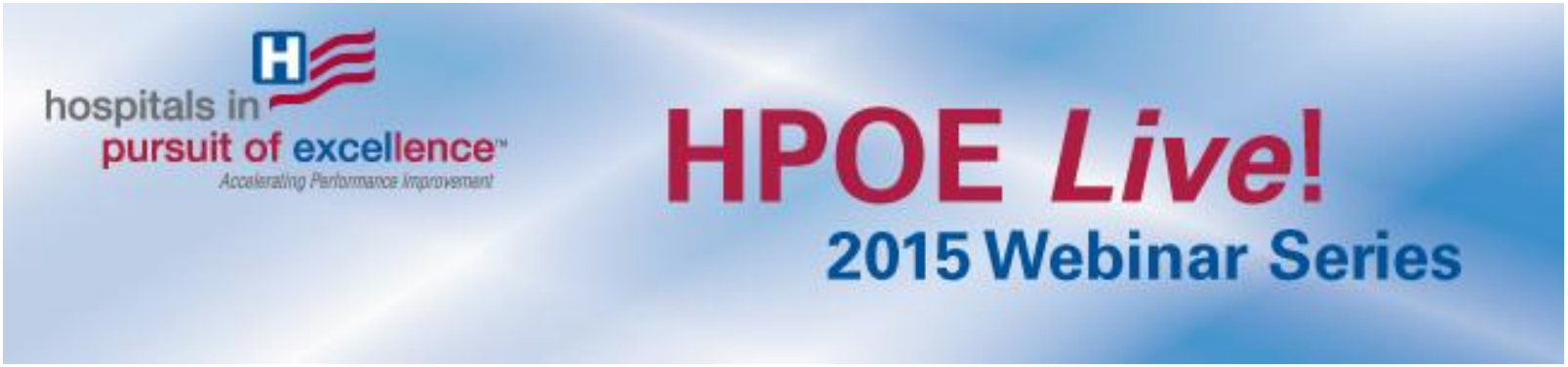


The presentation will begin shortly.

INTRODUCTION: ENHANCING STATEWIDE HOSPITAL DISCHARGE DATABASES

Roxanne Andrews, Ph.D.

HSR Special Issue, Guest co-Editor

(Recent retiree from Healthcare Cost and Utilization Project, AHRQ)

October 2, 2015

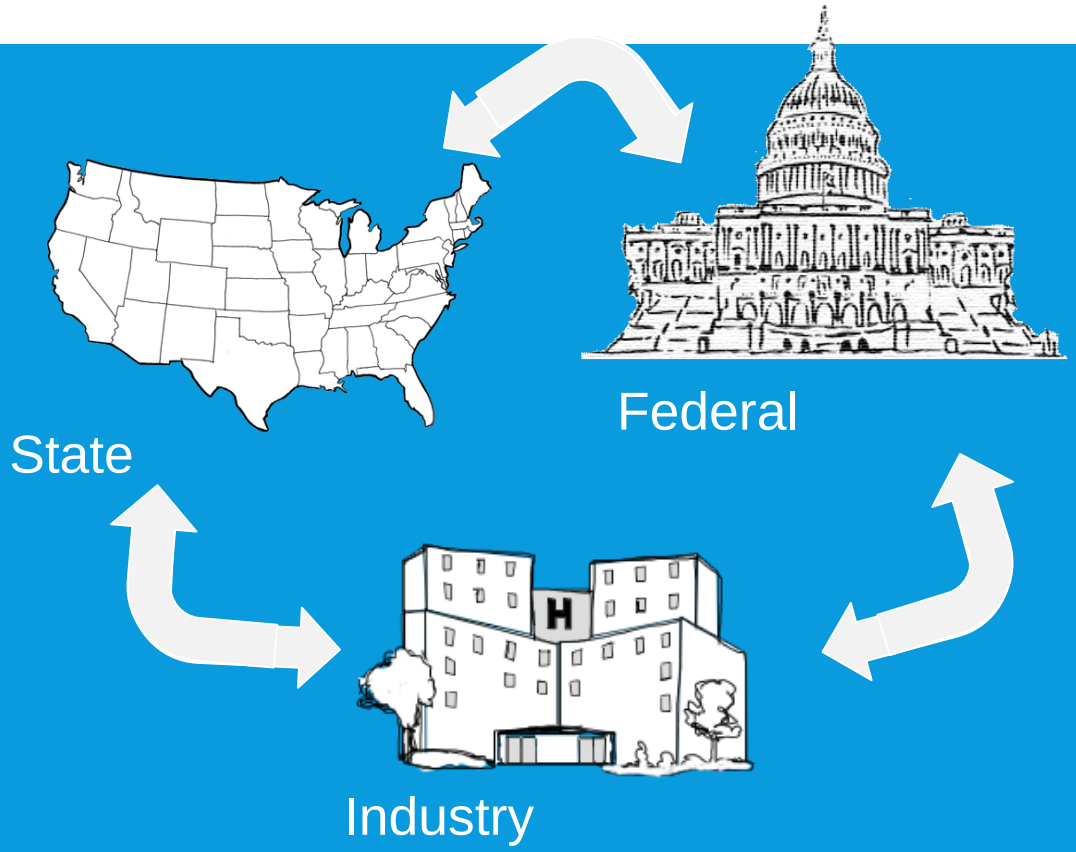
OUTLINE

- Statewide hospital discharge data
- Healthcare Cost and Utilization Project
- AHRQ-funded Enhanced State Data Grants
- *Health Services Research* special issue on grant findings

STATEWIDE HOSPITAL DISCHARGE DATA

- Almost all states have all-payer statewide collection
- Billing data involve little extra data collection burden
- Fairly standardized across hospitals
- Core data set useful for a wide-range of purposes
- Research methods & software readily available
- AHRQ's HCUP aggregates at national level; creates uniform research files

THE HCUP PARTNERSHIP



Multi-Year,
starting 1988

All-Payer

Inpatient

Emergency Department

Ambulatory Surgery

Databases

based on
Hospital Billing Data

DATA USES SPANNING 40 YEARS

- Health Services Researchers
  - Health policy
  - Access and quality
  - Clinical practice and clinical aspects of care
  - Race-ethnicity and insurance impacts
  - Economics and financing
- States, Communities, Hospitals
  - Public health and safety
  - Disease and injury surveillance and registries
  - Community health assessments and health planning
  - Quality assessment and performance improvement
  - Public reporting for purchasing and comparative reports

NEED FOR IMPROVED RACE & ETHNICITY DATA

- Racial/ethnic minorities receive lower access & quality care
  (Unequal Treatment; Nat'l Healthcare Disparities Report; Numerous studies)
- Need good data to identify areas for improvement; track progress
- Challenges identified by HCUP Partners
  - Convincing stakeholders about the value of collecting race/ethnicity data
  - Concerns about accuracy (e.g. clerks collecting by observing)
  - Sensitivity about asking for the information
  - Coding schemes (national standards vs local needs)

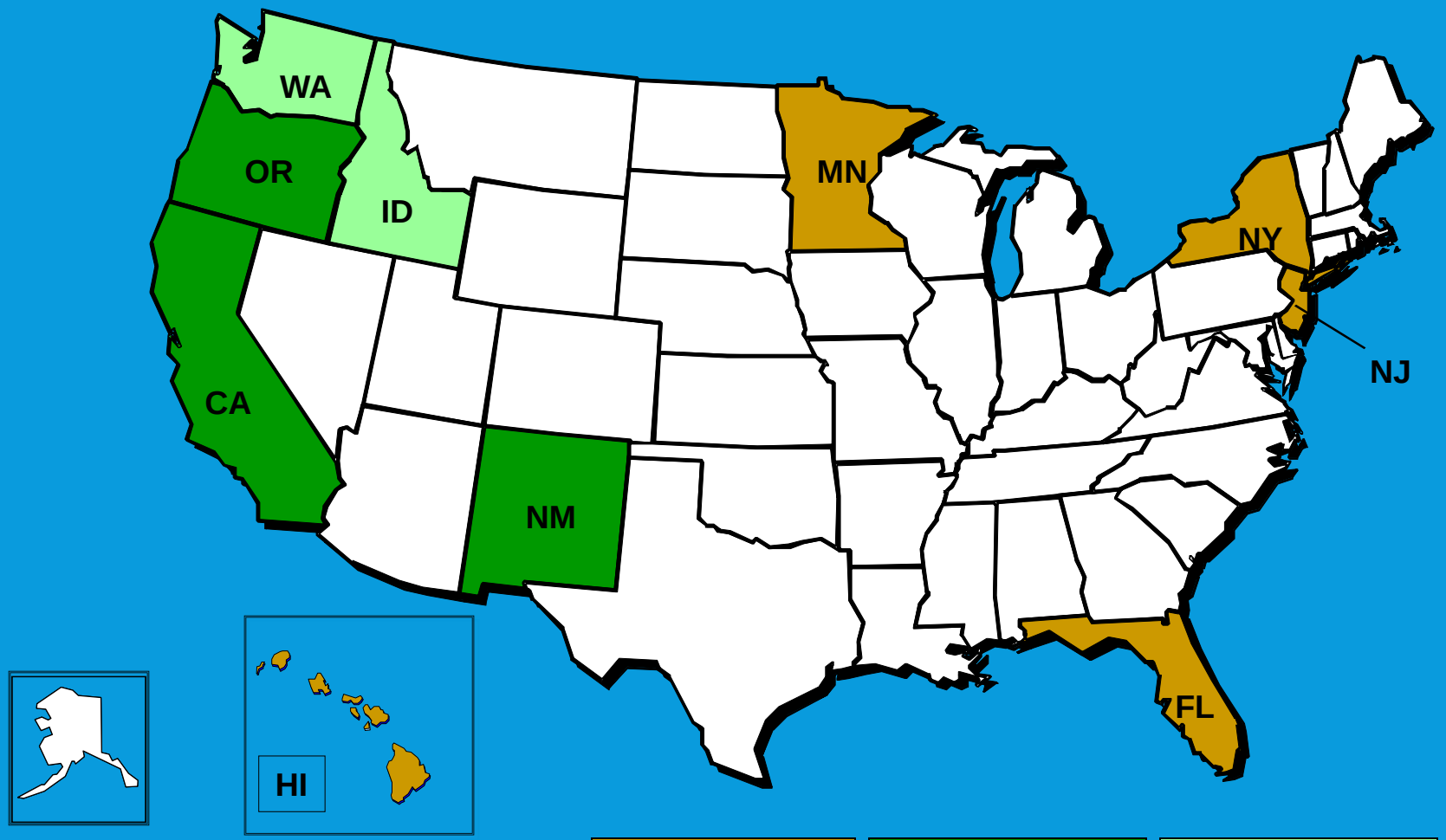
NEED FOR IMPROVED CLINICAL DATA

- Limited to ICD-9-CM diagnosis codes
- Missing physiological data (lab values and vital signs) for hospitalization
- Lacks relevant pre- and post-hospitalization clinical information
- With advances in IT and EHRs, there is a growing availability of clinical data in electronic form

AHRQ GRANTS TO ENHANCE STATE ADMINISTRATIVE DATA

- Recovery Act (ARRA) funds to improve data infrastructure for comparative effectiveness research
  - Three-year grants awarded in Fall 2010
- Enhance the data infrastructure of statewide data organizations to improve local uses and HCUP data

AHRQ ENHANCED STATE DATA GRANTS



Key:

Clinical Data Grant	Race/Ethnicity Data Grant	Race/Ethnicity Data - Covered State

RACE-ETHNICITY DATA GRANTS

State	PI	Data Improvement
CA	David Zingmond UCLA	Improve accuracy of race-ethnicity and language data through improved auditing methods, training and indirect (statistical) methods.
NM	Michael Landen NM Dept of Health	Improve the quality of race and ethnicity data, including use of OMB categories. Collect tribal identifier data.
ID, OR, WA	Victoria Warren-Mears Northwest Portland Area Indian Health Board	Using the roster of AI/AN in the Northwest, correct inaccurate AI/AN data in hospital discharge, vital statistics, STD/HIV, cancer & trauma registries.

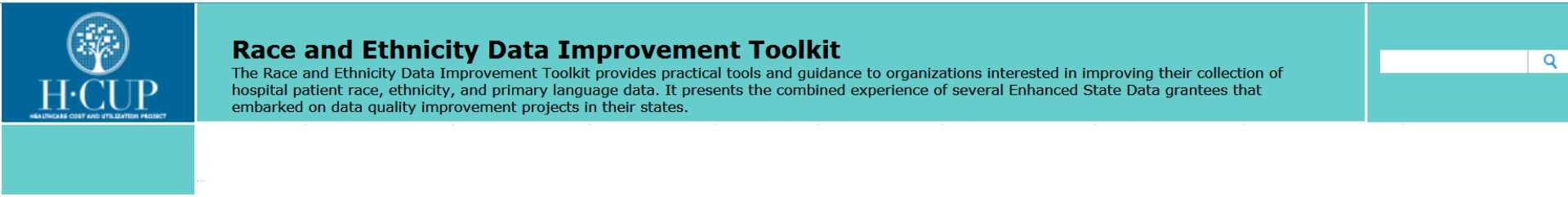
CLINICAL DATA GRANTS COLLECTING LAB DATA

State	PI	Hospital Data Enhancement
HI	Todd Seto Queen's Medical Center	Add **laboratory data**
MN	Mark Sonneborn MN Hospital Association	Increase **lab data** submission, add inpatient **pharmacy**, link patients across hospitals & with **death certificates**
NY	Barbara Dennison NY State DOH	Add **laboratory data**

OTHER CLINICAL DATA GRANTS

State	PI	Hospital Data Enhancement
FL	Hamisu Salihu Univ of South Florida	Link IP with **vital stats**, ED & AS data to create statewide maternal child dataset
NJ	Derek DeLia Rutgers University	Link to **prehospital EMS data** & **death certificates**

RACE AND ETHNICITY DATA TOOLKIT



Race and Ethnicity Data Improvement Toolkit

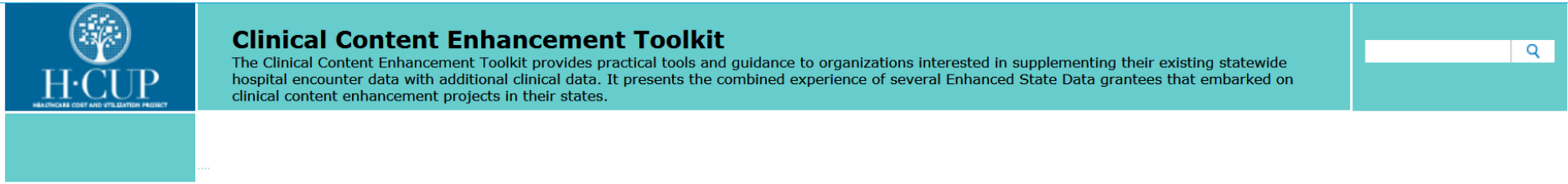
This toolkit provides practical tools and guidance to those interested in improving the quality of their hospital patient race, ethnicity, and primary language (R/E/L) data collection efforts. The toolkit is designed for statewide data organizations that collect hospital administrative data, such as those participating in AHRQ's Healthcare Cost and Utilization Project. However, the toolkit may also be useful for a variety of others with a role in improving the collection of R/E/L in hospital data, such as hospital leadership, quality improvement personnel, clinicians, patients and consumers, registration and admitting departments, and hospital IT departments.

The toolkit is based on the materials developed by, and the experiences of, three AHRQ Enhanced State Data grantees from California, New Mexico, and the Northwest region (Idaho, Oregon, and Washington) that embarked on R/E/L data quality improvement projects. Enhancements included making substantial, sustainable improvements to the reporting of R/E/L data among patients in California's hospitals; improving the quality of race and ethnicity data in hospital discharge databases by revising the New Mexico administrative code to mandate race, ethnicity, and tribal identifier data reporting; and conducting record linkage with an array of health-related data systems in a three-state region in the Pacific Northwest to identify and, in some cases, augment racial misclassification and improve disease/mortality estimates.

- The Case for Improving Race, Ethnicity, and Language Data
- Data Improvement through Education and Training of Hospital Staff
- Data Improvement through Data Linkages and Data Validation
- About the Grants (includes tools developed by each grantee)

http://www.hcup-us.ahrq.gov/datainnovations/raceethnicitytoolkit/home_race.jsp

CLINICAL CONTENT ENHANCEMENT TOOLKIT



Clinical Content Enhancement Toolkit

This toolkit provides practical tools and guidance to those interested in broadening and supplementing their existing administrative health data by adding clinical data elements. The toolkit is designed for statewide data organizations that collect hospital administrative data, such as those participating in AHRQ's Healthcare Cost and Utilization Project. However, the toolkit may also be useful for a variety of others with a role in enhancing administrative databases with clinical data elements, such as hospital leadership, quality improvement personnel, clinicians, and hospital IT departments.

The toolkit is based on the materials developed by, and the experiences of, five AHRQ Enhanced State Data grantees from Florida, Hawaii, Minnesota, New Jersey, and New York who collaborated with state and health care provider organizations to enhance existing hospital claims databases with clinical data, and use them to demonstrate how the enhancements improved their value in comparative effectiveness research. Enhancements included linking hospital claims data to hospital numerical laboratory data, to hospital ambulatory and emergency room claims data, to birth and death certificate data, to inpatient pharmacy order data, and to pre-admission emergency medical services data.

- The Case for Improving Clinical Data
- Project Initiation and Planning
- Training
- Data Collection, Linkage, and Management
- About the Grants (includes tools developed by each grantee)

http://www.hcup-us.ahrq.gov/datainnovations/clinicalcontentenhancementtoolkit/home_toolkits.jsp

AHRQ-SPONSORED *HSR* SPECIAL ISSUE

- Background on Statewide Discharge Data & Grants
- Grantee Challenges & Lessons Learned (collaborative paper)
- Case study- Sustainability of grant achievements
- Demonstration of the value of adding laboratory data
- An innovative approach for linking patient data
- Two different approaches to assessing and improving race-ethnicity data quality

PARTING COMMENTS TO RESEARCHERS

- Develop new methods to broaden the usefulness and improve statewide discharge data
- Collaborate with statewide data organizations and hospitals on data improvement
  - The Enhanced State Data grant projects are examples
- Let statewide data organizations (and HCUP) know about your data needs and ideas for improvement

RESOURCES

- HCUP Website

  http://www.hcup-us.ahrq.gov/

- HCUP Partners (Statewide Data Organizations)

  http://www.hcup-us.ahrq.gov/partners.jsp

- Clinical Content Enhancement Toolkit

  http://www.hcup-us.ahrq.gov/datainnovations/clinicalcontentenhancementtoolkit/home_toolkits.jsp

- Race and Ethnicity Data Toolkit

  http://www.hcup-us.ahrq.gov/datainnovations/raceethnicitytoolkit/home_race.jsp

Improving the Reporting of Race, Ethnicity, and Language in California Hospitals

David Zingmond, MD, PhD

The David Geffen School of Medicine at UCLA

Objectives and Approach

Overall Objective: To improve the reliability, validity, and completeness of self-reported Race, Ethnicity, and Language in data for patients seen in California hospitals (inpatient, ED, and ambulatory surgery)

1. Pre- and Post- needs assessments through **structured surveys** to hospital registrars (and others) in California hospitals.
2. Adaptation/development/implementation of training materials
3. **Development of revised data auditing rules for evaluating data quality throughout the project and feeding back to hospitals**
4. Post-collection data improvement (supplementation and imputation)

Study Approach

- Compared R/E reporting in 2008-2009 discharge data vs. existing self-report R/E information overall and by hospital
- Created new audit measures based upon hospital population mean estimates from zip code of residence
- Assessed new audit measure vs self-report
- Compared new audit measure vs existing measures

Gold Standard Assessment

- Linked the California Patient Discharge Data to two external gold-standards
  - California State Vital Statistics – birth records
  - California State Cancer Registry
    - Subset of cases with self-reported race/ethnicity (SF Bay Area and LA County)
    - Full state cancer registry – chart abstraction with name-based algorithm
- Calculated agreement for race/ethnicity for each cohort

Table 1: Demographics and Overall Agreement: Inpatient Data versus Maternal Cohort* and versus Cancer Cohort†

	Maternal Cohort 1		*Cancer Cohort 2,3*	
	N	*% Gold Standard Agreement*	*N*	*% Gold Standard Agreement*
Total discharges	1,052,238		14,918	
Overall combined race/ethnicity		85.8		90.1
Overall race only		70.7		90.7
Discharges by race/ethnicity				
Hispanic	551,643	89.1	1,264	66.4
Non-Hispanic	500,595	82.1	13,654	92.3
Whites (all)	792,975	72.3	11,000	93.7
Non-whites	259,263	65.7	3,918	82.5
Mean age of patients at discharge (years)	28.1		62.8	
Number of hospitals involved	261		227	
Number of observations per hospital (mean, range)	4,001	<1, 15,263>	66	<1, 715>

*PDD 2008–2009 versus Birth Cohort 2008–2009.
†PDD 2008–2009 versus Cancer Cohort: 2000–2008.

Demographics and Overall Agreement: Inpatient Data versus Cohort* and versus Cancer Cohort†

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(mean, range)				

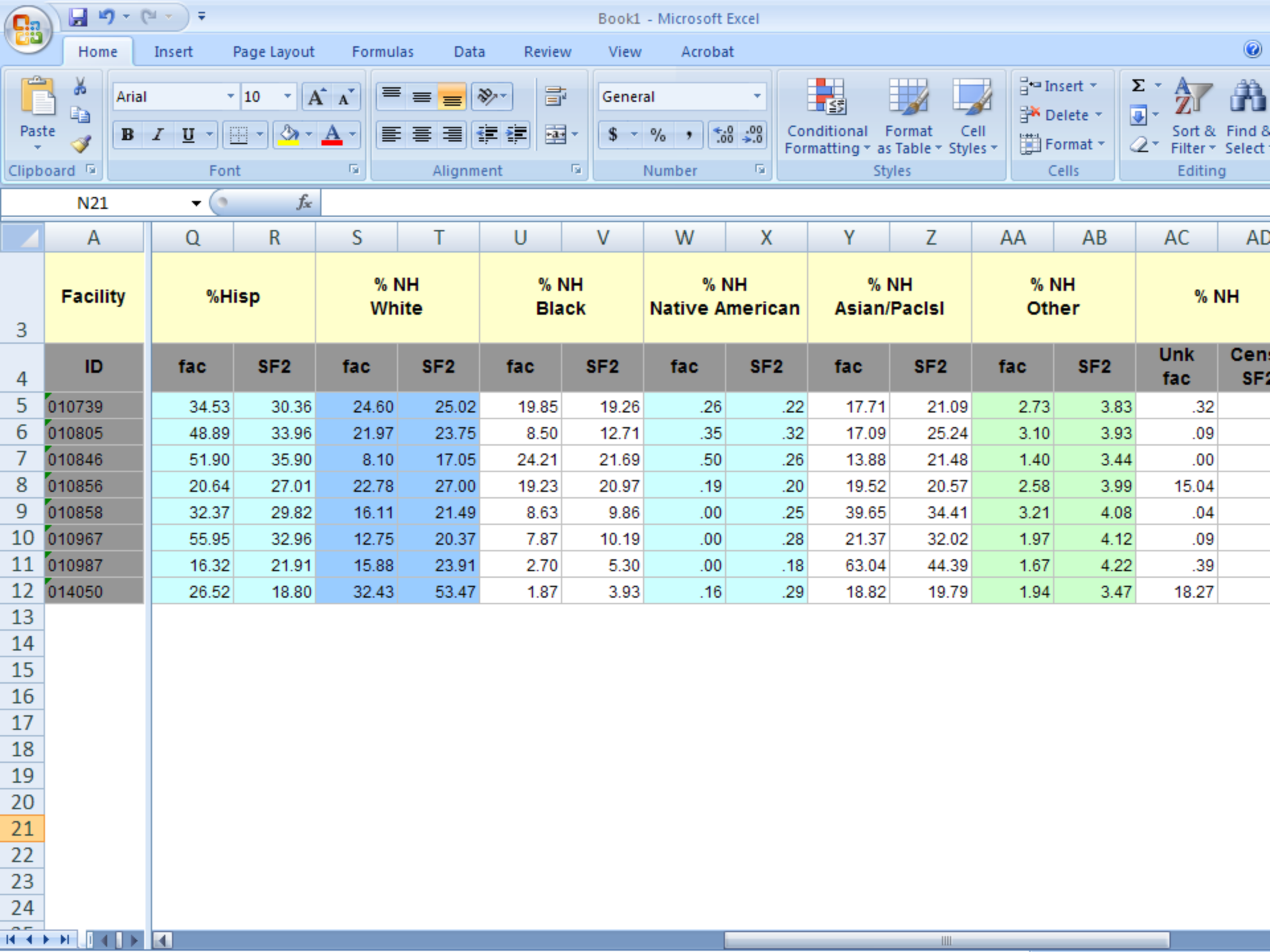
2009 versus Birth Cohort 2008–2009.
2009 versus Cancer Cohort: 2000–2008.

New Audit Measure: Mean-Population Comparison

Estimate disagreement between:

- Reported = Distribution of race categories as reported by the hospital
- Predicted = Population mean predicted distribution using zip-code level distribution for each patient in the hospital

Root mean squared difference (normalized vector difference between the reported and predicted



Book1 - Microsoft Excel

Home Insert Page Layout Formulas Data Review View Acrobat

Paste Clipboard Arial 10 Font Alignment General Number Conditional Formatting Format as Table Cell Styles Styles Insert Delete Format Cells Sort & Filter Find & Select Editing

N21

	A	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD
3	Facility	%Hisp		% NH White		% NH Black		% NH Native American		% NH Asian/PacIsl		% NH Other		% NH	
4	ID	fac	SF2	fac	SF2	fac	SF2	fac	SF2	fac	SF2	fac	SF2	Unk fac	Cens SF2
5	010739	34.53	30.36	24.60	25.02	19.85	19.26	.26	.22	17.71	21.09	2.73	3.83	.32	
6	010805	48.89	33.96	21.97	23.75	8.50	12.71	.35	.32	17.09	25.24	3.10	3.93	.09	
7	010846	51.90	35.90	8.10	17.05	24.21	21.69	.50	.26	13.88	21.48	1.40	3.44	.00	
8	010856	20.64	27.01	22.78	27.00	19.23	20.97	.19	.20	19.52	20.57	2.58	3.99	15.04	
9	010858	32.37	29.82	16.11	21.49	8.63	9.86	.00	.25	39.65	34.41	3.21	4.08	.04	
10	010967	55.95	32.96	12.75	20.37	7.87	10.19	.00	.28	21.37	32.02	1.97	4.12	.09	
11	010987	16.32	21.91	15.88	23.91	2.70	5.30	.00	.18	63.04	44.39	1.67	4.22	.39	
12	014050	26.52	18.80	32.43	53.47	1.87	3.93	.16	.29	18.82	19.79	1.94	3.47	18.27	
13															
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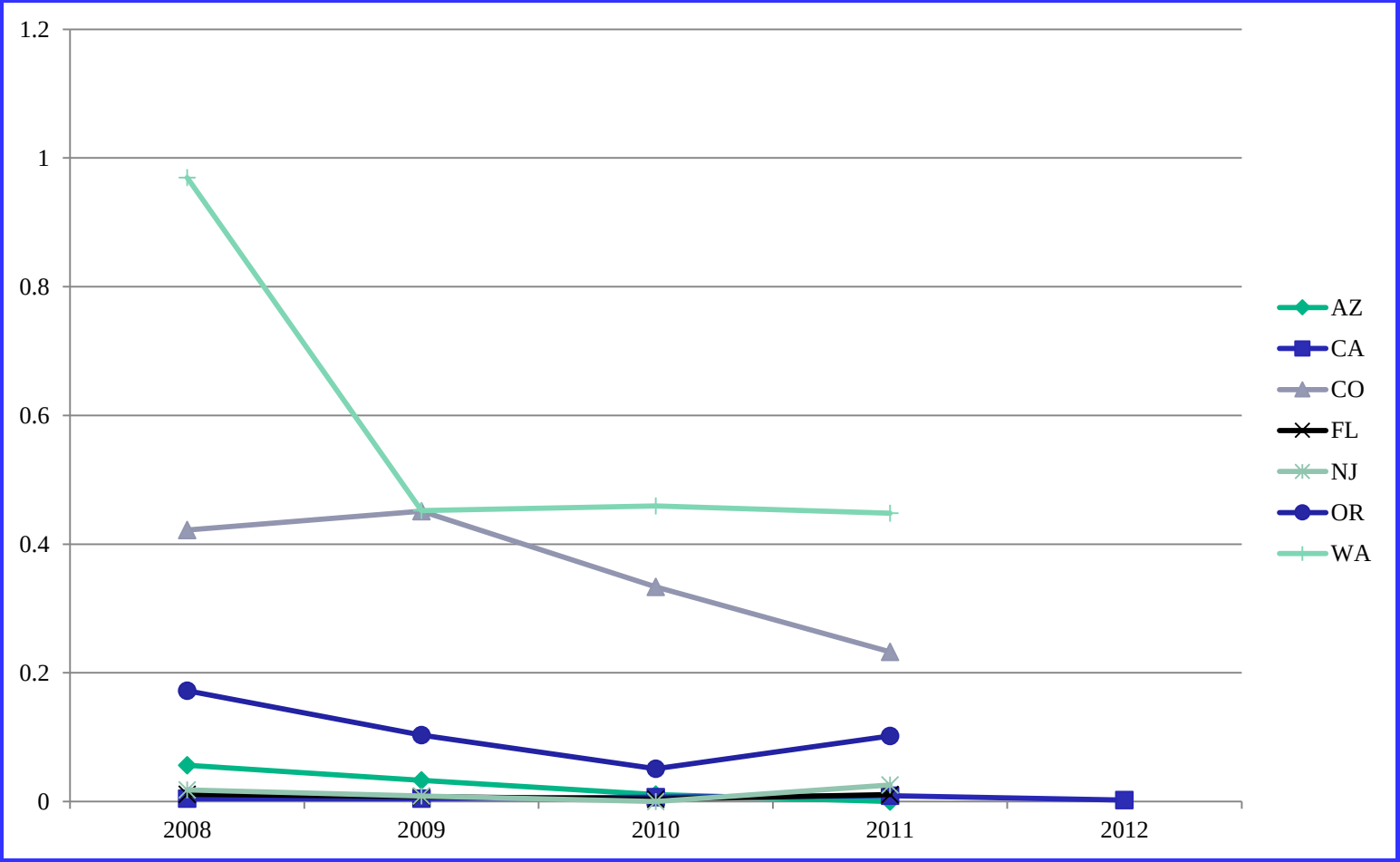
Audit measure vs Gold Standard

- Overall kappa: 0.44
- Kappa (highest 20% versus lowest 80% by RMSD): 0.47
- Kappa of audit rank disagreement versus gold standard measure: 0.1

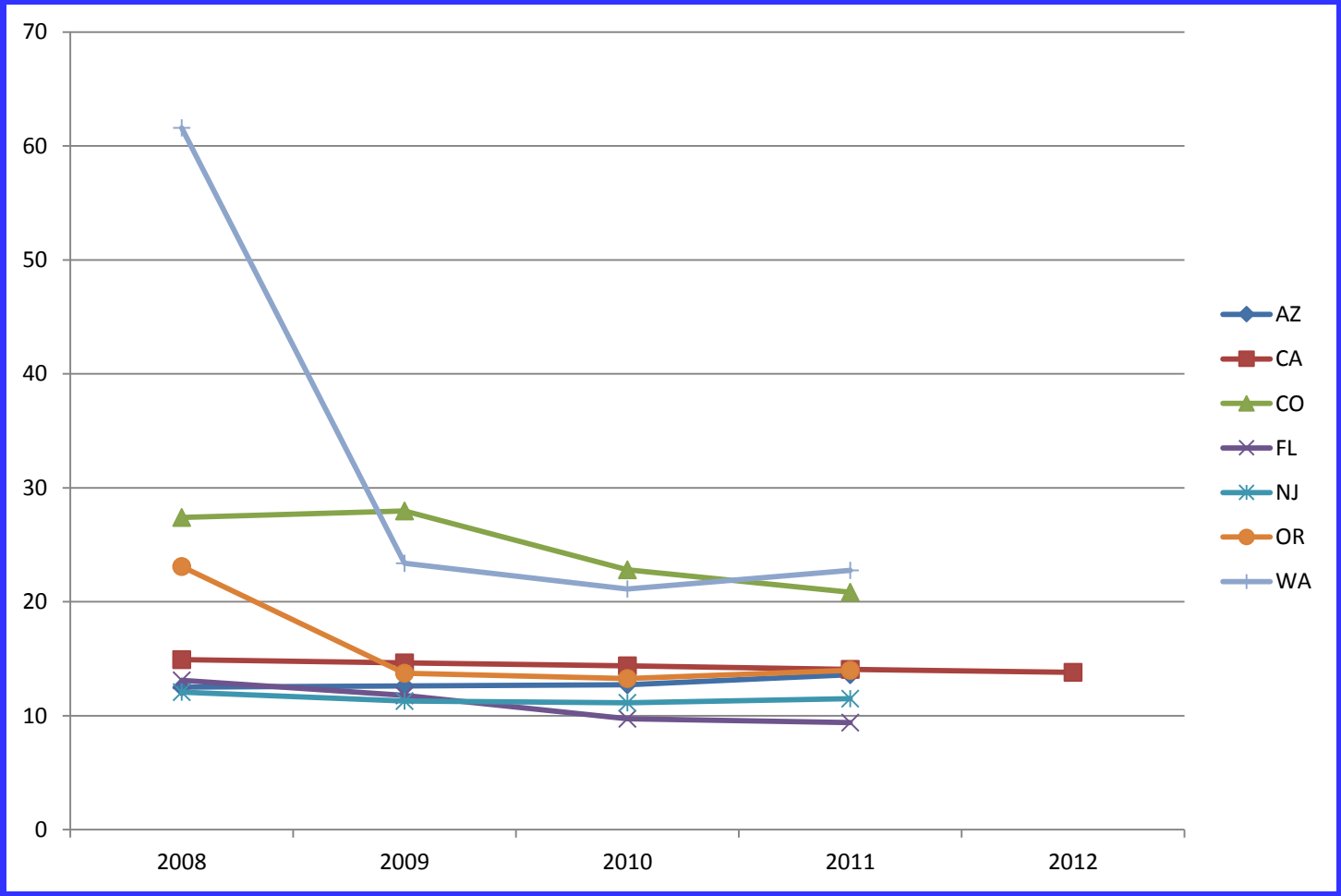
Audit Measures by States and Years

- Examined race and ethnicity reporting in CA and six comparison states—AZ, CO, FL, NJ, OR, & WA
- Compared the existing measure and the new audit measure

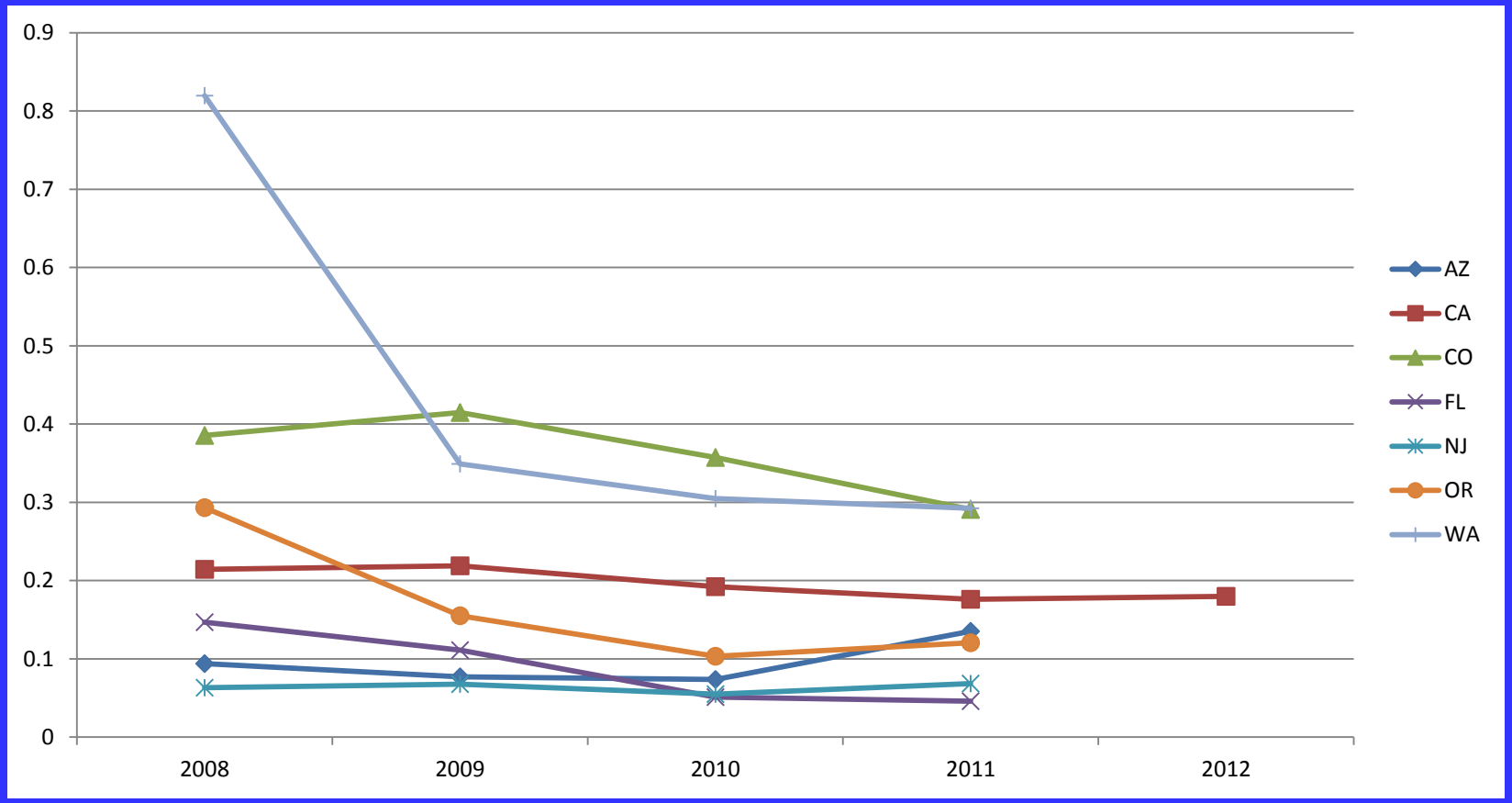
Rates of High ‘Other/Unknown’ RE Reporting by State



Average Estimated Disagreement in RE across Hospitals by State



Rates of High* Disagreement of RE Reporting by State



* > 0.20 error

Discussion

- Created audit measures that can assist hospitals and states with tracking overall reporting performance for R/E
- Development of alternative validated metrics for assessing the accuracy of data is difficult
  - For R/E, self-report is the gold standard
  - Few routinely collected sources of information are available for data auditing or comparison

Discussion

- Alternative metrics must depend upon routinely available, self-report data
  - Census data uniformly available, but problematic
  - Granularity of data likely to improve estimates
  - Certain comparisons of this type may cause false positives (& negatives) due to selection effects
- Revised audit measures show promise, but cannot account for specific, underlying biases
  - e.g. the general population (Census) does not resemble patients seen in the hospital

Reasonable Approaches to Improve Data

- Collecting institutions could change data reporting by adding:
  - Patient name
  - More granular geographic information
- Improving dissemination of developed education intervention

Reasonable Approaches to Improve Data

- Hospitals could change data collection by:
  - Increasing avenues for data collection and data improvement, e.g. allow patients to modify their profiles electronically

Incentivizing Hospitals to Make Change

- Fairness
- Quality ⇔ assure appropriate decision making
- Marketing ⇔ appeals to competitiveness / attractiveness to community members
  - Directed marketing
  - Improved patient satisfaction
- Publicly reporting estimated accuracy
- Regulatory fiat (with penalties)

Conclusions

- Mean population predictions appear to be a reasonable contextually relevant improvement for audit purposes
- Data improvement will come with improved data collection and collateral information for auditing and indirect improvement (imputation) of data
- Changes in hospital culture are necessary to improve collection of patient demographic data

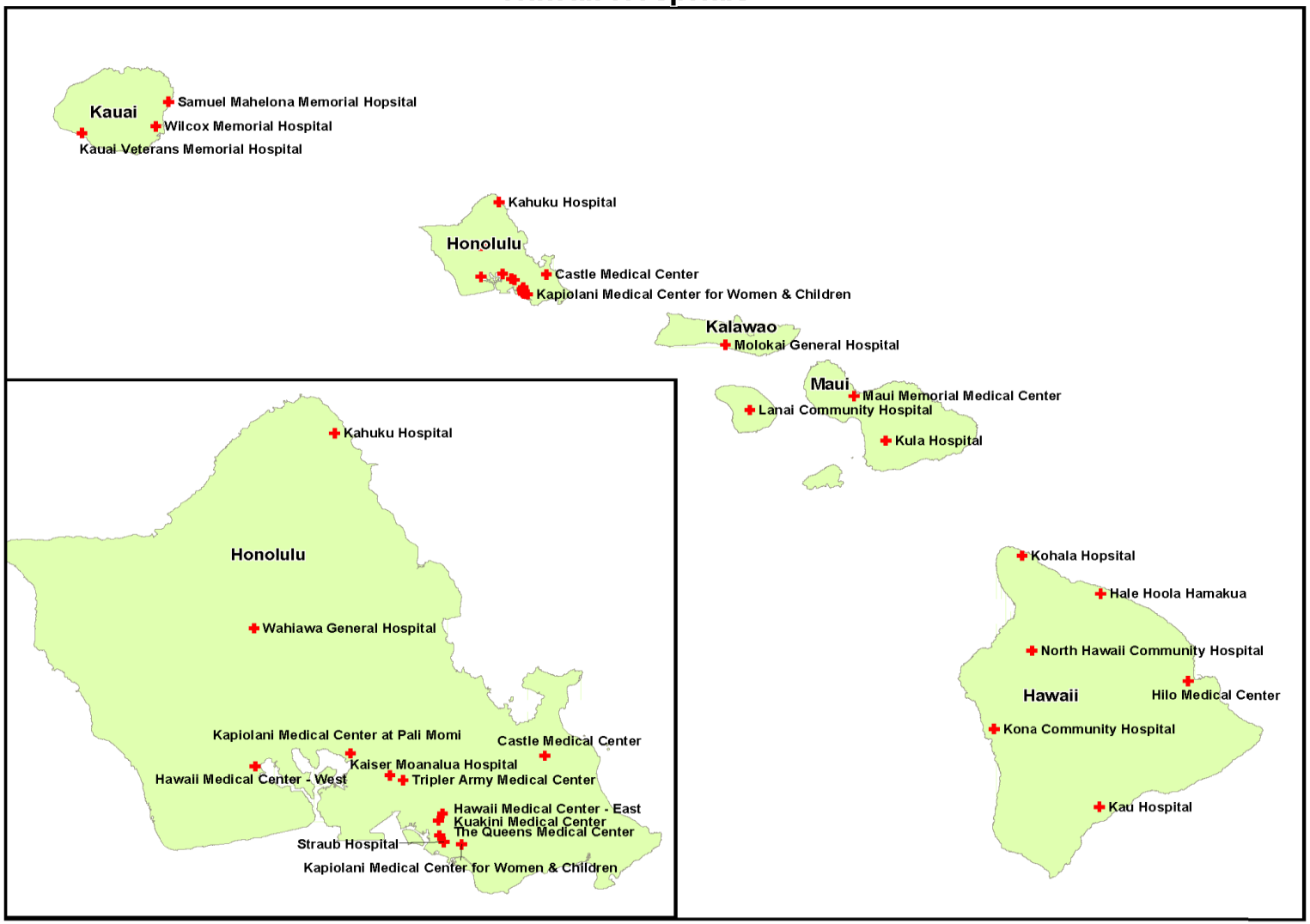
Incorporation of Laboratory Results into Statewide Hospital Data

Todd Seto, M.D. Principal Investigator
Jill Miyamura, Ph.D. Co-Principal Investigator
Christine Reuschel, Project Manager

HAWAII HEALTH INFORMATION CORPORATION

and

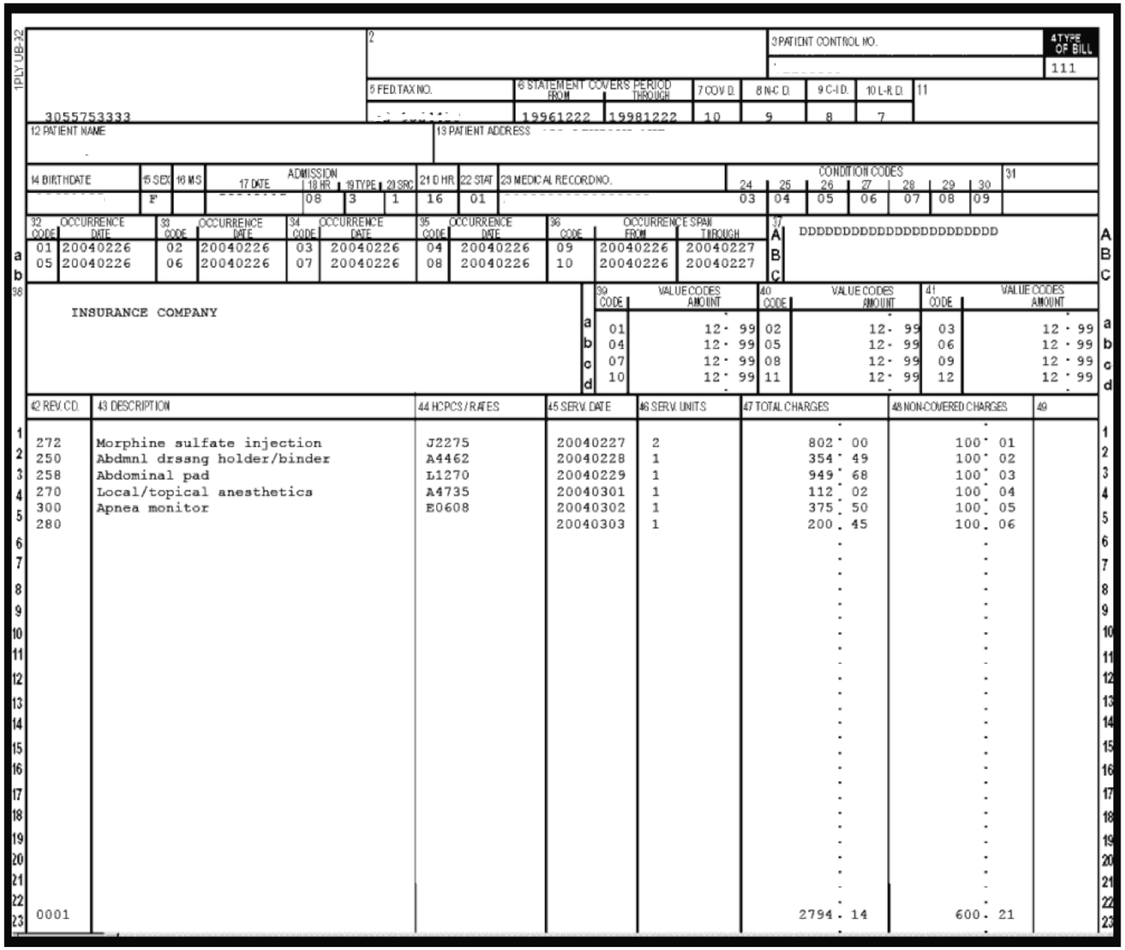
Hawaii Hospitals



Large Administrative Databases

Administrative, or Billing Data

UB-92 (UB-04) Billing Form



1PLY UB-92

3055753333

2

3 PATIENT CONTROL NO.

4 TYPE OF BILL: 111

5 FED. TAX NO.

6 STATEMENT COVERS PERIOD FROM: 19961222 THROUGH: 19981222

7 COV D.: 10 | 8 N-C D.: 9 | 9 C-I D.: 8 | 10 L-R D.: 7 | 11

12 PATIENT NAME

13 PATIENT ADDRESS

14 BIRTHDATE | 15 SEX: F | 16 MS | ADMISSION 17 DATE | 18 HR: 08 | 19 TYPE: 3 | 20 SRC: 1 | 21 D HR: 16 | 22 STAT: 01 | 23 MEDICAL RECORD NO.

CONDITION CODES 24: 03 | 25: 04 | 26: 05 | 27: 06 | 28: 07 | 29: 08 | 30: 09 | 31

32 OCCURRENCE CODE	DATE	33 CODE	DATE	34 CODE	DATE	35 CODE	DATE	36 OCCURRENCE SPAN CODE	FROM	THROUGH
01	20040226	02	20040226	03	20040226	04	20040226	09	20040226	20040227
05	20040226	06	20040226	07	20040226	08	20040226	10	20040226	20040227

37 A DDDDDDDDDDDDDDDDDDDDDDD

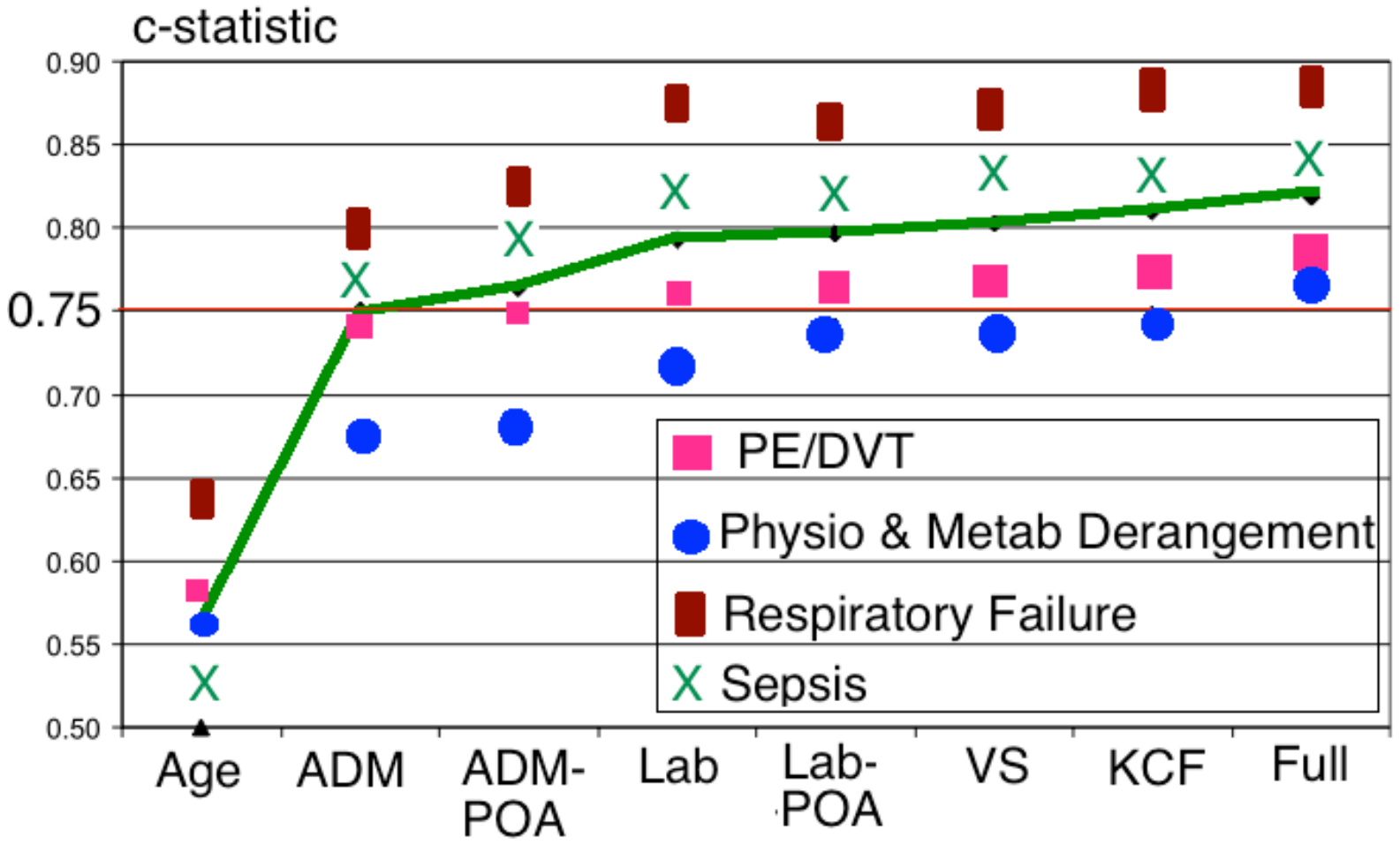
38 INSURANCE COMPANY

39 VALUE CODES CODE	AMOUNT	40 CODE	AMOUNT	41 CODE	AMOUNT
01	12 · 99	02	12 · 99	03	12 · 99
04	12 · 99	05	12 · 99	06	12 · 99
07	12 · 99	08	12 · 99	09	12 · 99
10	12 · 99	11	12 · 99	12	12 · 99

42 REV. CD.	43 DESCRIPTION	44 HCPCS / RATES	45 SERV. DATE	46 SERV. UNITS	47 TOTAL CHARGES	48 NON-COVERED CHARGES	49
272	Morphine sulfate injection	J2275	20040227	2	802 · 00	100 · 01	
250	Abdmnl drssng holder/binder	A4462	20040228	1	354 · 49	100 · 02	
258	Abdominal pad	L1270	20040229	1	949 · 68	100 · 03	
270	Local/topical anesthetics	A4735	20040301	1	112 · 02	100 · 04	
300	Apnea monitor	E0608	20040302	1	375 · 50	100 · 05	
280			20040303	1	200 · 45	100 · 06	
0001					2794 · 14	600 · 21	

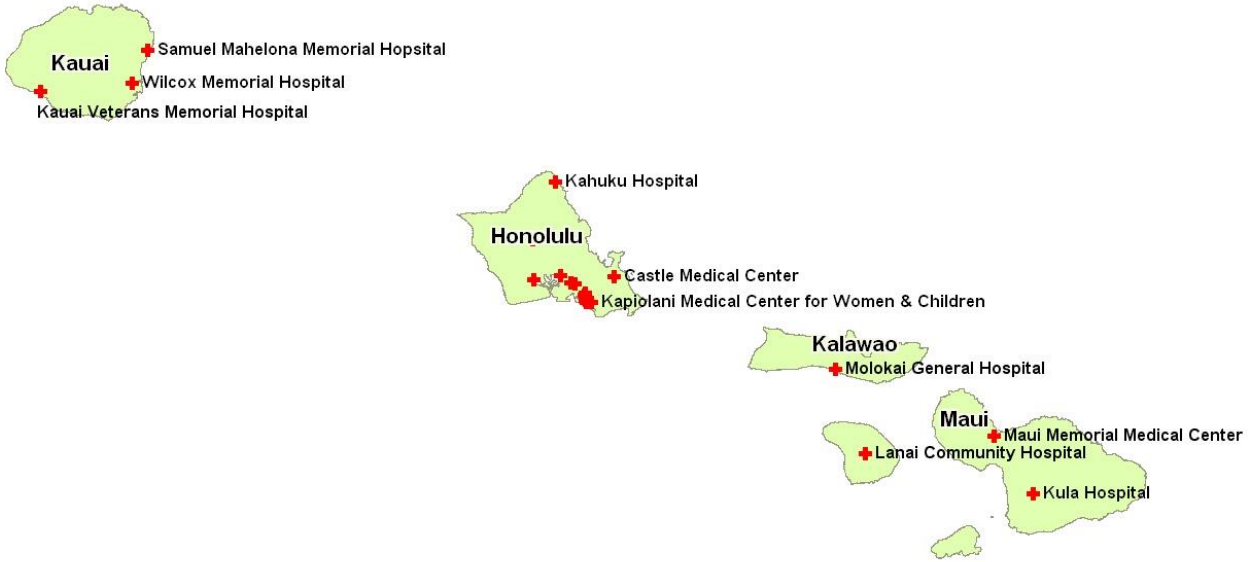
- Demographics (age, sex)
- Diagnoses & procedures (ICD-9-CM, DRG)
- Expected payer
- Length of stay
- Patient disposition
- Admission source & type
- Admission month
- Charges

Predictive Accuracy
Adding Laboratory



Fry et al, Ann of Surg 2007; Vol 246(5)875-885.

Hawaii Hospitals



Aim 1: Build infrastructure for CER

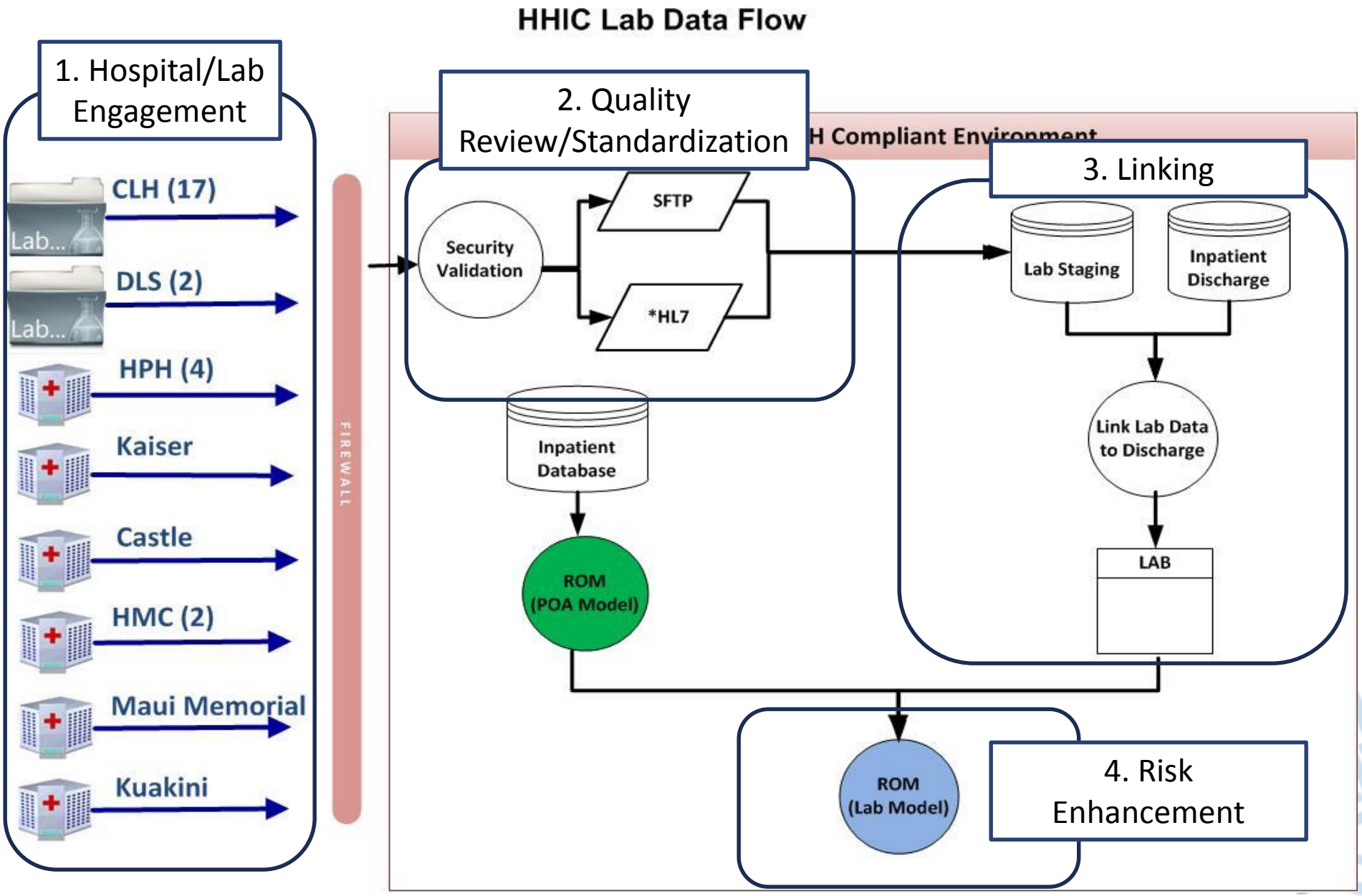
- Add laboratory data
- Extend MPI to all new records

Aim 2: Use enhanced database for CER

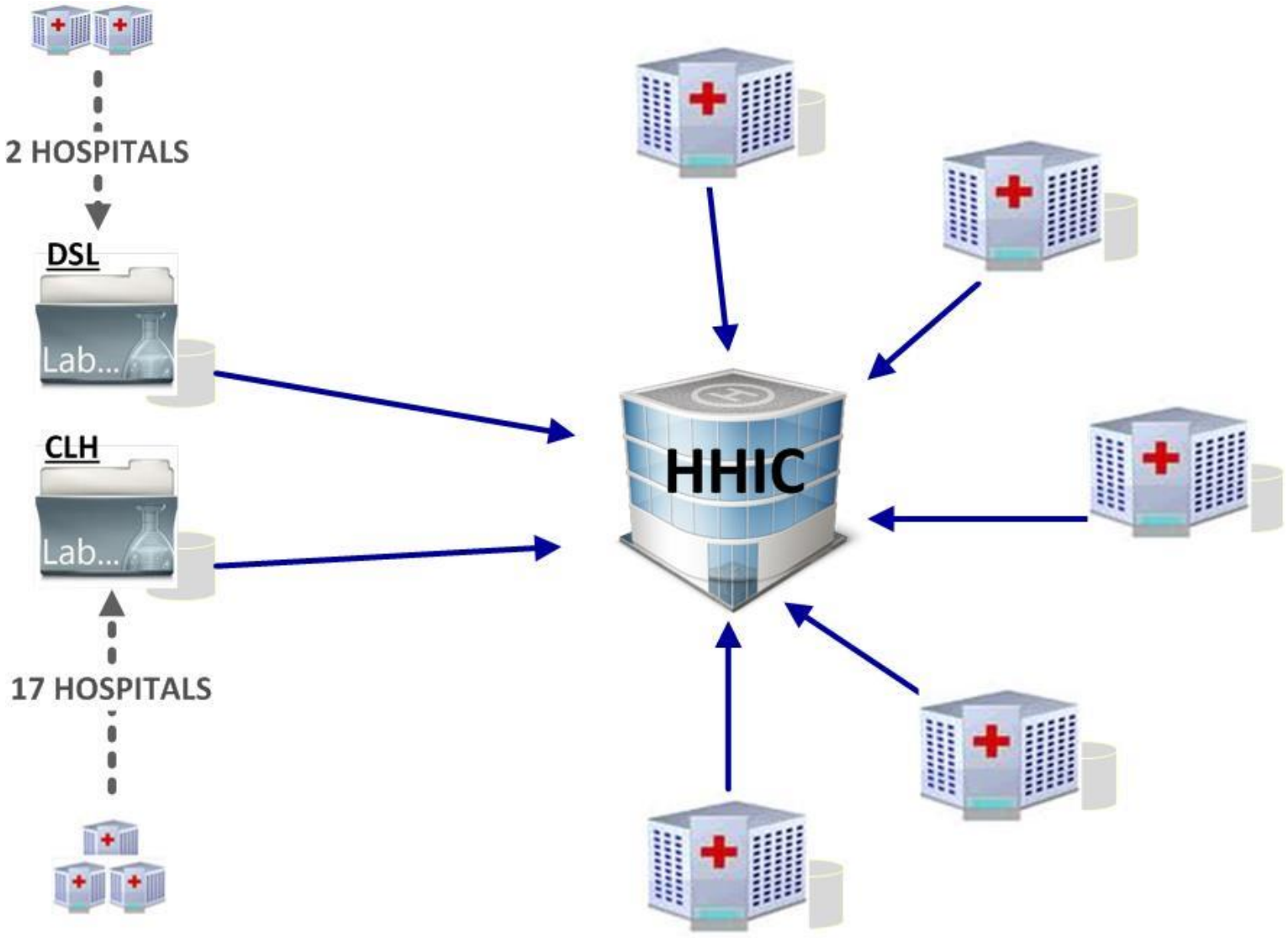
ADMISSION LABS

Category	Lab Tests		
Chemistry	Albumin	Creatinine	Sodium
	Alkaline phosphatase	Glucose	Troponin I
	Blood urea nitrogen (BUN)	Gamma glutamyl transferase	SGOT
	Calcium	Potassium	SGPT
	Chloride	Phosphate	
	Creatine kinase-MB	BNP	
Blood Gas	pO2	pH	Bicarbonate
	pCO2	Base Excess	
Hematology	Hemoglobin	Partial thromboplastin time (PTT)	Platelet Count
	Hematocrit	INR	White blood count (WBC)
Microbiology	Blood Culture	Urine Culture	Sputum Culture

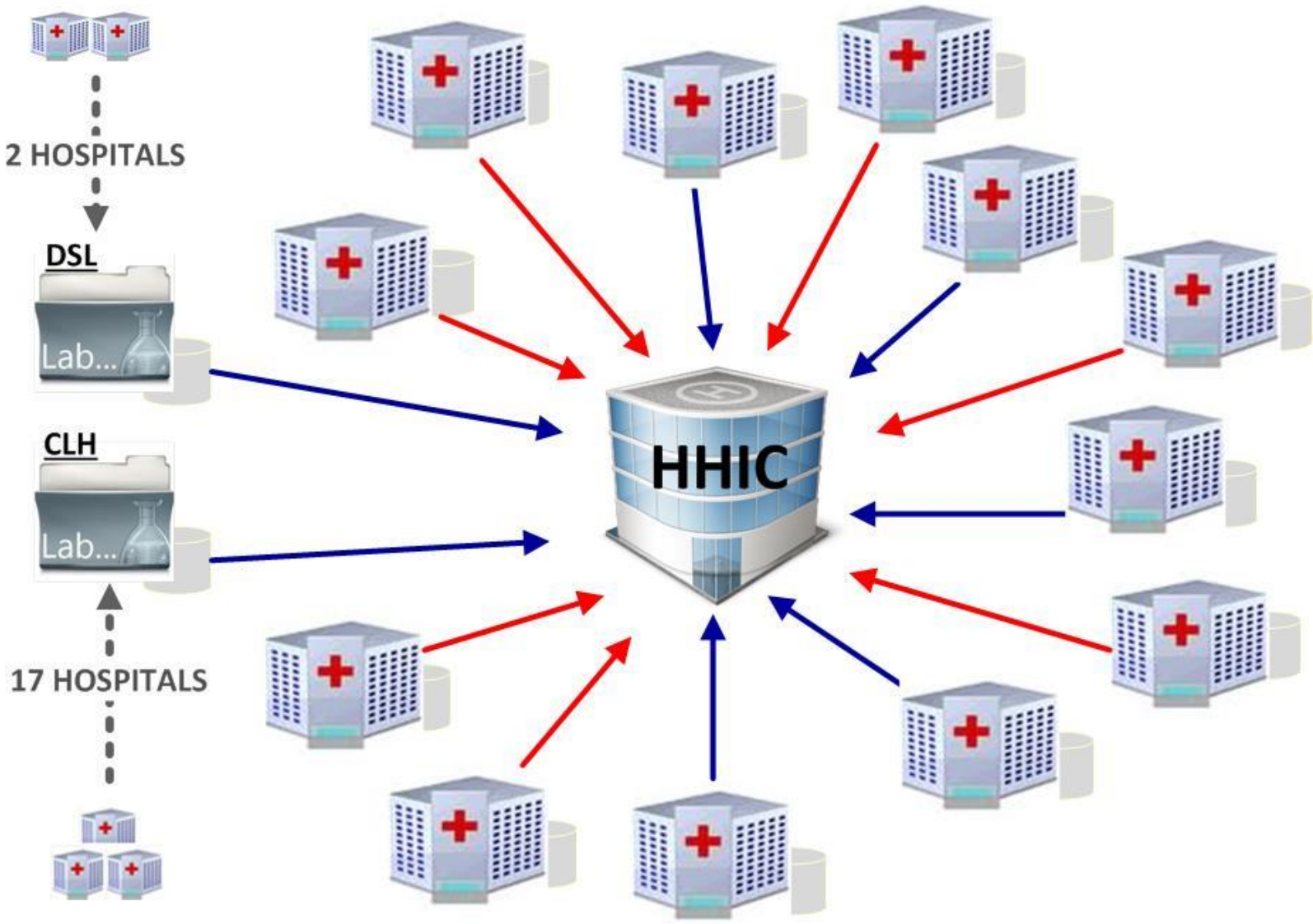
DATA TRANSFORMATION



Hospital Participation – As Conceived



REALITY!!



STRATEGIES THAT WORKED

Not Necessarily in Order of Importance

- Expect “surprises”; have back-up plan(s)
- Invest in technology
- Others important to our success
  - CEO buy-in (signed Agreements)
    - Clear description of roles
  - Communicate often; be adaptable; be nice
  - Reimburse for time
  - Have a great Project Manager!
  - Remove obstacles
    - Centralized labs
    - HL7 interface (Rhapsody)

2. DATA STANDARDS

Established Data Specifications

Lab Data Transmission – Data Elements	
*Sending Facility	Receiving Application
*Account Number	Create Date/Time
*Medical Record Number	Patient Class
*DOB	Hospital Test (Order)
Gender	Hospital Test Result (LOINC)
*SSN	Observation Date/Time
*Patient First Name	Results Report/Status Change
*Patient Last Name	Results Status
*Patient Middle Initial	Observation Value
*Admission Date/Time	Unit of Measure
*Discharge Date/Time	Reference Range
Order Physician First Name	Abnormal Flag
Order Physician Last Name	Observation Result Status
Order Physician Middle Initial	Comments
Physician Identifier	

* Variables used for linking Lab data to HHIC Inpatient discharge data

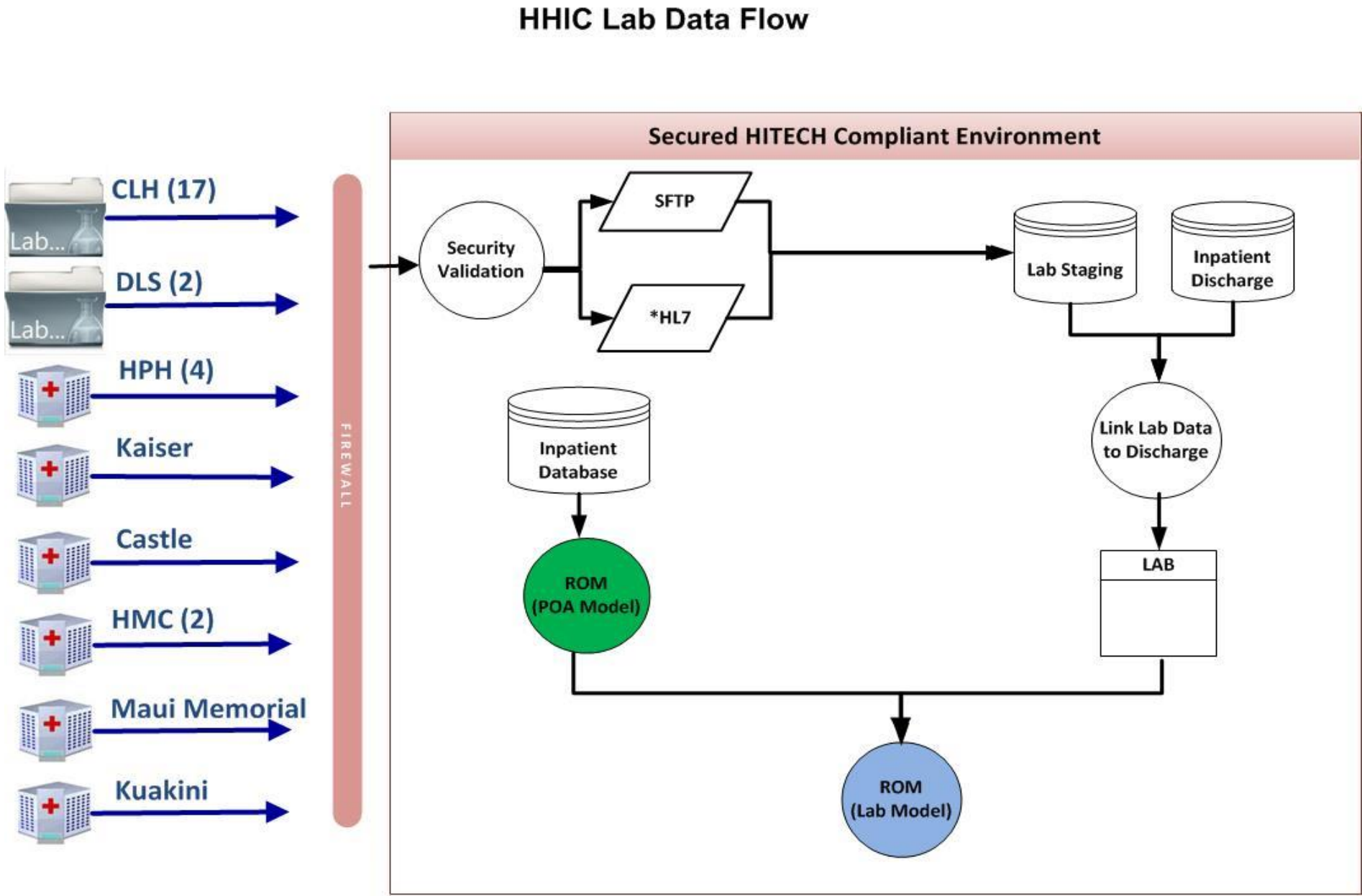
2. Data Quality/Standardization
Too much, too little, what is this???

- **Too Much**
  - ALL lab data received vs. 32 requested labs
- **Too Little**
  - Limited or Missing Key Demographic Linking Variables
  - Missing Laboratory Data
- **What is this?**
  - Logical Observation Identifiers Names and Codes(LOINC)
  - Facility ID Standardization

3. Data Linking

Data Variable
Sending Facility
Account Number
Medical Record Number
Date of Birth
Gender
Patient First Name (up to first space if multiple names were present)
Patient Last Name
Date of Admission/Lab Observation Date
SSN

Data Transformation



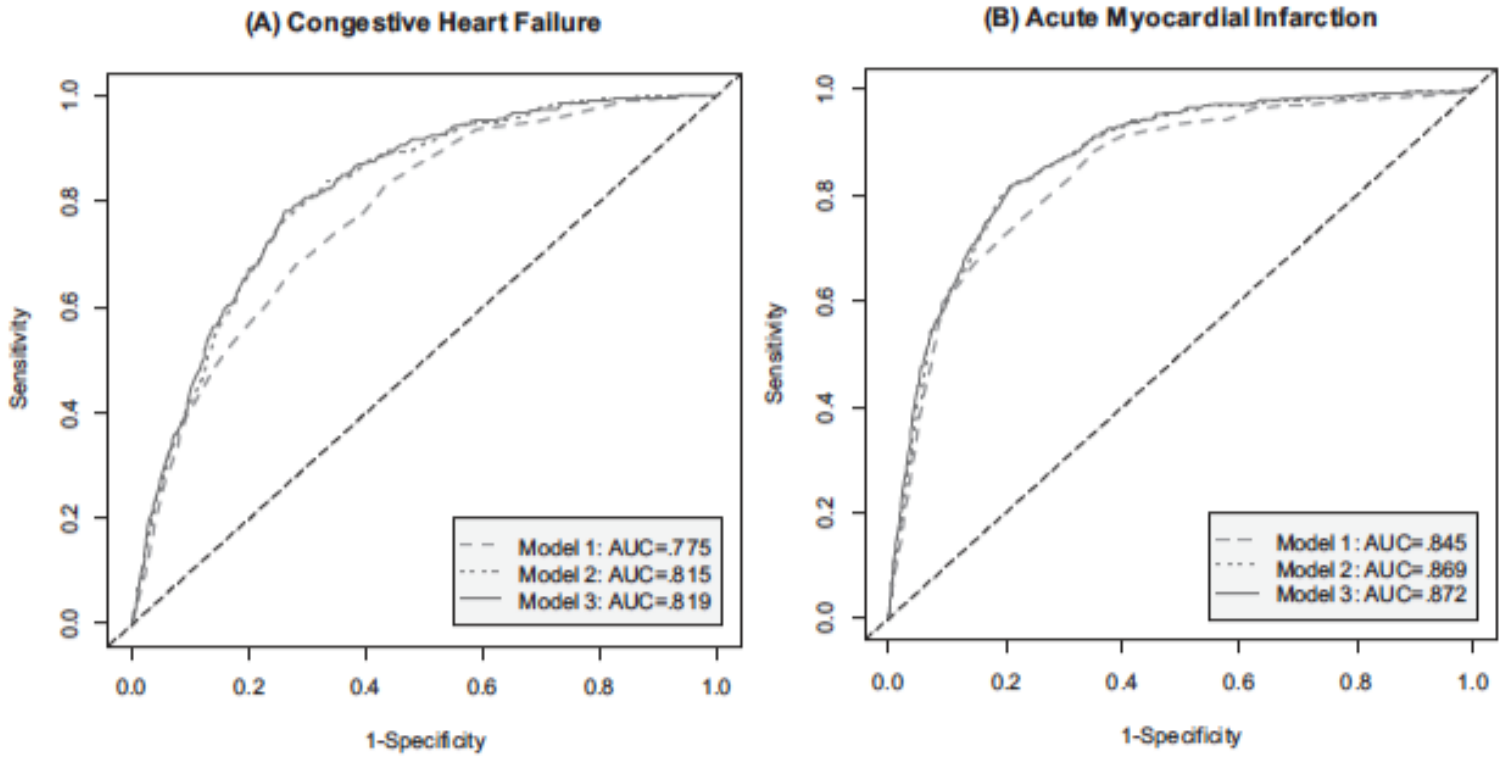
Impact of Risk-Adjusted In-Hospital Mortality Models*

- 3 Models
  - Model 1: 3M ROM (POA) + Age + Gender
  - Model 2 : Model 1 + Lab severity
  - Model 3 : Model 2 + Race/Ethnicity
- Lab severity: based on number of abnormal lab tests

Reason for Hospitalization	Mild	Moderate	Severe
CHF	0-5	6-8	9-20
AMI	0-3	4-6	10-24

*Lim, E, Cheng, Y, Reuschel, C, Mbowe, O, Ahn, H, Juarez, D, Miyamura, J, Seto, T, Chen, J: Risk-Adjusted In-Hospital Mortality Models for Congestive Heart Failure and Acute Myocardial Infarction: Value of Clinical Laboratory Data and Race/Ethnicity. Health Services Research, 50:S1, Part II (August 2015), pp1351-1371. (Based on Figure 1)

Impact of Risk-Adjusted In-Hospital Mortality Models*



Notes: Model 1 = 3M Risk of Mortality (ROM) + Gender + Age; Model 2 = 3M ROM + Gender + Age + Lab Severity; Model 3 = 3M ROM + Gender + Age + Lab Severity + Race/Ethnicity.

*Lim, E, Cheng, Y, Reuschel, C, Mbowe, O, Ahn, H, Juarez, D, Miyamura, J, Seto, T, Chen, J: Risk-Adjusted In-Hospital Mortality Models for Congestive Heart Failure and Acute Myocardial Infarction: Value of Clinical Laboratory Data and Race/Ethnicity. Health Services Research, 50:S1, Part II (August 2015), pp1351-1371. (Based on Figure 1)

AMI MORTALTY RATES*

The Impact of Different Risk Models on Hospital Ranking

Hospital ID	Unadjusted	Model 1 (3M ROM)
A	1	2
B	2	6
D	3	1
C	4	5
H	5	4
E	6	3
F	7	8
I	8	7
J	9	9
G	10	10

Model 1: 3M Risk of Mortality+ POA +Age + Gender

*Lim, E, Cheng, Y, Reuschel, C, Mbowe, O, Ahn, H, Juarez, D, Miyamura, J, Seto, T, Chen, J: Risk-Adjusted In-Hospital Mortality Models for Congestive Heart Failure and Acute Myocardial Infarction: Value of Clinical Laboratory Data and Race/Ethnicity. Health Services Research, 50:S1, Part II (August 2015), pp1351-1371. (Based on Table 4)

AMI MORTALTY RATES*

The Impact of Different Risk Models on Hospital Ranking

Hospital ID	Unadjusted	Model 1	Model 2 (w Labs)
A	1	2	3
B	2	6	8
D	3	1	1
C	4	5	5
H	5	4	4
E	6	3	2
F	7	8	7
I	8	7	6
J	9	9	9
G	10	10	10

Model 1: 3M Risk of Mortality + POA + Age + Gender

Model 2: Model 1 + Add Lab

*Lim, E, Cheng, Y, Reuschel, C, Mbowe, O, Ahn, H, Juarez, D, Miyamura, J, Seto, T, Chen, J: Risk-Adjusted In-Hospital Mortality Models for Congestive Heart Failure and Acute Myocardial Infarction: Value of Clinical Laboratory Data and Race/Ethnicity. Health Services Research, 50:S1, Part II (August 2015), pp1351-1371. (Based on Table 4)

AMI MORTALTY RATES*

The Impact of Different Risk Models on Hospital Ranking

Hospital ID	Unadjusted	Model 1	Model 2 (w Labs)	Model 3 (+Race)
A	1	2	3	3
B	2	6	8	7
D	3	1	1	1
C	4	5	5	5
H	5	4	4	4
E	6	3	2	2
F	7	8	7	8
I	8	7	6	6
J	9	9	9	9
G	10	10	10	10

Model 1: 3M Risk of Mortality + POA + Age + Gender

Model 2: Model 1 + Add Lab

Model 3: Model 2 + Add Ethnicity/Race

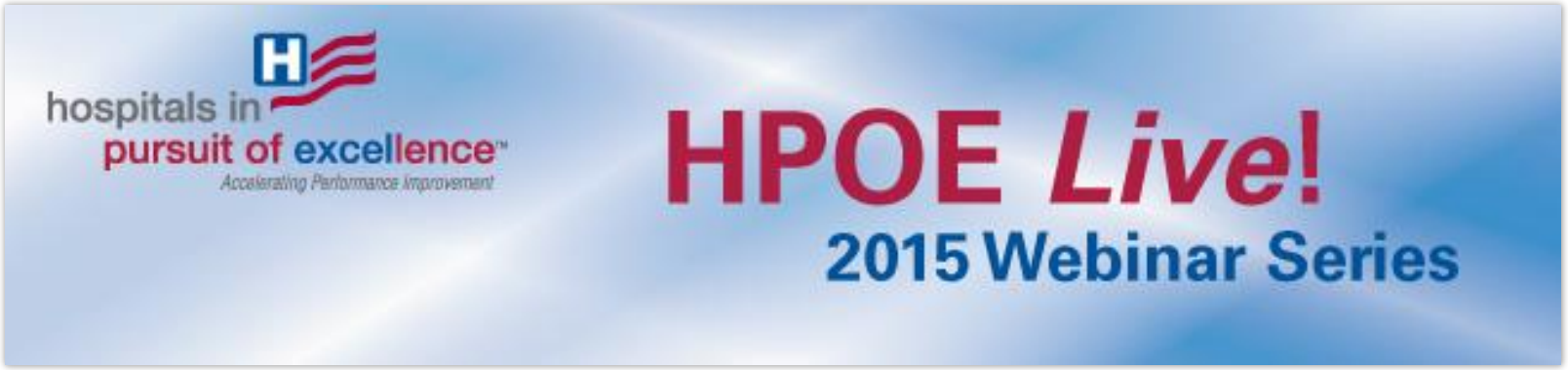
*Lim, E, Cheng, Y, Reuschel, C, Mbowe, O, Ahn, H, Juarez, D, Miyamura, J, Seto, T, Chen, J: Risk-Adjusted In-Hospital Mortality Models for Congestive Heart Failure and Acute Myocardial Infarction: Value of Clinical Laboratory Data and Race/Ethnicity. Health Services Research, 50:S1, Part II (August 2015), pp1351-1371. (Based on Table 4)

Beyond Risk Stratification…
New Opportunities
Using Clinically Enhanced Claims Data

- Public health
  - Injury Prevention (toxicology labs)
  - MRSA
- Research topics
  - Diabetes (HbA1c)
  - Others…

MAHALO!

- AHRQ (Grant # 1R01HS019990-01)
- Hospitals
- Clinical Labs Hawaii
- Diagnostic Lab Services
- HHIC Team
  - Christine Reuschel, Project Manager
  - Mike Murata, Data Warehouse Manager
  - Lana Kadooka, Senior Developer
  - Billy Lin, DBA/Business Analyst
  - Jean Kailiawa, Data Manager
- Office of Biostatistics & Quantitative Health Sciences – University of Hawaii John A Burns School of Medicine
  - NIMHD (Grant 2U54MD007584-04 AND G12MD007601); NIGMS of the NIH (P20GM103466)



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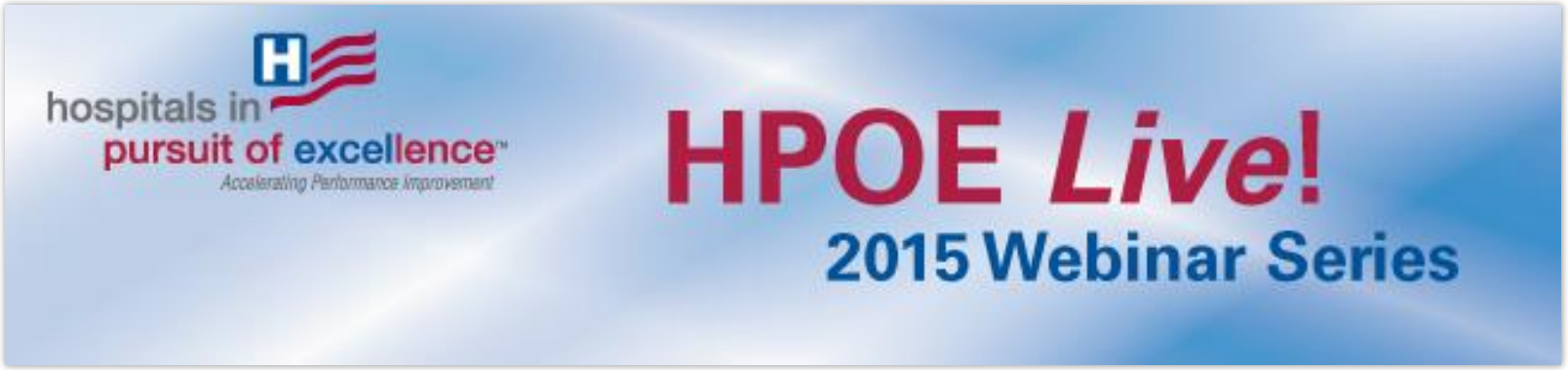

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