Using Harm-Based Weights for the AHRQ Patient Safety for Selected Indicators Composite (PSI 90):

Does it Affect Assessment of Hospital Performance and Financial Penalties in VA Hospitals?

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Poll Question #1

- What is your primary role in VA?
  - Student, trainee, or fellow
  - Clinician
  - Researcher
  - Administrator, manager or policy maker
  - Other

Poll Question #2

- How familiar are you with the AHRQ Patient Safety Indicators (PSIs) and/or the Patient Safety for Selected Indicators Composite (PSI 90)?
  - Very familiar, use them often, part of my job
  - Use them occasionally
  - Have heard of them, but never use them myself
  - Completely new to me

Overview

- Background of the AHRQ PSIs
- Describe concerns about the use of PSI 90 for pay-for-performance
- Examine whether specific changes in weighting individual components of PSI 90 impact hospital profiles for hospital reporting and pay-for-performance
- Discuss conclusions and implications

Historical Background

2003 AHRQ PSIs- a set of computerized algorithms to flag potentially preventable safety events using administrative data

2009 PSI 90 "AHRQ Patient Safety for Selected Indicators" Composite Measure, calculated using weighted average of all component PSIs

Now Transition from ICD-9 to ICD-10

Patient Safety Indicators (PSIs)

Provider-Level Indicators

- PSI 02 - Death rate in low-mortality diagnosis related groups (DRGs)
- PSI 03 - Pressure ulcer rate
- PSI 04 - Death rate among surgical inpatients with serious treatable conditions
- PSI 05 - Retained surgical item or unretrieved device fragment count
- PSI 06 - Iatrogenic pneumothorax rate
- PSI 07 - Central venous catheter-related blood stream infection rate
- PSI 08 - Postoperative hip fracture rate
- PSI 09 - Perioperative hemorrhage or hematoma rate
- PSI 10 - Postoperative physiologic and metabolic derangement rate
- PSI 11 - Postoperative respiratory failure rate
- PSI 12 - Perioperative pulmonary embolism or deep vein thrombosis rate
- PSI 13 - Postoperative sepsis rate
- PSI 14 - Postoperative wound dehiscence rate
- PSI 15 - Accidental puncture or laceration rate
- PSI 16 - Transfusion reaction count
- PSI 17 - Birth trauma rate – injury to neonate
- PSI 18 - Obstetric trauma rate – vaginal delivery with instrument
- PSI 19 - Obstetric trauma rate-vaginal delivery without instrument
- PSI 90 - Patient Safety for Selected Indicators

Area-Level Indicators

- PSI 21 - Retained surgical item or unretrieved device fragment rate
- PSI 22 - Iatrogenic pneumothorax rate
- PSI 23 - Central venous catheter-related blood stream infection rate
- PSI 24 - Postoperative wound dehiscence rate
- PSI 25 - Accidental puncture or laceration rate
- PSI 26 - Transfusion reaction rate
- PSI 27 - Postoperative hemorrhage or hematoma rate

http://www.qualityindicators.ahrq.gov/Downloads/Modules/PSI/V50/PSI_Brochure.pdf

Patient Safety for Selected Indicators (PSI 90) in Version 5.0

- Comprised of 11 component PSIs
  - PSI03 Pressure Ulcer Rate
  - PSI06 Iatrogenic Pneumothorax Rate
  - PSI07 Central Venous Catheter-Related Blood Stream Infection Rate
  - PSI08 Postoperative Hip Fracture Rate
  - PSI09 Perioperative Hemorrhage or Hematoma Rate
  - PSI10 Postoperative Physiologic and Metabolic Derangement Rate
  - PSI11 Postoperative Respiratory Failure Rate
  - PSI12 Perioperative Pulmonary Embolism or Deep Vein Thrombosis Rate
  - PSI13 Postoperative Sepsis Rate
  - PSI14 Postoperative Wound Dehiscence Rate
  - PSI15 Accidental Puncture or Laceration Rate

http://www.qualityindicators.ahrq.gov/Downloads/Modules/PSI/V50/TechSpecs/PSI_90_Patient_Safety_for_Selected_Indicators.pdf

Patient Safety for Selected Indicators (PSI 90) in Version 5.0

- Each component PSI indirectly risk-standardized using demographic/clinical covariates and then reliability-adjusted
- Each component PSI weighted based on relative frequency of PSI events in population (numerator-based weighting)
- Assumes that more frequent events receive higher weights and that all PSIs are of equal seriousness or harm

Use of PSI 90

- Original use of PSI 90: provide robust & comprehensive picture of hospital safety performance
- Current use: hospital profiling, public reporting, pay-for-performance
  - Reported on Centers for Medicare and Medicaid Services (CMS) Hospital Compare website
  - Core metric in 2 CMS pay-for-performance programs: the Hospital-Acquired Condition (HAC) Reduction program and the Hospital Value-based Purchasing (HVBP) program

www.medicare.gov/hospitalcompare/search.html
www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/AcuteInpatientPPS/HAC-Reduction-Program.html
www.cms.gov/Medicare/Quality-initiatives-patient-assessment-instruments/hospital-value-based-purchasing/index.html

Concerns regarding PSI 90 (weighting by volume)

- 78% of weight on 2 PSIs (PSI 15, Accidental Puncture or Laceration; PSI 12, Perioperative Pulmonary Embolism or Deep Vein Thrombosis) with variable clinical significance
- Misalign quality improvement efforts towards frequently occurring PSIs rather than most harmful PSIs
- Unfairly penalize hospitals financially

Redesigning PSI 90 in Version 6.0: AHRQ's Response to Concerns

- Reweighted component PSIs based on:
  1. Excess harm associated with each individual PSI
  2. Estimated preferences for health states reflected by these harms ("disutilities" or "severity")
  3. Volume of each PSI

  - Harms: identified and ranked based on expert panel/literature (e.g., mortality, readmission, outpatient dialysis)
  - Disutility: measure of severity of adverse events associated with each of harms (e.g., outcome severity or least preferred states from patient perspective)

- In addition to reweighting, PSIs 09, 10,11 added; specific changes made to PSIs 08,12,15

Volume-based vs. Harm-based Weights

Component Patient Safety Indicator (PSI)	Volume-Based Weights 5.0	Harm-Based Weights (NQF-endorsed)	Harm-Based Weights 6.0
PSI #3 Pressure Ulcer Rate	0.0330	0.0363	0.05984
PSI #6 Iatrogenic Pneumothorax Rate	0.0751	0.0976	0.0535
PSI #7 Central Venous Catheter-Related Blood Stream Infection Rate	**0.0377**	**0**	**0**
PSI #8 Postoperative Hip Fracture Rate	0.0018	0.0088	0.0101
PSI #9 Perioperative Hemorrhage or Hematoma Rate	**0**	**0.1503**	**0.08533**
PSI #10 Postoperative Physiologic and Metabolic Derangement Rate	**0**	**0.0492**	**0.04102**
PSI #11 Postoperative Respiratory Failure Rate	**0**	**0.2154**	**0.30494**
PSI #12 Perioperative Pulmonary Embolism or Deep Vein Thrombosis Rate	**0.3379**	**0.1843**	**0.20895**
PSI #13 Postoperative Sepsis Rate	**0.0573**	**0.2413**	**0.21605**
PSI #14 Postoperative Wound Dehiscence Rate	0.0182	0.0089	0.01327
PSI #15 Accidental Puncture or Laceration Rate	**0.4390**	**0.0082**	**0.00701**

http://www.qualityindicators.ahrq.gov/News/PSI90_Factsheet_FAQ.pdf

Objectives

- To assess the extent to which use of harm-based weights (”harm-based PSI 90”) vs. original volume-based composite (“volume-based PSI 90”) leads to changes in:
  - Hospital profiles for public reporting
  - Hospital payments under HAC and HVBP programs
- We hypothesized that applying new weights to PSI 90 would change assessment of hospital performance & affect payment

Methods: Data and PSI 90 Calculation

- Retrospective study using VA hospital discharge data: 01/01/2012-12/31/2014 (132 acute-care hospitals)
- Applied the PSI software version (5.0) to obtain hospital risk-adjusted PSI rates for 11 PSIs in PSI 90 (PSIs #03, 06-15) and calculated volume-based PSI 90 (with original weights)
- Substituted volume-based weights with harm-based weights and reran software to generate harm-based PSI 90

Methods: Hospital Profiles for Public Reporting

- Computed a 95% CI for each hospital's PSI 90 composite score
- Categorized hospitals into performance categories
  - "Better than": hospital's 95% CI < national VA PSI 90 score
  - "No different": hospital's 95% CI included national VA PSI 90
  - "Worse than": hospitals 95% CI > national VA PSI 90 score

Methods: Hospital Penalty under HAC Reduction Program

- Categorized hospitals into quartiles (i.e., hospitals in worst quartile based on total HAC score have 1% payment reduction. PSI 90 comprises 25% of the score)
- Simulated the $ amount of hospital's penalty, if any
  - Assumed VA hospitals would receive payments under CMS IPPS (FY2016)
  - Set wage index = 1 for all VA hospitals
  - Payment for each admission = Base Rate ($5,466) x the Diagnosis Related Group (DRG) relative weight
  - Payment for hospital i=∑(payments for each admission at hospital i)
  - Penalty under HAC reduction program = 1% x 25% x total hospital payment at hospital i

Methods: Hospital Payment Under HVBP Program

- Payment pool allocated for hospital PSI performance
- Hospital's performance score= (P-M)/(B-M)
  - M is defined as the median PSI-90 score
  - B as the benchmark PSI-90 score (mean of the top 10% of hospitals)
  - P as the PSI-90 of an individual hospital
- Hospital *i*'s payment (%) = performance score *i* /∑(performance scores among all hospitals)

Analyses

- Examined correlation between volume-based and harm-based PSI 90
- Examined changes in hospital profiles for public reporting based on volume-based vs. harm-based PSI 90
- Assessed impact on payment penalties under the CMS HAC Reduction Program and HVBP program using volume-based vs. harm-based PSI 90

Results: Changes in Hospital Profiles for Public Reporting

	Hospital Profiles Based on Harm-Based PSI 90			
Hospital Profiles Based on Volume-Based PSI 90	Better than	Average-performing	Worse than	Total
Better than	1	3	0	4
Average-performing	0	120	1	121
Worse than	0	2	5	7
Total	1	125	6	132

Better than: hospital's 95% CI < national VA PSI composite
Average-performing: 95% CI of hospital's PSI composite overlaps with national VA composite
Worse than: lower 95% CI of hospital's PSI composite is higher than national average VA composite

5% of hospitals would have changed classification for public reporting

Results: Changes in Hospital Payment under HAC Reduction Program

	Hospital Payment Based on Harm-Based PSI 90				
Hospital Payment Based on Volume-Based PSI 90	Best	2nd	3rd	Worst*	Total
Best	20	5	5	3	33
2nd	8	13	10	2	33
3rd	3	10	15	5	33
Worst*	2	5	3	23	33
Total	33	33	33	33	132

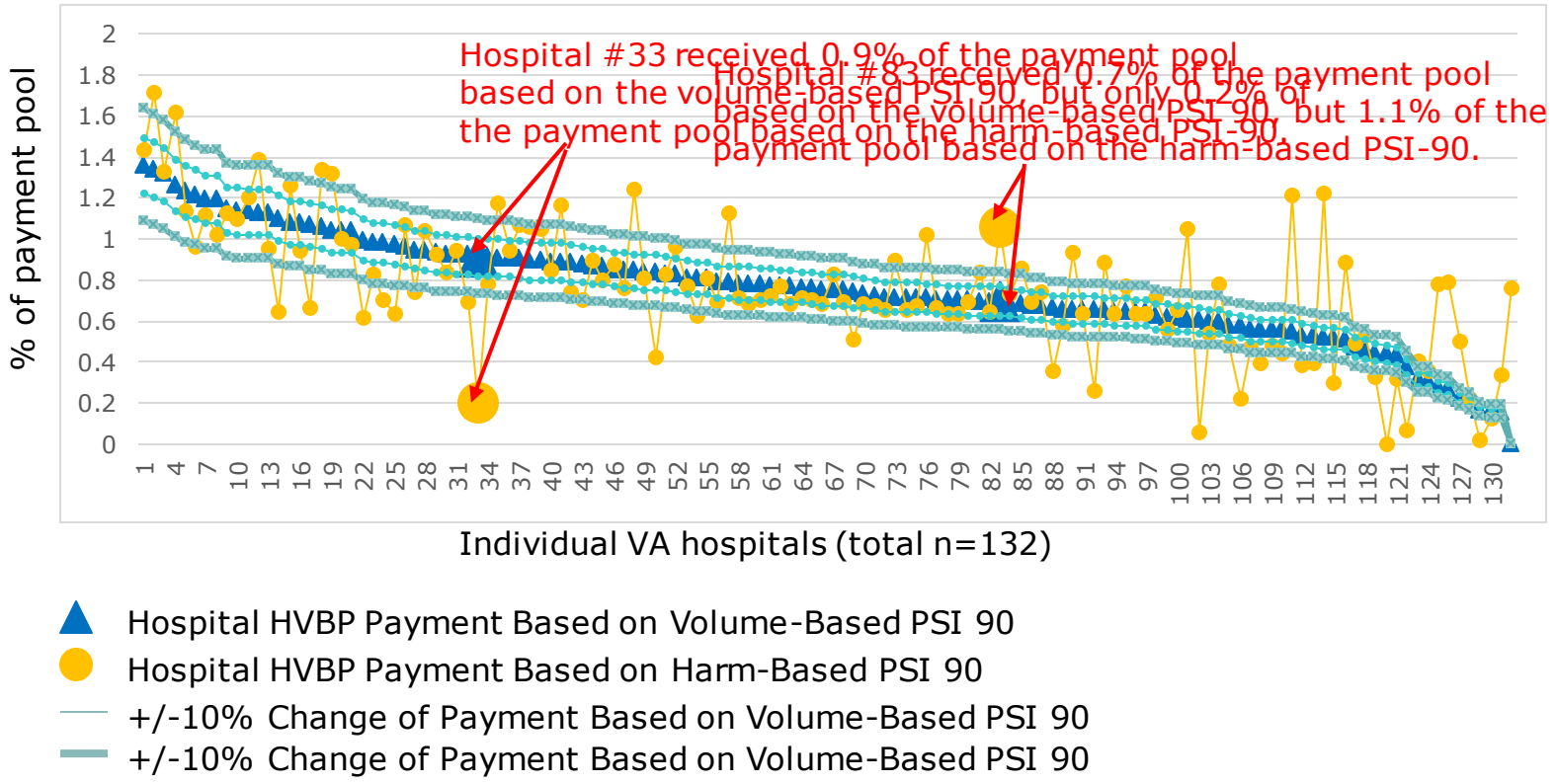
* 1% payment reduction

$444,000

$636,000

14% of hospitals would have faced different payment penalties under HAC Reduction Program

Results: Changes in Hospital Payment under HVBP Program



71% of hospitals would have faced changes >20%, and 85% would have faced changes >10%, on percentage of their payment pools under HVBP

Summary

- Use of harm-based PSI 90 had bigger impact on pay-for-performance than public reporting because of the different methodologies used in these programs (i.e., point estimates vs CIs)
- Although the overall distribution in hospital profiles did not change dramatically, changes occurred systematically
  - Hospitals with high rates on PSI #9,#11 and #13 now had 'worse' performance
  - Hospitals with high rates on PSI #12 and #15 now had 'better' performance

Limitations

- We did not use actual new PSI 90 composite measure
- Lack of longitudinal data to assess improvement score used by HVBP program

Implications

- Type of weighting used for PSI 90 affects hospital profiles
  - Changes in hospital payments, in particular, could be substantial for some hospitals with high rates on specific PSIs using harm-based weights in PSI 90
- Changes in hospital profiles were associated with changes in component PSI weights
- Misclassification of hospital performance can lead to misguided QI activities

Conclusions: Consequences of the Evolution of a Patient Safety Measure

- "Transitional period" or "phasing in" as PSI 90 evolves and reimbursement definitions change
  - Blend the old and new PSI 90 results for a period of time
  - Begin with public reporting, then move to P4P
  - Provide educational materials to guide hospitals through this transition

Conclusions: Consequences of the Evolution of a Patient Safety Measure

- New weighting scheme improves validity of PSI composite by accounting for both frequency of harms associated with each PSI and disutility of those harms
  - New PSI 90 more closely associated with concept of patient safety: "reducing harm caused to patients"
  - Help hospitals to develop QI plans to reduce the harmful safety events during the delivery of care

Thank you!

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