

BENCHMARKING AND RISK ADJUSTMENT OF PATIENT OUTCOMES ACROSS ANESTHESIA PROVIDER TEAMS.

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ABSTRACT

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Introduction: In our current health care climate, it is becoming more common to compare patient outcome benchmarks across institutions and across providers within an institution. The JCAHO is mandating hospitals to submit standardized outcome measures on a quarterly basis for comparative purposes. In an Anesthesiology Service, the Anesthesiologist and certified nurse anesthetist (CRNA) often work as a team. We evaluated defined benchmarks stratified by teams in addition to individual performance.

Methods: A standardized data collection form was completed for all surgical cases in a veteran's hospital from 7/1/97 to 6/30/98. Data was collected as part of a performance measurement system. Data collected included: patient demographics, anesthesia duration, co-morbidities, and adverse events occurring in the operating room, post-anesthesia care unit (PACU) and post-discharge from the recovery unit (within 48 hours of procedure). The outcome measure of interest was the occurrence of an adverse event from the start of anesthesia to 48 hours post discharge from the recovery unit. The rate of occurrence of adverse events for an anesthesia team was risk adjusted based on age, ASA class, ambulatory vs. inpatient procedure, and anesthesia duration. Logistic regression was used to generate predictions. A 95% confidence interval was computed for the standardized adverse event rate across individuals or teams, where a 1 indicates identical observed and predicted adverse event rates.

Results: Standardized adverse event rates ranged from 0.79 to 1.23 and 0.71 to 1.29 for individual Anesthesiologists and CRNAs, respectively. None of these values represented statistically significant differences from a standardized rate of 1. Of the 42 anesthesia teams, 21 had a standardized adverse event rate of < 0.71 and 10 had a standardized adverse event rate of > 1.29. However, on evaluation of one anesthesia team, the standardized rate ranged from 0.0 to 3.55 for one Anesthesiologist across multiple CRNAs. The observed rates of adverse events ranged from 0 events to 23.1% of a team's cases reported to have at least one adverse event.

Discussion: As multidisciplinary teams and patient outcomes become more defined, it is important that the effectiveness of the teamwork be evaluated in addition to individual performance. A benchmark database with the ability to risk adjust for case severity is one way to evaluate effectiveness.

INTRODUCTION

In our current climate of health care, more and more national and professional organizations and accrediting agencies are requiring health care organizations to re-evaluate their processes of care and to collect clinical outcome data to assist in the documentation of process and patient improvements of care. Physician profiling is becoming common practice where a physician is provided feedback on a particular patient outcome and is ranked in relation to other physicians within the practice. This feedback is used to spark a dynamic educational process whereby ideally a process is improved and a best practice is established. However, a physician rarely works alone in their capacity of providing care. In the surgical center, it is often the case that a nurse anesthetist will work along side or under the supervision of an anesthesiologist. In this analysis, the rate of adverse events over a one year time period were compared across individual anesthesia providers, but also across the anesthesiologist/nurse anesthetist team to evaluate the variance of patient outcomes across teams.

METHODS

Population:

All 2440 surgical cases performed during the time period from 7/1/97 to 6/30/98.

Data Collected:

In conjunction with the Perioperative Outcomes Research Program a standardized data collection form was completed for all surgical patients including the following data items:

- patient demographics
- anesthesia duration
- co-morbidities
- adverse events occurring in the operating room, post-anesthesia care unit, or post-discharge from the recovery unit (within 48 hours of procedure)

Adverse events included:

- airway problems
- renal problems
- respiratory problems
- regional/pain management
- other patient injury/complaint
- cardiovascular
- medication problems
- integument incident
- nausea/vomiting
- unplanned admissions

Clinical Outcome Measure:

Any adverse event occurring from the start of anesthesia to 48 hours post discharge from the recovery unit.

Risk Adjustment:

The adverse event rate was risk adjusted across the anesthesia providers using the following characteristics:

- patient age
- ambulatory vs inpatient procedure
- ASA class
- anesthetic duration

A logistic regression model incorporating the above data items as independent variables and the occurrence of an adverse event as the dependent variable was used to compute the risk-adjusted rates.

Standardized adverse event rate:

A standardized adverse event rate was computed as follows:

$$\frac{\text{observed adverse event rate}}{\text{risk adjusted adverse event rate}}$$

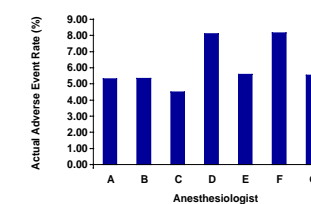
A standardized adverse event rate of > 1 indicates that more adverse events occurred than were expected to occur based on the characteristics used in the risk adjustment.

A standardized adverse event rate < 1 indicates that fewer adverse events occurred than were expected to occur based on the characteristics used in the risk adjustment.

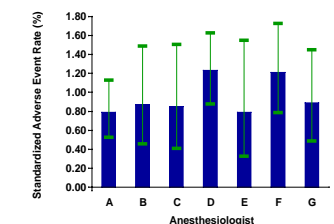
Standardized adverse event rates were plotted for anesthesiologists individually and in conjunction with the nurse anesthetist working on the surgical case.

RESULTS

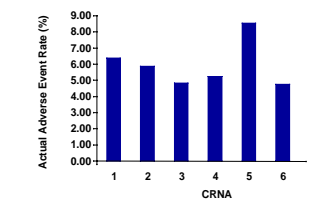
Adverse Event Rate by Anesthesiologist



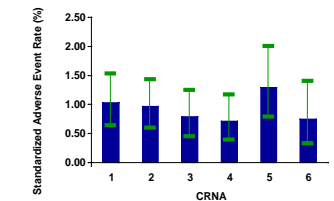
Standardized Adverse Event Rate by Anesthesiologist with Confidence Intervals



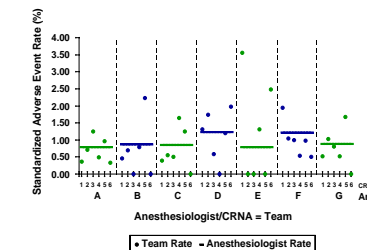
Adverse Event Rate by CRNA



Standardized Adverse Event Rate by CRNA with Confidence Intervals



Standardized Adverse Event Rate by Anesthesiologist/CRNA



Overall Demographics

Demographics	N (%)	Demographics	N (%)
Total Number of Cases	2440	Age (years)	18-30 35 (1.4)
Attendant Provider			31-45 169 (6.9)
A	565 (23.2)		46-60 494 (20.2)
B	244 (10.0)		61-75 1071 (43.9)
C	245 (10.0)		76-90 468 (19.2)
D	543 (22.3)		>90 4 (0.2)
E	143 (5.9)	Anesthetic Procedure	General 1706 (69.9)
F	343 (14.1)		MAC 435 (17.8)
G	271 (11.1)		Other 197 (8.1)
ASA Class		Top Six Services	General 428 (17.5)
1	79 (3.2)		Urological 371 (15.2)
2	680 (27.9)		Vascular 335 (13.7)
3	1387 (56.8)		Orthopedic 299 (12.3)
4	233 (9.5)		Cardiac 218 (8.9)
5	28 (1.1)		Otolaryngology 218 (8.9)
Emergency	174 (7.1)		
Sex			
Male	2266 (92.9)		
Female	73 (3.0)		

CONCLUSIONS

- As multidisciplinary teams and patient outcomes become more defined, it is important that the effectiveness of the teamwork be evaluated in addition to individual performance.
- A benchmark database with the ability to risk adjust for case severity is one way to evaluate effectiveness. Risk adjustment attempts to eliminate differences in severity of or type of surgical case.
- Further work needs to be done to determine the reasons for the variability in adverse event rates for a particular anesthesiologist across different nurse anesthetists and to determine if the variability is random or systematic.