

The Cost of Hospital Adverse Events and the Value of Nursing

Rocky Mountain Hospital Medicine Symposium

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Centura Health

- A faith-based, nonprofit health care organization formed in 1996 by Catholic Health Initiatives and Adventist Health System
- Colorado's fourth largest private employer with nearly 13,000 associates including 5000 nurses
- The Centura system encompasses 13 hospitals, seven senior living communities, and Centura Health at Home – home care, hospice, and palliative care program



The Value of Nursing

- One area of focus for healthcare reform is delivering patient outcomes of high quality and safety at reasonable costs – or delivering value
- Value = $\frac{\text{Quality/Satisfaction}}{\text{Cost}}$
- “value in health care is expressed as the physical health and sense of well-being achieved relative to the cost” (IOM Roundtable on Evidence-Based Medicine, 2008) – The Future of Nursing

So we know about Quality...

- Outcomes linked to nursing practice
 - ✓ Medication errors
 - ✓ Nosocomial infections
 - ✓ Patient falls
 - ✓ Pressure ulcers
- Under consideration by National Quality Forum
 - ✓ VAP
 - ✓ CLABSI
 - ✓ CAUTI

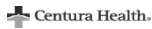
And we know about Satisfaction...

- Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS)
 - ✓ Courtesy/respect of nurses
 - ✓ Nursing listening carefully to patients
 - ✓ Timely response to call buttons
 - ✓ Staff doing everything they can to help with pain

But what about costs...

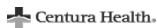
- Are they the same as charges?
 - ✓ Costs as percent of charges
 - ✓ Cost to Medicare
- Do we want nursing costs?
- What about nursing and supply costs?

Pappas, SH 2007. Describing Costs Related to Nursing. JONA 37(1) 37-40.
Federal Register 73, no. 161 (August 2008):48473-74.



And now we know costs...

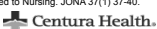
- Hospitals have financial databases used to develop budgets, monitor budget compliance, and report costs
- Within these databases are standardized costs representing hospital resources used in patient care
- Enabled CNO to use financial data as the same decision-making platform as the CFO
- Helps describe value



Activity Based Costing

RESOURCES NEEDED TO PERFORM ACTIVITY	ACTIVITY	TOTAL COST OF PATIENT CARE PROCESS
Scheduling \$2/test	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> Chest x-ray Total \$36 </div>	Unit \$540
Performing (labor & supplies) \$12/RVU		Emergency Room \$175
Processing image \$12/film		Lab \$153
Interpreting results \$8/film		Pharmacy \$16
Transporting patient \$2/patient		Pulmonary Radiology \$36
		Cardiology \$16
TOTAL \$36		TOTAL \$960

Pappas, SH 2007. Describing Costs Related to Nursing. JONA 37(1) 37-40.



The Big Question

How do the structures and processes of nursing practice impact quality and financial outcomes for hospitalized patients?

Purpose

- To describe the relationship between nurse staffing and actual patient cost per case
- To determine if the presence of adverse events explained differences in cost per case
- To reveal the actual cost of an adverse event

Sources of Data

- Eclipsis/TSI
 - ✓ Patient demographic data
 - ✓ Cost data
 - ✓ Staffing data
- Quality and risk systems
- Severity data
 - ✓ CHF stage – abstractors
 - ✓ ASA scores – ORSOS/Surginet

Variable modification to meet assumptions and achieve model fit

Structure
RNHPPD
Total HPPD

Outcomes
Cost /Case
LOS
Medication Errors
Urinary Tract Infection
Pneumonia
Falls
Pressure Ulcers

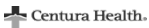
RNHPPD
Non RNHPPD

Cost/Case without
Operating Room costs
Combined Adverse Events



Methods

- A population of 3230 patients discharged with a diagnosis of CHF, total joint replacement, or major bowel procedure
- Two hospitals with similar Case Mix Index (CMI)
- Multiple regression of cost per case on variables
- Logistic regression of adverse events on variables
- Analysis accounted for patient age, gender, insurance type, severity, hospital clustering, and time
- Statistical analysis performed with Stata/SE 9.2
- Colorado Multiple Institutional Review Board (COMIRB) approved as exempt study



Sample Characteristics

- DRG
 - ✓ CHF 475 cases
 - ✓ Total Joint Replacements 2628 cases
 - ✓ Major Bowel Procedures 128 cases
- Patient characteristics
 - ✓ 89% over 50 years of age
 - ✓ 61% female
 - ✓ 63% Medicare
- Unit characteristics



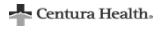
Overall Results

- An adverse event increased the cost by \$1000 per case
- The presence of an adverse event best predicted costs once LOS was removed
- Patient characteristics best predicted the presence of an adverse event
- Unable to use severity adjustment when medical and surgical patients combined
- Medical and surgical cases responded to different variables, costs behaved differently, and produced different results



Medical Group (475 cases)

- 11% of the variance in cost per case was explained by the 8 variables
- Each hour increase in RNHPPD increased the cost per case by \$791
- Each adverse event increased cost per case \$1029



Surgical Group (2020 cases)

- 23% of the variance of cost per case was explained by the eleven variables
- There was no significant relationship between RN staffing and cost per case
- Each adverse event increased cost per case \$903
- A higher ASA surgical risk score increased the odds of an adverse event
- Costs for patients cared for by certified MDs were lower by \$324



What was the impact of individual adverse events?

- Adverse events were the strongest predictor of differences in cost per case
- Initially combined because of small numbers
- Unbundled to determine actual cost

The Cost of Adverse Events

<u>Adverse Event</u>	<u>Medical</u>		<u>Surgical</u>	
	Cost	OR	Cost	OR
Med error	\$334	.34	\$545	.61
Fall	\$648	1.56	\$328	1.00
UTI	\$1005*	1.46	\$1043*	1.29
Pneumonia	\$1071	1.63	\$1631*	.40*
PU	\$2384*	1.02	\$25	undet

*p<0.05

No operating room costs in fall costs

OR if>1 increase, if<1 decrease in odds of AE

Pappas, SH. 2008. JONA, 38(5), 230-236.

Conclusion

- Methodology combining clinical and financial data made it possible to describe the actual cost of nurse sensitive adverse events
- Use of existing measures to predict patient risk (age and severity) could inform unit level staffing
- While these actual findings cannot be generalized outside this hospital system, the methodology can be replicated

So what has happened since 2008?

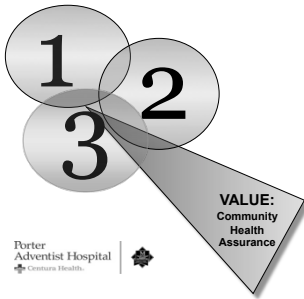
Even more emphasis on value

Refinements in methods to describe costs



Institute for Healthcare Improvement Triple Aim

Adapted from Donald M. Berwick, MD, *Embracing the Triple Aim: Who? How? When?* IHI, 8th International Summit on Redesigning Clinical Office Practice; Nashville, TN, March 26, 2007.



A collaborative practice designed to simultaneously improve the experience of care, improve the health of populations, and reduce per capita costs of health care.

Preconditions for this include the enrollment of an identified population, a commitment to universality (centrality) for its members, and the existence of an organization (an "integrator") that accepts responsibility for all three aims for that population.

The integrator's role includes at least 5 components: partnership with consumers (individuals) and families, redesign of primary care, population health improvement, financial management, and creating neighborhood cultures of health through macro system integration.



CMS Proposes Rule for Hospital Value-Based Purchasing Program

- The Patient Protection and Affordable Care Act of 2010
- Pays hospitals for their actual performance on quality measures
- Begins FY 2013k however performance period for measure is from July 1, 2011 to March 31, 2012



Leveraging the EHR

- Electronic occurrence reporting
- Patient level cost and AE data
- Costs by procedure or supply usage



Ventilator Associated Pneumonia

Reported Patient Volume

Facility	VAP	
	FY09	FY10
1	6	4
2	0	2
3	0	0
4	2	0
5	0	0
6	3	2
7	0	1
8	1	1
9	0	2
10	0	0
Totals	12	12

The Volume for these patients remains low, but the cost impact is high.

- On average the LOS increases from 10 to 30 days.
- Direct cost increases by \$30,000 per patient.
 - ✓ Negatively impacts patient, by increasing hospitalization by 20 days
 - ✓ Negatively impacts Centura Health by \$360,000 annually.

Central Line Associated Bloodstream Infection

Reported Patient Volume

Facility	CLABSI	
	FY09	FY10
1	8	5
2	2	2
3	0	0
4	5	14
5	0	0
6	5	0
7	6	7
8	4	1
9	0	0
10	1	0
Totals	31	29

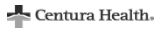
The Volume of these patients grew from FY09 to FY10. (Central Lines placed grew)

- On average the LOS increases from roughly 12-13 days per stay to 30-36 days across Centura.
- Direct cost increases by \$25-30,000 per patient.
 - ✓ Negatively impacts patient, by increasing hospitalization by 18-25 days
 - ✓ Negatively impacted Centura Health by \$1.1M to \$1.4 million dollars in FY2010.
 - ✓ Impact grew by roughly 50% from FY2009

Patient Falls with Injury

- Analysis of the Types of Falls and Impact from these falls over the past two Fiscal Years
- Falls with injury matched patients based on DRG and severity of illness
- \$4956 additional cost for falls with fracture

Note: Volume grouped into FY based on date fall occurred



Case Example

An ICU has a central line associated bloodstream infection rate above the national mean at 12/year. The evidence based bundle was implemented with some reduction, however the rate is still not zero. The ICU Committee requests the addition of a chlorhexidine patch to the care regimen at an annual cost of \$30,000.

Questions

- Is this a good recommendation clinically?
- Is this a good recommendation financially?
- What will be the justification for making this change?



Where do we go from here?

- Staffing to patient risk
- Evidence Based Staffing (matching numbers of RNs and RN capability to patient)



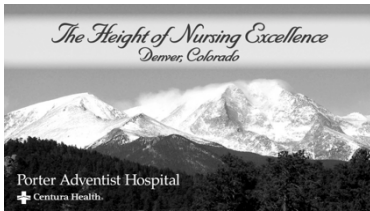
Nurses provide value...
...and how do we prove it



I hope I have presented these key concepts...

- Described methodology that determines the cost of an adverse event.
- Reported the results of quality and cost analysis that helped describe nursing value.
- Provided one more decision making tool





Questions???

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