Summary of Key Anesthesia Policy Research Studies

General Comments:

- Two of the four pro-physician studies (in **green**) were independently funded. Six of the seven pro-nurse anesthetist studies (in **red**) were funded by the American Association of Nurse Anesthetists. The Cochrane Collaboration 2014 Review (in **gray**) is neither pro-physician nor pro-nurse anesthetist.
- Fully independent nurse anesthetist practice generally occurs only with low-risk patients undergoing low-risk procedures, so these studies should not be used for policy decisions spanning the full spectrum of anesthesia care.
- In all research, it is much easier to find "no difference" between two groups than to find a difference. The level of evidence needed to find a difference is much higher, similar to requirements for a "guilty" verdict in a court of law.

Sun et al 2018

Published in *Anesthesiology*
Outcomes Study

What the study says:
"Among elderly patients undergoing inpatient surgery ... found no significant differences in outcomes between care teams with anesthesiologist assistants compared to care teams with nurse anesthetists."

Key Points:

- Found no difference in inpatient mortality for care teams with anesthesiologist assistants compared to care teams with nurse anesthetists.
- Though not statistically significant, care teams with anesthesiologist assistants were associated with decreased length of stay and medical spending.

Staffing data source..... 2004-2011 Medicare Claims
Outcomes data source..... 2004-2011 Medicare Claims
Study sample ..... 443,098 cases in states that allowed anesthesiologist assistants to practice

Memtsoudis et al 2012

Published in *Journal of Clinical Anesthesia*
Outcomes Study

What the study says:
"Factors independently increasing the risk for unexpected disposition *[a research term associated with adverse outcomes and increased costs]* included...anesthesia provided by non-anesthesiology professionals and certified registered nurse-anesthetists versus anesthesiologists."

Key Points:

- The odds of "unexpected disposition" after ambulatory surgery were 80% higher when the anesthesia care was provided by a nurse anesthetist as opposed to a physician anesthesiologist.
- Independently funded.
- Uses data that are more recent than any pro-nurse study and includes the most cases out of all of the studies.
- Found differences for relatively low-risk procedures (outpatient knee and shoulder surgery).
- The results mirror those seen in a comparable 2005 study, strengthening the validity of the results.

Staffing data source ..... National Survey of Ambulatory Surgery (NSAS) 1996 and 2006
Outcomes data source..... NSAS 1996 and 2006
Study sample ..... 2,470,978 cases nationwide

Miller et al 2015 (QZ Study)

Published in *A&A Case Reports*
Case Study

What the study says:
"Of the 538 hospitals that reported only the modifier QZ, 47.5% had affiliated physician anesthesiologists ... The modifier QZ does not seem to be a valid surrogate for no anesthesiologist being involved in the care provided."

Key Points:

- Physician anesthesiologists were affiliated with almost half of hospitals that exclusively reported billing modifier QZ.
- Modifier QZ does not accurately represent solo nurse anesthetist practice.
- Dulisse and Cromwell 2010 (Health Affairs study) and Pine et al 2003 use modifier QZ to represent solo nurse anesthetist practice. Therefore, the conclusions of these studies are likely invalid.

Billing data source..... 2013 Medicare Claims
Staffing data source..... 2014 Physician Compare
Study sample ..... 538 hospitals across the U.S.

Silber et al 2000

Published in *Anesthesiology*
Outcomes Study

What the study says:
"After adjustments for severity of illness and other confounding variables, we found higher mortality and failure-to-rescue rates for patients who underwent operations without medical direction by an anesthesiologist."

Key Points:

- Found 2.5 excess deaths within 30 days of admission and 6.9 excess failures-to-rescue (deaths) per thousand cases when an anesthesiologist was not involved.
- Independently funded.
- Contains better risk adjustment than any of the pro-nurse studies, including detailed statistical validation.
- The results may be understated due to the authors' generous definition of an "undirected" case.

Staffing data source..... Medicare 1991-1994
Outcomes data source..... HCFA Vital Status File 1991-1994, ICD-9 and CPT codes 1991-1994
Study sample ..... 194,430 cases in 1 state (Pennsylvania)

Summary of Key Anesthesia Policy Research Studies

Cintina et al 2018

Published in *Nursing Economic$*
Cost-Effectiveness Analysis

What the study says:
"This analysis ... suggests costs associated with anesthesia delivery can be reduced significantly by eliminating directional and supervisory models of anesthesia delivery and allowing CRNAs to practice to the full extent of their training."

Key Points:
- Funded by the American Association of Nurse Anesthetists.
- This is an updated version of Hogan et al 2010 *(see box below)* and did not include any original data or directly measure differences in cost-effectiveness. It is simulation based entirely on a set of assumptions.
- Cost and revenue estimates were simulated in delivery models by assumption that all cases were performed under a physician anesthesiologist or nurse anesthetist alone.
- Did not account for differences in care quality or productivity between a nurse anesthetist and physician anesthesiologist.

Dulisse and Cromwell 2010 (*Health Affairs* study)

Published in *Health Affairs*
Sometimes AKA "Research Triangle Institute" study
Outcomes Study

What the study says:
"No evidence to suggest that there is an increase in patient risk associated with anesthesia provided by unsupervised CRNAs."

Key Points:
- Funded by the American Association of Nurse Anesthetists.
- Did not adequately account for differences in patient "sickness" (weak risk adjustment).
- Uses a flawed approach to identify nurse anesthetist-solo cases (QZ Modifier).

Staffing data source.....Medicare 1999-2005
Outcomes data source .....Medicare 1999-2005
Study sample ..... 481,440 cases nationally

Negrusa et al 2016

Published in *Medical Care*
Outcomes Study

What the study says:
"... strong evidence of differences in the likelihood of anesthesia complications by patient characteristics, patient comorbidities, and the procedures being administered, but virtually no evidence that the odds of a complication differ by SOP or delivery model."

Key Points:
- Funded by the American Association of Nurse Anesthetists.
- Uses billing modifier QZ to define CRNA-solo practice despite that modifier being commonly used when physician anesthesiologists are involved in the case.
- Uses classifications of state scope of practice laws based on "an anlaysis conducted by the AANA" and refers loosely to nursing or facility statutes and regulations. The ASA submits that the classification does not accurately reflect state statutes and regulations.
- Statistical model does not include hosptial variables, which often confound differences in patient outcomes.
- This is a cross-sectional study, not a longitudinal study. The authors attempt to measure an association; however, no "impact" can be assessed in a cross-sectional study.

Hogan et al 2010

Published in *Nursing Economic$*
Sometimes AKA "The Lewin Group" study
Cost-Effectiveness Analysis

What the study says:
"These results support the conclusion that the most cost- effective delivery model is CRNAs practicing independently."

Key Points:
- Funded by the American Association of Nurse Anesthetists.
- Did not include any original data or directly measure differences in cost-effectiveness. It is a simulation based entirely on a set of assumptions.
- The biggest assumption is that there is no difference in care quality between nurse anesthetists and physician anesthesiologists. This assumption is based primarily on Pine 2003 and Simonson 2007 *(see next page)*.
- Did not account for differences in productivity between nurse anesthetists and physician anesthesiologists.

Summary of Key Anesthesia Policy Research Studies

Needleman and Minnick 2009

Published in *Health Services Research*
Outcomes Study

What the study says:
"Hospitals that use only CRNAs, or a combination of CRNAs and anesthesiologists, do not have systematically poorer maternal outcomes compared with hospitals using anesthesiologist-only models."

Key Points:

- Funded by the American Association of Nurse Anesthetists.
- Ignores the fact that sicker patients are more likely cared for in physician anesthesiologist-only facilities vs. nurse anesthetist-only facilities.
- These same authors found in 2008 that "CRNA-only" facilities were far more likely to be Level 1 (low complexity) obstetric facilities than facilities using other anesthesia provider models.
- Includes disproportionately healthy patients that do not accurately represent the US population.
- ICD-9 codes are an unreliable outcome measure due to "under-coding" in smaller (nurse anesthetist-staffed) hospitals.

Staffing data source.....2004 survey of hospitals
Outcomes data source .....ICD-9 codes 1999-2001
Study sample .....1,141,000 cases in 6 states

Pine et al 2003

Published in *AANA Journal*
Outcomes Study

What the study says:
"Hospitals without anesthesiologists had results similar to hospitals where anesthesiologists provided or directed anesthesia care."

Key Points:

- Funded in part by the AANA Foundation.
- Uses a flawed approach to identify nurse anesthetist-solo cases (QZ Modifier).
- Provides few details about its risk adjustment methods.

Staffing Data Source.....Medicare 1995-1997
Outcomes data source.....Medicare 1995-1997
Study sample ..... 404,194 cases in 22 states

Simonson et al 2007

Published in *Nursing Research*
Outcomes Study

What the study says:
"There is no difference in rates of complications between the two types of staffing models [nurse anesthetist-only vs. with anesthesiologist]."

Key Points:

- ICD-9 complications may be coded less frequently in smaller (nurse anesthetist-staffed) hospitals due to a lack of resources, so there are missing data about adverse outcomes in those hospitals.
- The hospital survey determining anesthesia staffing model asked respondents to remember staffing models from up to 12 years prior (hard to do accurately).

Staffing data source.....Hospital survey 1993-2004
Outcomes data source ICD-9 1993-2004
Study sample .....134,806 cases in 1 state (Washington)

Cochrane Collaboration Review 2014

Published in *The Cochrane Library*
Literature Review

What the review says:
"No definitive statement can be made about the possible superiority of one type of anaesthesia care over another."

What the AANA says about this review:
"No definitive statement can be made about the possible superiority of one type of anaesthesia care over another."

Key points:

- The authors' actual conclusion is that currently available scientific evidence is unable to definitively answer this question. (pp. 2, 3, 15)
- Did not collect any original data. The authors evaluated over 8,000 studies, but only 6 were included in the review.
- No randomized controlled trials – patients randomly assigned to a physician anesthesiologist or nurse anesthetist for care (research gold standard) – were included. The authors state that "randomization may be unacceptable to health service providers, research ethics committees and patients, particularly for high-risk patients and procedures."
- The authors state that it is possible that many cases using "independent" nurse anesthetist care may involve physician anesthesiologists.
- Reports important differences between patients from nurse anesthetist-solo cases and from cases involving a physician anesthesiologist.
- Determined that the Dulisse 2010 Health Affairs study (see previous page) was at "high risk" for bias due to its funding source.