Evaluating the AHRQ Inpatient Mortality Indicators for Public Reporting in California

AHRQ Users Meeting

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AHRQ Inpatient Mortality Indicators (IMIs): Background to CA Decision

- Per statute, OSHPD should be publishing 9 risk-adjusted hospital mortality reports per year
- Traditional approach to producing reports costly, time-consuming, fraught with delays
- CA patient discharge data now available only 7 months after end of reporting year (inpatient mortality)
- State death file (necessary for 30-day mortality) not available until 15 months after end of reporting year
- APR-DRG risk model not ‘black box’ anymore
- POA now incorporated in APR-DRG risk adjustment algorithm
- Some IMIs have undergone NQF vetting process

AHRQ Inpatient Mortality Indicators: California Plans for Public Reporting

Conditions (7)	Procedures (8)
Acute Stroke	Esophageal Resection*
Gastrointestinal (GI) Hemorrhage	Pancreatic Resection*
Hip Fracture*	Craniotomy
AMI	Carotid Endarterectomy
AMI without transfer cases	Percutaneous Transluminal Coronary Angioplasty (PTCA)
Pneumonia*	Abdominal Aortic Aneurysm (AAA) Repair*
Congestive Heart Failure*	~~Hip Replacement~~
	Coronary Artery Bypass Graft (CABG) Surgery

Indicators NOT planned for release in Gold

* **Endorsed by NQF May, 2008**

Comparison of Traditional OSHPD Mortality Reports* with AHRQ IMIs

OSHPD Mortality Reports

- 30-day mortality
- Link with CA death file data (delay)
- Include POA information
- Detailed technical reports accompany results
- Data validation study performed
- Considered quality “measures”
- No national vetting/endorsement

AHRQ IMIs

- Inpatient mortality
- No death file data used
- Now include POA information
- Minimum documentation (Tech. Note with links to AHRQ)
- Data not formally validated in CA
- Considered quality “indicators”
- Six received National Quality Forum (NQF) endorsement (Hip replacement mortality withdrawn)

*** Not including CABG report based on clinical data**

Planned and Published OSHPD Quality Metrics: Varying Levels of Validity

	CA CABG Report	OSHPD Traditional Reports *	OSHPD Benchmark Reports**	AHRQ IMIs	AHRQ Volume & Utilization Indicators
Type of Data	Clinical Registry	Patient Discharge Data	Patient Discharge Data	Patient Discharge Data	Patient Discharge Data
Data Quality Checks	Extensive, ongoing changes	Automated; no changes past acceptance	Automated; no changes past acceptance	Automated; no changes past acceptance	Automated; no changes past acceptance
Medical Chart Audit	Yearly	With initial validation study	Limited: CHF, None: AAA	None	None
Risk Model Review	Yearly	Infrequent	Infrequent	Periodic by AHRQ	Periodic by AHRQ
Expert Panel Review	Continuous	With initial validation, TAC	TAC	Periodic by AHRQ & NQF	Periodic by AHRQ & NQF
Principal Source of Validation	National STS & associated literature	Initial validation study & literature	For CHF, CMS validation; for AAA, literature	Extensive literature review & NQF vetting	Extensive literature review & NQF vetting

*** Includes two reports produced (heart attack, pneumonia) and two in progress**

**** Two reports in progress (AAA repair & CHF) to be released without a formal validation study**

AHRQ Message on IMI Validity

- *Providers, policy makers, and researchers can use with inpatient data to identify apparent variations in the quality of inpatient care*
- *Although quality assessments based on administrative data cannot be definitive, they can be used to flag potential quality problems and success stories, which can then be further investigated and studied*
- *Hospital associations, individual hospitals, purchasers, regulators, and policymakers at the local, State, and Federal levels can use readily available hospital administrative data to begin the assessment of quality of care*

OSHPD Message on IMI Validity

OSHPD views these indicators as potentially useful starting points for examining hospital quality but does not regard them as definitive measures of quality. When this information is carefully considered, with its limitations, alongside other reliable healthcare provider information, it may be helpful to patients and purchasers when making decisions about healthcare treatment choices. Healthcare providers may also benefit from using this information in quality improvement activities.

OSHPD Implementation of IMIs

- Used 2007 CA patient Discharge Data
- Transformed data elements and values into formats for AHRQ software (Version 3.2)
- POA option utilized
  - APR-DRG risk scores based only on conditions coded as pre-existing, not hospital-related complications
- Calculated risk-adjusted rates
  - Used APR-DRG risk model with coefficients from CA & NY
  - Logistic regression model (with random hospital effects)
- Calculated statistical outliers
  - **No hospital case volume limit applied**
  - **95% upper and lower CIs**
  - "Better" and "Worse than Expected" labels used

2007 CA Statewide California IMI Results

Procedure/Condition	# Cases	# Hospitals	Rate	# Better	# Worse
Esophageal Resection	190	59	6.5	0	2
Pancreatic Resection	623	121	4.5	0	5
Craniotomy	11,427	294	6.2	1	14
Acute Stroke	49,915	343	10.4	20	33
GI Hemorrhage	48,691	358	2.1	1	13
Hip Fracture	23,700	300	2.4	0	14
PTCA	52,152	154	1.3	2	11
Carotid Endarterectomy	8,132	238	0.4	1	7

Analyses to Detect Major Biases in IMIs Using Internal Data

- Do certain types of hospitals (teaching, public, profit, non-profit) have worse IMI rates than other types of hospitals?
- Do hospitals with a large percentage of DNR, palliative care, or SNF patients have worse IMI rates than other hospitals?
- Do hospitals with very poor POA coding quality (rarely coding complications) have better IMI rates than others?
- Do *high transfer-intensity* hospitals benefit from use of inpatient mortality compared to 30-day mortality?
- Does the AHRQ inclusion of POA improve validity of original IMI by bringing it closer to a gold standard proxy?

Hospital 2007 IMI Rates by Type of Hospital

	Hospital Type			
	Non-Profit	Investor	Public	Teaching
Number of Hospitals*	191	96	62	20
IMIs				
Craniotomy***	5.4	4.7	11.7	6.9
Stroke**	10.4	9.0	12.3	10.6
GI Hemorrhage**	2.2	1.9	3	1.8
Hip Fracture*	2.3	2.8	3.3	2.2
PTCA**	1.2	1.0	1.5	1.6
Carotid Endarterectomy	0.4	0.3	0.5	0.1

- **Includes all CA hospitals meeting minimum volume thresholds: most IMIs will have fewer hospitals reporting**

p<.05 **p<0.01 ***p<0.001 (ANOVA)

Effect of DNR, Palliative Care, and SNF Patients on Hospital Performance

- For each hospital, across all patients, calculated the percent of total who had:
  - DNR coded within 24 hours of admission
  - ICD-9 code for palliative care (99.7)
  - Source of admission = SNF
  - Marker for unmeasured severity
- Correlated % of patients with DNR, PC, & SNF with 8 IMI rates
- For DNR, PC & SNF, determined which 10% of hospitals had highest coding rates
  - Calculated and compared the IMI rates for the high 10% group with other 90%
- However, when comparing hospitals in top & bottom 5% of mortality performance, no consistent trend in DNR, PC, and SNF patient caseloads (even for CHF & stroke)

Correlations Between Hospital DNR, Palliative Care, and SNF Admission Rates and IMI Rates

IMIs	# Hospitals	Pearson Correlation		
		DNR Rate	Pall. Care Rate	SNF Admit Rate
Esophageal Resection	16	0.08	0.37	0.05
Pancreatic Resection	60	0.10	0.19	-0.05
Craniotomy	159	-0.13	0.02	-0.05
Acute Stroke	273	0.22***	0.21***	-0.08
Gastrointestinal Hemorrhage	292	0.00	0.02	0.05
Hip Fracture	277	0.10	0.08	0.04
PTCA	132	0.01	0.10	0.07
Carotid Endarterectomy	170	0.03	-0.01	-0.01
Community-acquired pneumonia (OSHPD report)	354	.11*	0.13*	---

*p<.05, **p<.01, ***p<.0001

Do Hospitals Coding Large Numbers of DNR, Palliative Care, or SNF Admissions Have Higher IMI Rates?

IMIs	DNR		Palliative Care		SNF Admissions	
	High	Other	High	Other	High	Other
Craniotomy (%)	--	--	5.2	6.3	4.3	6.2
Stroke (%)	15.8	10.0	11.9	10.1	8.8	10.5
GI Hemorrhage (%)	2.7	2.1	2.3	2.1	2.3	2.1
Hip Fracture (%)	1.7	2.6	2.3	2.6	1.8	2.6
PTCA (%)	1.8	1.3	1.3	1.3	1.5	1.3
Carotid Endarterectomy (%)	0	0.3	0.7	0.3	1.2	0.3

Impact of Hospital POA Coding Quality on Performance

- POA analyses using % cases coded POA='yes' (crude measure) and 3M POA coding quality metric
  - No consistent correlation (direction or strength) between % hospital cases coded POA="yes" and IMI rates
  - No consistent difference between lowest & highest 5% of hospitals by mortality rate, on % cases coded POA="yes"
  - Using 3M metric, poor coding hospitals are not over-represented in lowest 5% mortality rate hospitals

Do Hospitals with Bad POA Coding Have Better IMI Rates Than Other Hospitals?

IMIs	Hughes et al. Metric		OSHPD Metric	
	Other	Bad	Other	Bad
Craniotomy (%)	5.7	9.4	6.0	9.1
Stroke (%)	10.6	9.3	10.4	8.7
GI Hemorrhage (%)	2.1	2.5	2.1	2.4
Hip Fracture (%)	2.6	2.2	2.6	2.0
PTCA (%)	1.2	1.6	1.3	3.6
Carotid Endarterectomy (%)	0.3	0.3	0.3	0

Does the Use of Inpatient Mortality vs. 30-Day Mortality Bias Hospital Results?

- 30-day mortality is the preferred measure for outcomes assessment
  - Not impacted by hospital discharge practices
  - May result in less timely reports
- Transfer rates vary greatly by hospital
  - Transfers to acute care (excluded in IMIs):
  - Transfers to SNF/other care:
- Methods
  - Created hospital "transfer intensity" measure
    - Rates created for top 10%, middle 80%, and bottom 10% of hospitals according to ALL patient discharges to non-hospital care (SNF/intermediate care, other care)need to describe/research better
  - Calculated crude inpatient and 30-day mortality rates for hospitals by transfer intensity group
  - Calculated difference between hospital inpatient and 30-day crude mortality rates by IMI
  - Calculated an "impact measure that describes to what degree different transfer intensity groups are favorably impacted by use of inpatient mortality

What Impact Does Hospital Transfer Intensity Have on 30-day Crude Mortality Rates Compared to Crude Inpatient Rates?

IMI	Transfer Intensity	# Hospitals	Inpatient Rate	30-Day Rate	Difference	Impact*
Craniotomy	High	6	14.3	19.0	4.7	**+2.2**
	Moderate	121	9.9	12.8	2.9	--
	Low	11	8.5	10.3	1.8	**-1.1**
Stroke	High	18	7.2	13.7	6.5	**-0.6**
	Moderate	236	10.4	17.5	7.1	--
	Low	16	10.1	14.1	4.0	**-2.9**
GI Hemorrhage	High	25	2.5	4.9	2.5	**-0.4**
	Moderate	246	2.5	5.4	2.9	--
	Low	20	2.8	4.6	1.7	**-1.2**
Hip Fracture	High	21	3.2	8.1	4.9	**+0.5**
	Moderate	250	3.1	7.5	4.4	--
	Low	13	2.1	4.1	2.0	**-2.4**
Carotid Endarter-ectomy	High	5	.32	.63	.31	**-0.2**
	Moderate	164	.47	.98	.51	
	Low	6	.39	.39	.00	**-0.51**

*** Impact = Difference for High or Low group minus difference for moderate group**

Does Inclusion of POA Coding Improve the IMIs Relative to a "Gold Standard"?

- Generated 2006 risk-adjusted mortality rates (RAMRs) for hospitals using CABG gold standard proxy
  (Parker et al., Med Care 2006)
- For same patient cohort, generated RAMRs using AHRQ software with and without POA
- Used inpatient mortality for both outcomes
- Calculated correlation between AHRQ CABG IMI (with & without POA) with CABG gold standard proxy
- Correlation with gold standard proxy improved from .87 (without POA) to .93 (with POA): a 7% improvement

Summary of Findings

- Some patient illness severity is not explained by APR-DRG risk model (as demonstrated by DNR, PC & SNF status) but this does not strongly bias results (stroke a possible exception)
- Hospitals that do a poor job of POA coding do not appear to benefit in terms of their IMI results
- Public hospitals had higher mortality rates for 5 out 6 IMIs: Both Teaching and Investor hospitals had lowest rates for 3 IMIs.
- Hospitals that rarely transfer patients to SNFs & other care perform more poorly when using inpatient mortality compared to 30-day mortality
  - Transfer to SNF/other care rates by hospital Type:

    Non-profit = 15%, Investor = 20%, Public= 15%, Teaching = 10%
- Utilization of POA coding improves assessment of hospital quality relative to a CABG gold standard proxy

BACKUP SLIDES