Orthopedic Service Line Optimization

How to Use Big Data for Your Value-Based Purchasing Decisions

HIPPOCRATES

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Presenters

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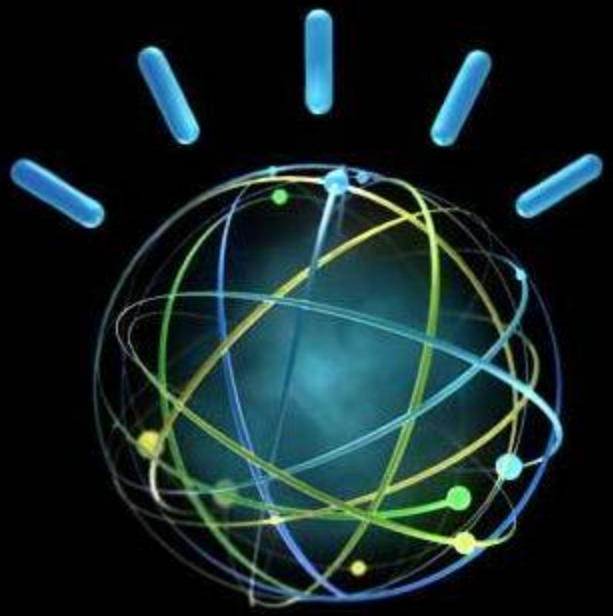
IBM WATSON™

Steve Gold



The Mega Trends

Cloud

Mobile

Social

Analytics

Watson Has Opened Up a World of New Possibilities

Jeopardy

s | sp | corp | flexibi | #users

2011

2880 cores
Single user system
2-3 sentences input
5+ days to retrain
Wikipedia, general corpus

Cognitive Products

size | speed | corpus | flexibility | #users

2013

Single Power 750, 240% faster
1000s of users
20 pages of input
< Day to ingest and train
Medical corpus

Cognitive Ecosystem

size | speed | corpus | flexibility | #users

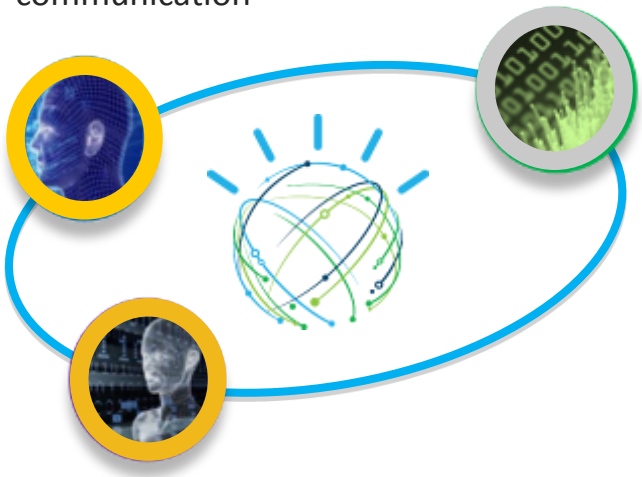
2014

Watson cloud service
Millions of users
Dialog chaining
Few hours
Broad industry corpus

Watson is Cognitive Computing

1 Understands natural language and human style communication

2 Generates and evaluates evidence-based hypothesis



3 Adapts and learns from training, interaction, and outcomes

Watson understands me.

Watson engages me.

Watson learns and improves over time.

Watson helps me discover.

Watson establishes trust.

Watson has endless capacity for insight.

Watson operates in a timely fashion.

So Why Is It So Hard For Computers To Understand Humans?

Welch ran this?

Person	Organization
L. Gerstner	IBM
J. Welch	GE
W. Gates	Microsoft

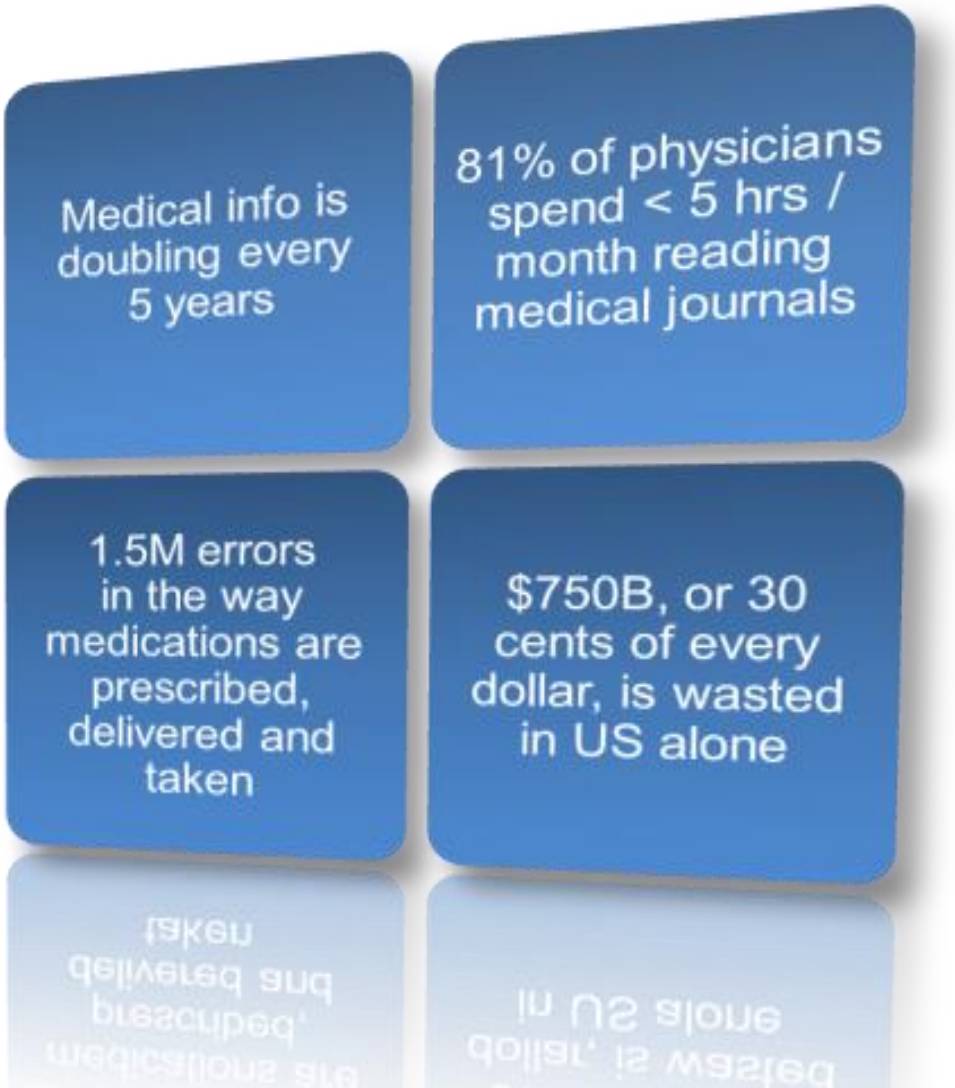
"If leadership is an art then surely Jack Welch has proved himself a master painter during his tenure at GE."

- Noses that run and feet that smell?
- How can a house can burn up as it burns down?
- Does CPD represent a complex comorbidity of lung cancer?
- What mix of zero-coupon, non-callable, A+ munis fit my risk portfolio?

IBM Watson Can Help Address the Challenges of Healthcare

"Medicine has become too complex. Only about 20% of the knowledge clinicians use today is evidence-based."

Steven Shapiro
Chief Medical & Scientific Officer
University Pittsburgh Medical Center



Watson Helps Support Medical Device Purchasing

Rapid decision support platform to transform the medical technology procurement selection process

Business problem:

Hospitals are constantly challenged to meet the procurement needs of their physician while respecting a tight budget

Solution:

Reduce costs and increase operational flexibility by streamlining a traditionally manual process

AJRR American Joint Replacement Registry

Caryn Etkin

Randolph Meinzer

AJRR Mission and Vision

MISSION

Foster a national center for data collection and research on total hip and knee replacement with far-reaching benefits to society including reduced morbidity and mortality, improved patient safety, improved quality of care and medical decision-making, reduced medical spending, and advances in orthopaedic science and bioengineering.

VISION

A national total joint registry dedicated to the improvement in arthroplasty patient care by data driven modifications in the behavior of collaborating providers, institutions, manufacturers, payers, and patients.

AJRR Support and Collaboration

AJRR's goal is to capture **90%** of all total joint replacement procedures in the U.S.

- American Academy of Orthopaedic Surgeons
- American Association of Hip and Knee Surgeons
- The Hip Society
- The Knee Society
- Payors
- Orthopaedic Industry (via AdvaMed)
- Participating Institutions

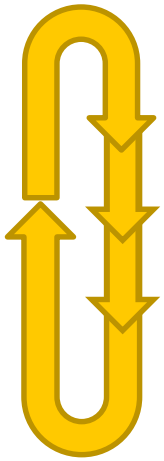
Big Data: Creating a Standard in Orthopedics

Level One (Today)	Level Two (Fall 2014)	Level Three (Fall 2014)
• Patient-Specific Data • Hospital Information • Surgeon Data • Procedure Specifics	• Pre-Operative Assessment • Patient Risk Factors/Co-Morbidities (ICD 9/10) • Prophylaxis • Length of Stay • American Society of Anesthesiologists Score • Operative and Post-Operative Complications • PQRS Measures	• SF-36 • HOOS and KOOS • Modified WOMAC • Oxford Hip and Knee Scores • Knee Society Knee Scoring System • Harris Hip Score
Level One will provide important information regarding hospital and surgeon revision rates and associated implant performance metrics.	Level Two will allow for risk adjustment of Level One data and more meaningful reporting to hospitals and surgeons. Data on complications have the ability to provide insight into patient outcomes.	Level Three will provide an opportunity for hospitals and surgeons to assess patients' longer term health-related outcomes and patient experience.

Data Sharing Between a Hospital and AJRR

AJRR provides online demand reports and quality metric dashboards for subscribing institutions (i.e., national comparative revision rates, component usage, other general benchmarks).

AJRR American Joint Replacement Registry



Pre-Operation: Level Two patient co-morbidities

During Operation: Level One revision rates and implant performance

Post-Operation: Level Two post-operative complications

Periodic Reports: AJRR subscribing institutions have the ability to utilize AJRR's PROMs technology (Level Three) with any tool at any follow up time they choose.

Benefits of Big Data for Collaborators

- **Specialty Societies:** AJRR will provide a platform for analysis of de-identified data to ultimately improve patient outcomes.
- **Orthopaedic Industry:** Post market studies have the ability to improve the quality of orthopaedic implants, while monitoring of implants has the potential to reduce costs for providers and identify performance outliers.
- **Payors:** Cross referencing of claims data with AJRR data will provide a way for hospitals to accurately track post-operative complications. Substantial percentage of patients receive revisions or other post-operative care at other institutions. Claims data supports further risk adjustment for hospitals and surgeons.
- **Hospitals:** Participating hospitals will have access to de-identified national benchmarks related to TJR; institutional information including quality metrics and component usage.

AJRR Today

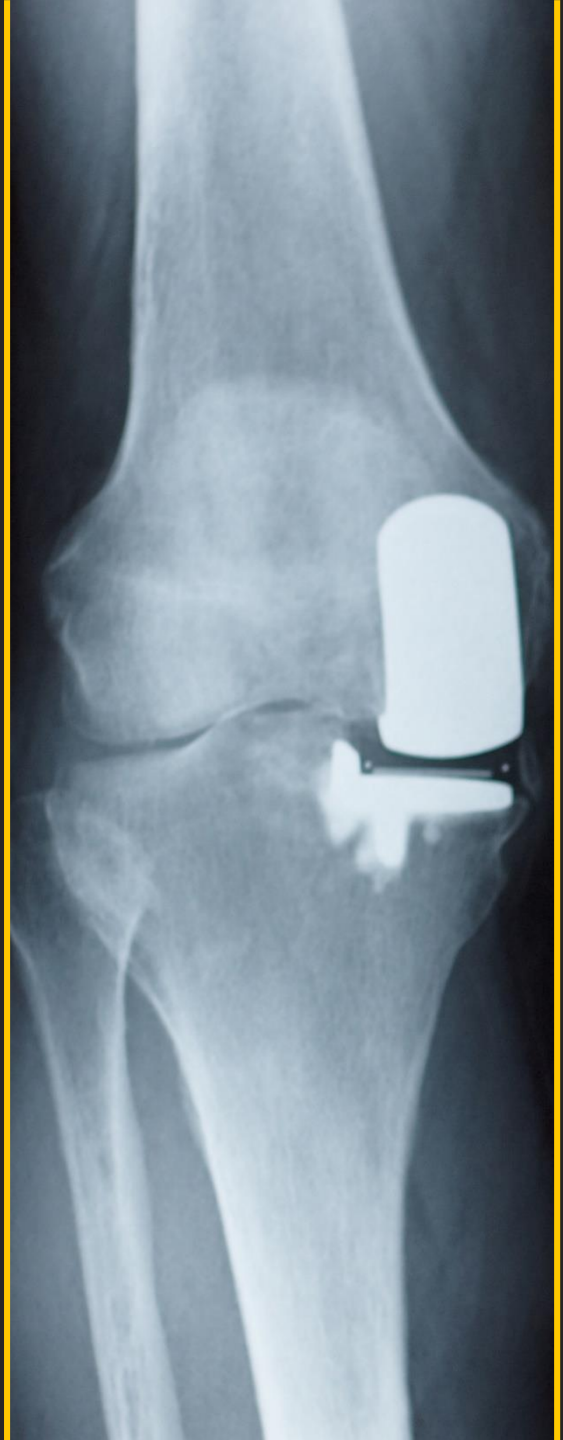
- **Enrollment N = 300 hospitals in 48 states**

- Level One electronic reporting capabilities with numerous vendors (i.e., Epic, Cerner, Ortech, InVivoLink, URS Oberd, others in process)
- AJRR policies and procedures are compliant with CFR45 Part 164--HIPAA and HITECH Act.
  - Over 100 hospital security assessments completed and approved
- Over 150,000 procedures received from 181 hospitals and 2,000 surgeons
  - Over 2,500 procedures submitted weekly
- Component database continues to be expanded (38,000 entries)
- Only orthopaedic initiative designated a Qualified Clinical Data Registry by CMS
  - Provides an option for Physician Quality Reporting System (PQRS) submission

CMS
CENTERS FOR MEDICARE & MEDICAID SERVICES

FORCE TJR

Patricia Franklin



FORCE-TJR

MISSION

Independent, unbiased, expert data collection and reporting to guide best TJR surgical practices to assure patients achieve optimal pain relief and functional gain with minimal adverse events and implant failures.

GOALS

1. Establish national registry with a consortium of 150+ orthopedic surgeons representing all regions of the U.S. and varied hospital practices and >30,000 diverse patients.
   - Track patients annually for decades.
   - Complete data (level 1, 2, 3) on ALL patients.
2. Research to monitor/improve outcome after TJR, including patient-reported pain and function, adverse events, and revision.

FORCE TJR

Function and Outcomes Research for Comparative Effectiveness in Total Joint Replacement

FORCE-TJR: Federally Funded, Independent TJR Outcome System

Competitive Application: P50 grant to Department of Orthopedics at U Massachusetts Medical School (2011):

1. To develop a comprehensive TJR registry by developing a sustainable data infrastructure for comprehensive TJR outcome monitoring.
2. To conduct TJR research by conducting comparative effectiveness and quality/safety research.

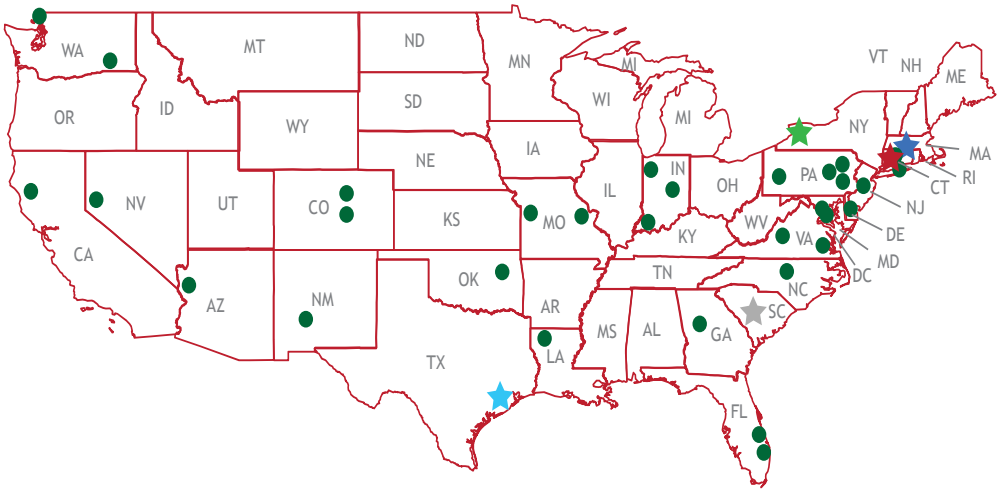
FORCE TJR

Function and Outcomes Research for Comparative Effectiveness in Total Joint Replacement

FORCE-TJR: National Cohort of >150 Surgeons in 22 States

- 75% of surgeons are community -based
- Fellowship-trained, general orthopedic surgeons
- High and low volume surgeons/hospitals; urban and rural hospitals
- Teaching hospitals, non-teaching hospitals
- Patients with private, public and HMO insurance
- All major implant manufacturers
- Primary TJR, revision TJR, Uni, PF, HR, all types of implants

Map of Participating Core Centers and Community Sites



Core Clinical Centers

- UMass Medical School, Worcester, MA
- Connecticut Joint Replacement Institute, Hartford, CT
- The University of Rochester Medical Center, Rochester, NY
- Medical University of South Carolina, Charleston SC
- Baylor College of Medicine, Houston, TX

Community Sites

- Community Sites currently enrolled

FORCE TJR

Function and Outcomes Research for Comparative Effectiveness in Total Joint Replacement

FORCE-TJR: 100% Patients with PRO, AE, Implant Data Across TJR Care Cycle

Patient	Hospital	Direct to Patient (EHR validated)			
Before Surgery	Surgery	30 Days	90 Days	6 Months	Annual
• Global and joint pain and function • Medical and orthopedic risks • Demographics	• Implants • Operative notes	• Readmit to ANY hospital • ER or OR • Pain, PT	• All cause complications • ANY hospital	• Global and joint pain and function • Revision • Revision/ complication	• Global and joint pain and function • Revision

FORCE TJR

Function and Outcomes Research for Comparative Effectiveness in Total Joint Replacement

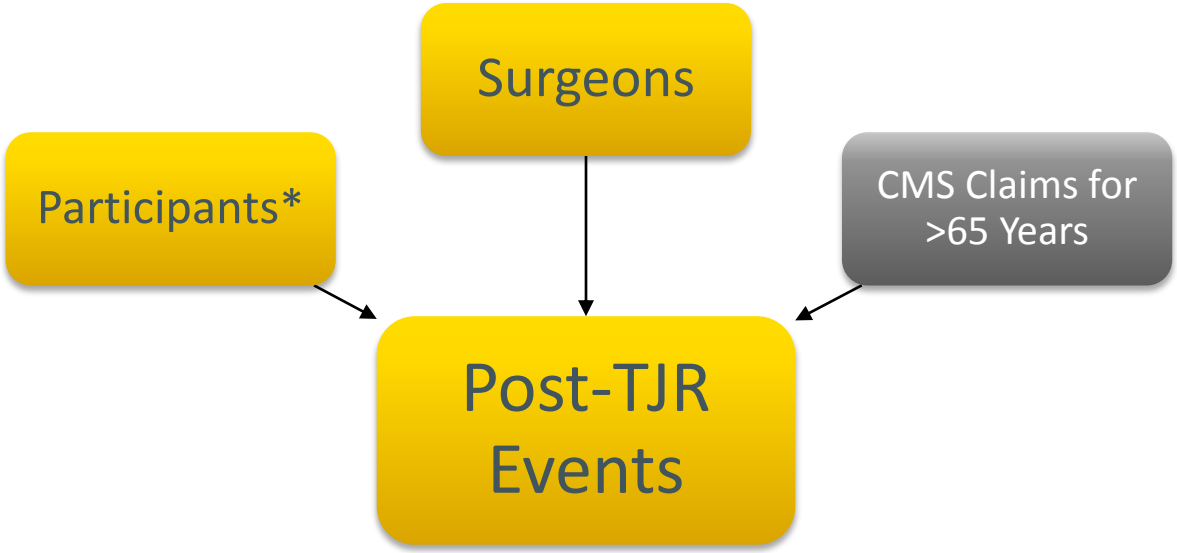
FORCE-TJR: U.S. Data for Early Implant Failures and Revisions

- Metal on metal failures and recalls taught us that early pain/disability can be risk factor for implant failure.
- New Zealand registry reported a direct relationship between increased pain at 6 and 12 months after TJR and early revision.
- FORCE-TJR data reporting both early pain and function (poor implant performance) and revision rates.
  - Implant manufacturer, design, material, and component details are analyzed for both revision and poor performance in early years.
  - All manufacturers

FORCE TJR

Function and Outcomes Research for Comparative Effectiveness in Total Joint Replacement

FORCE-TJR: Post-TJR Readmission and Complications Beyond Your Hospital



*25% of all 30-day readmissions go to non-surgical hospitals; patient report; chart validated.

Follow patients regardless of where they seek care and/if insurance changes.

FORCE TJR

Function and Outcomes Research for Comparative Effectiveness in Total Joint Replacement

FORCE-TJR: Web-based Confidential Quarterly Comparative Reports:

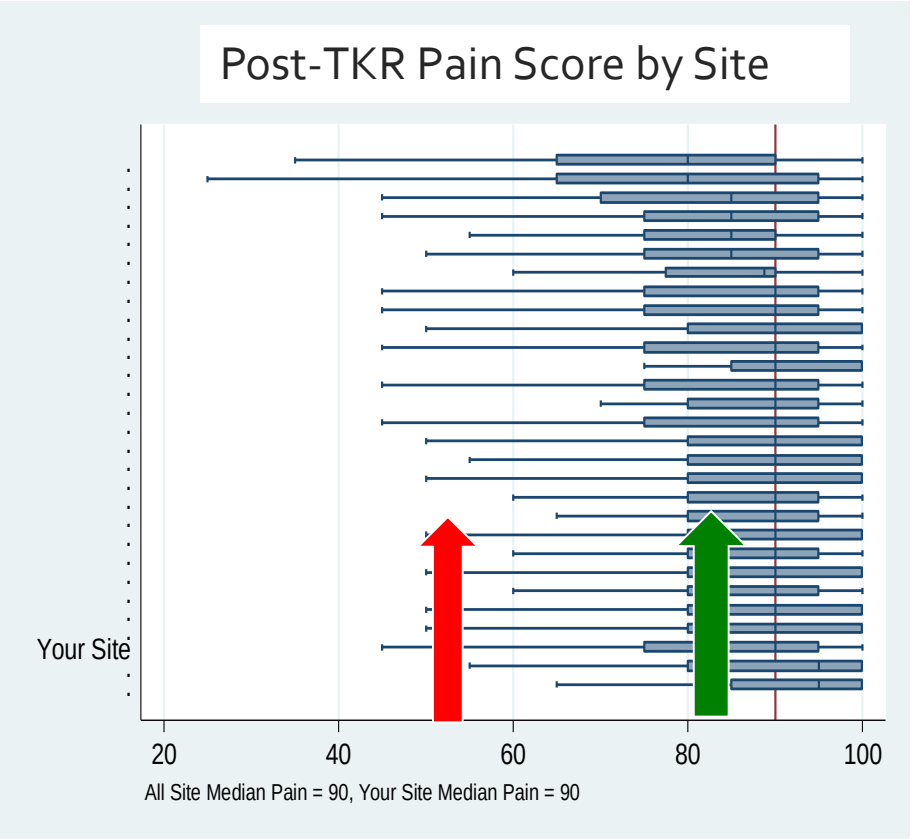
1. **Patient Mix:**
   How do my patients compare to patients at other sites on key risk-adjustment factors?
2. **Patient Selection/Timing of TJR:**
   How do my patients compare to others on pre-TJR pain and function?
3. **TJR Patient-Reported Outcomes:**
   How do my risk-adjusted 6 and 12 month pain and function compare to other sites?

FORCE TJR

Function and Outcomes Research for Comparative Effectiveness in Total Joint Replacement

FORCE-TJR: Sample Post-TJR Pain Comparative Report by Site

- Significant pain before TJR is consistent across sites (red)
- Pain relief in majority of patients at 6 months after TJR (green)
- Is persistent pain in minority of patients associated with patient, clinical, or implant factors?



FORCE TJR

Function and Outcomes Research for Comparative Effectiveness in Total Joint Replacement

FORCE-TJR: Comprehensive PROs, Post-Op Events, Revisions, Refined Risk Adjustment

EXTERNAL DATA USES

1. Comparative reports to prepare for CMS public reporting by hospital
2. Use of PROs for incentives, private insurer/ACO models
3. PQRS/CMS incentives, report to avoid payment adjustments

INTERNAL DATA USES

1. Quality and outcome monitoring
   - Patient risk factors
   - Pre-op pain/function
   - 30-day readmissions
   - 90-ay complications
   - Revisions
   - Post-op pain/function

FORCE TJR

Function and Outcomes Research for Comparative Effectiveness in Total Joint Replacement

HIPPOCRATES

by md buyline

David Rodriguez

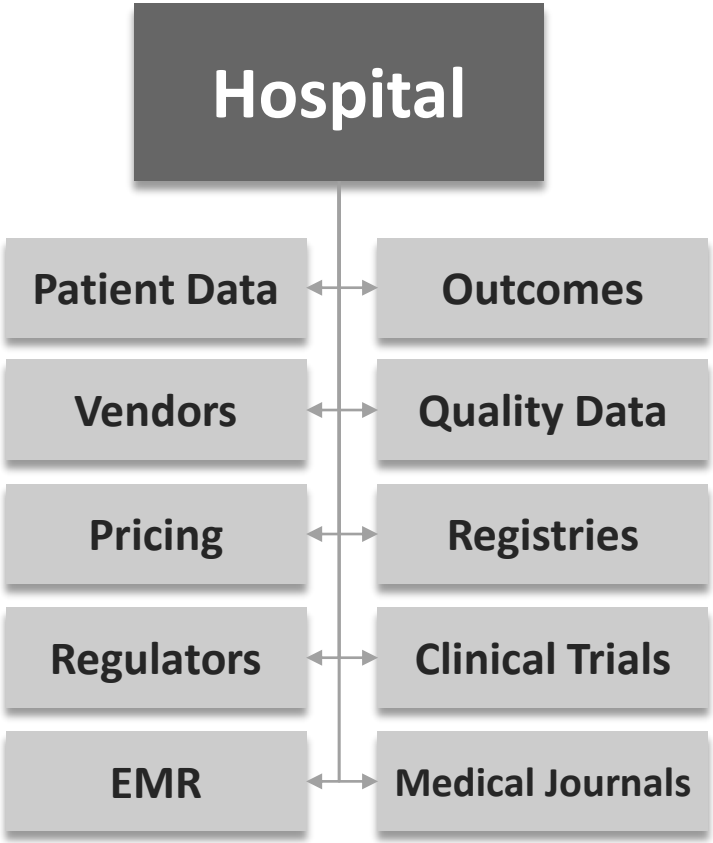
HIPPOCRATES

Device Decisions Are Not Driven By CQO

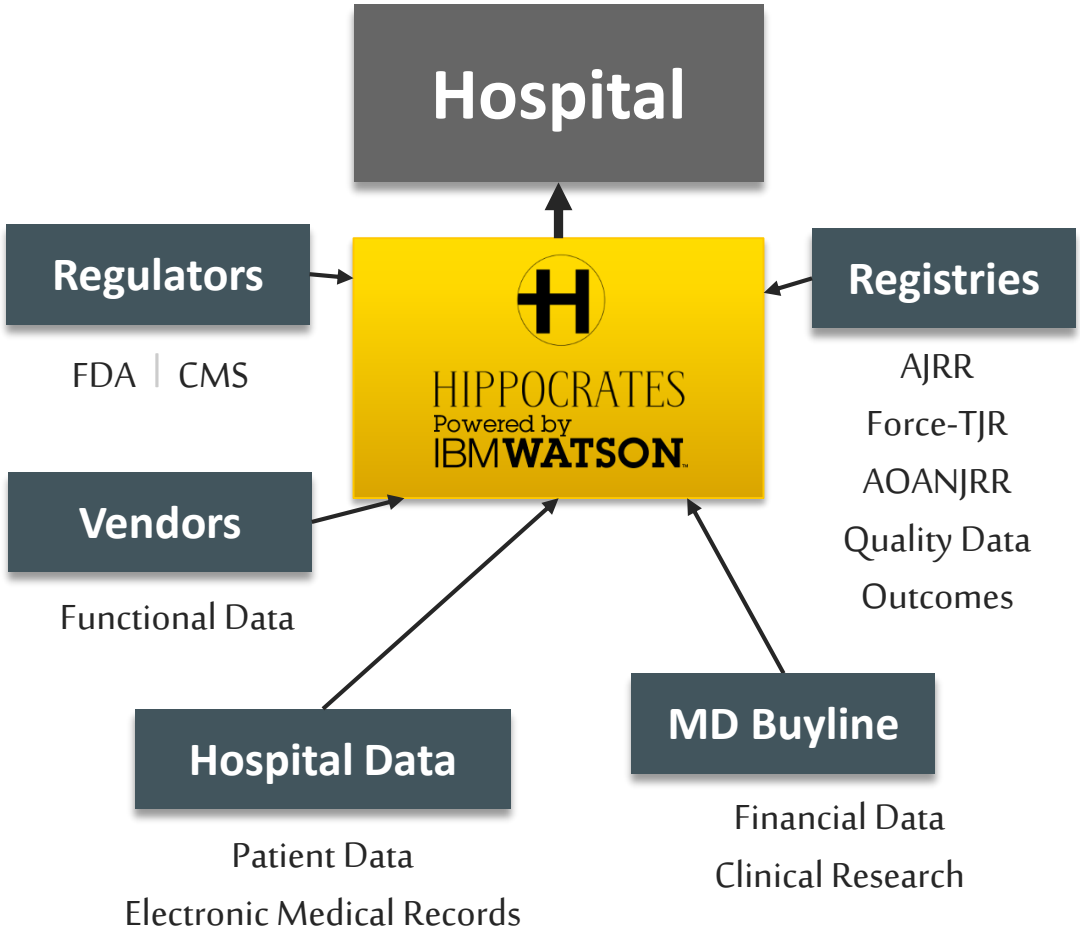
- Medical device selection is one of the leading differentiators when comparing physicians with similar case types and outcomes
- Device decisions are driven by relationships, not data or evidence
  - Physicians are often financially incented to recommend/use one vendor over another
  - Vendor representatives control technology education
- Cross references are difficult to create
- Combined public and private data for better decision making is non-existent

Transforming Orthopedic Device Selection

Today's Model



Hippocrates Model



How Will You Benefit From Hippocrates?

Service Line Leader

- Cross-reference grid
- Compare constructs and components side-by-side
- View technical and functional specifications
- Evidence-based cost, quality and outcome data

Surgeon

- View all possible equivalent products by category
- Compare all orthopedic devices apples-to-apples
- See revision rates, comparative effectiveness and other quality and outcome data

Value Analysis Team Member

- Compare financial impact of orthopedic devices on your hospital
- Collaborate with value analysis team, surgeons, service line leaders and other stakeholders to make a decision

- Efficiently view and compare evidence-based outcome, cost and functionality data for all orthopedic devices
- Utilize IBM Watson's cognitive capabilities to interrogate the data, asking questions and receiving answers in real time
- Determine the appropriate orthopedic device in order to improve patient outcomes, quality and financial results

Thank You!

Connect With Us

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