

BIG DATA AND PREDICTIVE ANALYTICS



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WHAT PHRASES INSTILL HORROR IN MOST SURGEONS?



QUESTIONS...

- WHAT IS BIG DATA?
- WHAT IS PREDICTIVE ANALYTICS?
- WHY IS IT BEING APPLIED TO MEDICINE?
- WHO IS PUSHING THIS?
 - HOSPITALS?
 - ADMINISTRATORS?
 - INSURANCE CARRIERS?
 - GOVERNMENT?





MORE IMPORTANTLY...

- HOW IS THIS GOING TO CHANGE MY PRACTICE?
- WILL A COMPUTER NOW DECIDE MY PATIENTS CARE?



WHAT IS BIG DATA?

- In medicine:
 - Data sets that have been enabled by the EMR
 - Share three characteristics:
 - Volume (massive data availability)
 - Velocity (flood-like data availability)
 - Variety (arrival of data from multiple sources with differing formats)

PREDICTIVE ANALYTICS

- That branch of analytics that makes predictions about unknown future events.



Together, the hope is that by analyzing previously unattainable massive data sets, accuracy about the prediction of future events will be enhanced.

For example: The probability of success of surgery in a specific patient.

IMAGINE...

- Being handed a summary of thousands of manuscripts analyzing every important parameter on tens of thousands of patients
 - e.g. physiologic, demographic, treatment history, medications, etc
 - Among which thousands of patients match the exact details of my patient...
- Predictions on probabilities of outcomes for my patient become vastly more accurate
 - DVT, pneumonia, infection, successful outcome
- This enables a “fact based” discussion with my patients and gives them realistic probabilities of outcomes upon which they can make their decisions
- This is true “personalized” medicine, and has to improve outcomes

FORCES PUSHING THIS INTO MEDICINE

- Success in other fields

- Increased sales from “personalized” marketing
 - Facebook, aol, google, etc.
- Prospect of improved patient care
 - Hospitals and doctors are becoming more “at risk” for payment based on patient outcome
- Cost of care is going up while reimbursement is going down
 - Gov’t is decreasing reimbursement on a yearly basis
 - Bundled payments
 - Changing “inpatient “ procedures to “observation”
 - Lengthening ”observation” period
 - Hospitals are exploring ways to decrease overhead
 - Predicting OR usage and adjusting is one area to improve efficiency
 - Knowing real probabilities of complications and how to minimize them will decrease cost

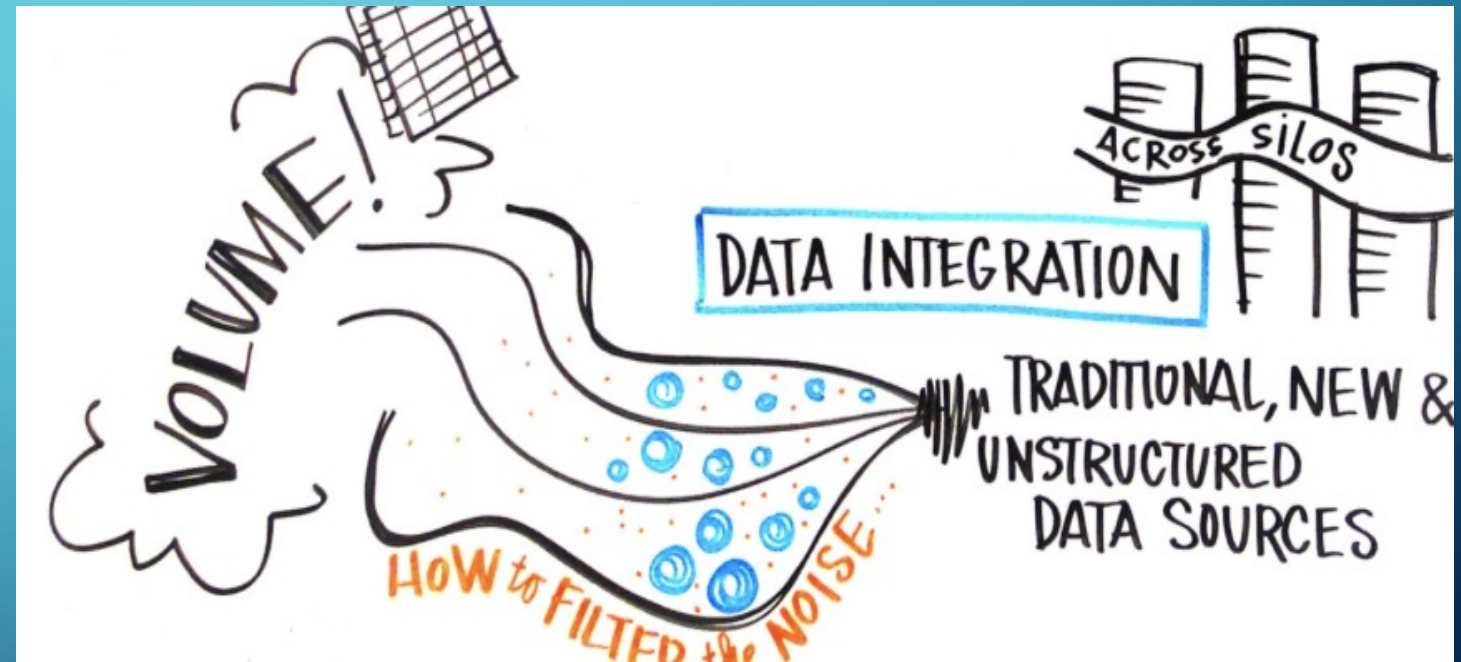


RISK ASSESSMENT AND PREDICTION TOOL RAPT-CLEVELAND CLINIC

- With only 6 questions it predicts the probability of discharge home vs to a skilled nursing facility for total joint replacement patients
 - With accurate prediction of length of stay, room utilization and patient flow can be maximized prior to any treatment
 - Efficiency and outcome are maximized
- Hospitals and physicians that can achieve this efficiency are going to have the “competitive edge” in attracting patients

BARRIERS TO WIDESPREAD USE OF BIG DATA AND PREDICTIVE ANALYTICS

- Necessary investments are HUGE
 - Infrastructure
 - Analytical tools
 - Personnel
 - Data guidance and protection
- Where will that money come from?
- Will there be enough skilled analysts for widespread implementation?

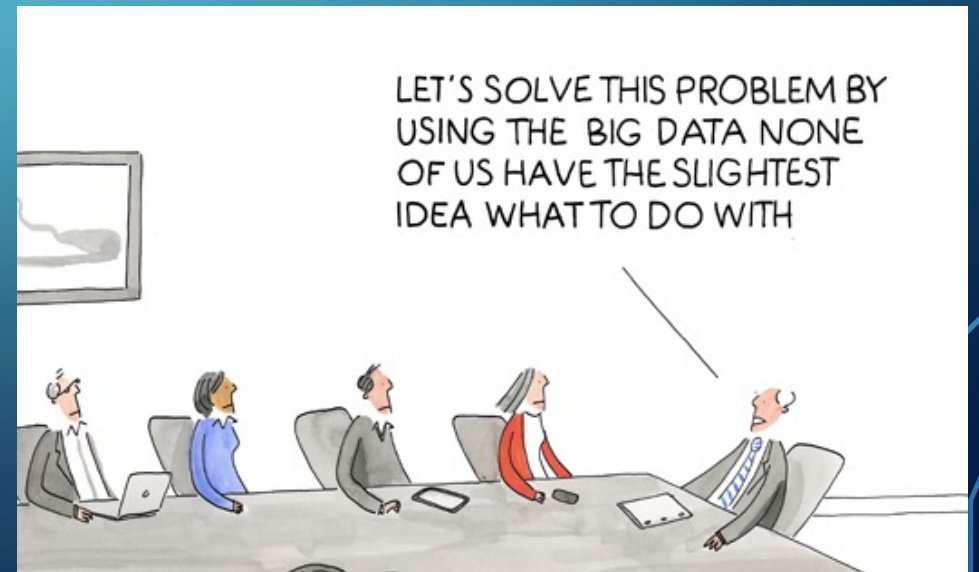


BARRIERS

- EHR
 - Must be fully in place and fully functional between multiple parties
 - Data warehousing on site will be necessary
- Currently data is only available in multiple, disparate formats, many of which are unstructured
 - Few hospitals are capable of this level of data management

BARRIERS

- Turning “information overload” into “actionable insight”
 - To fully implement such a program, all parties (not just IT personnel) must be able to fully understand, interpret, and utilize the information, models and predictions
 - This will require lengthy and detailed training in an area not familiar to physicians
 - Models of workflow must be accurate
 - For accurate prediction algorithms, questions must be specific, detailed, and relevant to the topic
 - Target need must be clearly defined, computational questions created which are accurate to that need, and specific variables gathered
 - This will require total “buy in” from all parties involved



VERACITY (THE FOURTH “V”)

- Ultimately, the accuracy of data input will determine “predictability”
 - “Garbage in, garbage out”



SUMMARY

- The potential benefit of “big data” and “predictive analytics” at all levels of health care are HUGE
- BUT, the barriers to widespread implementation are equally large
- Although focused and limited programs at select institutions are already being trialed,
- Widespread implementation in the near future is highly unlikely

THANK YOU



