



Systems | Standards | Data | Analytics

### **Advanced Analytics in Healthcare**

Using data and analytics to improve quality, financial outcomes and patient satisfaction for Accountable Care Organizations

August 24, 2015

## Healthcare Data Conundrum

We are drowning in data but starving for knowledge! - unknown author

It is a capital mistake to theorize before one has data. Insensibly one begins to twist facts to suit theories, instead of theories to suit facts. - Sherlock Holmes

## **Healthcare** Icons





## Healthcare Data

- 10 X 30<sup>th</sup>
- Growing at 40% annually
- Largely unstructured audio dictation, clinical narratives, personal monitors and sensors, images, EMRs, email/text, social media, applications
- 1000's of EMRs that don't talk to one another
- Less than 10% of all ACOs in the U.S. are focusing on analytics
- 60% haven't even started!

# **The Value of Data**



## Healthcare Landscape

- Movement from volume-based value-based
- PCP and Nursing shortages require greater efficiency and effort to achieve patient satisfaction
- Entrenched inefficiencies in care caused by poor gathering, sharing and use of information
- Rising inpatient costs and readmissions
- Pervasiveness of chronic illnesses with patients living longer
- Patients not fully engaged in their care plans
- Timely, actionable intelligenge is missing; Physicians need to be armed with tools to make them successful

# **Technology Adoption**

### Technology adoption

Years until used by one-quarter of American population



# Handheld Healthcare



# **Personal Health Monitoring**



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# **Engaging in Home Health**



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# **Alternative Delivery Channels**



### TELEHEALTH SERVICES SURGING

Leading reasons for Teladoc visits by children and adults

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Acute respiratory illusions	1,151	.MA			
Urinary Insul Infections and unitary symptos	ene 438	0.00			
Skin problems	0.6	9.9.			
Abdominal pairs, non-bing and disortes	alari -	. 62			
Back and joint problems	-190	65			
Influenza and general viral illevases	112	425			
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Eye probleme	100	57			
Ear industriants interval and externals	137	.32			
All others	756	101			



### Artificial intelligence and psychology The computer will see you now

A virtual shrink may sometimes be better than the real thing

Aug 16th 2014 | From the print edition

() Timekeeper



# The Promise of ACOs

- Improve clinical outcomes through effective care coordination between care team and patient, and determining patient-provider attribution
- Streamline operations and reduce practice costs by measuring the true costs of care delivery and determination of patient-provider attribution
- Create actionable insights from data through improved understanding of risk adjustment and at-risk populations
- Acquire and integrate pertinent external clinical, demographic, socioeconomic, and geographical data for higher patient engagement, retention and satisfaction
- Develop personalized health and wellness programs that successfully meet the financial needs of both providers and consumers
- Manage patients with chronic illness or poor adherence individually and innovatively





### **Business Value**

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## **Healthcare Analytics**







# **Integrating Big Data**



### **Foundational Analytics Assessment**



# **Big Data – Data Integration**



# **Big Data – Data Mining**

### **Cluster analysis**

involves determining which records are closely grouped

Anomaly detection looks for unusual records in the data

Association mining attempts to determine where dependencies occur in the data



# **Big Data – Predictive Model**

**Regression** models describe the linear relationship between a target variable and a set of predictor variables (Logistic for Binary)

Decision trees involve multiple variable analysis that enables you to go beyond simple one-cause, one-effect relationships Figure 1. Relationship between opioid prescribing rate (per 1,000 OPDPeligible population) and opioid-related mortality rate (per 100,000 population) among Ontario counties





# **Big Data – Unstructured Data**

### Text, Web and Sentiment Analytics

- 85% of healthcare data is in unstructured formats
- Uses sophisticated linguistic rules and statistical methods to evaluate text
- Automatically determines keywords and topics, categorizes content, manages semantic terms, unearths sentiment and puts things in context
- Visualization supports easy, perceptual inference of relationships that are otherwise more difficult to induce through typical tabular or graphically static formats
- **Real-Time** analytics from systems and devices which immediately supply patient data to improve coordination of care and outcomes

## **Little Data**

- Extremely powerful
- Grain and drill-down
- Define a metric
- Trend analysis
- Simple ways to visualize and digest
- Big Data techniques on a very limited but vital set of problems

# **Operational Analytics**

### Amherst's Caring Pediatric Dentist, Growing Smiles

Growing Smiles follows both the American Association of Pediatric Dentists and the ... Our office is located in the beautiful suburb of Buffalo, East Amherst. 4.9 ★★★★★ Google reviews · Write a review · Google+ page

6501 Transit Rd, East Amherst, NY 14051
 (716) 580-3580

#### **Our Family**

Meet our Growing Smiles family of dental care specialists.

First Visit What you need to know before a child's first dental visit.

#### Dr. Amanda's Blog

Dr. Amanda's Blog. Welcome to Dr. Amanda's Blog! Check back ...

More results from growingwnysmiles.com »

#### Office Info

Hours and address of Growing Smiles dental locations.

#### Dental Caring

Dental Caring ...Download a Fun Brushing Chart for Your Child ...

#### Emergencies

Emergencies. 1: Permanent tooth knocked out. If your child's ...



# • Initial efforts focused only on the dissatisfied 2%

• Analytics showed 95% of those who responded (even if dissatisfied) kept their 6 month follow-up but only 61% of those who did not respond kept the appointment

- Processes put in place to 'touch' non-responders in the time before the next visit
- 92% of patients now keep their follow-up appointments

# **Patient Analytics**

Detiont Drofile



Tom

		Fallent	Aye			
Primary Dx -	Diabetes	123	67			
Disease Duration	Lives Alone	Last PCP Visi	t Date	Chro	nic Comorbi	ids
36	Yes	Jul-14		3		

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# **Provider Analytics**

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	Provider ID	Allow ed PMPM	Gaps in Care/10	000 Average HCC		
	123	\$1,400.00	400	1.21		
Risk A	Adj PMPM	Risk Adj PMPM Ra	ate (24 Month)	Gaps in Care Rate (24 Month)		
\$1,157		3.81%		0.051%		



	Provider ID	Allow ed PMPM	Gaps in Care/1000		Average HCC	
	456	\$2,100.00	650		1.85	
Risk Adj PMPM Risk Adj PMPM Ra		ate (24 Month)	Gaps	s in Care Rate (2	24 Month)	
\$1,135		2.40%		-0.093%		



Provider ID	Allow ed PMPM	Gaps in Care/1	000 Av	erage HCC	
789	\$3,800.00	900	3.2	25	
Risk Adj PMPM	Risk Adj PMPM Ra	ate (24 Month)	Gaps in	Care Rate (24	4 Month)
\$1,169 -2.20%			-24.5%		

# **Gaps in Care Analysis**

### Salient ACO Quality Measures

### SALIENT HHS d-Wise

Attribution Filters:	My ACO National ED Ou	tcomes Inpatient (	Dutcomes P	Primary Care Outo	comes At-Ris	k of Leav	ing A(	0			
	ACO GPRO Scores				<u>∎</u> ∠ ∠ <u>a</u>		D	Non-Com	pliant Benef	iciaries	▤◣↗◜▯
	ACO16 BMI Screening & Fo	llow-Up					Sur	nrise Physician	's Group		
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Risk & Quality Filters:								040020619A	1	AGUILAR	
Current HCC Range								052045627A	1	SOUS	
All								032913027A		NORBOW	
GPRO								039709743A	1	BOVER	
ACO16 BMI Screening & 🛠 🚩								010033430A		COODWIN	JODITH
								120090200A		GOODWIN	
Disease Filters:								120701049A		HODGE	
CC CAD								132307008A		TATE	TRACIE
All								40000/900A			
CC Diabetes								242900337A		ROWLAND	DANONA
All								245975424C4		MORALES	
CC Heart Failure								21307342401		ADIAS	KERBY
All								405690444A		ARIAS	IRIC
CC Hypertension								403000411A			
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### **30-Day Readmissons Dashboard**





Predictive modeling (logistic regression) used to identify members with an increased likelihood of utilizing the Emergency Room greater than 3 times in a calendar year



The model correctly predicts frequent flyers ~68% of the time for the Medicare population in this analysis

© d-Wise 2013

## **Analytics Enhance Clinical Insight**

- BIG Data techniques can only serve to enhance current intervention methods
- Analytics should not be thought of as a replacement for clinical insight
- There is a bigger need than ever for the knowledge and understanding of clinicians
- Those with medical backgrounds interpret the new sources and patterns in data to determine how outcomes might change as clinical pathways are altered

## Limitations to Big Data & Analytics

- Time to implement Lag between the labor and capital investments and productivity gains
- Shortage of Talent
- Investment in IT is NOT big data
- Industry Payors may gain at the expense of providers
- Cost for providers to implement EMRs

## Limitations to Big Data & Analytics



# Why ACOs Will Prevail

- Data is more readily available and providers have a better understanding of what to do with it
- Current software tools focus solutiuons on providers rather than health plans
- Medical schools are starting to teach and focus on teambased care
- Integration between clinical and financial systems is much easier to do today
- Quality reporting will become better and better refined to provide immediate alerts and insight for providers

# Why ACOs Will Prevail (con't)

