Population Health and Cerner’s Approach

Peter Smart
Senior Director, Analytics at Cerner
Talking Points

• Industry Shift to Population Health
• Cerner’s Approach
Cerner Today
Cerner today

- Over 22,000 Associates
- Over 5,431 Hospitals
- Over 450,000 Physician Users
- 5,594 Physician Practices
- 3,888 Extended Care Facilities
- 98 clients named Health Care’s 2015 Most Wired
- 52 client hospitals named US News and World Report Most Connected
- 345+ Patents Worldwide
- Over 20,000 Client Facilities
- Over 30+ Countries
- 414 Acute Clients
- 184 Ambulatory Clients
- $4.9B Cumulative R&D Investment
- $4.4 Billion 2015 Revenue

Updated 4/2016
Investing in innovation

Cumulative R&D

$4.9B+

$685M R&D investment in 2015

Cerner R&D investment

47% growth YOY 2014 to 2015

*Dollars in millions

* Includes additive spending from Siemens H.S. R&D-Values reflect Gross R&D (before capitalization and amortization)
World-class technology

2016 top inpatient EHR vendor

#1 Hospital chains, system and IDNS
#1 Community Hospitals (101-250 beds)

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Great product & market overall grades

A leader in vision and execution

Cerner is in the leaders quadrant for enterprise EHR systems

Scores well above industry average

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Move to Population Health
## EXHIBIT ES-1. OVERALL RANKING

### COUNTRY RANKINGS
- **Top 2***
- **Middle**
- **Bottom 2***

### OVERALL RANKING (2013)

<table>
<thead>
<tr>
<th>Country</th>
<th>AUS</th>
<th>CAN</th>
<th>FRA</th>
<th>GER</th>
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### Health Expenditures/Capita, 2011**

- **AUS**: $3,800
- **CAN**: $4,522
- **FRA**: $4,118
- **GER**: $4,495
- **NETH**: $5,099
- **NZ**: $3,182
- **NOR**: $5,669
- **SWE**: $3,925
- **SWIZ**: $5,643
- **UK**: $3,405
- **US**: $8,508

**Notes:** * Includes ties. ** Expenditures shown in $US PPP (purchasing power parity); Australian $ data are from 2010.

What Is Population Health?

As an approach, population health focuses on interrelated conditions and factors that influence the health of populations over the life course, identifies systematic variations in their patterns of occurrence, and applies the resulting knowledge to develop and implement policies and actions to improve the health and well-being of those populations.\[1\]

Determinants of Health

- Biology and Genetics
- Individual Behavior
- Health Services – Public Health
- Social Factors
- Policymaking

Aim for 21st Century Healthcare

Safe
Effective
Patient-Centered
Timely
Efficient
Equitable

Health care quality and the IOM reports

• In recent times, driven by “triple aim” [3]
  • Better health
  • Better healthcare
  • Lower cost

• Quality measured in three categories at individual and organizational levels [4]
  • Structural – factors that make it easier or harder to deliver high-quality care
  • Process – factors describing healthcare content and activities,
  • Outcomes – changes attributable to care

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| Access           | 8   | 9   | 11  | 2   | 4    | 7  | 6   | 4   | 2    | 1  | 9  |
| Cost-Related Problem | 9   | 5   | 10  | 4   | 8    | 6  | 1   | 7   | 1    | 11 | |
| Timeliness of Care | 6   | 11  | 10  | 4   | 2    | 7  | 8   | 9   | 1    | 3  | 5  |
| Efficiency       | 4   | 10  | 8   | 9   | 7    | 3  | 4   | 2   | 6    | 1  | 11 |
| Equity           | 5   | 9   | 7   | 4   | 8    | 10 | 6   | 1   | 2    | 2  | 11 |
| Healthy Lives    | 4   | 8   | 1   | 7   | 5    | 9  | 6   | 2   | 3    | 10 | |

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**Notes:**
- *Includes ties.*
- **Expenditures shown in US PPP (purchasing power parity); Australian $ data are from 2010.**

**Source:**
Shift to accountability | continuum of payment models

Fee-for-service

Pay-for-performance

Episodic bundling

Bundled and ACO Payments

Partial risk / shared savings

Full-risk: % of premium HMO

Latest CMS Announcements

Medicare w. Quality Measures

2016 85%

2018 90%

2016 30%

2018 50%

Next Gen ACO 85%-100%

Provider Accountability

Patient Centered Medical Home

Accountable Care Organization

2016

2018

30%

50%

85%

90%

85%

90%

2016

2018
Definition of an ACO

Accountable Care Organizations (ACOs) are:

groups of doctors, hospitals, and other health care providers,

who come together voluntarily to give

coordinated, high quality care to the patients they serve
ACO Patient Satisfaction – 8 measures

- CAHPS: Consumer Assessment of Healthcare Providers and Systems

<table>
<thead>
<tr>
<th>ACO #</th>
<th>Measure title</th>
<th>NQF #</th>
<th>Measure steward</th>
<th>Method of data submission</th>
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<td>ACO-1</td>
<td>CAHPS: Getting Timely care, Appointments, and Information</td>
<td>0005</td>
<td>AHRQ</td>
<td>Survey</td>
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<td>ACO-34</td>
<td>CAHPS: Stewardship of Patient Resources</td>
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## ACO Readmissions – 7 measures

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<td>ACO-8</td>
<td>Risk Standardized, All Condition Readmission</td>
<td>1789 (adapted)</td>
<td>CMS</td>
<td>Claims</td>
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<tr>
<td>ACO-35</td>
<td>Skilled Nursing Facility 30-Day All-Cause Readmission Measures (SNFRM)</td>
<td>2510 (adapted)</td>
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<td>ACO-36</td>
<td>All-Cause Unplanned Admissions for Patients with Diabetes</td>
<td>N/A</td>
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<td>ACO-37</td>
<td>All-Cause Unplanned Admissions for Patients with Heart Failure</td>
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<td>ACO-38</td>
<td>All-Cause Unplanned Admissions for Patients with Multiple Chronic Conditions</td>
<td>N/A</td>
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<td>Ambulatory Sensitive Conditions Admissions: Chronic Obstructive Pulmonary</td>
<td>0275</td>
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<td>Disease (COPD) or Asthma in Older Adults</td>
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<td>ACO-10</td>
<td>Ambulatory Sensitive Conditions Admissions: Heart Failure</td>
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# ACO Quality – 18 measures

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<td>Documentation of Current Medications in the Medical Record</td>
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<td>ACO-13 (CARE-2)</td>
<td>Falls: Screening for Future Fall Risk</td>
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**Domain: Preventive Health**

| ACO-14 (PREV-7) | Preventive Care and Screening: Influenza Immunization | 0041 | AMA/PCPI        | GPRO WI                    |
| ACO-15 (PREV-8) | Pneumonia Vaccination Status for Older Adults        | 0043 | NCQA            | GPRO WI                    |
| ACO-16 (PREV-9) | Preventive Care and Screening: Body Mass Index Screening and Follow-Up | 0421 | CMS             | GPRO WI                    |
| ACO-17 (PREV-10) | Preventive Care and Screening: Tobacco Use: Screening and Cessation Intervention | 0028 | AMA/PCPI        | GPRO WI                    |
| ACO-18 (PREV-12) | Preventive Care and Screening for Clinical Depression and Follow-up Plan | 0418 | CMS             | GPRO WI                    |
| ACO-19 (PREV-6) | colorectal Cancer Screening                          | 0034 | NCQA            | GPRO WI                    |
| ACO-20 (PREV-5) | Breast Cancer Screening                               | N/A   | NCQA            | GPRO WI                    |

**Domain: Hypertension**

| ACO-21 (PREV-11) | Preventive Care and Screening: Screening for High Blood Pressure and Follow-Up Documented | N/A   | CMS             | GPRO WI                    |
| ACO-22 (PREV-13) | Statin Therapy for the Prevention and Treatment of Cardiovascular Disease               | N/A   | CMS             | GPRO WI                    |

**Domain: Ischemic Vascular disease**

| ACO-30 (IVD-2) | Ischemic Vascular Disease: Use of Aspirin of Another Antithrombotic | 0068 | NCQA            | GPRO WI                    |

**Domain: Heart failure**

| ACO-31 (HF-6) | Heart Failure: Beta-Blocker Therapy For Left Ventricular Systolic Dysfunction | 0083 | AMA/PCPI/ACC/AHA | GPRO WI                    |

**Domain: Coronary artery disease**

| ACO-33 (CAD-7) | Coronary Artery disease: Angiotensin-Converting Enzyme Inhibitor or Angiotensin Receptor Blocker Therapy—Diabetes or Left Ventricular Systolic Dysfunction (LVEF < 40%) | 0066 | AMA/PCPI/ACC/AHA | GPRO WI                    |
15 Medicare Shared Savings ACOs that generated the most savings in 2013

In performance year one, Medicare Shared Savings Program accountable care organizations with April 2012 and July 2012 start dates held spending to $652 million below their targets, according to CMS.

Here are the 15 MSSP ACOs that generated the most savings in performance year one.

1. Houston-based Memorial Hermann ACO — $57.83 million
2. Palm Springs, Fla.-based Palm Beach ACO — $39.57 million

Top MSSP ACOs in quality, shared savings for 2015

In the fourth performance year of the Medicare Shared Savings Program — 2015 — accountable care organizations generated net savings of $429 million for Medicare and improved quality performance on several different measures, according to data released Thursday by CMS.

About 30 percent of the 393 ACOs participating in 2015 earned shared savings, marking a steady growth in the proportion of ACOs that have generated shared savings. Many improved in quality, too. In four particular measures, the average quality performance score improved by more than 15 percent: screening for fall risk, depression screening and follow-up, blood pressure screening and follow-up and administering pneumonia vaccinations.

Here are the top 10 ACOs that led the way in shared savings in 2015, all of which are in Track 1 of the program.

1. Memorial Hermann ACO (Houston) — $41,912,527
2. Palm Beach ACO (Palm Springs, Fla.) — $33,834,657
3. Advocate Physician Partners Accountable Care (Rolling Meadows, Ill.) — $33,537,591
4. Millennium Accountable Care Organization (Fort Myers, Fla.) — $17,636,121
5. Atlantic ACO (Morgantown, N.J.) — $16,719,376
6. Cleveland Clinic Medicare ACO — $16,614,051
7. Hackensack (N.J.) Alliance ACO — $15,640,878
8. UT Southwestern Accountable Care Network (Dallas) — $14,188,861
9. Orange Accountable Care of South Florida (Miami Lakes, Fla.) — $13,442,691
10. RVG ACO Health Providers (Donna, Texas) — $12,619,152

Accountable Care IPA — $27.92 million

Stable Care — $24.68 million

Care Medical Group — $21.91 million

CO — $21.69 million

— $21.51 million

— $20.24 million

19.88 million

as — $19.40 million

Southeast Wisconsin — $17.70 million

million

— $17.03 million

million

in — $14.97 million
Bundled Payments

Patient has 2-day stay with primary dx ICD10 of ‘0SRU0JZ’ (LKJ Replacement) ~ MS-DRG of 470.

30-day SNF visit

Rehab 4x/week for 2 months

8/14
$13,464
$19,964 (trigger)

9/14
$8,994

10/14
$2,611

11/14
$2,600

$2,611

$14,205 (trailing)

= $34,169
How do providers keep track?

Ok, is this patient on Medicare, Aetna, or Anthem? What measures do they have to meet?
How Do Providers Feel?
What Makes Us Healthy

- 10% Access to Care
- 20% Genetics
- 20% Environment
- 50% Healthy Behaviors

What We Spend On Being Healthy

- 4% Healthy Behaviors
- 8% Other
- 88% Medical Services

Taken from: http://www.tbf.org/tbf/56/~/media/3A4F43041179488CB0D8D523268FE8F4.pdf
The Next Generation

Business Model Shifts

- Reactive Sick Care
- Fragmented Care
- Reward for Volume

Proactive Management of Health
Cross-Continuum System of Care
Rewarded for Quality, Safety and Efficiency

Health IT Shifts

- Record
- Transaction-Oriented
- Provider Enablement

Plan
Intelligence-Oriented
Consumer Enablement
Fragmented and reactive care delivery approach

67-year-old patient with a history of heart failure, poor understanding of disease, poor compliance with diet and medications.

$45,000+
spent in health care costs

TYPICAL CARE

- Paper Clipboards
- Siloed Record
- Prolonged ED Visit
- Heart Failure Order Set
- Redundant Assessments
- Nursing Documentations
- More …

Longitudinal, proactive and personalized care delivery approach

67-year old patient with personalized plan for health that includes education, nutrition, maintenance meds, quarterly GP visits and proactive surveillance.

$5,000+
spent in health care costs

EVIDENCE DRIVEN, LONGITUDINAL CARE

Episode of Care
- Care Process Models
- Adaptive Order Sets
- Smart Referrals
- Readmission Risk Prediction
- Transition of Care
- More …

67-year old patient with personalized plan for health that includes education, nutrition, maintenance meds, quarterly GP visits and proactive surveillance.

$24,000+
spent in health care costs

Longitudinal, proactive and personalized care delivery approach

67-year-old patient with a history of heart failure, poor understanding of disease, poor compliance with diet and medications.

$7,000+
spent in health care costs

Longitudinal, proactive and personalized care delivery approach
Centralized data aggregation
Common Approach to Pop Health Solutions

- Contract Mgmt.
- Registry
- Scorecards
- Med Mgmt.
- Risk Modeling
- Patient Record
- Network Mgmt.
- Analytics & EDW
- Care Mgmt.
Cerner’s Approach

- Contract Mgmt.
- Analytics & EDW
- Scorecards
- Patient Record
- Network Mgmt.
- Registry
- Med Mgmt.
- Risk Modeling
- Care Mgmt.

HealtheIntent
HealtheIntent platform

Aggregate and normalize

Create and apply intelligence

Act and measure
Aggregate and normalize

Create organized, meaningful concepts

<table>
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<tr>
<th>LOINC</th>
<th>ICD-10</th>
<th>Medi-Span</th>
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<tbody>
<tr>
<td>NDC</td>
<td>ICD-9</td>
<td>MEDCI</td>
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</tbody>
</table>

- Allergies
- Conditions
- Immunizations
- Lab results
- Medications
- Procedures
- Visits
- Vitals

Medications
- Most recent
  - Aspirin 300 mg oral delayed release tablet
  - ASA 500 MG Oral Tablet [Bayer Aspirin]
- Aspirin
  - 3/24/2014
  - Westwatch Bay
  - Mar 13, 2016
  - Aspirin (Multum ID0170)
  - 10/17/2013
  - Westwatch Bay
  - 4/23/2013
  - Get Well Now
  - 9/23/2013
  - Westwatch Bay
  - 2/18/2013
  - Westwatch Bay
  - 5/14/2012
  - Baseline East
  - 6/20/2011
  - Get Well Now

Match persons

Identify like-reference records

- SSN
- First name
- Last name
- Phone
- Address
- Race
- Gender
- Ethnicity

Determine similarity score to confirm records match

Assign unique EID number to linked records

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<th>Record ID A</th>
<th>Record ID B</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 Main, Lenexa, KS</td>
<td>10/30/75</td>
<td>SN 111-22-1234</td>
</tr>
</tbody>
</table>
Create and apply intelligence

Infer new knowledge

Un-diagnosed individual

Allergies

Medications

Conditions

Procedures

Immunizations

Visits

Lab results

Vitals

5' 10"

129/85 mm Hg

210 lbs.

3,200 steps / day

Pre-hypertension?

Hyperlipidemia registry

Measure, monitor and predict health status

REMINDER: Appointment

Clinic

ADD: New health goal

Community care manager

ALERT: High blood pressure

Physician

MESSAGE: Pollen alert

Family

ADD: Diagnosis

EHR

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Act and measure

Access record and plan anywhere, anytime

Create ecosystem of innovation

Longitudinal record
Registries and scorecards
Community care management
Enterprise data warehouse
Referral and network management*
Contract management*
Consumer relationship management*

*Future planned solutions.

SMART on FHIR
APIs

Software development toolkit
Data syndication

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Standardize - proprietary code standardization

- Match proprietary data to standard clinical terminology codes
- Allows data to be recognized and utilized in algorithms and reporting
- Clinical experts review proprietary codes and assign industry standards

- Medical Laboratory Scientists
- Registered Nurses
- PharmDs
- Pharmacy Technicians
Normalize - creating the concept

- **Concept** – a grouping of standards terminology codes that are being treated semantically equivalent
- **Context** – a grouping of concepts for a particular purpose

Influenza vaccine

- Vaccination codes
  - CVX: 88
  - CVX: 111
  - NDC: 42874001301

- Procedure codes
  - CPT: 90724
  - CPT: 90660

Terminology service

- Proprietary Millennium codes
  - 166603079
  - 207789903
  - 2361

- Proprietary Meditech codes

- Millennium sending standards

- Claims sources sending standards

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Registries and scorecards: HealtheRegistries

Using registries and scorecards, providers can:

- **Identify people:** What is this person's latest health and care data?
- **Include people in the appropriate registries:** According to this person's health and care data, is he or she diabetic or hypertensive?
- **Attribute people to the right providers:** Who is the person's primary care provider?
- **Pinpoint gaps in care:** If this person is diabetic, has he or she had a foot exam or A1C test?
- **Measure outcomes:** Is the person's A1C being managed?
- **Monitor at the person or population level:** What should the clinician focus on for this person or population?

- Identifies a population for registries and appropriate measures
- Provides visibility to the quality measures for the provider’s population and performance
- Produces client-defined, performance scorecards at specific or rollup levels
- Provides executive dashboards with drill-down capabilities
HealtheRegistries: available registries

Cerner registries

Chronic disease
- Atrial fibrillation
- Asthma
- COPD
- Depression
- Diabetes
- Heart failure
- Hepatitis C
- Hyperlipidemia
- Hypertension
- IVD/CAD
- Kidney disease
- Rheumatoid arthritis

Pediatric chronic disease
- Asthma
- Cardiomyopathy
- Diabetes
- Epilepsy
- Inflammatory bowel disease

Cancer
- Breast cancer
- Colon cancer
- Leukemia
- Prostate
- Myelodysplastic syndrome

Acute conditions
- Ambulatory urgent care
- Back pain

Wellness
- Adult wellness
- Adolescent wellness
- Childhood wellness
- Comprehensive adult wellness
- Maternity health
- Pediatric wellness
- Senior wellness

UK registries
- COPD
- Pediatric Diabetes
- Adult Diabetes
- Pediatric Asthma
- Adult Asthma

Industry registries

ACO registries
- MSSP 2016 quality measures
- MSSP 2016 event-based quality measures

HEDIS-based registries
- Administrative measures
- Event-based measures
- Hybrid measures

Cancer
- Breast cancer
- Colon cancer
- Leukemia
- Prostate
- Myelodysplastic syndrome

Acute conditions
- Ambulatory urgent care
- Back pain

Wellness
- Adult wellness
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- COPD
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Industry registries

ACO registries
- MSSP 2016 quality measures
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HEDIS-based registries
- Administrative measures
- Event-based measures
- Hybrid measures

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Embedded Content to Drive Value

Benchmarks

- CMS
- Hospital General Information
- Healthcare Associated Infections
- Readmissions, Complications, & Death
- Value Based Purchasing Scores
- Timely & Effective Care
- Outpatient Imaging Efficiency
- Relative Value Units
- Hospital Acquired Condition
- Heart Attack Payment Data
- Hospital ACS Measures
- Medicare Hospital Spending by Claim
- Medicare Volume
- Outpatient Procedures Volume
- Measure Dates
- HCAHPS
- Medicare Prescribing Data

Evidence-based Algorithms*

- 3M
  - Potentially Preventable Events
  - MS-DRG Grouper
  - MDC Grouper
  - Service Categorizations
  - Episode Groupers
  - Benchmarks

- NYU
  - Emergency Department Visit Classification

- Truven Health Analytics
  - Service Categories

- Milliman
  - MARA Prospective risk score
  - MARA Retrospective risk score

- Cerner
  - HCC Suggested Diagnosis
  - HCC Persistence Diagnosis
  - Recommended Transition of Care
  - Readmission Risk
  - Sepsis Risk

- HealthPartners
  - TCRV/TCOC

Reference

- CDC
  - Social Vulnerability Index
- Tract-Zip & Zip-tract
- American Time Use Survey
- NPPES

*Some content requires corresponding Analytics package
277+ HealthIntent data connections and counting

*Information is current as of May 2016

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Adoption of Cerner’s Population Health Platform

**DATA VARIETY**
- 360+ total data connections
- 24 connected EHR systems (Epic, Allscripts...)
- $39 connected claims & payer vendors

**SCALABILITY**
- 32M+ linked disparate records
- 109 Clients
  - ACOs, DSRIP, Bundles, APM, Employer
- 88M Lives

**INTELLIGENCE**
- 41 registries; 598+ measures
- 95% of records linked using machine intelligence
- 55 standard terminologies; 1.5M terminology codes grouped

*Information is current as of October 2016*
Developing HealtheIntent, creating new technology

**Advocate Health Care and Advocate Physician Partners**
Downer’s Grove, Ill. | 3,300 beds | 4,600 physicians

**Goal**
To create the technology infrastructure to enable enterprisewide change

- 39 data connections from claims, labs, and disparate EHRs
- 12 hospitals
- 14,670+ unique users with HealtheIntent access
- 5,000+ providers
- 86,500 at-risk covered lives within HealtheIntent

- 76.5% asthma control rate
  26% above national average
- 33% reduction in high-risk medication use
Memorial Hermann’s analyzes performance

Understand performance related to cost, quality and utilization

Leveraged measures in registries

Included measures across seven at-risk contracts and payers

Created initial set of measures, dashboards and analytic experiences

• Network leakage patterns and revenue opportunities
• Performance on value-based contracts
• Provider performance
• Post-acute network utilization

“We never really knew how well we were performing at a population, regional, hospital, practice or provider level…and with HealtheIntent we can. We now have insight that payers do not have.”

Amanda Hammel
Vice President, IT Operations and Population Health
Memorial Hermann Health System

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Quality Measures

Plan Contract Quality Measures

Choose a Plan

<table>
<thead>
<tr>
<th>Plan</th>
<th>Humana MA</th>
<th>MSSP</th>
<th>BCBS PPO</th>
<th>Humana Commercial</th>
<th>Aetna Commercial</th>
<th>Aetna MA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>30%</td>
<td>32%</td>
<td>37%</td>
<td>37%</td>
<td>37%</td>
<td>46%</td>
</tr>
</tbody>
</table>

Humana MA has a total met percentage on all measures of 30%

Measure Met Percentage Compared to Target

- Aetna Commercial
  - Blood Pressure < 140/90 mm Hg
  - LDL < 100 mg/dL
  - HbA1c < 8%
  - HbA1c Screening
  - Breast Cancer Screening
  - Beta Blocker Therapy
  - Colorectal Cancer Screening
  - ACEI/ARB Therapy

- Aetna MA
  - Blood Pressure < 140/90 mm Hg
  - LDL < 100 mg/dL
  - HbA1c < 8%
  - HbA1c Screening
  - Breast Cancer Screening
  - Beta Blocker Therapy
  - Colorectal Cancer Screening
  - ACEI/ARB Therapy

- BCBS PPO
  - Blood Pressure < 140/90 mm Hg
  - LDL < 100 mg/dL
  - HbA1c < 8%
  - HbA1c Screening
  - Breast Cancer Screening
  - Beta Blocker Therapy

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Avoidable Spend

$1.6M avoidable total paid charges
$3.7M total paid charges
43% total avoidable percentage

Visit Count Minimum (Provider visual only)
10

Service From Date Range
7/1/2015 9/30/2015

Provider Name: (A8)
Admitted?: (A8)

Percent of Total Cost

Color Legend
- % of Total Paid Charge
- Total Paid Charge

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C. diff Reporting

- Visibility to patients with a C. diff results, their antibiotics, and location at the time of the lab
- Through use of EDW Tools, visualizations were turned around within 1 week
Moving from 17 years half life of adoption to 17 months

From time new knowledge discovered until ½ of physicians act on that knowledge = 15 - 17 years

Adoption Half-life = 17y
Knowledge Half-life = 10y

Everett Rogers, Diffusion of Innovations, 1995
Balas, Boren. Managing Clinical Knowledge for Health Care Improvement. Yearbook of Medical Informatics 2000

“Finish medical school and residency knowing everything…read and retain 2 articles every single night…at the end of 1 year you’re only 1,225 years behind.”

W Stead. JAMIA 2005;12:113-20
Sepsis surveillance

Sepsis contributes to up to half of all hospital deaths in the U.S. according to a study by the University of Michigan. 
Source: *JAMA* doi:10.1001/jama.2014.5804


Monitoring
- Over 490 facilities
- 31,250 alerts received per hour
- 748,250 alerts received per day

Operating Characteristics
- Sensitivity 68-91%
- Specificity 91-97.6%
Advanced Algorithm to Prevent Readmissions

Readmission Risk Factors Analyzed > 700

**Prediction Models**

<table>
<thead>
<tr>
<th>Model</th>
<th>C-Stats*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early ACC Model</td>
<td>0.78</td>
</tr>
<tr>
<td>Previous Model</td>
<td>0.69</td>
</tr>
<tr>
<td>Average models reviewed in JAMA¹</td>
<td>0.66</td>
</tr>
<tr>
<td>CMS Models²</td>
<td>0.66</td>
</tr>
</tbody>
</table>

---

**30-Day Readmissions**

- **Medications**
  - e.g., Past & Present Medications, Polypharmacy

- **Conditions**
  - e.g., Past & Present Conditions

- **Procedures**
  - e.g., Past & Present Procedures

- **History & Physical Exam**
  - e.g., Vitals, Body Mass Index, etc.

- **Utilization**
  - e.g., Number of visits past 6 & 12 months, etc.

- **Demographics & Social**
  - e.g., Age, Gender, Race, etc.

- **Lab Tests**
  - e.g., Past & Present Lab Results

- **Exploratory**
  - e.g., Environmental, Interactions, etc.

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² Hospital-Wide All-Cause Unplanned Readmission Measure (HWARM). Average c-statistic across specialty cohorts. NOF #1789

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What Makes Us Healthy

- 10% Access to Care
- 20% Genetics
- 20% Environment
- 50% Healthy Behaviors

What We Spend On Being Healthy

- 4% Healthy Behaviors
- 8% Other
- 88% Medical Services
Thank You!