



Health Systems as Research Platforms

Enhancing Science, Value and Innovation

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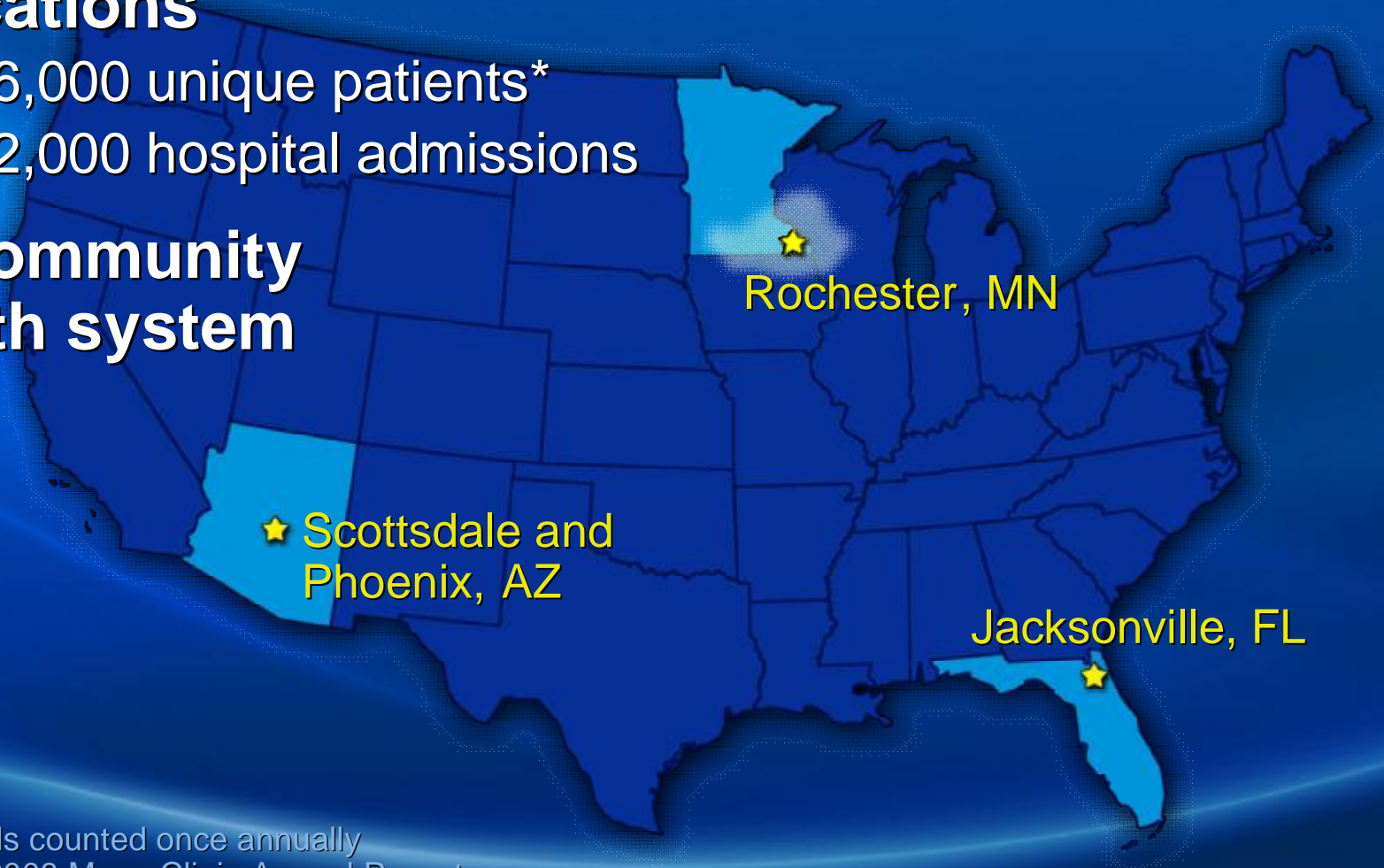
Institute of Medicine
April 1, 2010

Mayo Clinic provides inpatient, outpatient and community-based health care

3 locations

- 526,000 unique patients*
- 132,000 hospital admissions

70-community health system



*Individuals counted once annually
Source: 2008 Mayo Clinic Annual Report



MAYO CLINIC AND CLINICAL RESEARCH

An Outgrowth of Patient Care

- Part of our heritage and culture

**“Left open for further thought
and research”**

William Worrall Mayo, MD

Left open for further thought and research

Thursday July 11 - 1866
Called to see Nels Olsson of Rockdell 12 miles
The morning gloomy and unpleasant, there
had fallen during the night rain and sleep.
This mixture of rain and hail continued all
day. The sleighing was good but the atmosphere
unpleasant. The cause of my visit to this
patient freezing of some of his members.
This young-man Nels Olsson visited Rochester
on Christmas week and before leaving town



MAYO CLINIC AND CLINICAL RESEARCH

An Outgrowth of Patient Care

- Part of our heritage and culture
- Singular focus...
The needs of patients
- Strong emphasis on value
 - Individual patients
 - Broader health care system
- Translation of...

KNOWLEDGE  **DELIVERY**



Health Systems as Research Platforms

**Serving patients' needs today
and preparing to serve the needs
of patients tomorrow**

- 1. Rochester Epidemiology Project – population based**
- 2. Total Joint Registry – clinical practice based**
- 3. Anticoagulation optimization**
- 4. High Value Health Care Initiative**
- 5. Enterprise Data Trust**



Rochester Epidemiology Project

- **Collaboration among health care providers in Olmsted County, MN**
 - Share medical records for research
 - Research health and illnesses of people living in this community
 - Improve health/health care in the entire country
- **Unique resource**
 - One of few places for population-based research
 - NIH funded since 1966
 - Supports ~ 40 individual NIH grants
 - Cumulative publications to date = 2,042



Impact on Patient Care

Selected examples

- **Occurrence of Guillain-Barré syndrome after swine flu vaccine only slightly increased** (Beghi et al, 1985)
- **Putative adverse sequelae of silicone breast implant not confirmed** (Gabriel et al, 1994)
- **Putative increased risk of autism after immunizations not confirmed** (Barbaresi et al, 2005)
- **Increased mortality and increased risk of neurological disorders after prophylactic oophorectomy** (Rocca et al, 2006, 2007, 2008)



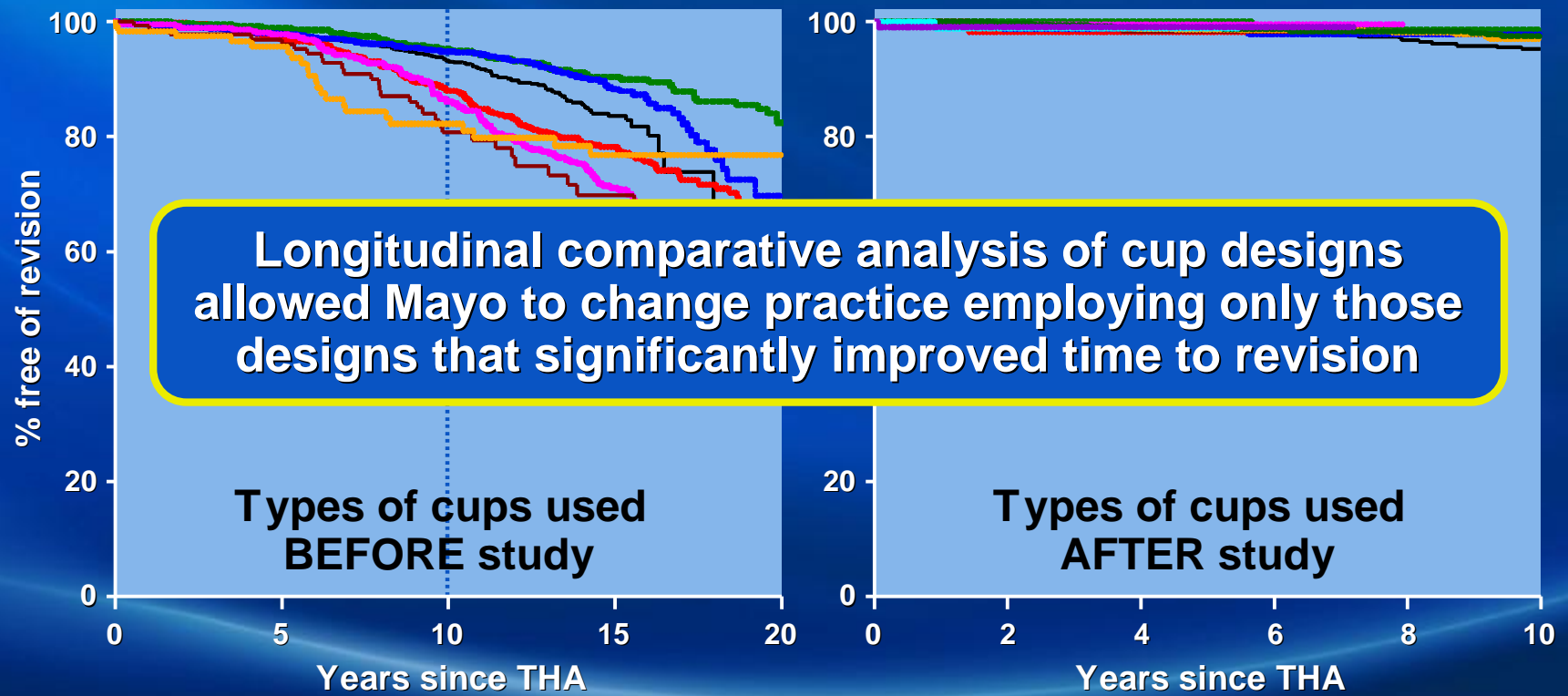
Mayo Clinic Total Joint Registry

- **Data on 97,500 arthroplasties since 1969 (i.e., world's most comprehensive joint replacement registry)**
- **Structured, standardized information gathered before, during and at scheduled intervals after surgery, for the lifetime of the patient and implant**
- **Allows comparisons of surgical technique, implant types, patient demographics, conditions and outcomes**
- **Identifies most effective surgical practices and implant models**



Impact on Patient Care

Total Hip Arthroplasty Age/Sex Adjusted Survival Free of Revision 7,989 patients, 9,584 hips





Anticoagulation Optimization Warfarin Project

Definition

Any inpatient receiving Warfarin is unsafe if any subsequent inpatient INR is >5.0

Baseline defect rate

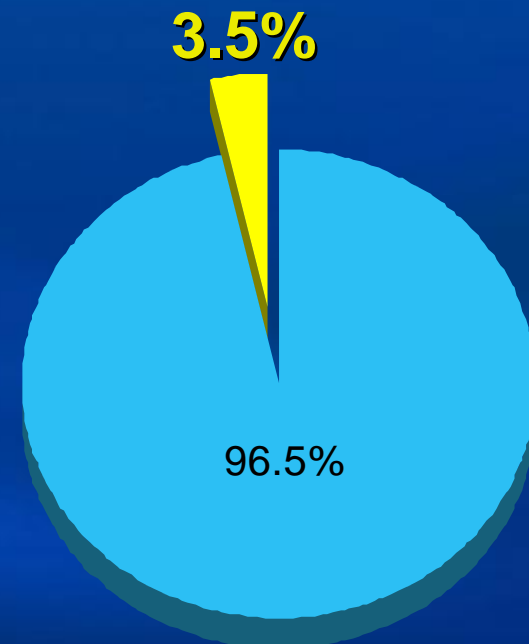
MC 3.5%

Primary goal

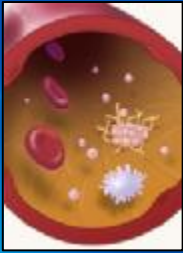
Reduce the proportion of unsafe Warfarin Inpatients to $<1.5\%$

2005 Baseline

18,700 Annual Warfarin Patients



■ INR within safe range
■ Hazardous INR >5



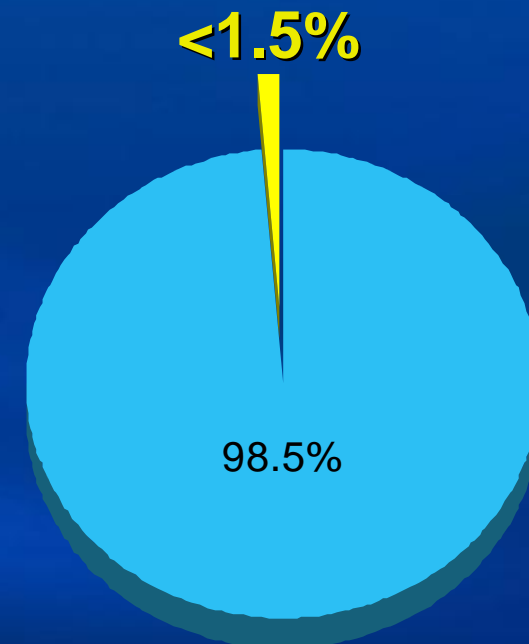
Impact on Patient Care

Standardization

1. Standardized rules-based, robust algorithm launched by prescriber order, then
2. Run by pharmacist
3. System and algorithm improved dozens of times (PDSA cycles) based on surveillance, performance data and user feedback

Starting in 2009

18,700 Annual Warfarin Patients



■ INR within safe range
■ Hazardous INR >5

Countermeasure: No increase in proportion of patients with INR <1.7 after 3 doses



Improving Value of Care

The Mayo Clinic Value Equation

$$\text{Value} = \frac{\text{Quality (outcomes, safety, service)}}{\text{Cost over time}}$$

Pay for results, outcomes, value,
not process compliance

**Goal: Quality care with decreased
unexpected variation and lower
use of resources**



Improving Value of Care

The High Value Health Care Initiative

- **Characterize the quality and cost of best practices over time**
 - Phase I: The distribution of costs of best practices compared to costs for risk matched patients
- **Implement evidence based best practice and shared decision making**
- **Study new reimbursement models that support high value care**
- **Improve the value of care for our patients**

Collaborative effort between

- **The Mayo Clinic**
- **The Dartmouth Institute**
- **Intermountain Health Care**
- **Geisinger Health System**

CLINICAL

FDA

RESEARCH

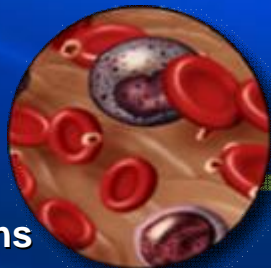
Physician



Patient

Clinical Notes

Biospecimens

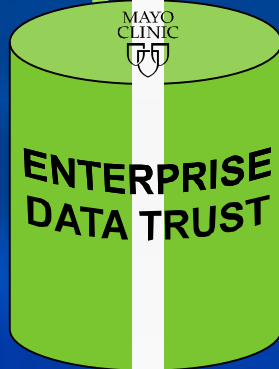


REGULATORY

REGULATORY

Institutional Review Board

Therapeutics
Biomarkers



Bioinformatics
Biostatistics

Clinical,
Translational &
Basic Science

- Epidemiology
- Pharmacology
- Oncology
- Pathology
- etc

ANALYTICS

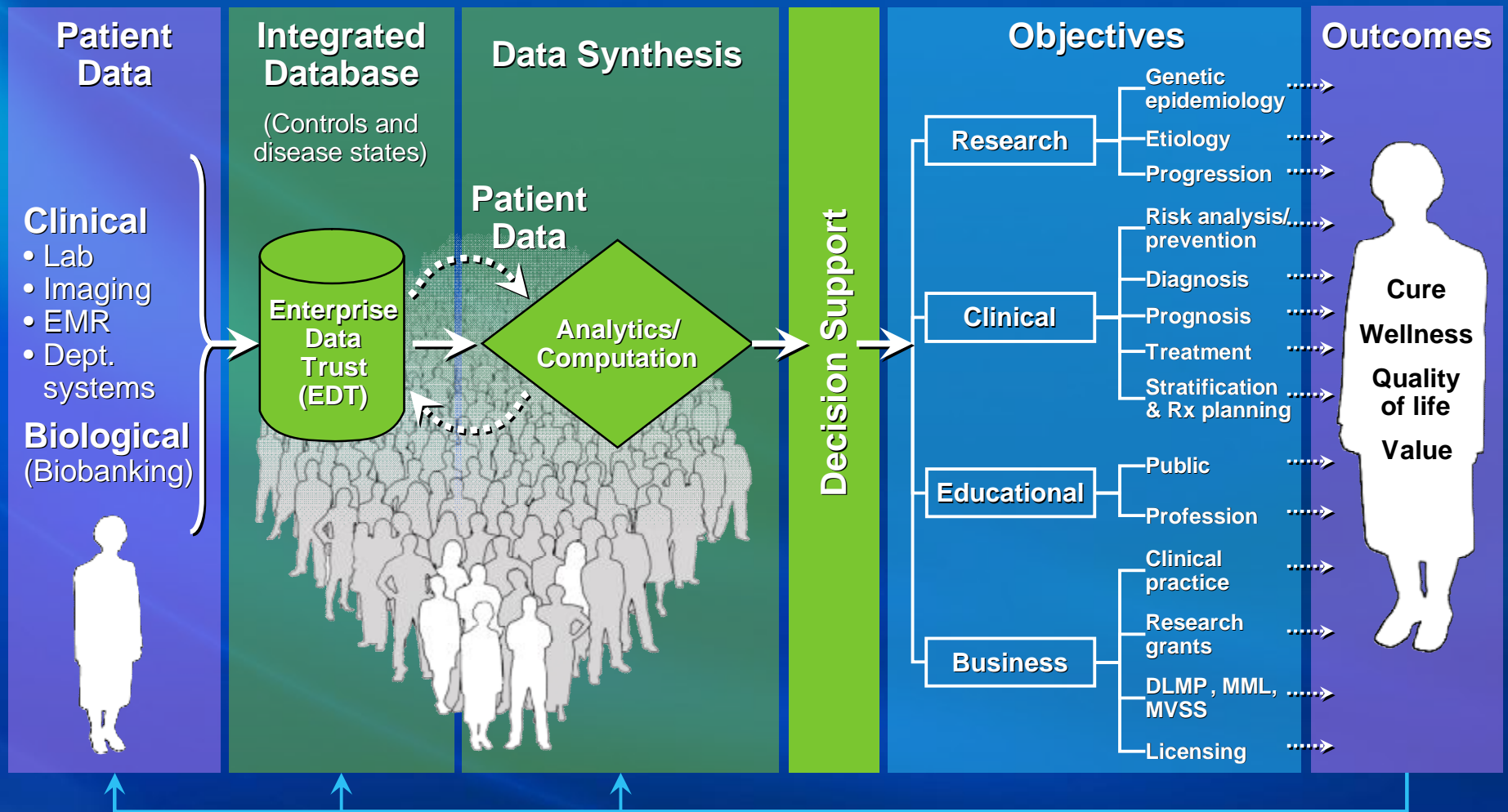
EXPERIMENTAL

Lab Test
Results

CORE Labs
Gene expression
Genotypes
Proteomics

BAP
Biospecimens

Generating Knowledge in Daily Clinical Settings





The Knowledge-Driven Health Care Delivery System of the Future

- **Patient-centered care – focus on quality (best results) and coordination of care**
- **Real time data and feedback for providers at point-of-care (horizon scanning)**
- **Culture of collaboration, innovation and translation of scientific knowledge into improved health for patients and communities**
- **Health information technology (HIT) systems – integration, standardization, interoperability**
- **Delivery of high-value health care in an information-enabled single practice**



Questions and Comments

