

Dear Members,

Governor Polis is currently considering a decision to fully remove or comprehensively “opt-out” of the federal Center for Medicare & Medicaid Services (CMS) safety requirement that physicians supervise nurse anesthetists in procedures involving CMS beneficiaries in Colorado. This safety requirement is one of the Medicare Conditions of Participation (CoP) and is required in facilities that wish to bill Medicare or Medicaid. The impetus for this change includes pressure from the Colorado Hospital Association –

1. Letters to Governor Polis in June of 2022 and February 2023, specifically promoting opting out from federal practice standards.
2. Upcoming expiration of federal emergency actions relating to COVID-19 pandemic. (In early 2020 a nationwide Public Health Emergency was declared which included a temporary exemption of the CMS physician supervision standards). The perceptions of Governor Polis and his staff are that opting out of physician supervision standards would not represent a change from current practice. What we, as practicing anesthesiologists are aware of, is that there has been no change in actual practice (physician supervision of CRNA’s) during this public health emergency.

This is not the first time that Colorado anesthesiologists have dealt with the threat of removing this important safety requirement. In 2010, former Governor Bill Ritter, Jr. issued an opt-out limited to critical access hospitals and specified rural hospitals. The opt-out exempted nurse anesthetists in those facilities from the requirement for physician supervision. As a result, the 2010 partial opt out did not result in any improvement of access to care nor any reduction in cost of care but did reduce the number of anesthesiologists in those facilities. There are no known peer reviewed journal articles or State of Colorado reports demonstrating any improvement of access to care or reductions in costs associated with this limited opt-out. However, there is clear evidence that the limited opt-out caused a reduction in the number of anesthesiologists in those facilities.

The Colorado Society of Anesthesiologists had an opportunity to meet with the Governor and express our concerns on February 2nd. We emphasized primarily patient safety concerns. The proper patient preparation for and administration of anesthesia is a complex and technically demanding medical process that requires physician supervision. Nurse anesthetists are qualified and important members of the anesthesia care team but cannot replace a physician. Compared to physicians, nurse anesthetists have about half the education and one-fifth the hours of clinical training. Removing physician supervision from anesthesia in surgery lowers the standard of care and jeopardizes patients’ lives. The Colorado Society of Anesthesiologists opposes any policies that eliminate patient-centered, physician-led anesthesia care, which not only saves lives but reduces cost. We presented several outcome research studies that support our position.

Silber et.al. “Physician anesthesiologist Care Decreases Risk of Death and Complications.” *Anesthesiology* 2000;93(1):152-163-increased likelihood of death when anesthesia not provided by physician anesthesiologist (these were patients undergoing general and or orthopedic procedures (usually hip or knee replacement). Overall, the odds of death were 8% higher and the odds of preventable deaths due to complication (failure to rescue) were 10% higher when anesthesia was not provided by physician anesthesiologist.

Memtsoudis et.al. "Hospitalization After Surgery Far Less Likely if Physician Anesthesiologist Provides Care" *J Clin Anesthesia* 2012;24(2):89-95-Odds of unexpected disposition to (hospital admission or death) was 80% higher when nurse anesthetist provided the care than when a physician anesthesiologist provided the care.

These and other resources will be provided on CSA website. Noteworthy is that the studies most quoted by AANA Dulisse 2010, Pine 2019, Hogan 2010, and Needleman 2009 were all funded by AANA, and rely on Medicare data contaminated by the QZ problem. The research that we are quoting all has independent funding.

CSA presented arguments that debunked the positions that opting out increased access to anesthesia care, particularly in rural areas. Since 2016, five studies have been published in peer reviewed journals examining the relationship between opt-out and anesthesia access. All five published studies found that opt-out was not associated with an increase in access to anesthesia care.^{1, 2, 3, 4} The 2019 Graduate Nurse Demonstration Project which was mandated as part of the Affordable Care Act of 2010, found "ninety-six percent of alumni who are [nurse anesthetists] ...reported working in urban settings. This is not surprising, as [nurse anesthetists] may be more likely to work in urban settings with larger anesthesia departments."⁵ Most recently, a 2021 *Journal of Rural Health* article provided in part, "Given that we found no evidence that being in an opt-out state increases the odds of using CRNAs in hospitals, we contribute to the growing literature suggesting that states adopting the opt-out policy have not realized increased health care access or reduced health care costs."⁶

Opting out similarly fails to save patients' or taxpayers' money. Medicare (and in a majority of states, Medicaid) pays the same for the totality of the anesthesia care whether the service is provided by a physician anesthesiologist, a physician anesthesiologist medically directing a nurse anesthetist or anesthesiologist assistant, a nurse anesthetist supervised by the operating surgeon, or in those rare circumstances where it takes place, a nurse anesthetist practicing without physician supervision. When a physician anesthesiologist medically directs a nurse anesthetist, the Medicare payment is divided equally between the physician and the nurse. When a surgeon supervises a nurse anesthetist, the surgeon does not receive any portion of the anesthesia fee; the full amount goes to the nurse anesthetist or his or her employer. The amount of the Medicare payment, no matter how it is allocated, is the same regardless of who provides the anesthesia care.

There is little support from the general public for opt-outs. Surveys repeatedly show patients want physicians in charge. In a recent American Medical Association survey, 91 percent of respondents said that a physician's years of medical education and training are vital to optimal patient care, especially in the event of a complication or medical emergency. Eighty-four percent said that they prefer a physician to have primary responsibility for the diagnosis and management of their health care.⁷ A survey

¹ Sun EC, Miller TR, Halzack NM. In the United States, "Opt-Out" States Show No Increase in Access to Anesthesia Services for Medicare Beneficiaries Compared with Non-"Opt-Out" States. *A&A Case Reports*. 2016; 6(9):283-5

² Sun EC, Dexter F, Miller TR. The Effect of "Opt-Out" Regulation on Access to Surgical Care for Urgent Cases in the United States: Evidence from the National Inpatient Sample. *Anesthesia & Analgesia*. 2016; 122(6):1983-91.

³ Sun EC, Dexter F, Miller TR, Baker LC. "Opt Out" and Access to Anesthesia Care for Elective and Urgent Surgeries among U.S. Medicare Beneficiaries. *Anesthesiology*. 2017; 126(3):461-71.

⁴ Schneider JE, Ohsfeldt R, Li P, Miller TR, Scheibling C. Assessing the impact of state "opt-out" policy on access to and costs of surgeries and other procedures requiring anesthesia services. *Health Econ Rev*. 2017; 7(1):10.

⁵ The Graduate Nurse Education Demonstration Project: Final Evaluation Report, Centers for Medicare and Medicaid Services. August 2019. <https://innovation.cms.gov/files/reports/gne-final-eval-rpt.pdf> (p.95).

⁶ Feyereisen SL, Puro N, McConnell, W. Addressing provider shortages in rural America: The role of state opt-out policy adoptions in promoting hospital anesthesia provision. *J Rural Health*. 2021; 37(4):684-691.

⁷ Baseline & Associates conducted a telephone survey on behalf of the AMA Scope of Practice Partnership between March 8–12, 2012. Baseline & Associates surveyed 801 adults nationwide. The overall margin of error is +/- 3.5 percent at the 95 percent level.

commissioned last summer by National Survey Research Group, commissioned by CSA clearly demonstrated overwhelming support of Colorado Residents for physician involvement in anesthesia care. Every query led the same conclusion, "Colorado Voters wants a physician providing their anesthesia care for major surgery by large margins."

As part of the process of considering an opt out, the Governor consulted with the Colorado Medical Board, led by an anesthesiologist, and the Board voted unanimously to oppose an opt out, citing lack of evidence of safety, no measurable improvement in access, and a belief that this was not in the best interests of Coloradans.

Finally, I want to thank the leadership of the Colorado Society of Anesthesiologists and the American Society of Anesthesiologists. Without their support, and that of our members, it would have been impossible to advocate for patients and the safety of all Coloradans. It is an honor to help lead this organization and to help our membership protect patients.

I have no doubt that many of you will hear about this in your hospitals in the coming days or weeks. Our position is strong and evidence based. Below you will find reference materials for further resources.

While this message is meant to keep you abreast of the current state of the situation, please watch your inbox as I may need your help in the near future petitioning our government on behalf of patient safety. If I may be in service to you in any way, please feel free to contact me through the CSA or my contact information below.

Respectfully,
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Universal Comments (apply across all studies):

- 2 of the 3 pro-physician studies (in **green**) were independently funded. 4 of the 5 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.

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 actually 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)

Mementsoudis 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 nonanesthesiology 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.

**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

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 reverse side).
- Did not account for differences in productivity between nurse anesthetists and physician anesthesiologists.

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

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 U.S. 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

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 American Association of Nurse Anesthetists says about this review:

“Researchers find no differences in care provided by CRNAs and Anesthesiologists.”

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 considered more than 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 actually 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 (reverse side) was at “high risk” for bias due to its funding source.

Physician
Anesthesiologists

Made for
This Moment

RESEARCH SUPPORTS PATIENT-CENTERED, PHYSICIAN-LED ANESTHESIA CARE

Physician anesthesiologists are guardians of patient safety, uniquely educated and trained for the critical moments in health care — in the operating room, in the delivery room, in the intensive care unit, and in a crisis. No other type of practitioner can match their ability to navigate life-and-death moments in patient care. Physician anesthesiologists are made for these moments.

Removing physician supervision from anesthesia in surgery lowers the standard of care and jeopardizes patients' lives. The American Society of Anesthesiologists opposes any policies that eliminate patient-centered, physician-led anesthesia care, which not only saves lives but reduces costs. The following provides a summary of available research to support the importance of physician-led anesthesia care.

Outcomes Research

Physician Anesthesiologist Care Decreases Risk of Death and Complications

Silber JH, Kennedy SK, Even-Shoshan O, et al. Anesthesiologist direction and patient outcomes. *Anesthesiology*. 2000;93(1):152-163. doi:10.1097/0000542-200007000-00026

Bottom line: Long considered the gold standard of anesthesia outcomes studies, this research found that patients having general or orthopedic surgery (usually knee or hip replacement) are more likely to die if the anesthesia for their procedure is not provided by a physician anesthesiologist.

The study by the numbers:

- In 1,000 cases in which an anesthesia or surgical complication occurred, a physician anesthesiologist prevented almost seven deaths.
- Overall, the odds of death were 8 percent higher and the odds of preventable deaths due to a complication (failure to rescue) were 10 percent higher among patients whose anesthesia was not provided by a physician anesthesiologist.
- Analysis of Medicare data of 194,430 surgeries in Pennsylvania from 1991-1994.

Background: Many factors influence patient outcomes making it difficult to determine the effect of one aspect of care. This study applied extremely robust risk assessment to rule out other health factors and zero in on outcome differences by anesthesia provider.

Research validity:

- Independently funded.
- Researchers ensured results were on equal footing by factoring in patients' health issues (including more than 40 conditions from high blood pressure to pneumonia).

Hospitalization After Surgery Far Less Likely if Physician Anesthesiologist Provides Care

Memtsoudis SG, Ma Y, Swamidoss CP, Edwards AM, Mazumdar M, Liguori GA. Factors influencing unexpected disposition after orthopedic ambulatory surgery. *J Clin Anesth*. 2012;24(2):89-95. doi:10.1016/j.jclinane.2011.10.002

Bottom line: The study found patients having outpatient surgery are far more likely to have an "unexpected disposition" (admission to the hospital or death) if their anesthesia was solely provided by a nurse anesthetist rather than a physician anesthesiologist.

The study by the numbers:

- The odds of an unexpected disposition was 80 percent higher when a nurse anesthetist provided the care than when a physician anesthesiologist provided the care.
- Analysis of a national survey of outpatient surgeries, including more than 2.4 million cases from 1996 and 2006.

Background: Patients having outpatient surgery are expected to be discharged to return home the same day as their procedure. Any other outcome such as admission to the hospital or death (a rare outcome) is considered an unexpected disposition and also leads to increased costs. This study compared the rate of unexpected disposition when anesthesia for outpatient knee and shoulder surgery was provided solely by a nurse anesthetist vs. a physician anesthesiologist.

Research validity:

- Independently funded.
- Mirrors the results of a 2005 study, strengthening the findings.



American Society of
Anesthesiologists

Independent Review of Anesthesia Outcomes Studies by Researchers Unable to Demonstrate “Increase in Confidence” in Skills of Nurse Anesthetists

Lewis SR, Nicholson A, Smith AF, Alderson P. Physician anaesthetists versus non-physician providers of anaesthesia for surgical patients. *Cochrane Database Syst Rev.* 2014;(7):CD010357. Published 2014 Jul 11. doi:10.1002/14651858.CD010357.pub2

Bottom line: After undertaking an extensive review of studies focused on anesthesia care provided by nurse anesthetists or physician anesthesiologists, the Cochrane Collaboration was unable to provide support for an increase in confidence in the skills of nurse anesthetists.

The study by the numbers:

- The review included six studies (of more than 8,000 studies initially considered). Altogether, the six studies included more than 1.5 million patients.
- All of the studies included were non-randomized controlled trials and non-randomized cluster trials. While the Collaboration aimed to include randomized controlled trials, none were found in which an anesthesia provider – physician anesthesiologist or nurse anesthetist – was randomly assigned to a patient without regard to the severity of a patient’s condition or the type of surgery the patient would undergo. One reason cited by the authors for the lack of randomized controlled trials for anesthesia care was that “randomization may be unacceptable to health service providers, research ethics committees and patients, particularly for high-risk patients and procedures” – an acknowledgement that nurse-only anesthesia (without the clinical oversight of a physician) may be too risky to even test in a scientific trial.
- The results varied widely between the studies.
- Concerned about the risk of bias and assessment of cofounders, the authors judged four of the studies at medium risk of inaccuracy, one at low risk, and one with insufficient detail to determine risk.
- Four of the six studies included received funding that could have influenced the reporting and interpretation of the results.

Background: Due to the increasing demand for surgery and a perceived shortage of physician anesthesiologists, reviewers wanted to assess whether anesthesia can be provided equally effectively and safely by nurse anesthetists as by physician anesthesiologists. As the authors conclude, however, none of the data were sufficiently high quality and findings were inconsistent, so they were unable to determine if there were differences in care.

Research validity:

- Independently funded.

VA Report Finds Insufficient Evidence to Support Full Practice Authority Related to Nurse Anesthetists

McCleery E, Christensen V, Peterson K, Humphrey L, Helfand M. Evidence Brief: The quality of care provided by advanced practice nurses. In: *VA Evidence Synthesis Program Evidence Briefs*. Washington (DC): Department of Veterans Affairs (US); September 2014.

Bottom line: With regard to anesthesia, the VA’s Quality Enhancement Research Initiative (QUERI) document found that the evidence to support full practice authority related to nurse anesthetists was “insufficient” and at “high risk of bias.”

The study by the numbers:

- QUERI conducted an evidence review of available literature “to assess the strength and relevance of studies comparing autonomous APRNs with physicians in primary care, urgent care, and anesthesia settings for 4 important outcomes: health status, quality of life, hospitalizations, and mortality.”
- The paper stated that “[t]he results of these studies do not provide any guidance on how to assign patients for management by a solo CRNA, or whether more complex surgeries can be safely managed by CRNAs, particularly in small or isolated VA hospitals where preoperative and postoperative health system factors may be less than optimal.”

Background: The VA utilized its own research resources to investigate the quality of care by a nurse anesthetist outside of a team-based model. After reviewing existing studies, even self-funded nursing advocacy studies, QUERI concluded the evidence did not prove it would be safe to implement nurse-only models of anesthesia for VA, specifically questioning “whether more complex surgeries can be safely managed by CRNAs.”

Research validity:

- Independently funded.

Surgical Outcomes Equivalent Whether Physician Anesthesiologist Assisted by Nurse Anesthetist or Anesthesiologist Assistant

Sun EC, Miller TR, Moshfegh J, Baker LC. Anesthesia care team composition and surgical outcomes. *Anesthesiology.* 2018;129(4):700-709. doi:10.1097/ALN.0000000000002275

Bottom line: Physician anesthesiologists often work with nurse anesthetists and anesthesiologist assistants in the anesthesia care team. This research found no difference in death rates, hospital length of stay, or costs between admission or discharge whether the physician anesthesiologist is assisted by a nurse anesthetist or an anesthesiologist assistant.

The study by the numbers:

- A retrospective analysis was performed of national claims data for 443,098 publicly insured elderly (ages 65 to 89 yr) patients who underwent inpatient surgery between January 1, 2004, and December 31, 2011.
- The adjusted mortality for anesthesia care teams with anesthesiologist assistants was 1.6 percent versus 1.7 percent for care teams with nurse anesthetists.
- When compared to anesthesia care teams with nurse anesthetists, care teams with anesthesiologist assistants were associated with non-statistically significant decreases in length of hospital stay and medical spending.

Background: All states permit nurse anesthetists to practice, whereas anesthesiologist assistants may practice in 17 jurisdictions. Arguments against expanding the number of states where anesthesiologist assistants may practice generally focus on the possibility that health outcomes may be worse when anesthesiologist assistants provide anesthesia care. The research shows that anesthesia care provided by an anesthesiologist assistant or nurse anesthetist is equivalent when led by a physician anesthesiologist.

Research validity:

- Based on national Medicare claims data of more than 400,000 patients.
- The analysis used instrumental variables to reduce confounding because randomization was not possible.
- Sensitivity analysis to model the estimated association between anesthesiologist assistant care and given outcomes (e.g., mortality, length of stay, inpatient costs).

Opt-out Analyses

Patients Don't Benefit When States Opt Out of Physician-Led Anesthesia Care

Five Studies (see below)

Bottom line: Five studies compared various aspects of access to care involving anesthesia in states that choose to be exempt from the longstanding Medicare patient safety standard requiring physician supervision of nurse anesthesia in the delivery of anesthesia. The studies found no evidence that opting out of the safety standard increases access to care.

The studies by the numbers:

Schneider JE, Ohsfeldt R, Li P, Miller TR, Scheibling C. Assessing the impact of state "opt-out" policy on access to and costs of surgeries and other procedures requiring anesthesia services. *Health Econ Rev.* 2017;7(1):10. doi:10.1186/s13561-017-0146-6

- Analyses of two databases:
 - Nationwide Inpatient Sample of 13,573 facility-year observations from 1998 to 2011.
 - State Ambulatory Surgery and Services Databases, comparing access in three opt-out states to three non-opt-out states based on a total of 9,994 facility-year observations.
- Patients did not have increased access to surgical care and anesthesia in opt-out states. Further, inpatient surgical care costs were 8.7 percent higher in opt-out states.

Sun EC, Dexter F, Miller TR, Baker LC. "Opt out" and access to anesthesia care for elective and urgent surgeries among U.S. Medicare beneficiaries. *Anesthesiology.* 2017;126(3):461-471. doi:10.1097/ALN.0000000000001504

- Analysis of more than 1.1 million Medicare patients to determine distance patients traveled for five common elective procedures (knee and hip replacement, cataract surgery, colonoscopy/sigmoidoscopy, and gallstone removal) and two emergency surgeries (appendectomy and hip fracture repair).
- Patients in opt-out states traveled the same distance for care as those in non-opt-out states.

Sun E, Dexter F, Miller TR. The effect of "opt-out" regulation on access to surgical care for urgent cases in the United States: evidence from the National Inpatient Sample. *Anesth Analg.* 2016;122(6):1983-1991. doi:10.1213/ANE.0000000000001154

- Analysis of National Inpatient Survey from 1998 to 2010 of more than 2.3 million patients with appendicitis, bowel obstruction, gallstone removal, or hip fracture to determine if there was a difference in access to care between states that recognize the Medicare patient safety standard and those who do not.
- Patients in opt-out states were not more likely to be admitted for care, nor were they less likely to suffer from a ruptured appendix.

Sun EC, Miller TR, Halzack NM. In the United States, "opt-out" states show no increase in access to anesthesia services for Medicare beneficiaries compared with non-"opt-out" states. *AA Case Rep.* 2016;6(9):283-285. doi:10.1213/XAA.0000000000000293

- Comparison of Medicare fee-for-service claims of anesthesia in 13 opt-out states to non-opt-out states.
- Anesthesia utilization growth rates were higher in most non-opt-out states compared to opt-out states.

Feyereisen SL, Puro N, McConnell W. Addressing provider shortages in rural America: The role of state opt-out policy adoptions in promoting hospital anesthesia provision. *J Rural Health.* 2021;37(4):684-691. doi: 10.1111/jrh.12487

- Analysis of rural hospitals in opt-out states and their choice of whether to offer CRNA services based on the American Hospital Association dataset of 1,581 unique acute care hospitals and 7,592 hospital-year observations, combined with county-level data from Area Health Resource Files and Area Deprivation Index scores from 2011 to 2015.

- No increased likelihood of CRNA services being offered in hospitals located in opt-out states, even when restricting the analysis to those in the most-disadvantaged areas.
- The likelihood of rural hospitals in opt-out states using CRNA services is slightly decreased compared to rural hospitals in non-opt-out states.
- The ability to opt out did not lead to acute care hospitals expanding their use of CRNAs.

Background: Due to a concern about the potential shortage of physician anesthesiologists in certain regions, in 2001 the U.S. government allowed states to choose to opt out of a Medicare rule that requires physician supervision of the administration of anesthesia by a nurse anesthetist: 20 states have done so in the hopes of increasing patient access to care and reducing travel times. Two of the states (Colorado and Utah) are partial opt-outs limited to critical access hospitals and specified rural hospitals.

Research validity:

- Two of the studies (published in Health Economics Review and Anesthesia and Analgesia Case Reports) were funded by the American Society of Anesthesiologists.
- Researchers analyzed vast databases, including the largest publicly available all-payer health care database (factoring in all types of public and private insurance).
- The studies looked at a wide variety of common procedures, including urgent and elective, inpatient and outpatient.

Cost Studies

Physician-Led Anesthesia Care Saves Lives, Reduces Costs

Three Studies (see below)

Bottom line: Medicare and virtually all commercial insurers pay the same whether anesthesia is administered by a physician or a nurse. However, two studies show physician-led anesthesia care actually saves costs by improving patient outcomes and saving lives, while also reducing medical consultations, unnecessary tests, and surgeries canceled due to medical reasons. A third study shows that the slightly higher cost of physician anesthesiologist-led care is reasonable when factoring in outcomes focusing on unexpected dispositions (admission to the hospital or death), which are higher when anesthesia is provided by nurse anesthetists.

The studies by the numbers:

Abenstein JP, Long KH, McGlinch BP, Dietz NM. Is physician anesthesia cost-effective?. *Anesth Analg.* 2004;98(3):. doi:10.1213/01.ane.0000100945.56081.ac

- Cost-benefit analysis based on survey data of anesthesia payment and outcomes studies to determine if physician-directed anesthesia is cost-effective.
- Physician-led anesthesia reduces mortality and saves costs via improved outcomes. Savings ranged from \$4,410 to \$38,778 for each year of life saved.

Wicklund RA, Rosenbaum SH. Anesthesiology. *N Engl J Med.* 1997;337:1132-1141. doi: 10.1056/NEJM199710163371606

- Review article looked at preparation of patients for surgery, development of anesthetics and techniques, pain management using a variety of techniques, and post-operative complications related to anesthesia.
- When a physician anesthesiologist was involved, medical consultation requests were reduced by 75 percent, cost of laboratory tests were reduced by 59 percent, and medically related surgical cancellations were reduced by 88 percent.

Ohsfeldt RL, Miller TR, Schneider JE, Scheibling CM. Cost impact of unexpected disposition after orthopedic ambulatory surgery associated with category of anesthesia provider. *J Clin Anesth.* 2016;35:157-162. doi:10.1016/j.jclinane.2016.06.012

- A projection model was used to compare costs and outcomes by anesthesia provider for outpatient knee and shoulder surgery.
- There were 2.3 more unexpected dispositions per 100 procedures when anesthesia was administered by nurse anesthetists, which resulted in lower quality-adjusted life-years (QALY).
- Factoring in those outcomes, the one-year cost was only \$31 more per outpatient procedure when care was directed by a physician anesthesiologist. The improvement in outcomes associated with physician-led care is attained at a reasonable additional cost and may even be cost-saving in some scenarios.

Background: Looking to cut costs, health systems may be tempted to turn to nurse anesthetists to provide anesthesia because advocates for nurses have falsely suggested that they are a cut-rate alternative to physician anesthesiologists.

Research validity:

- The studies analyzed anesthesia-related costs from very different perspectives – from improved outcomes and lives saved to unnecessary testing and other interventions. Two studies found physician-led anesthesia care is more cost effective and a third determined better outcomes are delivered at a reasonable additional cost – and in some cases may be cost-saving – when anesthesia is delivered by physician anesthesiologists.





June 24, 2022

Members of the Colorado Medical Board and
Members of the Colorado Board of Nursing

Via email to dora_medicalboard@state.co.us; dora_nursing@state.co.us

Dear members of the Colorado Medical Board and the Colorado Board of Nursing:

On behalf of more than 100 member hospitals and health systems, the Colorado Hospital Association (CHA) requests your consideration of a full statewide opt-out from the Centers for Medicare and Medicaid Services (CMS) physician supervision requirement for Certified Registered Nurse Anesthetists (CRNAs).

In 2010, Gov. Bill Ritter implemented the opt-out for rural and critical access hospitals in Colorado, which CHA supported at the time and successfully worked to defend when subsequently challenged in court. In order to ensure **all** Colorado hospitals have flexibility to engage or employ CRNAs that have adequate knowledge and training to safely provide high-quality care and to alleviate our current workforce shortages, CHA strongly supports moving forward with a statewide opt-out as soon as possible.

Colorado's experience with the opt-out since 2010, the expanding use of CRNAs nationally, and two decades of peer reviewed research has demonstrated that CRNAs have sufficient training and expertise to safely provide high-quality care without physician supervision, and often deliver a more cost-effective path to high-quality anesthesia care.¹

Further, a full statewide opt-out will allow hospitals to deploy all anesthesia professionals to the full extent of their training and expertise, improving the patient experience by expediting access to care and improving value. It will also eliminate current confusion caused by inconsistent state and federal guidance regarding whether and how physician supervision is required for CRNAs.

Finally, the Colorado General Assembly has provided CRNAs with full responsibility for the care they provide through the Nurse Practice Act, C.R.S. 12-255-101, et seq., such that physician supervision is neither required nor endorsed for advance practice nurses under state law. A statewide opt-out would eliminate the inconsistency between state and federal

¹ See, e.g., [Scope of Practice Laws and Anesthesia Complications](#), Medical Care, 2016; [Surgical Mortality and Type of Anesthesia Provider](#), AANA Journal, 2003; [No Harm Found when Nurse Anesthetists Work Without Supervision by Physicians](#), Health Affairs, 2010; [The Future of Nursing: Leading Change. Advancing Health](#), Institute of Medicine of the National Academies, 2010; [Cost Effectiveness Analysis of Anesthesia Providers](#), Nursing Economic\$, 2010, updated 2016.

law, and align with the Colorado General Assembly's intent to allow for independent practice of CRNAs and regulate practice in a manner which it deems to be in the best interest of Colorado citizens.

Even prior to the COVID-19 pandemic, Colorado has experienced strain in and among the health care workforce that hampers efforts to provide timely and accessible care. COVID has further exacerbated these challenges to a devastating degree. Health care facilities need the regulatory flexibility to ensure that every clinician is able to practice at their full scope to ensure patients receive safe, effective, timely, and affordable care.

Thank you for your consideration.



Katherine Mulready
Senior Vice President & Chief Strategy Officer
Colorado Hospital Association

CC: Elisabeth Arenales, Governor's Office

Physician anesthesiologists are guardians of patient safety, uniquely educated and trained for the critical moments in health care — in the operating room, in the delivery room, in the intensive care unit, and in a crisis. No other type of practitioner can match their ability to navigate life-and-death moments in patient care. Physician anesthesiologists are made for these moments.

Removing physician supervision from anesthesia in surgery lowers the standard of care and jeopardizes patients' lives. The American Society of Anesthesiologists opposes any policies that eliminate patient-centered, physician-led anesthesia care, which not only saves lives but reduces costs. The following provides a summary of available research to support the importance of physician-led anesthesia care.

Outcomes Research

Physician Anesthesiologist Care Decreases Risk of Death and Complications

Silber JH, Kennedy SK, Even-Shoshan O, et al. Anesthesiologist direction and patient outcomes. *Anesthesiology*. 2000;93(1):152-163. doi:10.1097/00000542-200007000-00026

Bottom line: Long considered the gold standard of anesthesia outcomes studies, this research found that patients having general or orthopedic surgery (usually knee or hip replacement) are more likely to die if the anesthesia for their procedure is not provided by a physician anesthesiologist.

The study by the numbers:

- In 1,000 cases in which an anesthesia or surgical complication occurred, a physician anesthesiologist prevented almost seven deaths.
- Overall, the odds of death were 8 percent higher and the odds of preventable deaths due to a complication (failure to rescue) were 10 percent higher among patients whose anesthesia was not provided by a physician anesthesiologist.
- Analysis of Medicare data of 194,430 surgeries in Pennsylvania from 1991-1994

Background: Many factors influence patient outcomes making it difficult to determine the effect of one aspect of care. This study applied extremely robust risk assessment to rule out other health factors and zero in on outcome differences by anesthesia provider.

Research validity:

- Independently funded.
- Researchers ensured results were on equal footing by factoring in patients' health issues (including more than 40 conditions from high blood pressure to pneumonia).

Hospitalization After Surgery Far Less Likely if Physician Anesthesiologist Provides Care

Memtsoudis SG, Ma Y, Swamidoss CP, Edwards AM, Mazumdar M, Liguori GA. Factors influencing unexpected disposition after orthopedic ambulatory surgery. *J Clin Anesth*. 2012;24(2):89-95. doi:10.1016/j.jclinane.2011.10.002

Bottom line: The study found patients having outpatient surgery are far more likely to have an "unexpected disposition" (admission to the hospital or death) if their anesthesia was solely provided by a nurse anesthetist rather than a physician anesthesiologist.

The study by the numbers:

- The odds of an unexpected disposition was 80 percent higher when a nurse anesthetist provided the care than when a physician anesthesiologist provided the care.
- Analysis of a national survey of outpatient surgeries, including more than 2.4 million cases from 1996 and 2006.

Background: Patients having outpatient surgery are expected to be discharged to return home the same day as their procedure. Any other outcome such as admission to the hospital or death (a rare outcome) is considered an unexpected disposition and also leads to increased costs. This study compared the rate of unexpected disposition when anesthesia for outpatient knee and shoulder surgery

was provided solely by a nurse anesthetist vs. a physician anesthesiologist.

Research validity:

- Independently funded.
- Mirrors the results of a 2005 study, strengthening the findings.

Independent Review of Anesthesia Outcomes Studies by Researchers Unable to Demonstrate “Increase in Confidence” in Skills of Nurse Anesthetists

Lewis SR, Nicholson A, Smith AF, Alderson P. Physician anaesthetists versus non-physician providers of anaesthesia for surgical patients. *Cochrane Database Syst Rev.* 2014;(7):CD010357. Published 2014 Jul 11. doi:10.1002/14651858.CD010357.pub2

Bottom line: After undertaking an extensive review of studies focused on anesthesia care provided by nurse anesthetists or physician anesthesiologists, the Cochrane Collaboration was unable to provide support for an increase in confidence in the skills of nurse anesthetists.

The study by the numbers:

- The review included six studies (of more than 8,000 studies initially considered). Altogether, the six studies included more than 1.5 million patients.
- All of the studies included were non-randomized controlled trials and non-randomized cluster trials. While the Collaboration aimed to include randomized controlled trials, none were found in which an anesthesia provider – physician anesthesiologist or nurse anesthetist – was randomly assigned to a patient without regard to the severity of a patient’s condition or the type of surgery the patient would undergo. One reason cited by the authors for the lack of randomized controlled trials for anesthesia care was that “randomization may be unacceptable to health service providers, research ethics committees and patients, particularly for high-risk patients and procedures” – an acknowledgement that nurse-only anesthesia (without the clinical oversight of a physician) may be too risky to even test in a scientific trial.
- The results varied widely between the studies.
- Concerned about the risk of bias and assessment of cofounders, the authors judged four of the studies at medium risk of inaccuracy, one at low risk, and one with insufficient detail to determine risk.
- Four of the six studies included received funding that could have influenced the reporting and interpretation of the results.

Background: Due to the increasing demand for surgery and a perceived shortage of physician anesthesiologists, reviewers wanted to assess whether anesthesia can be provided equally effectively and safely by nurse anesthetists as by physician anesthesiologists. As the authors conclude, however, none of the data were sufficiently high quality and findings were inconsistent, so they were unable to determine if there were differences in care.

Research validity:

- Independently funded.

VA Report Finds Insufficient Evidence to Support Full Practice Authority Related to Nurse Anesthetists

McCleery E, Christensen V, Peterson K, Humphrey L, Helfand M. Evidence Brief: The quality of care provided by advanced practice nurses. In: *VA Evidence Synthesis Program Evidence Briefs.* Washington (DC): Department of Veterans Affairs (US); September 2014.

Bottom line: With regard to anesthesia, the VA’s Quality Enhancement Research Initiative (QUERI) document found that the evidence to support full practice authority related to nurse anesthetists was “insufficient” and at “high risk of bias.”

The study by the numbers:

- QUERI conducted an evidence review of available literature “to assess the strength and relevance of studies comparing autonomous APRNs with physicians in primary care, urgent care,

and anesthesia settings for 4 important outcomes: health status, quality of life, hospitalizations, and mortality.”

- The paper stated that “[t]he results of these studies do not provide any guidance on how to assign patients for management by a solo CRNA, or whether more complex surgeries can be safely managed by CRNAs, particularly in small or isolated VA hospitals where preoperative and postoperative health system factors may be less than optimal.”

Background: The VA utilized its own research resources to investigate the quality of care by a nurse anesthetist outside of a teambased model. After reviewing existing studies, even self-funded nursing advocacy studies, QUERI concluded the evidence did not prove it would be safe to implement nurse-only models of anesthesia for VA, specifically questioning “whether more complex surgeries can be safely managed by CRNAs.”

Research validity:

- Independently funded.

Surgical Outcomes Equivalent Whether Physician Anesthesiologist Assisted by Nurse Anesthetist or Anesthesiologist Assistant

Sun EC, Miller TR, Moshfegh J, Baker LC. Anesthesia care team composition and surgical outcomes. *Anesthesiology*. 2018;129(4):700-709. doi:10.1097/ALN.0000000000002275

Bottom line: Physician anesthesiologists often work with nurse anesthetists and anesthesiologist assistants in the anesthesia care team. This research found no difference in death rates, hospital length of stay, or costs between admission or discharge whether the physician anesthesiologist is assisted by a nurse anesthetist or an anesthesiologist assistant.

The study by the numbers:

- A retrospective analysis was performed of national claims data for 443,098 publicly insured elderly (ages 65 to 89 yr) patients who underwent inpatient surgery between January 1, 2004, and December 31, 2011.
- The adjusted mortality for anesthesia care teams with anesthesiologist assistants was 1.6 percent versus 1.7 percent for care teams with nurse anesthetists.
- When compared to anesthesia care teams with nurse anesthetists, care teams with anesthesiologist assistants were associated with non-statistically significant decreases in length of hospital stay and medical spending.

Background: All states permit nurse anesthetists to practice, whereas anesthesiologist assistants may practice in 17 jurisdictions. Arguments against expanding the number of states where anesthesiologist assistants may practice generally focus on the possibility that health outcomes may be worse when anesthesiologist assistants provide anesthesia care. The research shows that anesthesia care provided by an anesthesiologist assistant or nurse anesthetist is equivalent when led by a physician anesthesiologist.

Research validity:

- Based on national Medicare claims data of more than 400,000 patients.
- The analysis used instrumental variables to reduce confounding because randomization was not possible.
- Sensitivity analysis to model the estimated association between anesthesiologist assistant care and given outcomes (e.g., mortality, length of stay, inpatient costs).

Opt-out Analyses

Patients Don’t Benefit When States Opt Out of Physician-Led Anesthesia Care

Five Studies (see below)

Bottom line: Five studies compared various aspects of access to care involving anesthesia in states that choose to be exempt from the longstanding Medicare patient safety standard requiring physician supervision of nurse anesthesia in the delivery of anesthesia. The studies found no evidence that opting out of the safety standard increases access to care.

The studies by the numbers:

Schneider JE, Ohsfeldt R, Li P, Miller TR, Scheibling C. Assessing the impact of state "opt-out" policy on access to and costs of surgeries and other procedures requiring anesthesia services. *Health Econ Rev.* 2017;7(1):10. doi:10.1186/s13561-017-0146-6

- Analyses of two databases:
 - Nationwide Inpatient Sample of 13,573 facility-year observations from 1998 to 2011.
 - State Ambulatory Surgery and Services Databases, comparing access in three opt-out states to three non-opt-out states based on a total of 9,994 facility-year observations.
- Patients did not have increased access to surgical care and anesthesia in opt-out states. Further, inpatient surgical care costs were 8.7 percent higher in opt-out states.

Sun EC, Dexter F, Miller TR, Baker LC. "Opt out" and access to anesthesia care for elective and urgent surgeries among U.S. Medicare beneficiaries. *Anesthesiology.* 2017;126(3):461-471. doi:10.1097/ALN.0000000000001504

- Analysis of more than 1.1 million Medicare patients to determine distance patients traveled for five common elective procedures (knee and hip replacement, cataract surgery, colonoscopy/sigmoidoscopy, and gallstone removal) and two emergency surgeries (appendectomy and hip fracture repair).
- Patients in opt-out states traveled the same distance for care as those in non-opt-out states.

Sun E, Dexter F, Miller TR. The effect of "opt-out" regulation on access to surgical care for urgent cases in the United States: evidence from the National Inpatient Sample. *Anesth Analg.* 2016;122(6):1983-1991. doi:10.1213/ANE.0000000000001154

- Analysis of National Inpatient Survey from 1998 to 2010 of more than 2.3 million patients with appendicitis, bowel obstruction, gallstone removal, or hip fracture to determine if there was a difference in access to care between states that recognize the Medicare patient safety standard and those who do not.
- Patients in opt-out states were not more likely to be admitted for care, nor were they less likely to suffer from a ruptured appendix.

Sun EC, Miller TR, Halzack NM. In the United States, "opt-out" states show no increase in access to anesthesia services for Medicare beneficiaries compared with non-"opt-out" states. *A A Case Rep.* 2016;6(9):283-285. doi:10.1213/XAA.0000000000000293

- Comparison of Medicare fee-for-service claims of anesthesia in 13 opt-out states to non-opt-out states.
- Anesthesia utilization growth rates were higher in most non-opt-out states compared to opt-out states.

Feyereisen SL, Puro N, McConnell W. Addressing provider shortages in rural America: The role of state opt-out policy adoptions in promoting hospital anesthesia provision. *J Rural Health.* 2021;37(4):684-691. doi: 10.1111/jrh.12487

- Analysis of rural hospitals in opt-out states and their choice of whether to offer CRNA services based on the American Hospital Association dataset of 1,581 unique acute care hospitals and 7,592 hospital-year observations, combined with county-level data from Area Health Resource Files and Area Deprivation Index scores from 2011 to 2015.
- No increased likelihood of CRNA services being offered in hospitals located in opt-out states, even when restricting the analysis to those in the most-disadvantaged areas.
- The likelihood of rural hospitals in opt-out states using CRNA services is slightly decreased compared to rural hospitals in non-opt-out states.
- The ability to opt out did not lead to acute care hospitals expanding their use of CRNAs.

Background: Due to a concern about the potential shortage of physician anesthesiologists in certain regions, in 2001 the U.S. government allowed states to choose to opt out of a Medicare rule that requires physician supervision of the administration of anesthesia by a nurse anesthetist: 20 states have done so in the hopes of increasing patient access to care and reducing travel times. Two of the states (Colorado and Utah) are partial opt-outs limited to critical access hospitals and specified rural hospitals.

Research validity:

- Two of the studies (published in *Health Economics Review* and *Anesthesia and Analgesia Case Reports*) were funded by the American Society of Anesthesiologists.
- Researchers analyzed vast databases, including the largest publicly available all-payer health care database (factoring in all types of public and private insurance).
- The studies looked at a wide variety of common procedures, including urgent and elective, inpatient and outpatient.

Cost Studies

Physician-Led Anesthesia Care Saves Lives, Reduces Costs

Three Studies (see below)

Bottom line: Medicare and virtually all commercial insurers pay the same whether anesthesia is administered by a physician or a nurse. However, two studies show physician-led anesthesia care actually saves costs by improving patient outcomes and saving lives, while also reducing medical consultations, unnecessary tests, and surgeries canceled due to medical reasons. A third study shows that the slightly higher cost of physician anesthesiologist-led care is reasonable when factoring in outcomes focusing on unexpected dispositions (admission to the hospital or death), which are higher when anesthesia is provided by nurse anesthetists.

The studies by the numbers:

Abenstein JP, Long KH, McGlinch BP, Dietz NM. Is physician anesthesia cost-effective?. *Anesth Analg.* 2004;98(3):. doi:10.1213/01.ane.0000100945.56081.ac

- Cost-benefit analysis based on survey data of anesthesia payment and outcomes studies to determine if physician-directed anesthesia is cost-effective.
- Physician-led anesthesia reduces mortality and saves costs via improved outcomes. Savings ranged from \$4,410 to \$38,778 for each year of life saved.

Wicklund RA, Rosenbaum SH. *Anesthesiology.* *N Engl J Med.* 1997;337:1132-1141. doi: 10.1056/NEJM199710163371606

- Review article looked at preparation of patients for surgery, development of anesthetics and techniques, pain management using a variety of techniques, and post-operative complications related to anesthesia.
- When a physician anesthesiologist was involved, medical consultation requests were reduced by 75 percent, cost of laboratory tests were reduced by 59 percent, and medically related surgical cancellations were reduced by 88 percent.

Ohnsfeldt RL, Miller TR, Schneider JE, Scheibling CM. Cost impact of unexpected disposition after orthopedic ambulatory surgery associated with category of anesthesia provider. *J Clin Anesth.* 2016;35:157-162. doi:10.1016/j.jclinane.2016.06.012

- A projection model was used to compare costs and outcomes by anesthesia provider for outpatient knee and shoulder surgery.
- There were 2.3 more unexpected dispositions per 100 procedures when anesthesia was administered by nurse anesthetists, which resulted in lower quality-adjusted life-years (QALY).
- Factoring in those outcomes, the one-year cost was only \$31 more per outpatient procedure when care was directed by a physician anesthesiologist. The improvement in outcomes associated with physician-led care is attained at a reasonable additional cost and may even be cost-saving in some scenarios.

Background: Looking to cut costs, health systems may be tempted to turn to nurse anesthetists to provide anesthesia because advocates for nurses have falsely suggested that they are a cut-rate alternative to physician anesthesiologists.

Research validity:

- The studies analyzed anesthesia-related costs from very different perspectives – from improved outcomes and lives saved to unnecessary testing and other interventions. Two studies found physician-led anesthesia care is more cost effective and a third determined better outcomes are delivered at a reasonable additional cost – and in some cases may be cost-saving – when anesthesia is delivered by physician anesthesiologists.