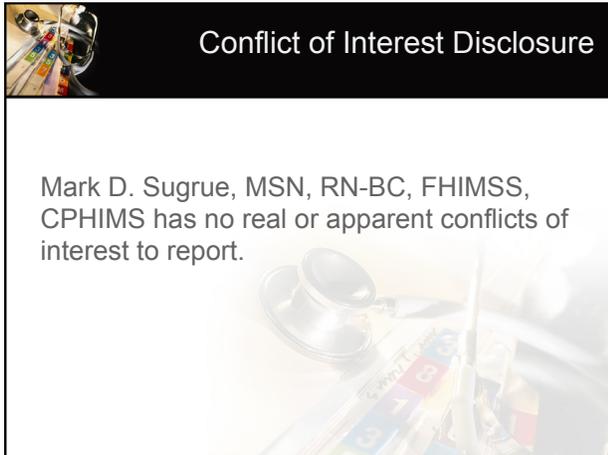




Driving Analytics to the Point of Care

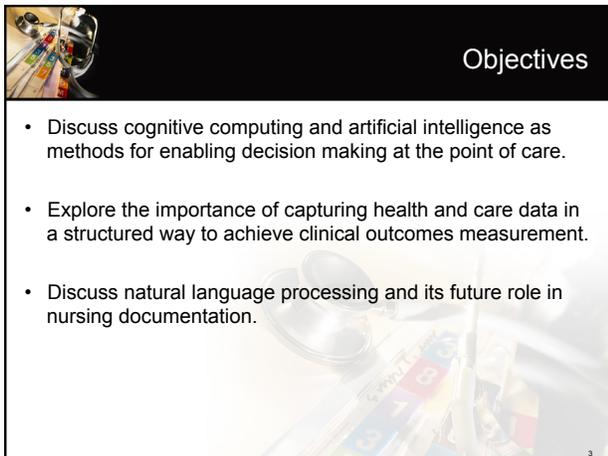
Mark D. Sugrue, MSN, RN-BC, FHIMSS, CPHIMS
April 12, 2017

New England Nursing Informatics Consortium



Conflict of Interest Disclosure

Mark D. Sugrue, MSN, RN-BC, FHIMSS, CPHIMS has no real or apparent conflicts of interest to report.



Objectives

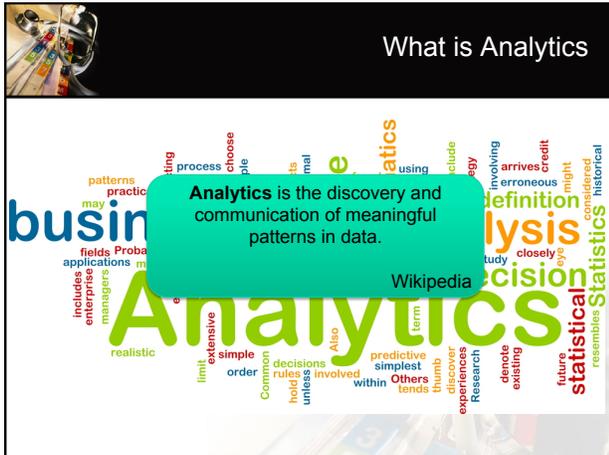
- Discuss cognitive computing and artificial intelligence as methods for enabling decision making at the point of care.
- Explore the importance of capturing health and care data in a structured way to achieve clinical outcomes measurement.
- Discuss natural language processing and its future role in nursing documentation.

3



Outline

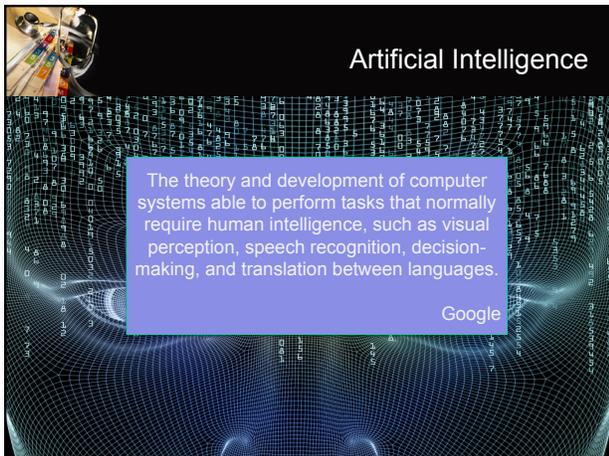
- Introduction/Definitions
- Historical Perspective
- Data & Analytics Today
- Applied Analytics
- Closing Thoughts



What is Analytics

Analytics is the discovery and communication of meaningful patterns in data.

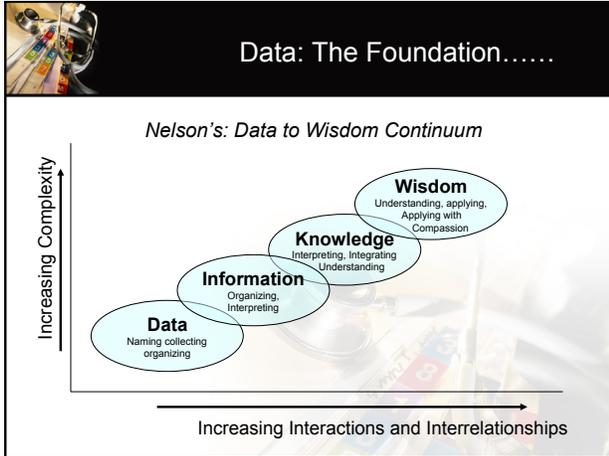
Wikipedia

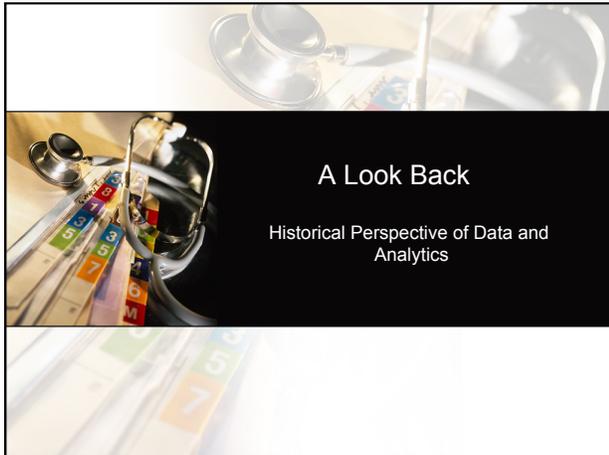


Artificial Intelligence

The theory and development of computer systems able to perform tasks that normally require human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages.

Google





Reporting and Analytics Pioneers

DIAGRAM OF THE CAUSES OF MORTALITY IN THE ARMY IN THE EAST.

APRIL 1855 to MARCH 1856 2

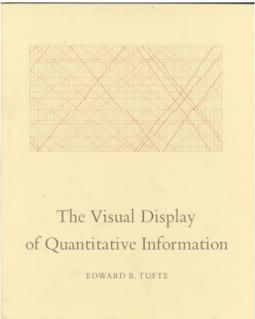
APRIL 1854 to MARCH 1855 1

The Russians were a minor enemy. The real enemies were cholera, typhus, and dysentery. Once the military looked at that eloquent graph, the modern army hospital system was inevitable

Florence Nightingale, 1856

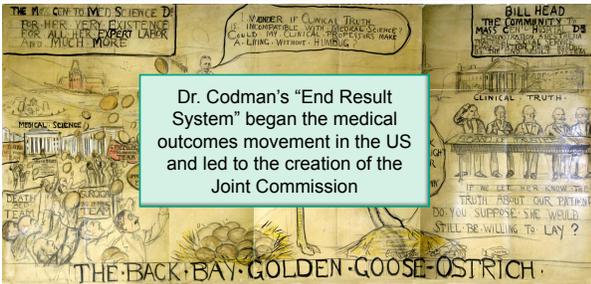
Suggested Reading.....beside Notes on Nursing

- *The Visual Display of Quantitative Information*
- Author Edward R. Tufte
- Best 100 Non-Fiction books of the 20th Century, Amazon.com



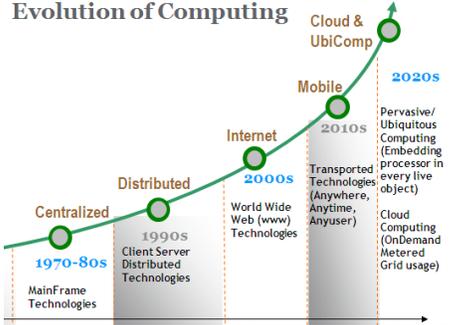
10

1915: Dr. Ernest Amory Codman



11

Evolution of Computing



12

History

We believe a historic shift in technology has occurred



1900
Tabulating



1950
Programmable



2011
Cognitive

13

Hidden Figures: Dorothy Vaughan



14

Fast Forward to the 21st
Century
"BIG DATA" !!!!

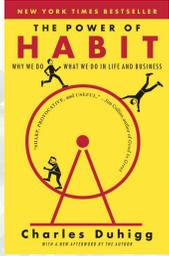
Data Today

THE WALL STREET JOURNAL 3/13/14, 5:22 PM EST The Little Black Book of Billionaire Secrets

How Target Figured Out A Teen Girl Was Pregnant Before Her Father Did

Data Today

- Ubiquitous
- The Internet of Things
- ?Privacy
- Social Media
- eCommerce



16

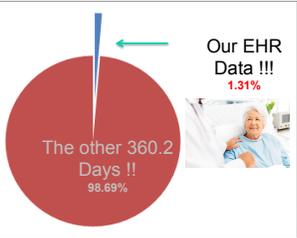
Healthcare Data and Analytics



EHR = Big Data? I Don't Think So !!

If the average length of stay in a hospital is 4.8 Days

One Year in the Life of our Patients.....



Our EHR Data !!!	1.31%
The other 360.2 Days !!	98.69%

Bigger Data



Stefano Bertozzi
 Dean and professor of health policy and management
 UC Berkeley School Of Public Health

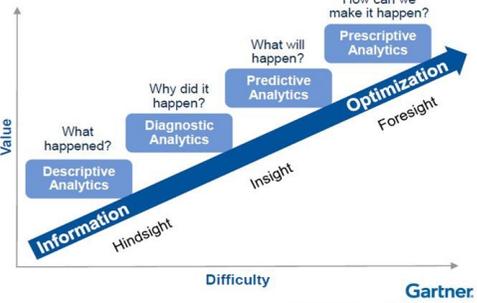
"Healthcare data is **getting bigger all the time**, just look at EHRs alone: Medical records becoming electronic, with the ability to access vast amounts of data about patients and the health system, is increasing rapidly.

....and when you **start to combine that data** with things like human resources, supply chain, characteristics of clinics and hospitals, provider training, reimbursement schemes – it just gets bigger.

When I was a graduate student, data was extensive and analysts were plentiful. Now, data is ubiquitous and **the bottleneck is our analytic capacity.**"

19

Reporting Maturity



The diagram shows a staircase of reporting maturity levels. The vertical axis is labeled 'Value' and the horizontal axis is labeled 'Difficulty'. The levels are:

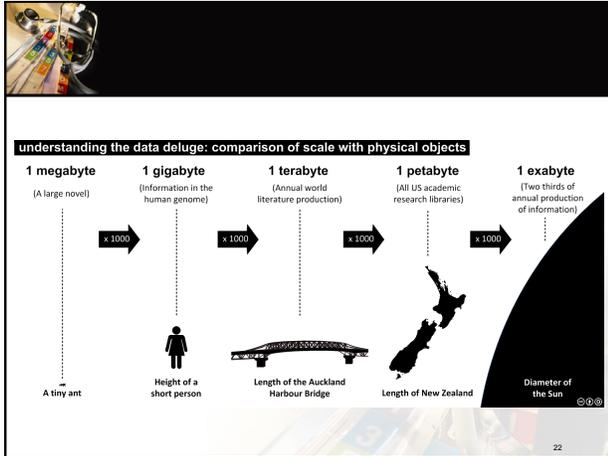
- Information** (Hindsight): What happened? (Descriptive Analytics)
- Insight**: Why did it happen? (Diagnostic Analytics)
- Optimization** (Foresight): What will happen? (Predictive Analytics)
- Optimization** (Foresight): How can we make it happen? (Prescriptive Analytics)

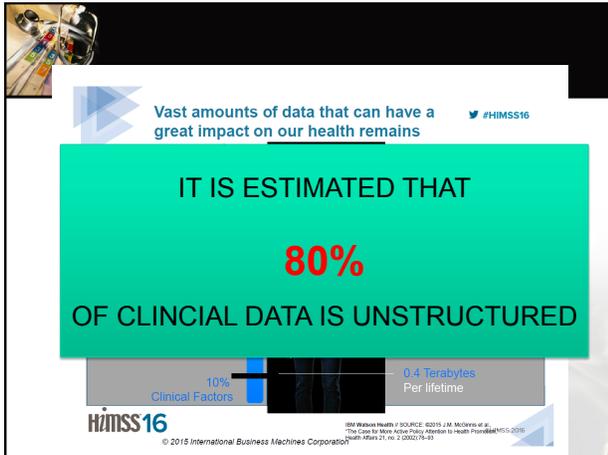
Gartner.

Data: Drinking from the fire house !!



21





Natural Language Processing

amazon alexa

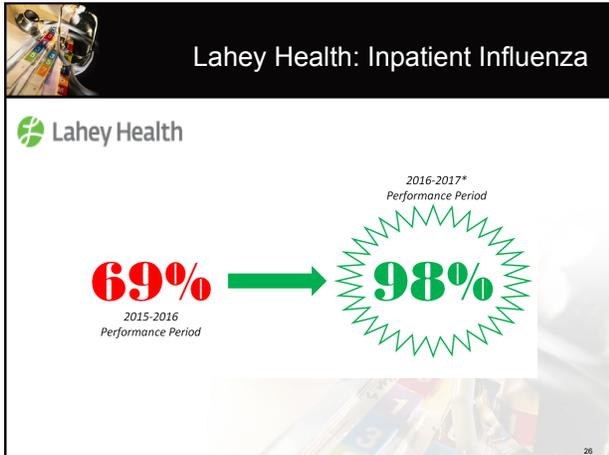
DRAGON
NATURALLY SPEAKING

Soon... Many, Many Others....



Making Data Actionable

Applied Analytics



Lahey Health

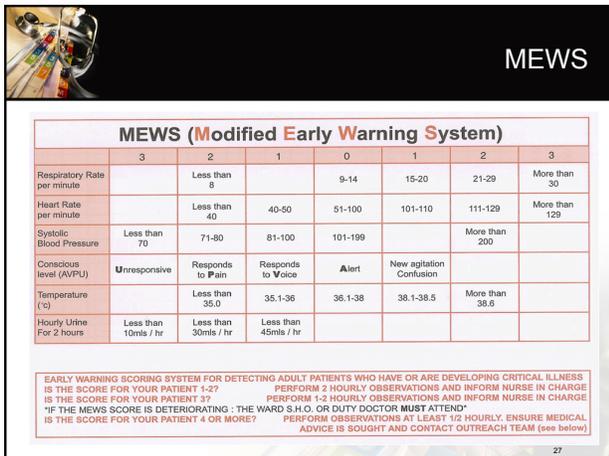
2016-2017*
Performance Period

98%

2015-2016
Performance Period

69%

26



MEWS

MEWS (Modified Early Warning System)							
	3	2	1	0	1	2	3
Respiratory Rate per minute		Less than 8		9-14	15-20	21-29	More than 30
Heart Rate per minute		Less than 40	40-50	51-100	101-110	111-129	More than 129
Systolic Blood Pressure	Less than 70	71-80	81-100	101-199		More than 200	
Conscious level (AVPU)	Unresponsive	Responds to Pain	Responds to Voice	Alert	New agitation Confusion		
Temperature (°C)		Less than 35.0	35.1-36	36.1-38	38.1-38.5	More than 38.6	
Hourly Urine For 2 hours	Less than 10mls / hr	Less than 30mls / hr	Less than 45mls / hr				

EARLY WARNING SCORING SYSTEM FOR DETECTING ADULT PATIENTS WHO HAVE OR ARE DEVELOPING CRITICAL ILLNESS
 IS THE SCORE FOR YOUR PATIENT 1-2? PERFORM 2 HOURLY OBSERVATIONS AND INFORM NURSE IN CHARGE
 IS THE SCORE FOR YOUR PATIENT 3? PERFORM 1-2 HOURLY OBSERVATIONS AND INFORM NURSE IN CHARGE
 "IF THE MEWS SCORE IS DETERIORATING - THE WARD S.H.O. OR DUTY DOCTOR MUST ATTEND"
 IS THE SCORE FOR YOUR PATIENT 4 OR MORE? PERFORM OBSERVATIONS AT LEAST 1/2 HOURLY, ENSURE MEDICAL
 ADVICE IS SOUGHT AND CONTACT OUTREACH TEAM (see below)

27

Hamilton Health Sciences

“Code Blue !!”

400 → **54**

(2006) (2016)

Sepsis: John’s Hopkins

“Computer algorithm could aid in early detection of life-threatening sepsis”

- TREWS – Targeted, Real-time, Early Warning System
- *Science Translational Medicine*, August, 2015
- Combines 27 factors to assess patient risk
- Henry, Hager, Pronovost, Saria

John’s Hopkins

BETTER MEDICINE THROUGH MACHINE LEARNING
Suchi Saria, Johns Hopkins University

SEPSIS

LEADING CAUSE OF DEATH

VERY HARD TO IDENTIFY

EVERY HOUR COUNTS

TREWS

TARGETED REAL-TIME EARLY WARNING SYSTEM

ANALYZES DATA FROM 1000s OF PATIENTS USING ELECTRONIC HEALTH RECORDS (EHR)

WORKING 24/7

SCALABLE

SOLVING A SMALL DATA PROBLEM

ML ALLOWS COMPUTERS TO LEARN

TEACHING ROBOTS TO WALK

DEFINE GOAL

SCORE EACH MOVE

LEARN FROM OTHERS

GET BEST POSSIBLE SCORE

WHAT DO WE NEED?

SMART ENGINEERS WORKING IN HEALTHCARE

OPEN EHRs

QUALITY BASED HC SYSTEM

COLLECTIVE NEXT



Johns Hopkins: Sepsis

"Our methods are reaching a point where they can be a real aid to clinicians," Saria said, "especially in noticing subtle hints, buried deep in a chart, that a problem is developing."
 "The tricky issue is thinking about **how the clinical team is provided with the information**," David Hager, MD, said. "A hospital's electronic health records system could be set up to convey alerts to clinicians via pager or cellphone at regular intervals," he said.

"But we have to do this in a way that it **is well-integrated into the existing clinical workflow** and does not cause alarm fatigue," Saria said. That is the focus of ongoing study.

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Alexa and Boston Children's Hospital

'Alexa, pull those lab results': A hospital tries out virtual assistants



32



Florence Nightingale



"The real heroes are those who find a way to improve things around them through the course of their daily lives.

In the nursing industry, there are many heroes who leave fine imprints of positive change because they deliver exceptional care to patients than what's expected of them.

Keep doing whatever you're doing and you could be one of them."

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A Closing Thought



"In God we trust, all others must bring data."
W. Edwards Deming

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Thank You and Questions !!



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