last 1 Day
8= BAND-Manual (BAND) is greater than 20 % and Reported Date is in the last 1 Day
9= LACTIC ACID @L1 (LACT) is 3.5 mmol/L and Reported Date is in the last 1 Day
10= LACTIC ACID @L1 (LACT) is greater than 3.5 mmol/L and Reported Date is in the last 1 Day
11= CREATININE (CREA) is greater than 2 mg/dL and Reported Date is in the last 1 Day
12= eGFR/1.73sq.m (GFR) is less than 55 mL/min and Reported Date is in the last 1 Day
13= BILIRUBIN,TOTAL (TBIL) is greater than 4 mg/dL and Reported Date is in the last 1 Day
14= ALT (SGPT) (SGPT) is greater than 114 U/L and Reported Date is in the last 1 Day
15= PLATELET COUNT (PLT) is less than 80 thou/uLand Reported Date is in the last 1 Day
16= PT (INR) (INR) is greater than 1.5 ratio and Reported Date is in the last 1 Day
17= Drug Order Date active and Start Date is any and Drug Name is not in WARFARIN SODIUM, ENOXAPARIN SODIUM, HEPARIN SODIUM, PORCINE and Route is any and Form is any and Strength is any and Dose is any and Frequency is any
18= aPTT, Patient (PTT) is greater than 60 sec and Reported Date is in the last 1 Day
19= Drug Order Date active and Start Date is any and Drug Name is not in WARFARIN SODIUM, ENOXAPARIN SODIUM, HEPARIN SODIUM, PORCINE and Route is any and Form is any and Strength is any and Dose is any and Frequency is any
20= pH (APH) is less than 7.3 and Reported Date is in the last 1 Day
21= PaO2 (PO2) is less than 81 mmHg and Reported Date is in the last 1 Day
22= pH (APH) is less than 7.35 and Reported Date is in the last 1 Day
23= PaCO2 (PCO2) is greater than 55 mmHg and Reported Date is in the last 1 Day
24= SYSTOLIC BP (SYSTOLIC) is less than 90 and Reported Date is in the last 1 Day
25= SYSTOLIC BP (SYSTOLIC) has decreased 20 % and Reported Date is in the last 1 Day
26= Drug Order Date active and Start Date is any and Drug Name is not in NITROGLYCERIN and Route is any and Form is any and Strength is any and Dose is any and Frequency is any

Advanced Rule Logic: ((( ( 1 OR 2 OR 3 OR 4 OR 5 ) AND ( 6 OR 7 OR 8 ) ) AND ( 9 OR 10 OR 11 OR 12 OR ( 13 AND 14 ) OR 15 OR ( 16 AND 17 ) OR ( 18 AND 19 ) OR 20 OR 21 OR ( 22 AND 23 ) OR ( ( 24 OR 25 ) AND 26 ) )))
# Visualization Tools for Clinicians

## Interventions that Improves Patient Outcomes and Decrease Costs

![SEPSIS RISK PATIENTS](image-url)

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</table>
CA-UTI Surveillance

Physician | Nurse | Quality Manager | Infection Control Team

Identify patients with indwelling catheters and at risk of catheter-associated urinary tract infection.

Review culture results (blood, urine, etc.) and track patients with positive microbiology results.

Enable timely care delivery to help prevent CA-UTI occurrence.

Manage cases of infection to analyze trends and risk factors for prevention, control and reporting, and to enable more effective care management.

Manage at-risk patients | Facilitate timely interventions | Optimize reimbursement
Correlation with Higher Incidence of Hospital Acquired UTI’s and Longer LOS – What is the root cause?

Bubble size reflects number of UTIs per unit in past year
Each bubble = different patient care unit

Average LOS in Days

Rate of Hospital Acquired UTI Per Patient Day
Readmissions Management
Retrospective Analytics
Prospective Screening
Prediction of Readmission
Reducing Readmissions

To help reduce preventable readmissions, organizations can actively address risks by...

- Effectively defining and monitoring patient groups across the enterprise
- Assessing patterns in key indicators to address root causes, e.g. 30 day readmissions, 72-hour ED revisits and ED recidivism
- Predicting readmit probability using predictive modeling
- Proactively managing at risk patients throughout their LOS and at discharge
Easily Explore Different Facets Of Readmissions

Pre-designed live reports allow you to analyze 30-day readmission by groupings, range of dates, hospital service, health plan, & specific conditions, such as Acute MI, Heart Failure, and Pneumonia.

Can drill down with a single click from an aggregate view or trend into the specific patients & encounters.
Easily Examine Which Patients/Cases Are Causing A Readmission Spike

Viewing the single click drill-down into the detailed list of readmitted patients or cases for a specific date

Drill into the details of a specific patient or encounter with a single click

30-day Readmits from 01/21/2005
1 to 43 of 43 patients

<table>
<thead>
<tr>
<th>MRN</th>
<th>Name</th>
<th>Age</th>
<th>Gender</th>
<th>Facility</th>
<th>Unit</th>
<th>Primary Diagnosis</th>
<th>Dis/C Dispo</th>
<th>Discharge Dt</th>
<th>Admission Dt</th>
</tr>
</thead>
<tbody>
<tr>
<td>8007153</td>
<td>TILLIS, SONYA</td>
<td>67</td>
<td>Female</td>
<td>HHH1</td>
<td></td>
<td>682.6</td>
<td>ADMT</td>
<td>01/21/2005</td>
<td>02/06/2005</td>
</tr>
<tr>
<td>8151022</td>
<td>BAZAN, JEROME</td>
<td>66</td>
<td>Male</td>
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<tr>
<td>8064516</td>
<td>CARBAUGH, FAITH</td>
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<td>ADMT</td>
<td>01/21/2005</td>
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<tr>
<td>8399529</td>
<td>SPEAKMAN, GENE</td>
<td>33</td>
<td>Male</td>
<td>HHH3</td>
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<td>ADMT</td>
<td>01/21/2005</td>
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<td>8497162</td>
<td>OVALLE, ANDRE</td>
<td>62</td>
<td>Male</td>
<td>HHH1</td>
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<td>8486601</td>
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<td>02/03/2005</td>
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<td>8131481</td>
<td>DEPUY, FLOYD</td>
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<td>8130043</td>
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<td>MCCUTCHEK, MARCUS</td>
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<td>02/18/2005</td>
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<td>8108798</td>
<td>JAQUES, FRANCISCO</td>
<td>71</td>
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<td></td>
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<td>ADMT</td>
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<td>02/08/2005</td>
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<td>8042427</td>
<td>MACARTHUR, THEODORE</td>
<td>36</td>
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<td>8321064</td>
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<td>8032286</td>
<td>LEBREDOGE, BERNARD</td>
<td>47</td>
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<td></td>
<td></td>
<td>ADMT</td>
<td>01/18/2005</td>
<td>02/01/2005</td>
</tr>
</tbody>
</table>
Near Real-Time Screening Tools For Readmits And Revisits

Near real-time screening / surveillance list of the population of current ER patients who were already admitted in the previous 30 days. This can be used as a work list for Case Managers or Charge Nurses to ensure application of appropriate planning and management resources.

<table>
<thead>
<tr>
<th>#ED Visits</th>
<th>#Admits</th>
<th>Facility</th>
<th>Name</th>
<th>G/S</th>
<th>Admit</th>
<th>Last EMR D/C</th>
<th>Last EMR (hrs)</th>
<th>Srv</th>
<th>LV Any D/C(d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>2</td>
<td>HHH2</td>
<td>WOODROW, LILA</td>
<td>83F</td>
<td>12/15/2005</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>26</td>
<td>8</td>
<td>HHH3</td>
<td>FLEISCHMANN, DUSTIN</td>
<td>39M</td>
<td>12/15/2005</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>23</td>
<td>11</td>
<td>HHH1</td>
<td>GLINES, MERCEDES</td>
<td>79F</td>
<td>12/15/2005</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td>12/15/2005</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>9</td>
<td></td>
<td></td>
<td></td>
<td>12/15/2005</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>8</td>
<td>HHH1</td>
<td>KAMINSKY, PEDRO</td>
<td>31M</td>
<td>12/15/2005</td>
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<tr>
<td>7</td>
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<td>BURKHEAD, LEE</td>
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<td>12/15/2005</td>
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<tr>
<td>2</td>
<td>0</td>
<td>HHH3</td>
<td>WALDMAN, MARGARITA</td>
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<td>12/14/2005 21:40</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>66</td>
<td>4</td>
<td>HHH1</td>
<td>NUNNERY, RAFAEL</td>
<td>51M</td>
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<td>3</td>
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<td>HHH3</td>
<td>ROSENNERRY, OLIVE</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>2</td>
<td>HHH3</td>
<td>MANSKE, VERNON</td>
<td></td>
<td>12/15/2005</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>HHH2</td>
<td>OTTE, GORDON</td>
<td>99F</td>
<td>12/15/2005</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>HHH1</td>
<td>LECOMBITE, GENIE</td>
<td>41M</td>
<td>12/15/2005</td>
<td>12/15/2005 06:00</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Get an immediate view of the # of previous ED Visits & Admits.

Near real-time screening / surveillance list of the population of current ER patients who were discharged from the ER within the last 72 hours.
Predict Readmit Probability and Manage Patients at Risk for Readmission

The % likelihood of Readmission is calculated when a patient is admitted.

This work-list can be used by Case Managers and Discharge Planners to prioritize their efforts and pro-actively allocate limited resources to the patients at greatest risk for re-admission.

The lists can be filtered by hospital, unit, provider, % of risk, etc.

MANAGE- AT RISK PATIENTS
Early Warning Systems
# Modified Early Warning Score Algorithm

Determining patients that are at risk of imminent deterioration:

<table>
<thead>
<tr>
<th>Score:</th>
<th>Intervention:</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-2...</td>
<td>Low Risk</td>
</tr>
<tr>
<td>3-4...</td>
<td>Notify Nurse and Attending</td>
</tr>
<tr>
<td>&gt;4</td>
<td>Activate RRT</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Score</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systolic BP</td>
<td>&lt;45%</td>
<td>30%</td>
<td>15% down</td>
<td>Normal for patient</td>
<td>15% up</td>
<td>30%</td>
<td>&gt;45%</td>
</tr>
<tr>
<td>Heart rate (BPM)</td>
<td>—</td>
<td>&lt;40</td>
<td>41-50</td>
<td>51-100</td>
<td>101-110</td>
<td>111-129</td>
<td>&gt;130</td>
</tr>
<tr>
<td>Respiratory rate (RPM)</td>
<td>—</td>
<td>&lt;9</td>
<td>—</td>
<td>14-Sep</td>
<td>15-20</td>
<td>21-29</td>
<td>&gt;30</td>
</tr>
<tr>
<td>Temperature (°C)</td>
<td>—</td>
<td>&lt;35</td>
<td>—</td>
<td>35.0-38.4</td>
<td>—</td>
<td>&gt;38.5</td>
<td>—</td>
</tr>
<tr>
<td>AVPU</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>A</td>
<td>V</td>
<td>P</td>
<td>U</td>
</tr>
</tbody>
</table>
Modified Early Warning Score (MEWS) Tracker

Nurses can view lists to monitor at-risk patients for clinical deterioration

Quality managers can monitor and analyze MEWS Scores, notifications, critical care/intensive care admissions, length of stay and mortality rates

Benefits

• Rapidly identify patients who may be at elevated risk for near-term deterioration

• Evaluate individual patient risk levels using a single numeric system

• Aggregate and present the data for Rapid Response Teams to focus resources

• Provide a deeper understanding by reviewing specific contributing data

• Ensure that critical data for safety monitoring is readily available

Analytics, algorithm and tools to identify at-risk patients, enabling hospitals to improve patient safety by enabling earlier intervention, achieve shorter lengths of stay and reduce ICU admissions.
**Quality & Patient Safety Impact**

**Increased**
Rapid Response Team Calls

**Decreased**
"CODE BLUE" Calls
Cost Savings In a 300 Bed Hospital

Unreimbursed expenses can be limited by using data to avoid ICU admissions. Help managing ICU capacity can reduce needs for capital investments.

35
Monthly ICU admissions for ABC Hospital

14
Admissions that could be avoided (McQuillan 1998)

$2,700
Average reimbursement shortfall for an ICU admission \(^1\). (HFMA July 2006)

$453,600
Potential Annual Savings by Using MEWS

Moving Forward
## Diverse Data for Integrated, Accountable Care

A foundational network in the community, enabling insights and innovative workflows

### Innovative, meaningful and actionable

<table>
<thead>
<tr>
<th>Component</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application Ecosystem</td>
<td>• Clinical, financial and operational workflow enablement &amp; automation</td>
</tr>
<tr>
<td>BI/Analytics</td>
<td>• BI tool integration</td>
</tr>
<tr>
<td></td>
<td>• Analysis and reporting</td>
</tr>
<tr>
<td>Development Platform</td>
<td>• Enabling innovation across customer and external development teams</td>
</tr>
<tr>
<td>Rich, normalized data asset</td>
<td>• Longitudinal patient record</td>
</tr>
<tr>
<td></td>
<td>• Ingest, aggregate and normalize</td>
</tr>
<tr>
<td>Health Information Exchange</td>
<td>• Data transport and interoperability</td>
</tr>
<tr>
<td></td>
<td>• Provider communications</td>
</tr>
</tbody>
</table>

**Power of the complete solution**
# CCHIT ACO HIT Framework

## Key Processes and Functions to Meet the Aims of ACOs

<table>
<thead>
<tr>
<th>Care Coordination</th>
<th>Cohort Management</th>
<th>Patient &amp; Caregiver Relationship Management</th>
<th>Clinician Engagement</th>
<th>Financial Management</th>
<th>Reporting</th>
<th>Knowledge Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access real time health insurance coverage information</td>
<td>Identify cohort from within entire patient population</td>
<td>Basic information services</td>
<td>User friendly, timely and actionable Clinical Decision Support (CDS)</td>
<td>Administrative simplification for operations</td>
<td>Retrieve Data specific to measures</td>
<td>User friendly, timely and actionable Clinical Decision Support (CDS)</td>
</tr>
<tr>
<td>Establish payer relationships</td>
<td>Monitor individual patients</td>
<td>Administrative simplification for patients</td>
<td>Standard clinical assessment tools</td>
<td>Normalized and integrated data</td>
<td>Store quality metric data</td>
<td>Personalize patient specific information</td>
</tr>
<tr>
<td>Establish provider relationships</td>
<td>Clinical Decision Support</td>
<td>Patient educational services</td>
<td>Well defined care teams</td>
<td>Health assessment of entire patient population</td>
<td>Calculate quality measures</td>
<td>Create and share clinical knowledge</td>
</tr>
<tr>
<td>Share clinical data during transitions of care</td>
<td>Patient engagement within cohort</td>
<td>Patient communication</td>
<td>Communication within organization</td>
<td>Patient attribution algorithms</td>
<td>Report quality metrics for internal use</td>
<td>Create and share process improvement knowledge</td>
</tr>
<tr>
<td>Identify best setting for care</td>
<td>Engage preferred providers and clinicians in care teams</td>
<td>Patient engagement in care</td>
<td>Communication external to organization</td>
<td>Performance reports</td>
<td>Report measures to external designated entities</td>
<td>Support comparative effectiveness research</td>
</tr>
<tr>
<td>Identify social &amp; community supports</td>
<td>Shared care management plan</td>
<td>Patient assumption of care responsibilities</td>
<td>Administrative simplification for providers</td>
<td>Risk sharing analytics</td>
<td>Report data required for syndromic surveillance</td>
<td></td>
</tr>
<tr>
<td>Manage referrals</td>
<td>Interventions</td>
<td>Monitor patient goals and outcomes</td>
<td>Usability of HIT</td>
<td>Payer contract management</td>
<td>Public Health reporting</td>
<td></td>
</tr>
<tr>
<td>Patient-centric medication management</td>
<td>Follow up</td>
<td>Patient experience of care surveys</td>
<td>Comprehensive educational systems for clinicians</td>
<td>Provider contract management</td>
<td>Registry reporting</td>
<td></td>
</tr>
<tr>
<td>Clinical information reconciliation</td>
<td>Monitor cohort</td>
<td></td>
<td>Community based resources</td>
<td>Cost accounting</td>
<td>Report resource consumption for internal use</td>
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</tr>
</tbody>
</table>

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# Continuity of Care Maturity Model

<table>
<thead>
<tr>
<th>STAGE 0</th>
<th>Limited to No E-communication</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAGE 1</td>
<td>Basic Peer-to-Peer Data Exchange</td>
</tr>
<tr>
<td>STAGE 2</td>
<td>Patient Centered Clinical Data using Basic System-to-System Exchange</td>
</tr>
<tr>
<td>STAGE 3</td>
<td>Normalized Patient Record using Structural Interoperability</td>
</tr>
<tr>
<td>STAGE 4</td>
<td>Care Coordination based on Actionable Data using a Semantic Interoperable Patient Record</td>
</tr>
<tr>
<td>STAGE 5</td>
<td>Community Wide Patient Record using Applied Information with Patient Engagement Focus</td>
</tr>
<tr>
<td>STAGE 6</td>
<td>Closed Loop Care Coordination Across Care Team Members</td>
</tr>
<tr>
<td>STAGE 7</td>
<td>Knowledge Driven Engagement for a Dynamic, Multi-vendor, Multi-organizational Interconnected Healthcare Delivery Model</td>
</tr>
</tbody>
</table>

*Image: *HIMSS Analytics Continuity of Care Maturity Model
An Eye Toward the Future

While retrospective reporting is important… a significant opportunity for the future is in real time analytics that supports predictive risk and surveillance for insight, decision-making and action for individual care management and populations.

That is our future

An opportunity and challenge for Clinical Informatics
Thank you!

Dana Alexander RN
dana.alexander@caradigm.com
#danaN2health
TOOLS

• An Introduction to the HIMSS Clinical Business Intelligence Primer


• All HA maturity models: