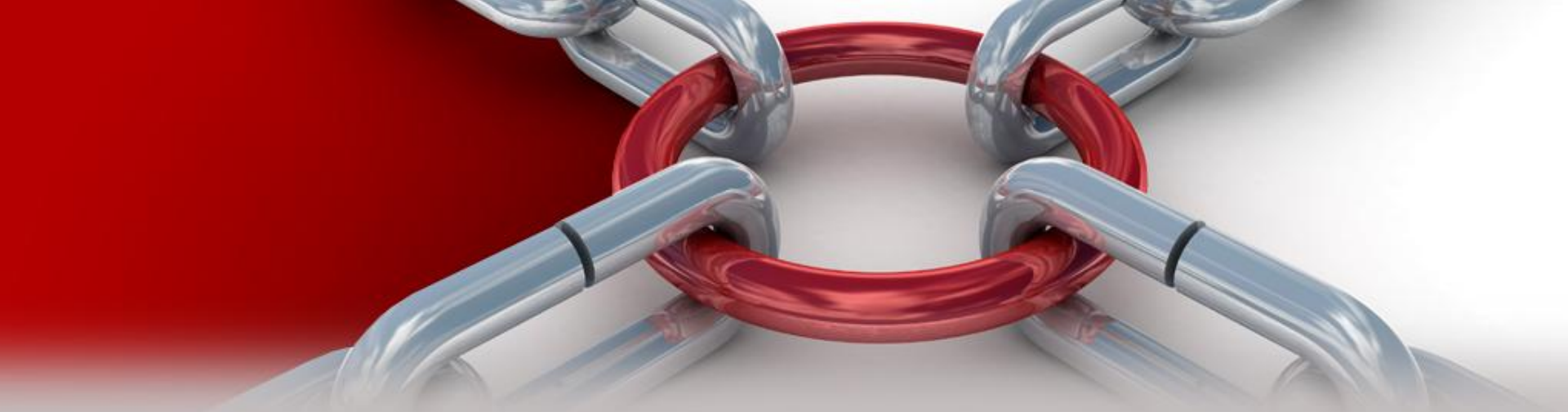
A 3D rendering of a chain with one red link and the rest blue, set against a red and white background. The chain is composed of several links, with one link in the center being a vibrant red, while the others are a light blue-grey. The background is split diagonally, with red on the left and white on the right. The lighting creates highlights and shadows on the metallic-looking links.

Cost Effectiveness of Anesthesia Providers

Juan F. Quintana DNP



The Cost Effectiveness of Anesthesia Study
conducted by the Lewin Group
has been funded in collaboration with the
AANA and AANA Foundation





Outline

- Purpose
- Education
 - Cost Effectiveness of Educating CRNAs
- Quality
 - Claims Information
- Anesthesia Practice Models
 - Cost Effective Anesthesia Delivery Models
- Access
 - The Value Added Component




Purpose

- Assess the cost effectiveness of CRNAs and Anesthesiologists with regard to Cost of Education, Quality of Care, Cost Effectiveness of Anesthesia Practice Models and Access to Care.

A 3D rendering of a chain with blue and red links. The word "Education" is written in white on a red background. The chain is composed of several blue links, with a central section of red links. The background is white, and the chain is set against a red surface on the left side.

Education



Educational Cost - Literature Review

(all estimates converted to 2008 dollars)

CRNA Education

\$52,076 (Direct Cost) Gunn (1996)

\$287,382 (Social Cost) Fagerlund (1998)

MD (PGY 2-4)

\$321,000 (Direct Cost) Dodoo, Phillips (2008)

\$301,178 (Direct Cost) Franzini, Berry (1997)

\$-114,031 (Direct + productivity) Franzini, Berry (1997)

\$245,969 (+ opportunity cost) Franzini, Berry (1997)

modified by Hogan to include opportunity cost

\$229,267 (Direct, before GME offset) Pissetsky, Lubarsky, et al (1998)

\$-213,000 (w/ productivity offset + GME subsidy) Pissetsky, Lubarsky, et al (1998)

\$146,940 Pissetsky, et al (1998) *w/ productivity offset with opportunity cost (Hogan)*



Educational Cost- Lewin Group

- Three types of cost included:
 - Direct education costs
 - Opportunity cost of student/resident's time
 - Value of student/resident services while training

Educational Cost Assessment

CRNA

Direct:

Pre-Anesthesia: \$53,696

Anesthesia: \$68,465

Opportunity: \$291,353

Productivity: - \$251,704

Total: \$161,809

Anesthesiologist

Direct:

Pre Anesthesia: \$623,818

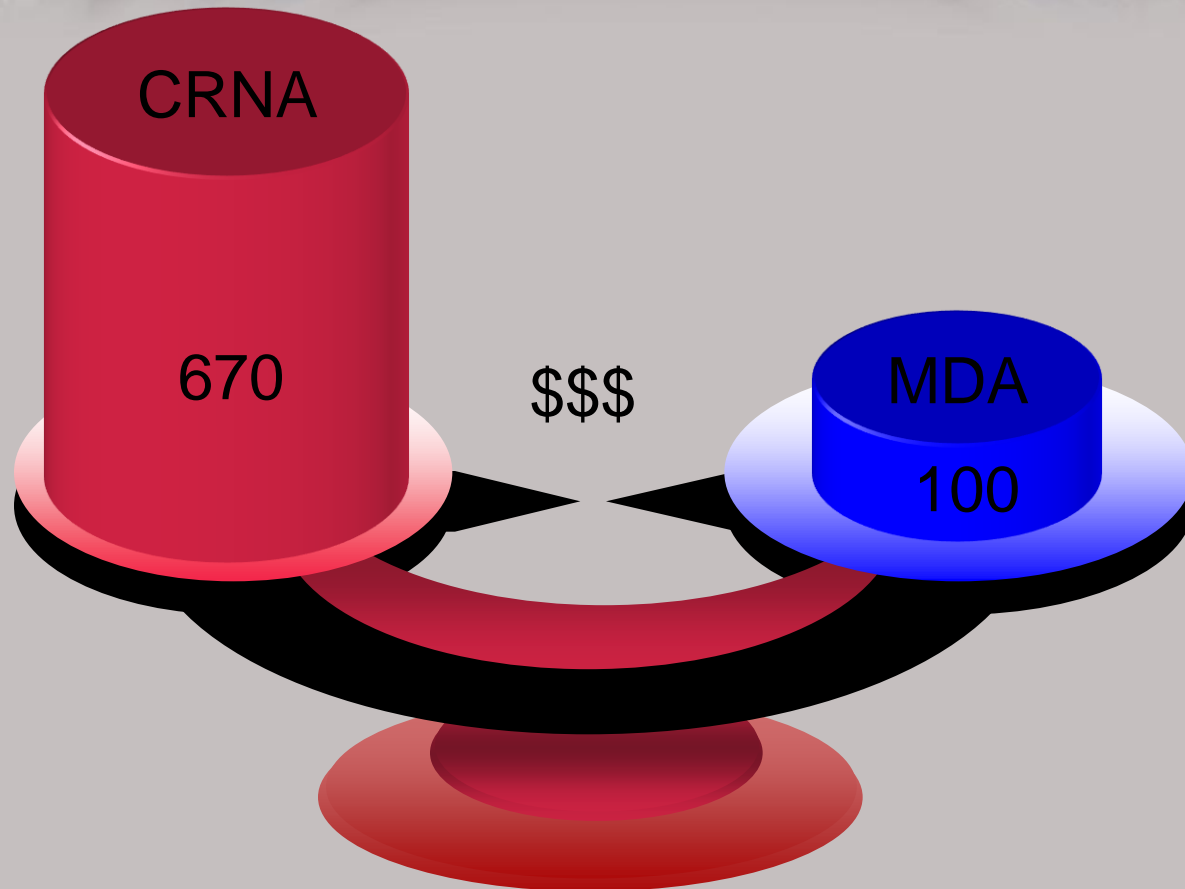
Anesthesia: \$494,420

Opportunity: \$897,793

Productivity: - \$775,073*

Total: \$1,083,795

Anesthesia Providers Produced





Conclusions:

Educational Cost

- Direct costs and Economic cost of educating CRNAs are significantly lower than the cost of anesthesiologists
 - Economic costs of graduate education for CRNA are 1/4th the cost of anesthesiologists
 - Total education costs of CRNAs are about 15% of the cost of anesthesiologists
- Key cost drivers:
 - Faculty cost and student-faculty ratio
 - Program length
 - Student opportunity cost
 - Productivity of students in clinical portion of graduate education

Quality





Quality: Literature

Majority - no statistically significant difference between anesthesiologists and CRNAs after controlling for other relevant factors

- Minnesota Department of Health, 1995
- Cromwell, 1999, Posner & Freund, 1999
- Hoffman, Thompson, Burke, & Derkay, 2002
- Pine, Holt, & Lou, 2003; Smith, Kane, & Milne, 2004
- Simonson, Ahern, & Hendryx, 2007
- Needleman & Minnick, 2008
- RTI & Cromwell, 2010

- Exceptions: Silber et al 2000
- Anesthesia Complications for Analyses: Donnelly & Buechner, 2001

Quality: Records Review

Nationwide Inpatient Sample (NIS) 2007 data

	N	%	Weighted N	%
No	8,034,162	99.88%	39,496,584	99.89%
Yes	9,253	0.12%	45,364	0.11%

Ingenix National Database

N = 52,636 claims;
No complications

National Survey of Ambulatory Surgery (NSAS)

N = 52,233*,
Weighted N = 34,738,440



Conclusions: Quality

- Incidence of complications due to anesthesia, regardless of delivery model, is low and declining
- With some exceptions, literature suggests no statistically significant difference in complication rates or mortality rates between CRNA and anesthesiologists
- Analysis of claims data is consistent with very low incidence of complications, and no differences between provider type

A 3D rendered image of a chain. The chain consists of several light blue links, with one central link highlighted in a vibrant red. The chain is arranged in a V-shape, with the red link at the bottom center. The background is white, with a red gradient on the left side. The text "Anesthesia Practice Models" is overlaid on the red gradient.

Anesthesia Practice Models



Cost Effectiveness: Literature Review Simulation Analyses

- Abenstein et al (2004), data from Silber et al (2000)
 - Medical direction model is more cost effective with respect to QALY's than a model in which CRNAs act independently
 - Data is NOT based on mortality due to anesthesia (Silber Study)
 - Variation in delivery models may be correlated with variation in other factors affecting quality of care or patient risk.
- Glance (2000)
 - Anesthesiologist model not cost-effective
 - Direction-models are cost effective, with ratios varying optimally based on risk class of case.
 - Subjective estimates of risk
 - Not clear how a given setting could adjust quickly to different models depending on risk



Cost Effectiveness: Literature Review Simulation Analyses

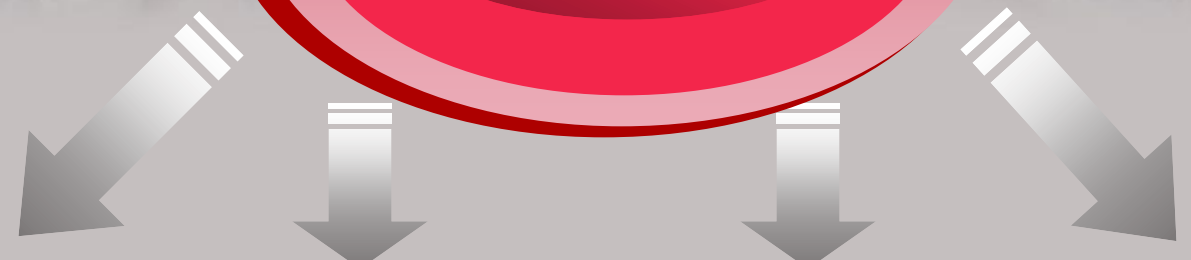
Quintana (2009) estimated costs associated with a number of different delivery models

- Quality outcomes are held constant
- Anesthesiologist intensive forms of delivery are less efficient, and more likely to require subsidization by the hospital

Anesthesia Practice Models



12 ORs
High / Low
Demand



CRNA

MDA

ACT

**Collaborative
(Supervision)**

H - 

H - 

H - 

H - 

L - 

L - 

L - 

L - 



Cost Effectiveness

Conclusions:

Simulation Analyses

- CRNAs acting independently is the MOST cost efficient model and MOST attractive financially
- Where demand is high, supervisory model (1:4+) and direction model (1:4) become relatively more attractive financially
 - Supervisory (Collaborative) model is the second least costly model
- When demand is constrained, models which require larger demand become less cost effective
- There are no circumstances examined in which a 1:1 direction model is cost effective or financially viable
- When demand is highly uncertain, CRNAs acting independently becomes relatively more attractive financially



Claims Analysis Average Billed

Delivery Model	N	Average Billed Amount
Anesthesiologist only	33,249	\$1,087.15
Direction 1:2-4	11,022	\$1,434.19
Direction 1:1	2,021	\$1,544.36
CRNA only	6,344	\$1,059.34



Claims Analysis Allowed Amounts

Delivery Model	N	Allowed Amount
Anesthesiologist only	33,249	\$470.54
Direction 1:2-4	11,022	\$438.13
Direction 1:1	2,021	\$477.57
CRNA only	6,344	\$307.23

Conclusions: Claims Analysis

Cost Effective

Billed Amounts

CRNA < all other models

Lowest to highest cost

- CRNA only
- Anesthesiologist only
- Direction 1: 2-4
- Direction 1:1

Reimbursed Amount

CRNA < all other models

Lowest to highest cost

- CRNA only
- Direction 1:2-4
- Anesthesiologist only
- Direction 1:1



Claims Analysis

Caveat

Delivery Model	N	% Cases
Anesthesiologist only	33,249	63%
Direction 1:2-4	11,022	21%
Direction 1:1	2,021	4%
CRNA only	6,344	12%
Total	52,636	100%

Access





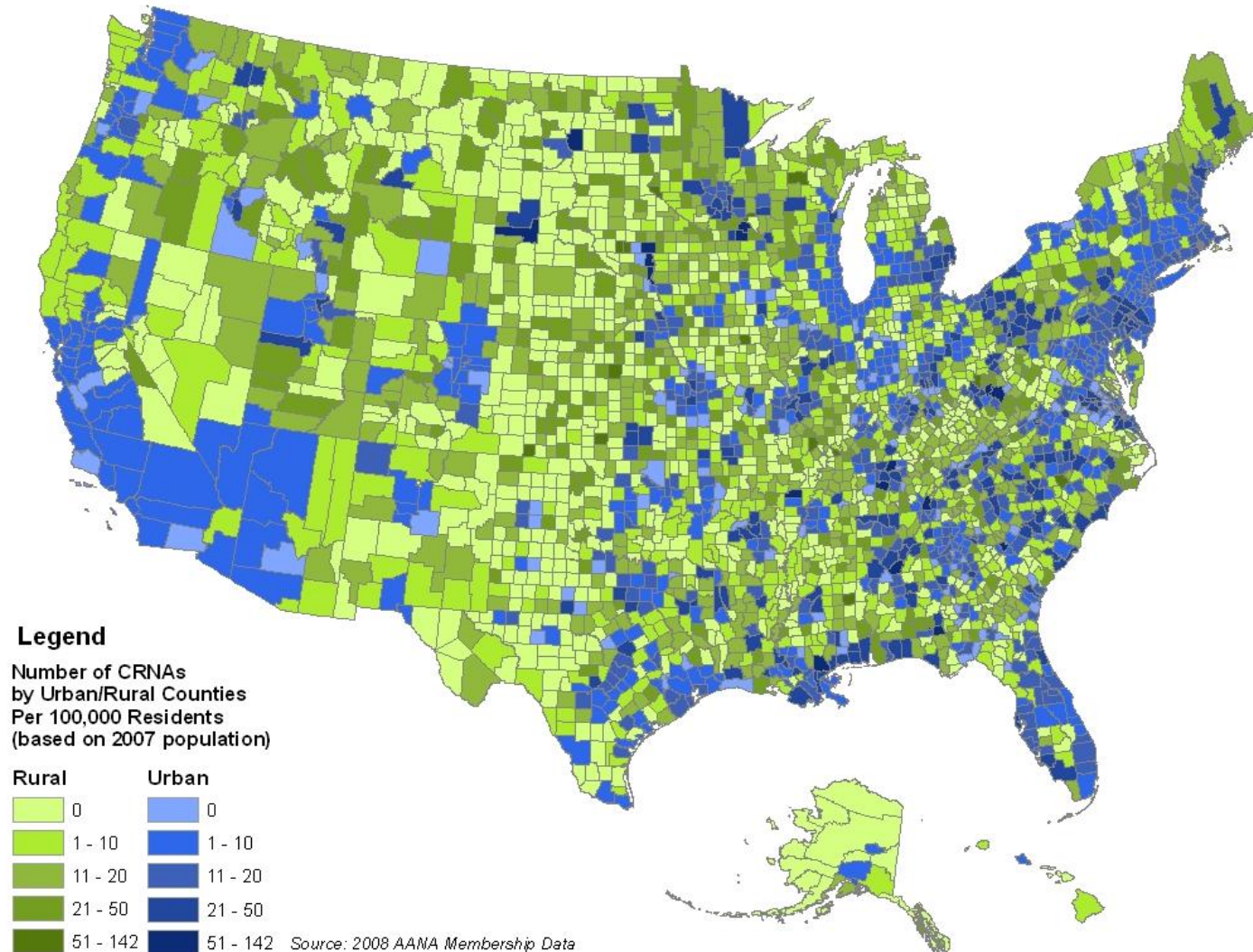
Access: The Value Added Component

CRNAs as the primary anesthesia providers in the rural United States provide a Value Added Component.

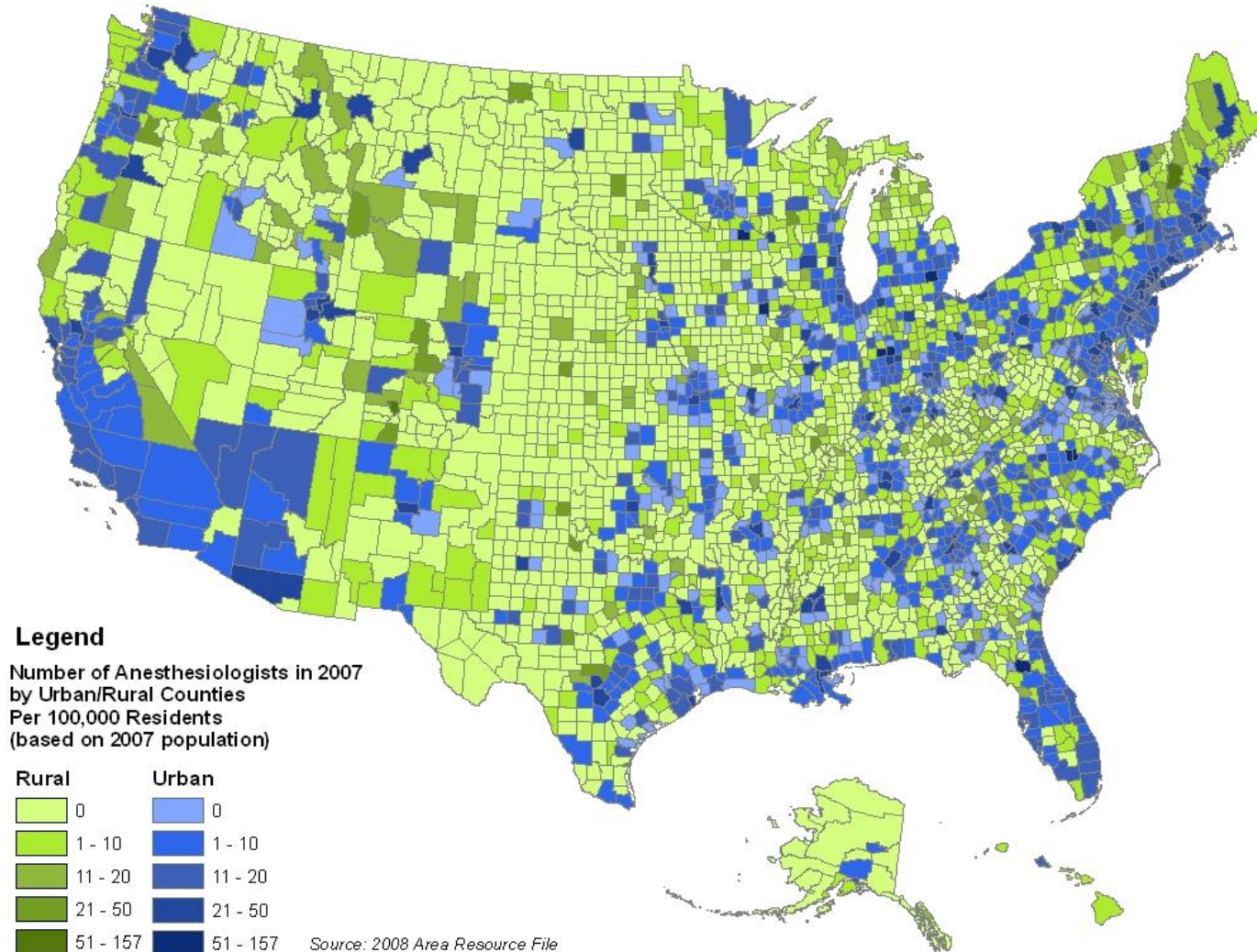
All things being equal (which they are not) we bring more to the table

Access to Care: CRNAs per Population

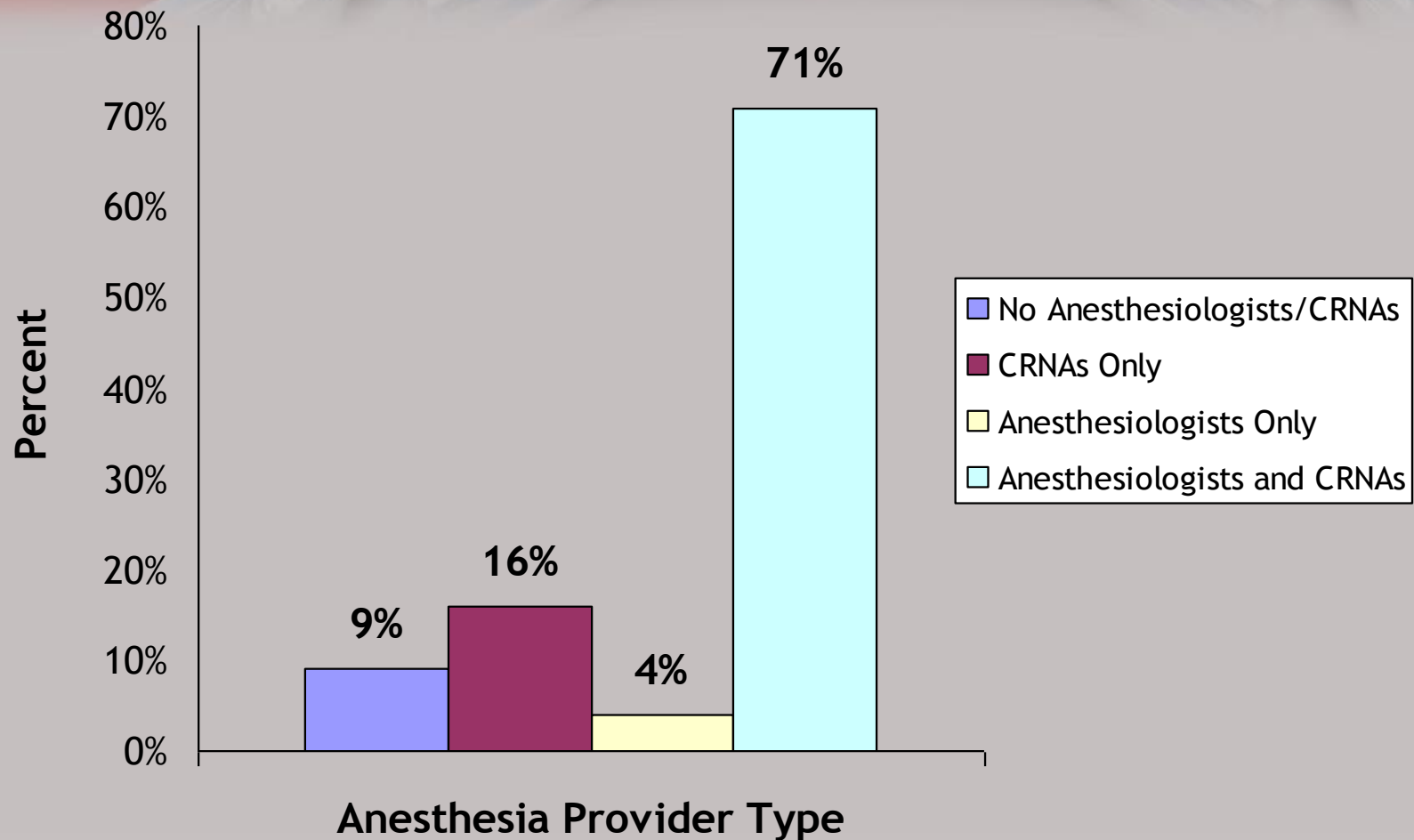
CRNAs Are in Most Counties of the Country



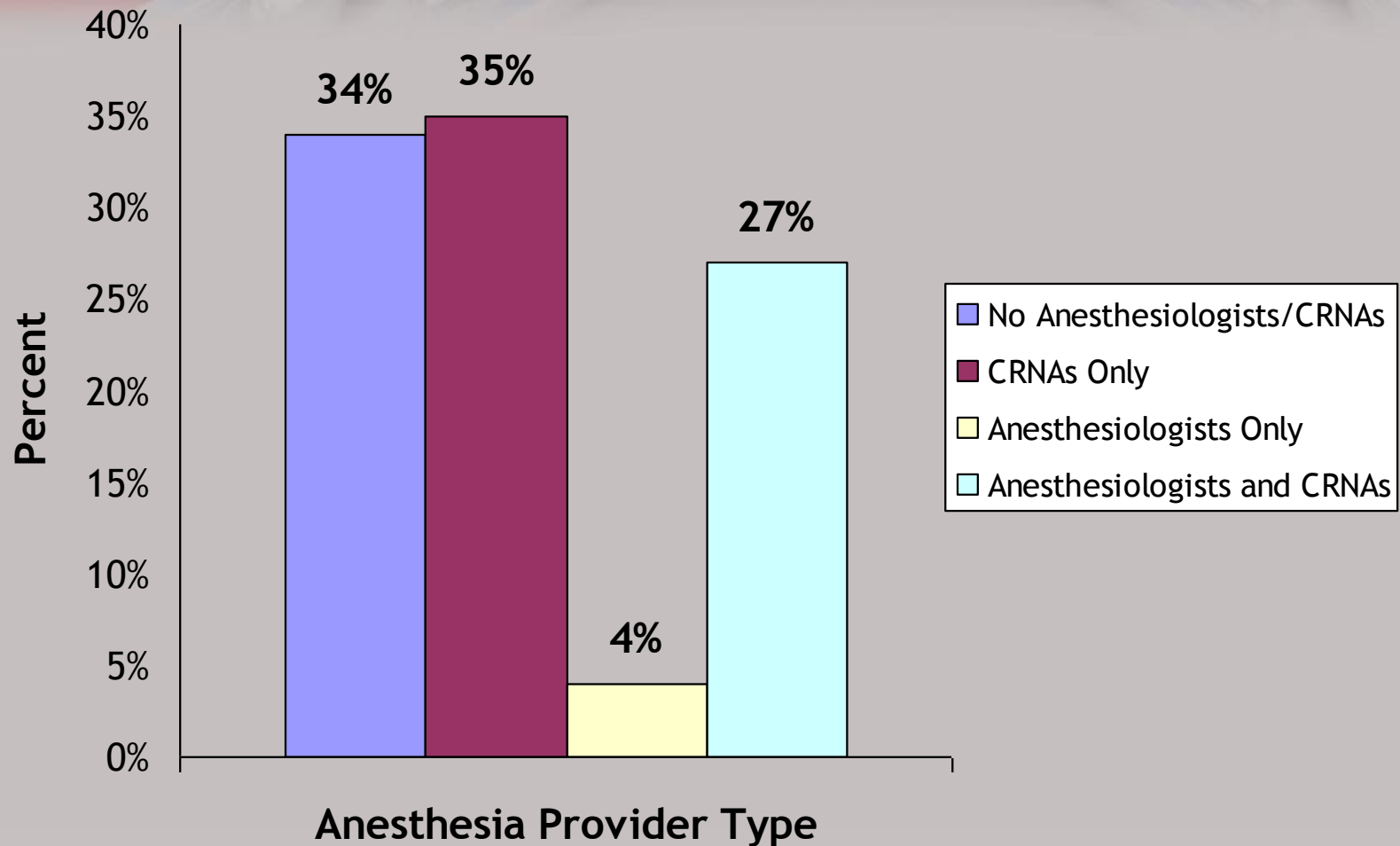
Access to Care: Anesthesiologists per Population Concentrated in Urban Areas



Percentage of Urban Counties by Anesthesia Provider Type



Percentage of Rural Counties by Anesthesia Provider Type





Conclusions: Access

- CRNAs significantly expand access to anesthesia services across the county
 - Lower cost
 - Greater physical access
- Particularly expand care to rural areas
 - Value Added Component



Summary

CRNAs are 6x more Cost Effective to Educate than Anesthesiologists

Quality of Anesthesia services is better than it ever has been without significant differences between CRNA and Anesthesiologists


Increased CRNA autonomy and more precisely Independence improves the Practice Models: Cost and Efficiency

CRNAs provide the Healthcare system the Value Added Component of increased Access to anesthesia services in Rural America



Cost Effectiveness Technical Advisory Panel

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- Betty J. Horton, CRNA, PhD
- Kenneth C. Plitt, CRNA, MBA
- Juan F. Quintana, CRNA, DNP
- Paul Santoro, CRNA, MS
- Jim Scarsella, CRNA, MSF
- Bruce A. Schoneboom, CRNA, PhD, FAAN
- James Walker, CRNA, DNP
- Lorraine M. Jordan, CRNA, PhD (Staff)



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