Washington State's Anesthesia Workforce

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Executive Summary

I. INTRODUCTION

The University of Washington Center for Health Workforce Studies (UW CHWS), in collaboration with the Washington State Board of Nursing (WABON), the Washington State Medical Commission (WMC), and the Washington State Department of Health (DOH), was designated to "study the workforce shortages in anesthesia care in each facility providing anesthesia services in Washington state, and shall submit an initial report to the legislature beginning June 30, 2025…" according to Section 3 of Engrossed Substitute Senate Bill (ESSB) 6286. A final report was to be due on June 30, 2029; however, funding was only available for Fiscal Year 2025 and no funding was allocated for Fiscal Year 2026 and beyond. The limit to one year of funding was only confirmed at the end of the 2025 legislative session. As a result, the UW CHWS team was significantly limited in their ability to address all aspects of ESSB 6286. This report presents the work done to-date, and no further findings will be produced unless additional years of funding are provided.

This report summarizes progress, including results, from the first year of the study. The results presented in this report are not intended to completely address all items named in ESSB 6286 given the truncated time frame. This report provides the following information, which was designed to provide a foundation of knowledge for future years of work:

- An overview of occupations providing anesthesia care in Washington state, including their training, career pathways, and scope of practice.
- A literature review synthesizing findings on workforce quality, safety, regulations, and approaches to addressing workforce gaps, including examination of barriers to entry into the anesthesia workforce.
- A descriptive analysis of the size of the Washington state workforce qualified to provide anesthesia services using licensure and employment data.

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II. METHODS

This study used multiple approaches to address as many of the items as possible named in ESSB 6286 within the time frame allotted. We applied a rigorous approach to analyzing available data based on decades of experience conducting research on a wide range of healthcare occupations.

Defining the Anesthesia Workforce

In this study, we included all occupations involved with providing higher levels of anesthesia care. Identifying and addressing workforce shortages – a complex concept – requires not only the count of the currently qualified, independent providers of anesthesia services, but also consideration of the policies that may define their scope of work, the geographic distribution of providers, and the availability of supportive members of the anesthesia team, among multiple other factors. In this study, we include information on certified registered nurse anesthetists (CRNAs), anesthesiologists (including allopathic and osteopathic physicians), physician assistants (PAs), certified anesthesiologist assistants (CAAs), dentists, oral and maxillofacial surgeons (OMFSs), and dental anesthesia assistants (DAAs).

Literature Review

We conducted a review of government and professional society websites and reports, and sought expert input, to identify the workforce providing anesthesia services, their education, training, and scope of practice in Washington state, and outcomes related to anesthesia care including patient safety and costs. We conducted a literature review, structured according to the objectives in ESSB 6286, focused on the US anesthesia workforce from 2010-2024, with earlier articles included when relevant. Searches were conducted using PubMed, CINAHL, and Google Scholar using occupational and topic specific keywords and subject headings. Additional articles were identified from reference lists and the American Association of Nurse Anesthesiology (AANA), the American Society of Anesthesiologists (ASA), and the American Academy of Anesthesiologist Assistants (AAAA) websites. We also searched for approaches other states have taken to address gaps in access to anesthesia care.

Quantitative Data and Analysis

Washington state licensure data were obtained for CRNAs, anesthesiologists (MDs and DOs), PAs, and oral health occupations who were qualified to provide anesthesia care either independently or with oversight. Demographic and employment survey data were additionally obtained for CRNAs, MDs, DOs, and PAs. We also tallied the total number of hospitals and ambulatory surgical facilities which provide anesthesia services. No quantitative analysis of CAAs was possible because data collection for this new occupation will not start until licenses are issued (estimated September 2025). Descriptive statistics—including frequencies, percentages, means, and ranges—were generated using STATA/MP 16.1. The analysis included demographic details, workforce distribution, and practice locations for the following occupations:

- **CRNAs:** Data were obtained from WABON and DOH, incorporating demographic and employment survey responses (NURSYS e-notify data) and licensure records. The sample was restricted to CRNAs with an active license in Washington state who were employed in nursing and had a practice ZIP Code in Washington.
- **Anesthesiologists (MDs & DOs):** MDs' licensure data were linked to data from the WMC MD Demographic Census survey, while DOs were assessed via the Washington Health Workforce Survey. The physician sample was restricted to those who had an active Washington state license, who reported actively practicing, whose specialty was in anesthesiology, and who had a practice ZIP Code in Washington.

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- **PAs:** PA licensure data were linked to data from the WMC PA Demographic Census survey. The sample was restricted to PAs who held active licenses, who reported their specialty or their supervising physician's specialty as being in anesthesiology, and who had a practice ZIP Code in Washington.
- **Dentists & DAAs:** Licensure data on dentists endorsed to administer anesthesia care and certified DAAs were analyzed in collaboration with the Washington Oral Health Workforce Tracking Program. The licensure data do not differentiate dentists who specialize in oral and maxillofacial surgery, limiting our ability to categorize them separately.

Facilities with anesthesia services: Data on facilities with anesthesia services (hospitals and ambulatory surgery centers [ASCs]) were obtained from the DOH. Information included the county in which the facility was located, enabling us to examine distribution of each type of facility at a county level.

Data limitations: Inconsistences exist with respect to how practice site is reported such that a respondent may state they work in Washington state but provide a practice site Zip Code which is in another state. These inconsistencies make it difficult to firmly identify practice locations. For this study, we chose to use practice site ZIP Code to identify whether the provider worked in Washington state to be consistent in how we restricted each occupational group sample, but the sample sizes should be interpreted with caution knowing this limitation. Finally, while we can identify hospitals and ASCs that have anesthesia services, we are not able to directly attribute an individual provider to a facility.

III. RESULTS

Overview of the Anesthesia Workforce

Occupations providing anesthesia care in Washington state

This report and related workforce analyses focus on occupations licensed in Washington state that have the required training and authorization to administer or be involved with administering varying levels of anesthesia.

- **Anesthesiologists:** Licensed MDs or DOs who have completed a four-year residency in anesthesiology, with optional subspecialty training.
- **Certified registered nurse anesthetists (CRNAs):** Advanced practice nurses who have completed a 36-51 month master's or doctorate level nurse anesthesia program.
- **Physician assistants (PAs)**: Providers who have completed a master's program, typically 27 months long; those specializing in anesthesia in Washington after 2021 require anesthesiology assistant training.
- **Certified anesthesiologist assistants (CAAs):** Newly approved occupation in Washington (2024) whose licensing will begin in fall 2025. CAAs must complete a 24-28 month master's program and be supervised by an anesthesiologist.
- **Dentists (DDSs/DMDs):** Providers who have completed dental school and obtained state permits for moderate sedation or general anesthesia, with additional training depending on the type of endorsement.
- **Oral and maxillofacial surgeons (OMFSs):** Dentists who have completed a four-to-six-year residency which includes training in anesthesia administration. Longer residencies may confer an MD.
- **Dental anesthesia assistants (DAAs):** Assistants who have completed a DAA training program ranging from 38-80 hours.

Regulations affecting anesthesia care in Washington state

- **Federal regulations:** Washington state is an "opt out" state, meaning that it has chosen to opt out of the Centers for Medicare & Medicaid Services (CMS) requirement that CRNAs be supervised by physicians to be eligible for Medicare and Medicaid reimbursement for anesthesia services.

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- **State regulations:** The following occupations have full independent scope of practice to provide anesthesia care in Washington state: anesthesiologists (MDs and DOs), CRNAs who have prescriptive authority, dentists with a general anesthesia permit, and OMFSs. All other occupations have a more limited scope requiring supervision when providing anesthesia care.
- **Organizational/facility level regulations:** Facility-specific policies may further influence practice, through both the credentialing process at the facility as well as the facility's medical bylaws.

Supply, Demographics, and Distribution of the Anesthesia Workforce in Washington State

The available data in Washington state show the following:

- Based on our estimates, there are approximately half as many CRNAs as there are anesthesiologists practicing in Washington state, with smaller numbers of other occupations providing anesthesia services. Because of data limitations, estimating the number of practicing CRNAs and anesthesiologists is challenging and likely contributes to an underestimate of both CRNAs and anesthesiologists.
- The distribution of practicing anesthesia clinicians in rural areas is such that 78% are CRNAs and 22% are anesthesiologists. These estimates represent 12.6% of all CRNAs and 1.9% of all anesthesiologists in the state for whom we have data.
- Among all DAAs in the state, 9.9% (n=30) have a rural license mailing address while 4.1% (n=35) of dentists have a rural license mailing address (practice ZIP Code not available).
- An estimated 82% of CRNAs with active licenses have prescriptive authority.
- Nearly half of anesthesiologists (45.0%) report working in more than one primary practice setting, while 26.2% of CRNAs hold more than one position.
- Most anesthesiologists report either working in a single specialty group (54.9%) or working as hospital employees (24.4%).
- Most CRNAs (76.3%) report working in hospitals as their primary setting, with a smaller proportion in ACSs (16.0%).
- Anesthesiologists, CRNAs, and PAs report similar working hours (48.5 hours/week, 40.3 hours/week, and 45.1 hours/week, respectively).

Anesthesia Outcomes and Workforce Trends

This section is divided into two parts: 1) impact of regulations and practice models on care delivery and the anesthesia workforce, and 2) anesthesia workforce demand, supply, distribution, and training. It should be noted that the overall number of studies addressing the anesthesia workforce is limited. Where studies are available, there are several limitations including potential for bias due to funding, limited data sources available to study the anesthesia workforce, use of varied outcomes across studies, and not accounting for contextual factors which impact patient outcomes. This report prioritized studies that examined similar outcomes and utilized a similar approach in comparing practice models.

Literature on regulations and practice models in anesthesia care delivery

In reviewing studies which met inclusion criteria and provided information on practice models, scope of practice, quality and safety, cost effectiveness, and temporary changes due to the pandemic, we found the following:

Anesthesia practice models

- Anesthesia providers work within various practice models, including independent anesthesiologist-alone and CRNA-alone models, models where anesthesiologists direct or supervise CRNAs or direct CAAs and/or anesthesiologist residents, or models where a physician (not limited to anesthesiologists) supervises a CRNA.
- Nationally, there is increased use of CRNAs, with different regional and local impacts depending on the scope of practice regulations and supervisory models being used in hospitals and ASCs.

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Scope of practice and access to anesthesia care

- Current research has not established a clear association between a state's decision to opt out of physician supervision requirements and increased access to anesthesia services. Instead, facility bylaws may have a larger effect on use of CRNA-alone models.

Quality and safety

- Systematically assessing outcomes across existing research is difficult due to inconsistent or limited choice of outcomes to represent anesthesia care quality and the relatively limited occurrence of anesthesia-related complications.
- The quality and safety of anesthesia care has not been found to be significantly different in regulatory environments that allow full independent practice for CRNAs compared to those with more restrictive regulations which require a physician relationship for CRNA practice.

Cost effectiveness

- It is difficult to compare cost effectiveness between practice models due to difficulty in measuring actual costs within and between hospitals.
- Where evidence is available, increased use of CRNA-alone models has the potential to lower anesthesia healthcare costs and ensure availability of anesthesia services in rural areas

IV. CONCLUSION

This report provides a summary of findings identified from the first and only funded year (FY 2025) of ESSB 6286 (originally described by the legislation as a five year study). UW CHWS aimed to meet the objectives of ESSB 6286 by: 1) describing the current workforce providing anesthesia care, the current practice models, and the regulations related to this workforce; 2) using publicly available data to identify the current supply and distribution of the anesthesia workforce in Washington state, and 3) examining the literature to identify high-quality studies related to the anesthesia workforce. There were data limitations, in addition to time constraints due to truncated funding, that did not allow our team to fully address all objectives. However, the work in this report will help to inform future research and policy discussions. Specifically, the UW CHWS team provides the following suggested areas of further research for consideration by state policymakers:

- Limited data exist on anesthesia workforce needs, including unmet care demand, reimbursement differences, and rural vs. urban practice preferences of CRNAs and anesthesiologists. Further exploration is needed to understand the incentives that draw CRNAs and anesthesiologists to rural versus urban practice and how rates of reimbursement may differ, particularly in rural areas.
- CRNAs with prescriptive authority are legally allowed to practice independently in Washington, but it is unclear how many CRNAs are able to practice at this level. More information is needed to understand the nature of facility bylaws, such as requiring physician supervision at some level, and how they may impact CRNA practice.
- Data are needed to assess the number of CRNA-owned practices and their impact on access to anesthesia care.
- Washington currently has a single nurse anesthetist education program and two anesthesiology residencies. Information about the percent of in-state program graduates who practice in Washington, and in turn the percent practicing who received their education out-of-state, is needed to inform education planning and policy.
- More information is needed regarding unmet demand and associated issues, such as patients being redirected to other facilities due to insufficient anesthesia staff. Additionally, an assessment of the required clinical training sites necessary to address this demand is essential.

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- Along with assessment of clinical training sites, more information is needed regarding barriers which exist for CRNAs entering educational programs, including financial barriers.
- As CAAs enter the Washington state workforce, research is needed to assess their distribution, demographics, impact on access to anesthesiology services, and any impacts on anesthesiologist and CRNA training availability.
- The shift toward contract-based anesthesia work highlights the need for comparative data on employment models and how this may impact supply or the availability of services.

Washington State's Anesthesia Workforce

INTRODUCTION

The University of Washington Center for Health Workforce Studies (UW CHWS), in collaboration with the Washington State Board of Nursing (WABON), the Washington State Medical Commission (WMC), and the Washington State Department of Health (DOH), was designated to "study the workforce shortages in anesthesia care in each facility providing anesthesia services in Washington state, and shall submit an initial report to the legislature beginning June 30, 2025…" according to Section 3 of Engrossed Substitute Senate Bill (ESSB) 6286.[1]

According to ESSB 6286 Section 3, the initial and each subsequent report were to address, but not be limited to, the following: a) identifying the factors and barriers to entry into the profession of nurse anesthesiology, b) evaluating and assessing the current training and pipeline for certified registered nurse anesthetists (CRNAs), c) developing recommendations that reduce barriers for individuals who want to become CRNAs and increasing the available clinical training slots for nurse anesthesia residents, d) creating and maintaining an implementation plan to improve the pipeline of CRNAs in the state, e) identifying the number of qualified anesthesia providers, including, at minimum, physician anesthesiologists and CRNAs, who may practice independently in the state of Washington at each facility providing anesthesia services, and f) providing policy recommendations to expand the nurse anesthesia workforce and optimize the cost of providing anesthesia services, including initiatives for all practicing independent anesthesia providers to practice at the top of their license.

In preparation for this report, we assembled a team of health workforce researchers within UW CHWS, assessed the available data sources, critically examined the literature, and obtained input and considered feedback from a multidisciplinary advisory committee during the course of our work. Aiming to establish a baseline of knowledge in the first year to inform subsequent years, we prioritized characterizing the current anesthesia workforce in the state of Washington, including its size and scope, and made progress towards items (a), (b), and (e) of ESSB 6286. A final report was to be due on June 30, 2029; however, funding was only available for Fiscal Year 2025 and no funding was allocated for Fiscal Year 2026 and beyond at the time of this report. The limit to one year of funding was only confirmed at the end of the 2025 legislative session. As a result, the UW CHWS team was significantly restricted in their ability to address all aspects of ESSB 6286. This report presents the work done to-date, and no further findings will be produced unless additional years of funding are provided. Given the shortened time frame and information collected to date, our team was limited in its ability to fully address all items, and particularly (c), (d), and (f).

This report summarizes progress, including results, from the first year of the study. The results presented in this report are not intended to completely address all items named in ESSB 6286 given the truncated time frame. This report provides the following information, which was designed to provide a foundation of knowledge for future years of work:

- An overview of occupations providing anesthesia care in Washington state, including their training, career pathways, and scope of practice.
- A literature review synthesizing findings on workforce quality, safety, regulations, and approaches to addressing workforce gaps, including examination of barriers to entry into the anesthesia workforce.
- A descriptive analysis of the size of the Washington state workforce qualified to provide anesthesia services.

METHODS

This study used multiple approaches to address as many of the items as possible named in ESSB 6286 within the time frame allotted. We applied a rigorous approach to analyzing available data, based on decades of experience conducting research on a wide range of healthcare occupations. Our team of experts at UW CHWS included clinically and non-clinically trained individuals with master's degrees and/or PhDs in health services, health policy, public health, health economics, and nursing research. Over the course of the first year we obtained input and considered feedback from an advisory committee that included representatives from WABON, DOH, WMC, Washington Association of Nurse Anesthesiology (WANA), Washington State Society of Anesthesiologists (WSSA), and the certified anesthesiologist assistant (CAA) occupation.

Defining the Anesthesia Workforce

Given that ESSB 6286 directs UW CHWS to examine "workforce shortages in anesthesia care", we considered all occupations involved with providing higher levels of anesthesia care. Identifying and addressing workforce shortages – a complex concept – requires not only the count of the currently qualified, independent providers of anesthesia services, but also consideration of the policies that may define their scope of work, the geographic distribution of providers, and the availability of supportive members of the anesthesia team, among multiple other factors. In this study, we include information on CRNAs, anesthesiologists (including allopathic (MD) and osteopathic (DO), physician assistants (PAs), CAAs, oral and maxillofacial surgeons (OMFSs), dentists, and dental anesthesia assistants (DAAs).

Literature Review

Overview of the Anesthesia Workforce

Our initial step was to conduct a literature review to define anesthesia care, identify which occupations provide or support provision of higher levels of anesthesia care and identify the regulations that determine scope of practice for each occupation in Washington state. We used state regulations and information from key organizational websites such as the American Association of Nurse Anesthesiology (AANA), the American Society of Anesthesiologists (ASA), and the American Academy of Anesthesiologist Assistants (AAAA).

Anesthesia Outcomes and Workforce Trends

After our initial literature review to define anesthesia care in the state, we conducted a more in-depth review to identify what is already known about the anesthesia workforce, including outcomes related to anesthesia care, costs and known barriers to anesthesia education. This review focused on the US anesthesia workforce, primarily from 2010-2024, with earlier articles included when relevant. We structured the literature review by first identifying each objective in ESSB 6286 and then creating a set of literature review categories which aligned with the bill objectives (e.g., barriers and facilitators for CRNA entry into the workforce). The initial search was conducted using PubMed, CINAHL, and Google Scholar using a combination of occupational and topic specific keywords and subject headings. Additional articles were identified from reference lists and AANA, ASA, and AAAA websites. We also searched for approaches other states have taken to address gaps in access to anesthesia care.

Quantitative Data and Analysis

To estimate the size of the anesthesia workforce in Washington state, we analyzed state professional licensure data for CRNAs, anesthesiologists (medical MDs and DOs), PAs, and oral health occupations who were qualified to provide anesthesia care either independently or with supervision. To understand the settings of work, distribution, and factors (e.g., age) that may affect the availability of the anesthesia workforce, we included demographic and employment survey data for CRNAs, MDs, DOs, and PAs; this was not available for dentists and DAAs. We also summed the total number of hospitals and ambulatory surgical centers (ASCs) which provide anesthesia services. No quantitative analysis of CAAs was possible because there are not yet licensed CAAs practicing in Washington. Below we detail the study samples, data sources, and analyses. This project was considered exempt by the Washington State Institutional Review Board (Study number 2024-168).

CRNAs: Nursing licensure data specific to CRNAs were obtained from WABON in collaboration with DOH. These data were linked by license number to the most recent demographic and employment survey responses from either NURSYS e-Notify (for surveys completed between January 2019 – November 2024) or Healthcare Enforcement and Licensing Management System (HELMS) (for surveys completed between November 2024 and January 2025). We identified individuals with active CRNA licenses in Washington, then excluded from analysis those for whom employment details were missing (i.e., had not completed relevant survey questions), and those who were not actively employed in nursing. We identified CRNAs practicing in Washington state according to the ZIP Code provided for their primary practice location. Residence location was represented by the mailing ZIP Code available in licensing data. A limitation of the data used in these analyses is that we were only able to identify CRNAs working in Washington state who provided their employment information in the demographic and census survey. The actual CRNA population working in Washington state is certainly larger than represented by survey data alone, and below we provide estimates of the percent of survey non-respondents who likely are working in the state.

Anesthesiologists (MDs and DOs): MD licensure data linked to MD demographic and employment data from the MD Demographic Census Survey were provided to our research team by WMC in collaboration with DOH. The MD Demographic Census survey is completed by physicians during their annual license renewal process and has an estimated 80% completion rate. Data used in our analysis were current as of March 2025 and contained information only on MDs who had completed the demographic survey and who reported their primary or secondary specialty was in anesthesiology. We further filtered the data to MDs whose practice state was Washington according to the associated practice ZIP Code listed in the MD's first, second or third practice location. We were able to determine whether a physician reported living in Washington state ("state of residence" reported as Washington) but we did not have their mailing ZIP Code and thus could not use this proxy to estimate if they lived in a rural or urban area. Physicians, however, may be more likely to have licenses mailed to their employment address, so even with license mailing ZIP Code the data would not have provided highly accurate data on residence location. As with data on CRNAs, we were only able to identify MD anesthesiologists working in Washington state who provided their employment information in the MD demographic survey. The actual MD anesthesiologist population working in Washington state is certainly larger than represented in the survey data alone, and below we provide estimates of MD anesthesiologists who are likely working in the state, accounting for survey non-respondents.

We obtained data on DOs via the Washington Health Workforce Survey. We used the most recent full year of data (May 2023-May 2024) and included DOs whose reported "primary" or "secondary" specialty was anesthesia, who stated they were "currently practicing in the profession", and whose practice ZIP Code was in Washington state. It should be noted that the Washington Health Workforce Survey completion rate for DOs is unknown. As such, analyses in this report specific to DOs should be recognized as an underestimate of all DOs practicing as anesthesiologists in Washington state.

PAs: PA licensure data linked to PA demographic and employment data from the PA Demographic Census Survey were provided to our research team by WMC in collaboration with DOH. Data were current as of March 2025 and contained information only on PAs who had completed the demographic survey and who reported their primary or secondary specialty as anesthesiology. Data were restricted to PAs who held active licenses, who reported their specialty or their supervising physician's specialty as being in anesthesiology, and whose practice site was in Washington according to their practice site ZIP Code.

Dentists and DAAs: Summary analyses specific to dental occupations were provided in collaboration with the Washington Oral Health Workforce Tracking Program. Data for that project are from the DOH, which provides licensure data on the frequency and demographics of licensed dentists holding general anesthesia and moderate sedation permits and certified DAAs. The licensure data do not differentiate dentists who specialize in oral and maxillofacial surgery, limiting our ability to categorize them separately. In addition, the licensure data do not contain employment information. As such, we could only confirm whether the dentists and DAAs were actively licensed or certified in the state, but we could not confirm their employment status.

Data were available for three types of sedation permits issued to dentists in the state: general anesthesia permits, moderate sedation with enteral agents permits, and moderate sedation with parenteral agents permits. When individuals had multiple permit types, we retained only the permit with the highest scope.

Facilities with anesthesia services: Data on facilities with anesthesia services (hospitals and ambulatory surgery centers [ASC's]) were obtained from the DOH. Information included the county in which the facility was located, enabling us to calculate the total number and examine the distribution of each type of facility at a county level.

Rural-urban designation: Where data were available, rural and urban residence and practice locations were classified using rural urban commuting area (RUCA) codes assigned to each ZIP Code.[2] A RUCA code of 4 or higher was defined as rural.

Statistical analyses: We generated descriptive statistics including frequency counts and percentages, means, standard deviations, and ranges on selected variables. All statistical analyses were performed using STATA/MP 16.1.[3]

Data limitations: While several data limitations were noted above related to specific occupational data sources, there were additional limitations across the sources of data which make comparisons difficult. First, the demographic surveys for CRNAs, MDs, and DOs ask certain questions differently which do not allow for direct comparison. For example, CRNAs are asked about the number of positions in which they work, whereas MDs are asked about the number of practice locations. Second, several different categories of information are gathered. For example, CRNAs are asked directly about their employment situation (e.g., employed in nursing, unemployed, other) whereas MDs are asked to break down their work hours into specific tasks (e.g., research, clinical, administrative). These limitations are important to note both regarding how these variables are labeled in the results tables and the inability to provide direct comparisons in the results summaries. Third, survey respondents do not always provide consistent answers to survey questions. For example, CRNAs, MDs and DOs are all asked if they practice in Washington state and are also asked for their practice ZIP Code, but some provide an out-of-state ZIP Code after indicating they practice in state, including (for MDs and DOs) occasionally for all practice locations. These inconsistencies make it difficult to firmly identify practice locations. For this study, we chose to use practice site ZIP Code to identify whether the provider worked in Washington state to be consistent in how we restricted each occupational group sample, but the sample sizes ("n") used for analyses should not be viewed as the actual number of each occupational group practicing in the state. In addition, while we had second and third practice site ZIP Code information for MDs and DOs, we only had primary practice site ZIP Code for CRNAs. Finally, while we can identify hospitals and ASCs that have anesthesia services, we are not able to directly attribute an individual provider to a facility.

RESULTS: OVERVIEW OF THE ANESTHESIA WORKFORCE

Anesthesia Care

Anesthesia is a medical intervention used to eliminate sensation during painful invasive procedures such as surgery. Different levels of anesthesia are used depending on the type and duration of the procedure with consideration of an individual's specific health status and medical conditions. Anesthesia care is a continuum of medical interventions, ranging from localized and/or short-acting anesthesia with no or minimal impact on a patient's breathing and circulation, to higher levels of anesthesia with more substantial effects on breathing and circulation and therefore greater risks to patients.[4] In Washington, anesthesia care can be provided in the settings and situations described below as defined in WAC 246-919-601.[5]

- **Local anesthesia** (or local infiltration) refers to numbing of a small part of the body while the patient remains awake, for example numbing one or two teeth during a dental procedure or the area around a small wound requiring stitches. It can be a topical solution, eye drop, or localized injection. Local anesthesia occurs in multiple types of healthcare settings, but rarely in the operating room. Local anesthesia carries minimal breathing or circulation risks.

- **Regional anesthesia** (or major conduction anesthesia) eliminates sensation in a specific body part (e.g. the arm) or section of the body (e.g. the lower half of the body) while the patient remains conscious. Routes of medication administration include epidural (e.g., for childbirth) or spinal (e.g., numbing a leg for knee arthroscopy). Regional anesthesia is commonly administered in operating rooms, labor and delivery areas, and outpatient procedural clinics. The risks associated with regional anesthesia vary depending on where in the body it is used and are generally lower when used in limbs than in the spinal or epidural space.
- **Monitored sedation** refers to a light, moderate, or deep level of induced depression of consciousness that varies depending on the type of procedure performed. Sedation typically involves administration of intravenous medication(s) but may include oral medications. Moderate to deep sedation can be used in operating rooms, emergency or inpatient settings, and outpatient clinics (e.g. dermatology, gynecology, dental), and for procedures such as a colonoscopy and carry a higher risk of breathing or circulation problems than light sedation.
- **General anesthesia** induces unconsciousness, eliminates sensation over the entire body, and immobilizes patients undergoing major surgeries (e.g., heart surgery or a hip replacement). General anesthesia typically includes both inhaled gas and intravenous medications and takes place in an operating room either in a hospital or an outpatient surgery center. Because anesthesia suppresses all movement, patients cannot breathe on their own and require an artificial airway and a ventilator. As a result, patients are at higher risk of circulatory problems during general anesthesia.

A Brief History of Anesthesia Professions in the US

Two physicians are credited with developing anesthetic agents in Boston and Edinburgh in the late 1840s.[6] Nurse anesthesia then developed as the American Civil War increased the need for anesthesia during operations. After the war, nursing education programs proliferated, and many graduates were employed to administer anesthesia.[7] The first programs for formalized nurse anesthesia training were established in the early 1900's and grew significantly during the world wars, leading to the development of accreditation standards in 1952 and the title of CRNA in 1956.

Physician involvement in anesthesia increased during World War I. Demand for services during this time also prompted the first university-based physician residency in anesthesiology at the University of Wisconsin in 1927. Anesthesiology became a board-certified specialty in 1940.[6]

In response to a reported workforce shortage in anesthesia care, the CAA occupation was proposed in the mid-1960's as an assistant working under the supervision of an anesthesiologist.[8] The first CAA training programs were established at Emory and Case Western Reserve Universities in 1969. The first CAA was licensed in Georgia in 1971. A national certification standard was initiated in 1989.[9]

Anesthesia Occupations in Washington State

Certain types of anesthesia care such as local anesthesia or monitored light sedation are commonly provided in a variety of settings, (e.g., emergency rooms, primary care clinics, dental offices) and by a wide range of clinicians without extensive training in anesthesia care. Higher levels of anesthesia include monitored moderate and deep sedation and general anesthesia which carry increased patient risks requiring additional clinician training. This report and related workforce analyses focus on occupations licensed in Washington state that have the required training and authorization to administer or be involved with administering higher levels of anesthesia. For the purposes of this report, the term 'monitored sedation' will be used to refer to both moderate and deep sedation unless otherwise specified. Below are brief descriptions of each of the anesthesia occupations licensed to provide monitored sedation and/or general anesthesia in Washington and any associated Washington state requirements. Detailed profiles of each occupation are in **Appendix 1:** Occupational Briefs and **Appendix 2:** Education and Licensing Requirements for Washington State Anesthesia Occupations. **Box 1** below provides links to regulations specific to each occupation.

- **Anesthesiologists** are licensed MDs or DOs who typically complete a four-year residency program in anesthesiology and may have additional training in specific subspecialties such as pediatrics or critical care.
- **Certified registered nurse anesthetists (CRNAs)** are advanced practice registered nurses who have completed a 36-51 month nurse anesthetist graduate program (master's or doctorate).
- **Physician assistants (PAs)** have completed a training program, typically 27 months long, which most commonly awards a master's degree. They are required to have a collaborative agreement in place with a physician to practice. Beginning in 2021, PAs who provide general or intrathecal anesthesia in Washington must complete an anesthesiology assistant program unless they've worked in anesthesia care prior – it is unknown whether any PAs have completed this education in Washington state. PAs who worked in anesthesia care prior to 2021 may continue to provide anesthesia care under a collaborative agreement with an anesthesiologist.
- **Certified anesthesiologist assistants (CAAs)** are a new occupation in Washington state, approved by the Washington State Legislature in 2024. Rules for implementation of the profession were adopted on May 9, 2025, with plans to begin issuing licenses in September 2025. CAAs must complete a 24-28 month master's program and be supervised by an anesthesiologist.
- **Dentists (Doctor of Dental Surgery [DDS] or Doctor of Medicine in Dentistry [DMDs])** complete four years of dental school and can obtain permits in Washington from the DOH to perform moderate sedation and/or general anesthesia, all of which require additional training depending on the type of endorsement.
- **Oral and maxillofacial surgeons (OMFSs)** are dentists who complete a four-to-six-year OMFS residency which includes training in anesthesia administration. Longer residencies often confer an MD.
- **Dental anesthesia assistants (DAAs)** assist dentists or OMFSs. They complete a dental anesthesia assistant program that can range from 38-80 hours and may require previous dental or health care experience. In Washington, DAAs must obtain certification to practice.

Box 1: Occupation-specific Washington State Regulations for Anesthesia Care:

- **Anesthesiologists**: RCW 18.71[10]; RCW 18.57[11]
- **Certified Registered Nurse Anesthetists:** WAC 246-840-300[12]; RCW 18.79.240[13]
- **Certified Anesthesiologist Assistants:** WAC 246-921[14] (Proposed rules)
- **Physician Assistants:** WAC 246-918-055[15]
- **Dentists:** Moderate sedation administration – WAC 246-817-755[16] & WAC 246-817-760[17]; General anesthesia administration - WAC 246-817-770[18]
- **Oral and maxillofacial surgeons:** WAC 246-817-770[18]; RCW 18.32.020[19]
- **Dental Anesthesia Assistants:** WAC 246-817-771[20]

Regulations Affecting Anesthesia Care in Washington State

In general, the independence and scope of practice for specific types of anesthesia occupations are regulated at (1) the federal level by the Centers for Medicare & Medicaid Services (CMS) regulations and billing policies; (2) the state level by laws and rules establishing scope of practice, certification, and supervisory requirements; and (3) the organizational and facility level by institution-specific medical staff bylaws.

Federal regulations

With respect to federal regulations, Washington state is an "opt out" state. This means that Washington has chosen to opt out of the CMS requirement that CRNAs be supervised by physicians to be eligible for Medicare and Medicaid reimbursement for

anesthesia services. The physician supervision rule is outlined in the conditions of participation (CoPs) established for hospitals to participate in the Medicare and Medicaid programs.[21] In 2001, this rule was amended to allow state governors to *opt out* of the requirement for physician supervision. Washington opted out in October 2003.[22] States can submit a request for reversal of opt out and the request is effective upon submission to CMS.[23]

State regulations

At the state level, Washington state law allows for full independent scope of practice for anesthesiologists, CRNAs who have prescriptive authority, dentists with a general anesthesia permit, and OMFSs. Those with full independent practice are permitted to provide anesthesia services in a range of settings, including acute care, outpatient surgery centers, and dental offices. CRNAs without prescriptive authority in Washington state may administer anesthetics under a provision of RCW 18.79.240[13] that allows them to select, order, and administer schedule II-IV controlled substances consistent with their scope of practice subject to facility-specific protocols and subject to the request of a physician, dentist or podiatrist. Other occupations in Washington have a regulated scope of practice that requires direction, supervision, collaboration and/or delegation. For example, both CAAs and PAs can order medication during a procedure, but only under the direction of an anesthesiologist. **Figure 1** compares scopes of practice for these occupations in Washington state.

Organization and facility policies

Additional policies determining occupation-specific scope of practice typically exist at the organizational/facility level related to credentialing, privileges, and medical staff bylaws. *Credentialing and privileging* are processes to verify a provider's qualifications and grant permission to deliver patient care in a facility. *Medical staff bylaws* describe the rights, responsibilities and limitations of anesthesia care providers within an organization. These may be more restrictive than the state's authorized scope of practice. For example, in Washington, a medical staff bylaw may require CRNAs to work under the medical direction of a physician even though state law allows for independent practice. **Appendix 3:** Credentialing and Medical Bylaws provides further information on credentialing and medical staff bylaws.

Figure 1 : Scope of Practice of Occupations Providing Anesthesia Care in Washington State as of March 21, 2025

The chart below highlights the most common activities each licensed occupation is permitted to perform independently in the state of Washington and is intended to provide a high-level comparison across occupations. This is not exhaustive of all job duties and procedures allowed under each occupation's scope of practice or even all anesthesia-related job duties, but rather the main activities associated with assisting or providing, at minimum, anesthesia which causes moderate sedation. In addition, the focus of this chart is at the state level – what is specified as permitted via state law – and practice may differ at the organizational level depending on facility bylaws.

	Procedures and Duties	Anesthesiologist[1]	Certified Registered Nurse Anesthetist[2]	Physician Assistant[3]	Certified Anesthesiologist Assistant[4]	Dentist		Dental Anesthesia Assistant[7]
						Limited Scope[5]	Full Scope[6]	
Pre-operative care	Perform comprehensive history and anesthesia-focused physical exam	•	•	•		•	•	
	Assist with preoperative anesthetic evaluations				•			•
	Order pertinent diagnostic studies and evaluate the results	•	•	•	•		•	
	Develop patient-specific anesthesia care plan	•	•	•	•	•	•	
	Prescribe pre-anesthetic medications	•	•	•		•	•	
	Select and/or order[8] pre-anesthetic medications	•	•	•	•	•	•	
	Administer pre-anesthetic medications	•	•	•	•	•	•	
	Initiate pain management multimodal strategies	•	•	•		•	•	
Interoperative care	Initiate, adjust, and discontinue intravenous lines to receive medications, sedation, or general anesthesia	•	•	•	•	•	•	•
	Provide advanced airway interventions, including fiberoptic intubation	•	•	•		•	•	
	Assist with basic and advanced airway interventions, including but not limited to endotracheal intubation, laryngeal mask insertion, and other advanced airways techniques				•			
	Prescribe anesthetic medications, including controlled substances	•	•	•		•	•	
	Select and/or order[8] anesthetic medications, including controlled substances	•	•	•	•	•	•	
	Administer general anesthetic medications which induce deep sedation (general anesthesia)	•	•	•	•		•	•
	Administer anesthetic medications which induce moderate sedation	•	•	•	•	•	•	
	Initiate regional anesthesia (subarachnoid, epidural, and caudal blocks)	•	•	•				
	Maintain and manage established regional anesthesia	•	•	•	•		•	
	Order blood products	•	•	•	•		•	
	Select and insert central venous lines	•	•	•			•	
	Establish arterial lines	•	•	•	•		•	
	Evaluate and manage patient's physiological response and complications during the provision of anesthesia services; request consultation as necessary	•	•	•	•	•	•	

Figure 1 continued next page

Figure 1 continued

	Procedures and Duties	Anesthesiologist[1]	Certified Registered Nurse Anesthetists[2]	Physician Assistants[3]	Certified Anesthesiologist Assistants[4]	Dentist		Dental Anesthesia Assistants[7]
						Limited Scope[5]	Full Scope[6]	
	Facilitate emergence and recovery from anesthesia	•	•	•	•	•	•	•
Post-Anesthesia care	Initiate and administer respiratory support to provide adequate ventilation and oxygenation.	•	•	•	•	•	•	
	Prescribe postanesthetic medications, including controlled substances	•	•	•		•	•	
	Select and/or order[8] postanesthetic medications, including controlled substances	•	•	•	•	•	•	
	Administer postanesthetic medications, including controlled substances	•	•	•	•	•	•	
	Conduct post-anesthesia evaluation	•	•	•	•	•	•	
	Discharge from post-anesthesia care area or facility	•	•	•		•	•	
Outpatient Pain Management	Provide outpatient pain management services (including acute, chronic, and interventional services) – this includes therapeutic injections such as epidural, caudal, selective nerve, and sympathetic blocks.	•	•	•		•	•	
	Perform diagnostic injections with or without fluoroscopic guidance including epidural, caudal, spinal, facet joint, selective nerve, and sympathetic blocks.	•	•	•				
Other	Provide emergency and resuscitation services	•	•	•	•	•	•	•
	Order consults, treatments, medications or services related to patient's care (e.g. OT, PT)	•	•	•		•	•	

Notes
1 MD or DO – full scope of practice in Washington.
2 Must be licensed with prescriptive authority and DEA registration inclusive of pain management for full scope of practice in Washington.
3 Training as an anesthesiology assistant or a practice agreement predating September 2021 required to provide anesthesia care as a physician assistant.
4 Supervision arrangement with qualified anesthesiologist required. Certified Anesthesiologist Assistants (CAAs) may perform and assist with additional anesthesia-related duties as delegated by the attending anesthesiologist, provided the CAA has the requisite education, training, and experience.
5 Licensed dentists in this category are specifically those who have an enteral and/or parenteral permit to provide moderate sedation.
6 This category includes dentists with a general anesthesia permit and oral and maxillofacial dental surgeons. To obtain a general anesthesia permit, dentists must be ACLS (Advanced Cardiac Life Support) certified and complete two years of continuous full-time anesthesia training.
7 Supervision by dental anesthesiologist or oral and maxillofacial dental surgeon required.
8 For the purposes of this chart, "order" is defined as obtaining rather than prescribing medications due to limitations on prescribing for both anesthesiologist assistants and certified registered nurse anesthetists without prescriptive authority.

Disclaimer: This chart is for general comparisons among occupations only. This chart focuses on those who are licensed to assist with or independently provide, at minimum, anesthesia which causes moderate sedation. Provision of anesthesia which causes minimal sedation includes a wider range of occupations.

National Anesthesia Workforce Landscape

As of June 2024, 25 states (including Washington state) and Guam have opted out of the CMS physician supervision requirement; the District of Columbia (DC) has not opted out but grants CRNAs independent practice.[23,24] Two of the 25 states – Wyoming and Utah – have partially opted out, having only requested an exemption for rural or critical access hospitals or hospitals with 25 or fewer beds.

For state-level scope of practice regulation, anesthesiologists and OMFSs have full independent practice and prescriptive authority in all states, with some states requiring board certification for practice. CRNAs have independent practice authority in 15 of the 25 states which have opted out of the CMS requirement for physician supervision of CRNAs (this includes Washington state); the remaining 10 states require a collaborative agreement with a physician specifying allowed procedures and tasks. (See **Box 2** for differences in opt out status versus scope of practice for CRNAs). In all other states, CRNAs are required to have physician supervision. In addition, 25 states plus DC require dentists to obtain a special permit to work with a CRNA, and in three states, CRNAs are not permitted to practice in dental offices.[26] With respect to prescriptive authority, CRNAs can prescribe independently in 16 states (including Washington state) plus DC and have no prescriptive authority in 18 states. A physician relationship is required in the remaining 16 states. Prescriptive authority refers to the CRNA's allowance to prescribe pharmacologic and non-pharmacologic therapies which exceed routine anesthesia services (**Box 3**). CRNAs are not required to have prescriptive authority to order and administer medications in the context of anesthesia care in any state.[24]

PAs are legally permitted to practice in all 50 states, but only six states allow independent practice and prescriptive authority while all other states, including Washington, require a relationship with a physician to practice and

Box 2. Opt out status vs. scope of practice for CRNAs

Opt-out status is an exemption from the CMS requirement for physician supervision of CRNAs. States may have opt out status and still require CRNAs to have a collaborative agreement with a physician in order to practice. To opt out, a state's governor must submit a signed letter to CMS requesting exemption from physician supervision and attesting that the request follows consultation with the state's nursing and medical boards and complies with state law.[25]

Scope of practice is determined for individual occupations by state law, facility rules, and bylaws within each state. Scope of practice for CRNAs establishes if and at what level physician practice oversight is required, from no supervision or physician relationship required (i.e. independent practice), collaboration agreement required, or physician supervision required (i.e. CRNAs are members of a physician-led team).

In order for CRNAs to practice independently, a state must have BOTH opt-out status and scope of practice regulation that does not require a physician relationship.

Box 3. What is prescriptive authority?

Prescriptive authority refers to the ability of a healthcare provider to prescribe medication for a patient's use outside of a clinic or procedural area. For example, when a patient is discharged from the recovery area after surgery and needs medication to help manage ongoing nausea at home, their provider must have *prescriptive authority* to issue a pharmacy prescription.

Providers such as physicians are automatically granted prescriptive authority as part of their licenses. Other occupations such as CRNAs and PAs may obtain prescriptive authority separately from their license. Occupations without prescriptive authority can order and obtain medications for use in specific situations such as surgery or other procedures, but they cannot prescribe medications for home use.

As it relates to the anesthesia workforce, CRNAs without prescriptive authority can select and administer anesthetics within their scope of practice and subject to the request of a physician, such as an anesthesiologist, surgeon, or other physician performing a treatment or procedure (RCW 18.79.240).[13] CAAs do not have prescriptive authority, but can order and administer medications used during surgery or procedures under the supervision of an anesthesiologist (WAC 246-921).[14]

prescribe.[27] Two states, including Washington, require that PAs complete a CAA program to work in anesthesiology. There are no national data providing an overview of requirements for PAs to practice in anesthesia. CAAs legally practice in 23 US states, DC, and Guam under the direction of an anesthesiologist.[28] CAAs do not have prescriptive authority in any US state.

Dentists can provide monitored sedation and general anesthesia in all 50 states, with permitting, training, and setting requirements differing by state.[29] Forty-three states require a permit for dentists to provide monitored moderate sedation, including Washington state. To provide monitored deep sedation and general anesthesia, most states require specialty training or postdoctoral residency training in anesthesia. Kansas will accept documented patient care cases in place of specialty training.

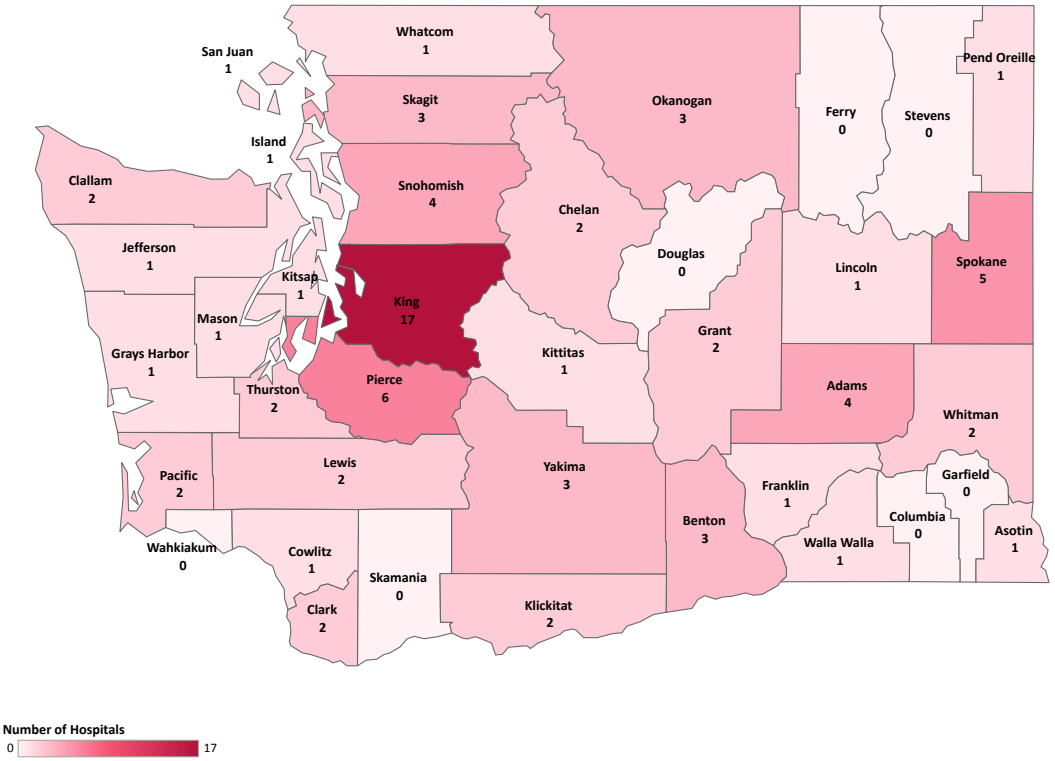
RESULTS: SUPPLY, DEMOGRAPHICS, AND DISTRIBUTION OF THE ANESTHESIA WORKFORCE IN WASHINGTON STATE

The following section provides a descriptive overview of the number and type of facilities with anesthesia services in the state, and the number, distribution, and characteristics of anesthesia occupations in Washington state including CRNAs, anesthesiologists, PAs who specialize in anesthesia, dentists with monitored sedation or general anesthesia permits, and DAAs. There are not yet any data specific to CAAs.

Hospitals and Ambulatory Surgical Centers with Anesthesia Services

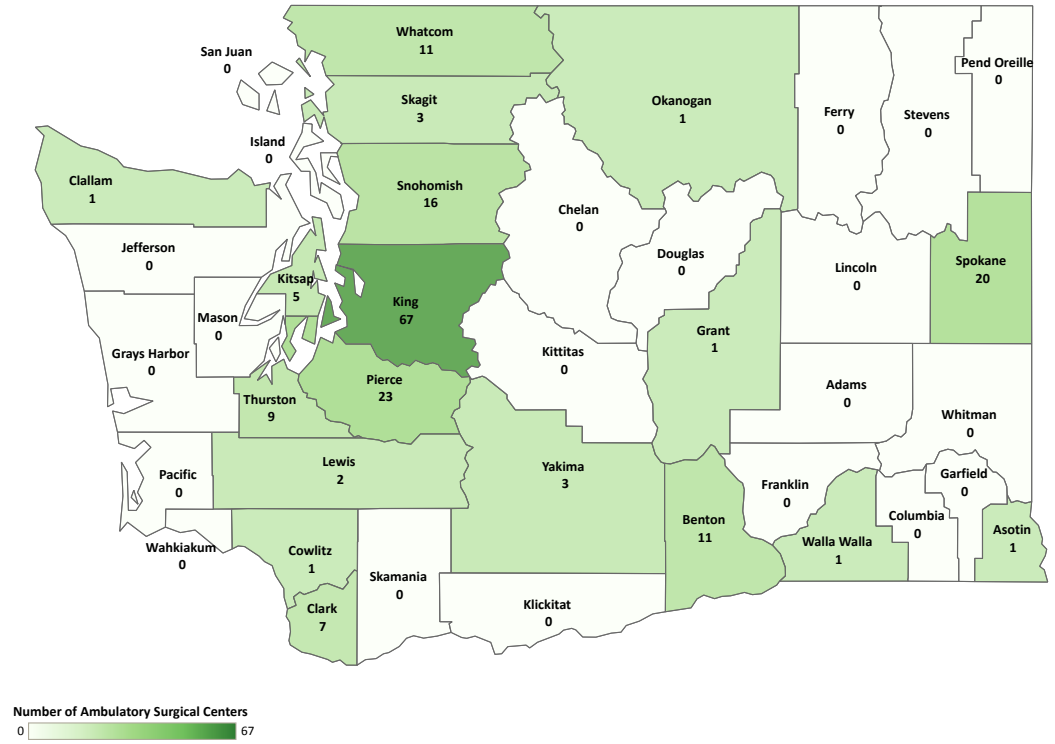
In total, there are 78 hospitals and 183 ASCs in Washington state which provide anesthesia services, based on data obtained from the DOH in October 2024. While most counties have a hospital and/or ASCs with anesthesia services, there are seven counties without hospitals or ASCs requiring anesthesia services (**Figures 2 and 3**). King County has the highest number of both hospitals and ASCs with anesthesia services. Pierce and Spokane counties additionally have a high number of ASCs compared to other counties in the state.

Figure 2. The number of hospitals that provide anesthesia services by county in Washington State, 2024



Data source: Facilities data from the Washington Department of Health.

Figure 3. The number of ambulatory surgical facilities that provide anesthesia services by county in Washington State, 2024



Data source: Facilities data from the Washington Department of Health.

Certified Registered Nurse Anesthetists (CRNAs)

We identified 1,347 individuals with active CRNA licenses in Washington as of January 2025. An estimated 63.6% (n=857) reported being employed in nursing, 3.8% (n=51) were unemployed, and 1.8% (n=24) were either retired, worked in nursing only as a volunteer, or worked in a field other than nursing. Employment information was unavailable for the remaining 30.8% (n=415) of Washington-licensed CRNAs (**Table 1**). Among those who said they were currently unemployed, the majority (84.3%, or 3.2% of all active licensed CRNAs) listed their reason for unemployment as "school" and 11.8% (0.5% of all active licensed CRNAs) said "taking care of home and family." (Data not tabled.)

In total, data were analyzed for 562 individuals who reported being actively employed in a nursing position and practicing in Washington state as of January 2025 according to their primary practice ZIP Code.

Table 1. Employment status of Certified Registered Nurse Anesthetists (CRNAs) in Washington state with active state licenses, January 2025

Employment Status	% of All Active Licensed CRNAs in WA, N=1,347	% Among Active Licensed CRNAs in WA Responding to Employment Question, n=932
Currently employed in nursing	63.6%	92.0%
Unemployed	3.8%	5.5%
Other[1]	1.8%	2.6%
Missing employment info	30.8%	--

[1] 'Other' includes: actively employed in a field other than nursing, retired, and working in nursing as a volunteer.

The 562 CRNAs who report being employed in nursing and working in Washington state according to their practice location ZIP Code represent 65.6% of actively Washington-licensed CRNAs who are employed in nursing (N=857). The 857 CRNAs who are employed in nursing represent 92% of the total CRNAs who completed the demographic survey (N=932). If comparable percentages apply to the CRNAs without survey responses and whose employment status remains unknown (n=415), we estimate that a combined total of 1,239 CRNAs (92.0% of the 1,347 with active licenses) were employed in nursing, of which an estimated 813 were practicing in Washington (65.6% of the estimated 1,239).

The following CRNA results focus on the CRNAs actively practicing in Washington (65.6% of CRNAs with Washington licenses who indicated they were currently employed in nursing).

Demographic characteristics

Most Washington CRNAs practiced in urban settings (87.4% urban vs. 12.6% rural) (**Table 2**). The mean age of Washington's working CRNAs was 49.6 years and 51.4% were female. CRNAs in rural areas were significantly older than those in urban settings, with mean ages of 53.9 and 49.0 years, respectively, and had a significantly lower proportion of females (33.8% vs. 54.0%). Overall, most of Washington's working CRNAs identified as White/Caucasian (88.7%). In rural Washington, 94.4% of the working CRNAs identified as White whereas the urban CRNAs had a slightly more diverse composition (9.2% Asian, 5.9% from groups typically underrepresented in healthcare, 87.9% White/Caucasian). Groups typically underrepresented in healthcare include American Indian or Alaskan Native, Native Hawaiian or other Pacific Islander, Black or African American, and individuals of Latino or Hispanic ethnicity of any race.[30]

Table 2. Demographics of CRNAs actively licensed and employed in Washington state as of January 2025, by practice location[1]; N=562 survey respondents

	All licensed and currently employed CRNAs in WA	Rural practicing CRNAs in WA	Urban practicing CRNAs in WA	p-value[2]
	N=562	n=71	n=491	
Age				**<0.05**
Mean years(SD)	49.6 (9.5)	53.9 (10.7)	49.0 (9.2)	**<0.05**
28 – 39	13.2%	7.0%	14.1%	
40 – 49	41.5%	32.4%	42.8%	
50 – 59	28.7%	28.2%	28.7%	
60+	16.7%	32.4%	14.5%	
Gender				**<0.05**
Female	51.4%	33.8%	54.0%	
Male	48.6%	66.2%	46.0%	
Race/Ethnicity				
Underrepresented in healthcare[3]	5.7%	4.2%	5.9%	NS
Asian	8.4%	2.8%	9.2%	NS
White/Caucasian	88.7%	94.4%	87.9%	NS
Other[4]	2.8%	1.4%	3.0%	NS
Mailing address state				NS
Washington	88.4%	87.3%	88.6%	
Oregon	1.3%	2.8%	1.0%	
Idaho	2.7%	4.2%	2.4%	
Other	7.7%	5.6%	7.9%	

Data Source: CRNA licensure data linked with demographic and employment survey data. Obtained via the Washington Board of Nursing and the Washington Department of Health. Calculations exclude missing values. Missing counts: Underrepresented in healthcare,[2] 15; Asian, 15; White/Caucasian, 5; Other race/ethnicity, 16.

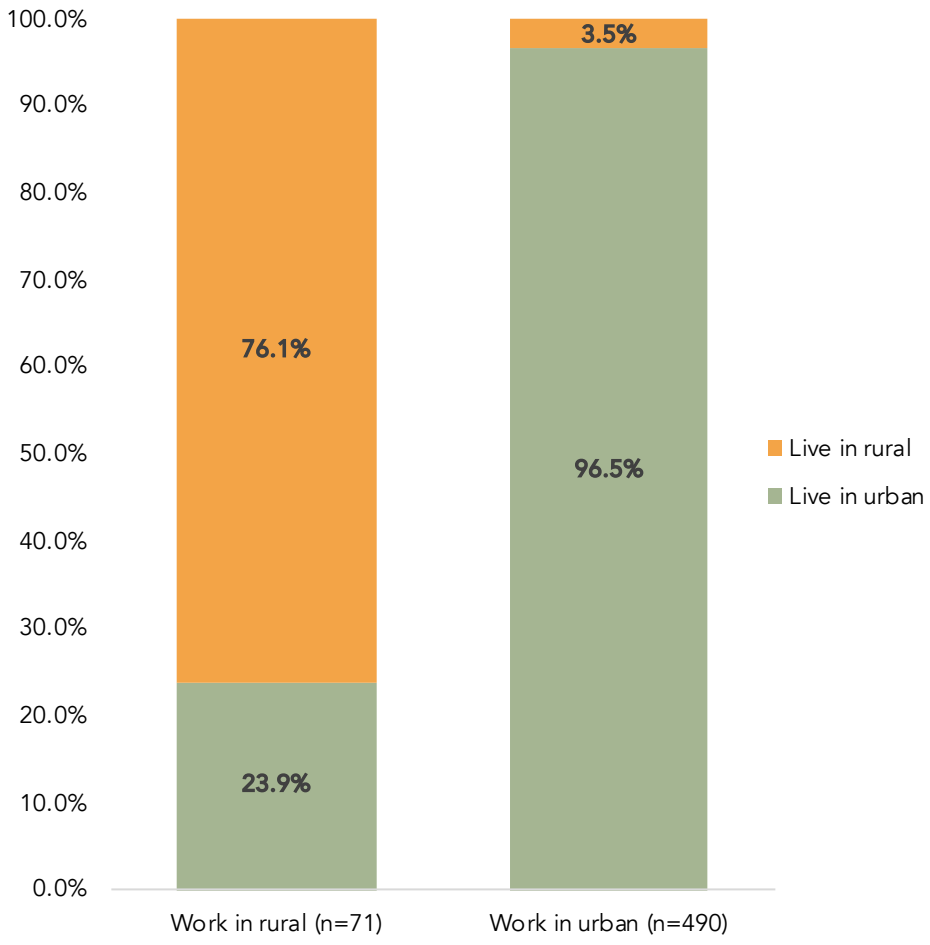
[1]Rural/urban practice location determined by RUCA code assigned to employment ZIP Code;[2] RUCAs 1-3 were defined as urban and RUCA greater or equal to 4 as rural.

[2]**P-values** indicate significant differences between rural and urban practicing CRNAs ($p < 0.05$) based on Chi-squared tests or t-tests, when appropriate. 'NS' indicates the difference between groups is 'not significant'.

[3]Based on the AMA definition for 'Underrepresented in medicine', which includes: American Indian or Alaskan Native, Native Hawaiian or other Pacific Islander, Black or African American, and individuals of Latino or Hispanic ethnicity of any race.[30] Survey respondents could check all that apply to race/ethnicity, so percents do not add to 100%.

[4]'Other' race includes CRNAs who 'declined to respond' and 'other, unspecified' race.

Figure 4: Rural versus urban employment and residence of actively licensed CRNAs working in Washington state as of January 2025, N=562 survey respondents[1]



Data Source: CRNA licensure data linked with demographic and employment survey data. Obtained via the Washington Board of Nursing and the Washington Department of Health.
Calculations exclude missing values. Missing counts: rurality of work location, 1.
[1]Rural/urban practice location determined by RUCA code assigned to employment ZIP Code[2]; RUCAs 1-3 were defined as urban and RUCA greater or equal to 4 as rural. Rural/urban residence location determined by RUCA code assigned to mailing address ZIP Code.

Nearly all (96.5%) CRNAs who reported working in urban communities in Washington state also lived in urban areas (**Figure 4**). In comparison, a slightly lower proportion (76.1%) of CRNAs working in rural communities lived in a rural area.

Table 3. Work Characteristics of CRNAs actively licensed and employed in Washington state as of January 2025, by practice location[1]; N=562 survey respondents

	Among survey respondents:			p-value[2]
	All licensed and currently employed CRNAs in WA	Rural practicing CRNAs in WA	Urban practicing CRNAs in WA	
	N=562	n=71	n=491	
Has prescriptive authority in WA				NS
Yes	82.0%	74.7%	83.1%	
Years since obtaining initial US nurse licensure				**<0.05**
Mean years (SD)	24.5 (9.8)	28.3 (10.7)	23.9 (9.5)	**<0.05**
0 – 9 years	0.7%	—	0.8%	
10 – 19 years	37.8%	28.2%	39.2%	
20 – 29 years	35.4%	31.0%	36.1%	
30+ years	26.1%	40.9%	23.8%	
Country of initial nurse licensure				NS
United States	97.6%	100.0%	97.3%	
Canada	2.4%	0.0%	2.7%	
Actively licensed and practicing in another state, in addition to Washington state				**<0.05**
Yes	28.5%	50.0%	25.7%	
Employment status at primary nursing position				**<0.05**
Full time	86.3%	94.4%	85.1%	
Part time and per diem[3]	13.7%	5.6%	14.9%	
Average hours worked per week[4]				
Mean hours (SD)	40.3 (9.8)	43.2 (10.2)	39.9 (9.6)	**<0.05**
Employment setting				**<0.05**
Hospital	76.3%	90.1%	74.3%	
Ambulatory care setting	16.0%	5.6%	17.5%	
Other[5]	7.7%	4.2%	8.2%	
Number of positions currently employed				NS
One	73.8%	74.7%	73.7%	
Two	19.4%	16.9%	19.8%	
Three or more	6.8%	8.4%	6.5%	
Employment specialty[6]				**<0.05**
Anesthesia	94.1%	100.0%	93.3%	

Data Source: CRNA licensure data linked with demographic and employment survey data. Obtained via the Washington Board of Nursing and the Washington Department of Health. Calculations exclude missing values. Missing counts: Years since initial licensure, 17; country of initial licensure, 17; actively licensed and practicing in another state, 197; employment setting, 17; employment specialty, 16.

[1]Rural/urban practice location determined by RUCA code assigned to employment ZIP Code.[2]

[2]**P-values** indicate significant differences between rural and urban practicing CRNAs ($p < 0.05$) based on Chi-squared tests. 'NS' indicates the difference between groups is 'not significant'.

[3]Part time and per diem CRNAs grouped to account for small numbers among rural CRNAs.

[4]Average hours among full-time CRNAs is 42.5 and among part-time and per diem CRNAs is 26.6.

[5]The majority of those reporting 'other' work settings did not specify their setting (N=44). The remaining 6 reported their setting as a community health center, school health service, or academic setting (school of nursing).

[6] Specialties selected other than anesthesia include: acute/critical care, obstetrics, other clinical specialties, other non-clinical specialties, pediatrics, perioperative, and women's health.

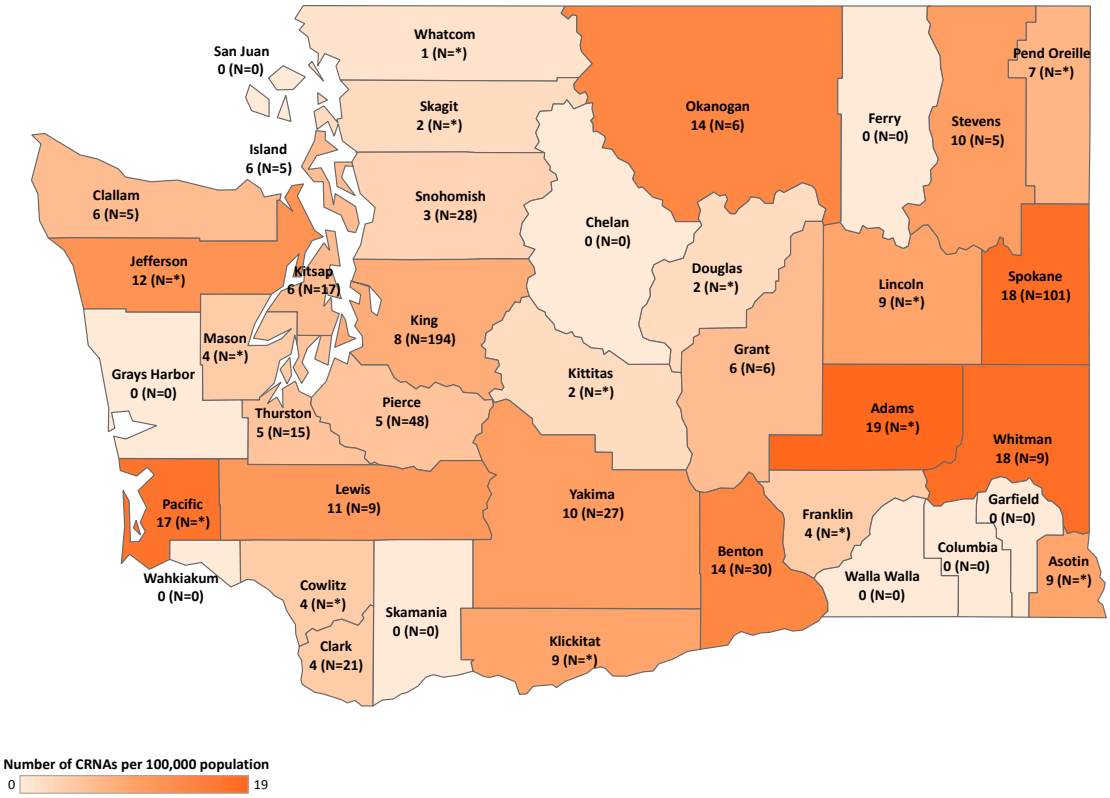
Work Characteristics

Over four-fifths (82.0%) of actively licensed CRNAs practicing in Washington had prescriptive authority as of January 2025; however, a smaller proportion of rural CRNAs compared to urban CRNAs held this authority (74.7% vs. 83.1%, not significant) (**Table 3**). Rural CRNAs, on average, had held their initial US registered nursing license for a longer period compared to urban CRNAs (28.3 versus 23.9 years, $p<0.05$). Rural CRNAs were also significantly more likely to have an active license in another state alongside their Washington state license compared to urban CRNAs (50.0% vs. 25.7%). Almost 95% of rural-practicing CRNAs worked in full time positions compared to 85.1% of urban CRNAs. Full time CRNAs in both groups worked an average of 40.3 hours per week.

Most CRNAs reported working in a hospital (76.3%) and 94.1% indicated anesthesia as their specialty. Rural CRNAs were significantly more likely to work in hospitals compared to their urban counterparts (90.1% vs. 74.3%), while a higher proportion of urban versus rural CRNAs worked in ambulatory care settings (17.5% vs. 5.6%, $p<0.05$).

Variation in the practice location of CRNAs can be seen in **Figure 5,** which shows the estimated density of CRNAs per 100,000 population in each county as well as the count of CRNAs per county. The highest estimated density of CRNAs can be found in Adams, Whitman, Pacific and Spokane counties (all but Spokane are considered rural counties). The highest estimated counts of CRNAs can be found in more urban counties such as King, Spokane, and Pierce counties. From our estimates based on survey data, nine of the 39 counties in WA were found to have no CRNAs according to practice location information provided, and 10 counties had five or fewer CRNAs per 100,000 population. Because not all practicing CRNAs completed the survey, these estimates may not reflect the actual number per county.

Figure 5. Estimated count and density per 100,000 population of Certified Registered Nurse Anesthetists practicing in each county in Washington State as of January 2025



Data Source: April 1, 2024 Official Population Estimates. Washington Office of Financial Management (county population data);[31] CRNA count data obtained from CRNA licensure data linked with demographic and employment survey data, which was obtained via the Washington State Board of Nursing and the Washington State Department of Health.

Note: Density and counts shown represent CRNAs who completed the demographic and employment surveys, reported they are working in nursing, and indicated a practice location in Washington state. Location is mapped according to employer or practice location ZIP Code. In the count data, a count of N=5 or fewer is suppressed for privacy reasons (represented as N=*). Because survey response rates are less than 100%, these estimates may undercount supply in some areas.

Changes to the Washington CRNA workforce over time

Of the total estimated number of CRNAs for whom there was employment information, there was little difference in the proportion who were employed in nursing in 2019 (94.3% or 1,001 out of 1,061 for whom there was employment information) and 2024 (92.0%, or 862 out of 937 for whom there was employment information).[32] Out of CRNAs with active Washington licenses and employed in nursing, there was a 2.2 percentage point decrease from 2019 to 2024 in those estimated to be practicing in Washington (67.9% to 65.6%).

With respect to demographics and employment setting, the following comparisons represent the respondents from 2019 and 2024 who report practicing as a CRNA in Washington state. The mean age of CRNAs has increased from 46.7 years to 49.6 years old, and males continue to make up around half of practicing CRNAs, which has been consistent over the past two decades.[32,33] There is an increase in CRNAs reporting they practice in hospital settings (71.6% in 2019 to 76.3% in 2024) and a decrease in those reporting practicing in ambulatory settings (16.9% to 16.0%). Current data showing Spokane county and King county have the highest number of CRNAs echoes data from 2019 showing the highest density of CRNAs per 100,000 population in those areas. Note that all estimates from 2019 hold similar data caveats to currently available data in that they only represent those who completed the demographic and census survey at that time and likely is an undercount of actively licensed CRNAs working in Washington state in 2019.

Anesthesiologists

As of March 2025, there were 1,434 MDs with active licenses in Washington state who reported a primary or secondary specialty of anesthesiology, of which 1,000 reported a first, second, or third practice location in Washington state. There were 76 DOs who reported a primary or secondary specialty of anesthesiology with active licenses in Washington state, of which 52 reported a practice location in Washington state. In total, 1,052 MD and DO actively Washington-licensed anesthesiologists practicing in Washington state were identified in the data. This number represents only those MDs and DOs who completed their requisite demographic census surveys and should be considered an underestimate of the actual number of physicians practicing anesthesiology in the state.

The 1,000 MD anesthesiologists who reported working in Washington state represent 69.7% of the total number of MD anesthesiologists with an active Washington state license who completed the demographic survey (N=1,434). The 1,434 MD anesthesiologists who completed the demographic survey represent 6.1% of the total MDs (N=23,490) who completed the survey.

To adjust for survey non-response, if we assume similar percentages of practice characteristics between the groups, we can estimate that there are 1,949 anesthesiologists in Washington state with an active license (6.1% of 31,947 actively licensed MDs in Washington) and 1,358 MD anesthesiologists working in Washington state (69.7% of the estimated 1,949). We do not have information on the total number of actively licensed DOs in Washington state and thus are unable to provide similar estimates for this group.

The following anesthesiologist results focus on the anesthesiologists who reported their practice site was in Washington state based on survey data (with respect to MDs, this represents 69.7% of MDs with an active license who report they specialize in anesthesiology).

Demographic characteristics

Most anesthesiologists reported practicing in settings we determined to be urban (98% urban vs. 1.9% rural) (**Table 4**). The mean age of Washington's working anesthesiologists was 50.2 years and 29.6% were female. Anesthesiologists in rural areas were similar in age to those in urban settings, and rural had a significantly higher proportion of females (52.6% vs. 29.1%). Overall, most of Washington's working anesthesiologists identified as White (65.7%) or Asian (26.1%). In rural Washington, 80.0% of the working anesthesiologists identified as White whereas the urban anesthesiologists had a slightly more diverse composition (26.4% Asian, 7.0% from groups typically underrepresented in health care, 65.4% White/Caucasian). Most anesthesiologists report being educated in the United States or Canada (90.1%).

Table 4. Demographics of anesthesiologists actively licensed and practicing in Washington state as of March 2025, by practice location[1]; N=1,052 survey respondents

	Among survey respondents:			p-value[2]
	All Licensed anesthesiologists in WA	Rural practicing anesthesiologists in WA	Urban practicing anesthesiologists in WA	
	N=1,052	n=20	n=1,031	
Age				NS
Mean years(SD)	50.2 (11.1)	51.7 (9.5)	50.1 (11.2)	
30 – 39	20.0%	5.0%	20.3%	
40 – 49	33.1%	45.0%	32.9%	
50 – 59	23.1%	25.0%	23.0%	
60+	23.9%	25.0%	23.9%	
Gender				**<0.05**
Female	29.6%	52.6%	29.1%	
Male	70.4%	47.4%	70.9%	
Race				NS
Underrepresented in healthcare[3]	7.0%	6.7%	7.0%	
Asian	26.1%	13.3%	26.4%	
White	65.7%	80.0%	65.4%	
Other[4]	1.2%	0.0%	1.2%	
Degree Type				NS
Doctor of Medicine (MD)	95.1%	95.0%	95.1%	
Doctor of Osteopathic Medicine (DO)	4.9%	5.0%	4.9%	
Medical School Location				NS
International (IMG)	9.9%	10.5%	9.9%	
United States/Canada	90.1%	89.5%	90.1%	
State of Residence				**<0.05**
Washington	91.1%	75.0%	91.4%	
Oregon	4.5%	0.0%	4.6%	
Idaho	0.5%	0.0%	0.5%	
Other	4.0%	25.0%	3.6%	
Plan to retire in next 12 months				NS
Yes	3.5%	5.3%	3.5%	

Data source: Physician Demographic Census for Workforce Planning, WA Medical Commission
Calculations exclude missing values. Missing counts: Practice location RUCA, 1. Gender, medical school location, and plan to retire unavailable for DOs, n=52 missing for these variables. Additional missing counts: gender, 3; race, 138.
[1] Rural/urban practice location determined by RUCA code assigned to employment ZIP Code[2]; RUCAs 1-3 were defined as urban and RUCA greater or equal to 4 as rural.
[2] **P-values** indicate significant differences between rural and urban practicing anesthesiologists ($p < 0.05$) based on Chi-squared tests or t-tests, when appropriate. 'NS' indicates the difference between groups is 'not significant'.
[3] Based on the AMA definition for 'Underrepresented in medicine', which includes: American Indian or Alaskan Native, Native Hawaiian or other Pacific Islander, Black or African American, and individuals of Latino or Hispanic ethnicity of any race.[30]
[4] 'Other' race includes those who selected 'Other' and did not provide additional information that could be easily recoded.

Table 5. Work Characteristics of anesthesiologists actively licensed and practicing in Washington state as of March 2025, by practice location[1]; N=1,052 survey respondents

	Among survey respondents:			p-value[2]
	All Licensed anesthesiologists in WA	Rural practicing anesthesiologists in WA	Urban practicing anesthesiologists in WA	
	N=1,052	n=20	n=1,031	
Years since medical graduation				NS
Mean years (SD)	16.5 (9.0)	21.3 (9.8)	16.4 (8.9)	
0 – 9 years	25.1%	7.7%	25.5%	
10 – 19 years	45.4%	46.2%	45.4%	
20 – 29 years	19.847%	23.1%	19.7%	
30+ years	9.7%	23.1%	9.4%	
American Board of Medical Specialties certification				NS
Anesthesiology	87.5%	89.5%	87.5%	
Other[3]	0.9%	0.0%	0.9%	
None	11.6%	10.5%	11.6%	
Primary practice type				**<0.05**
Single-specialty group	54.9%	60.0%	54.9%	
Multi-specialty group	8.8%	0.0%	9.0%	
Solo practitioner	5.3%	10.0%	5.2%	
Hospital or clinic employee	24.4%	20.0%	24.4%	
State or Federal employee	4.9%	0.0%	5.0%	
Other	1.5%	10.0%	1.4%	
Number of practice locations				NS
One	54.9%	70.0%	54.6%	
Two	24.3%	20.0%	24.4%	
Three	20.7%	10.0%	21.0%	
Average hours worked per week – total and by setting, mean hours (SD)				
Total hours per week, all activities	48.5 (18.2)	44.7 (18.2)	48.6 (18.2)	NS
Clinical activities	42.5 (17.9)	41.3 (19.6)	42.6 (17.9)	NS
Administrative activities	3.0 (5.4)	3.4 (7.4)	2.9 (5.3)	NS
All other activities[4]	3.3 (7.7)	0.2 (0.5)	3.3 (7.7)	NS
Certified pain management specialist				NS
Yes	10.9%	5.3%	11.0%	

Data source: Physician Demographic Census for Workforce Planning, WA Medical Commission and the Washington Health Workforce Survey (DOs).
Calculations exclude missing values. Missing counts: Practice location RUCA, 1; clinical hours, 1; administrative hours, 32; other hours, 32. Years since graduation, ABMS specialty certification, pain management certification, n=52 missing for these variables. Additional substantial missing for "years since graduation" (N=465) and interpretation should be done with caution.

[1] Rural/urban practice location determined by RUCA code assigned to employment ZIP Code[2]; RUCAs 1-3 were defined as urban and RUCA greater or equal to 4 as rural.

[2] **P-values** indicate significant differences between rural and urban practicing anesthesiologists ($p < 0.05$) based on Chi-squared tests or t-tests, when appropriate. 'NS' indicates the difference between groups is 'not significant'.

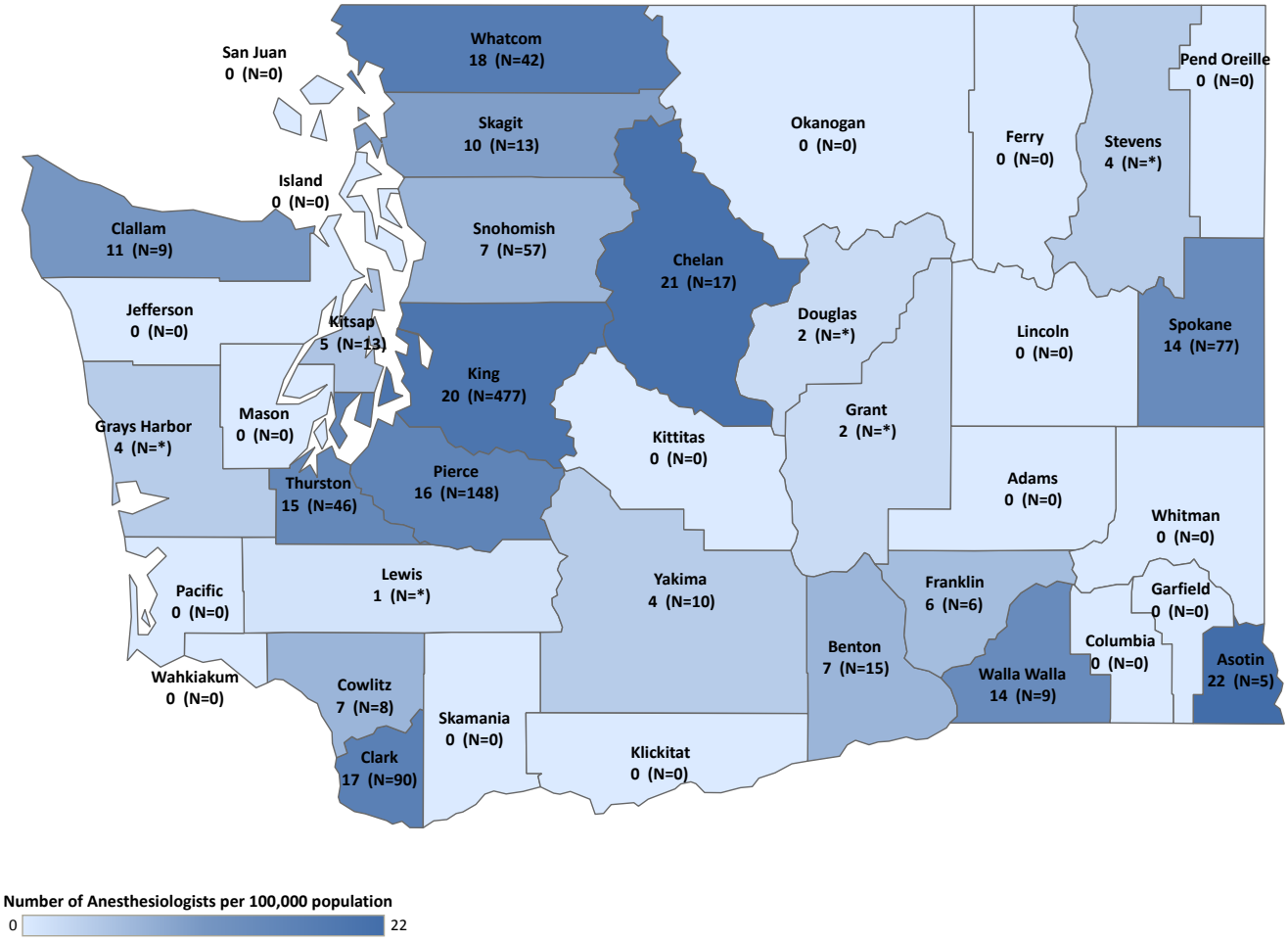
[3] 'Other' ABMS specialty certifications include Internal Medicine and Pediatrics.

[4] 'All other activities' include research, education, volunteer, and other (unspecified) activities. These categories have been combined due to small numbers.

Work Characteristics

On average, anesthesiologists had completed medical school 16.5 years prior to completing the survey, a difference that did not significantly vary by geography (Table 5). Most anesthesiologists reported being board certified in anesthesiology (87.5%), with a small proportion having no board certification (11.6%) or another type of board certification (0.9%). Most reported working in either a single specialty group (54.9%) or in a hospital or clinic (24.4%) for their primary practice, which was consistent across rural and urban settings. A slightly higher proportion of anesthesiologists in urban settings reported having more than one practice location (45.4%) compared to rural (30.0%) though the difference was not statistically significant. Anesthesiologists report working an average of 48.5 hours a week across all activities (clinical, administrative, research, education, volunteer, other), with most weekly hours being spent in the clinical space (42.5). Hours did not significantly vary by geographic location.

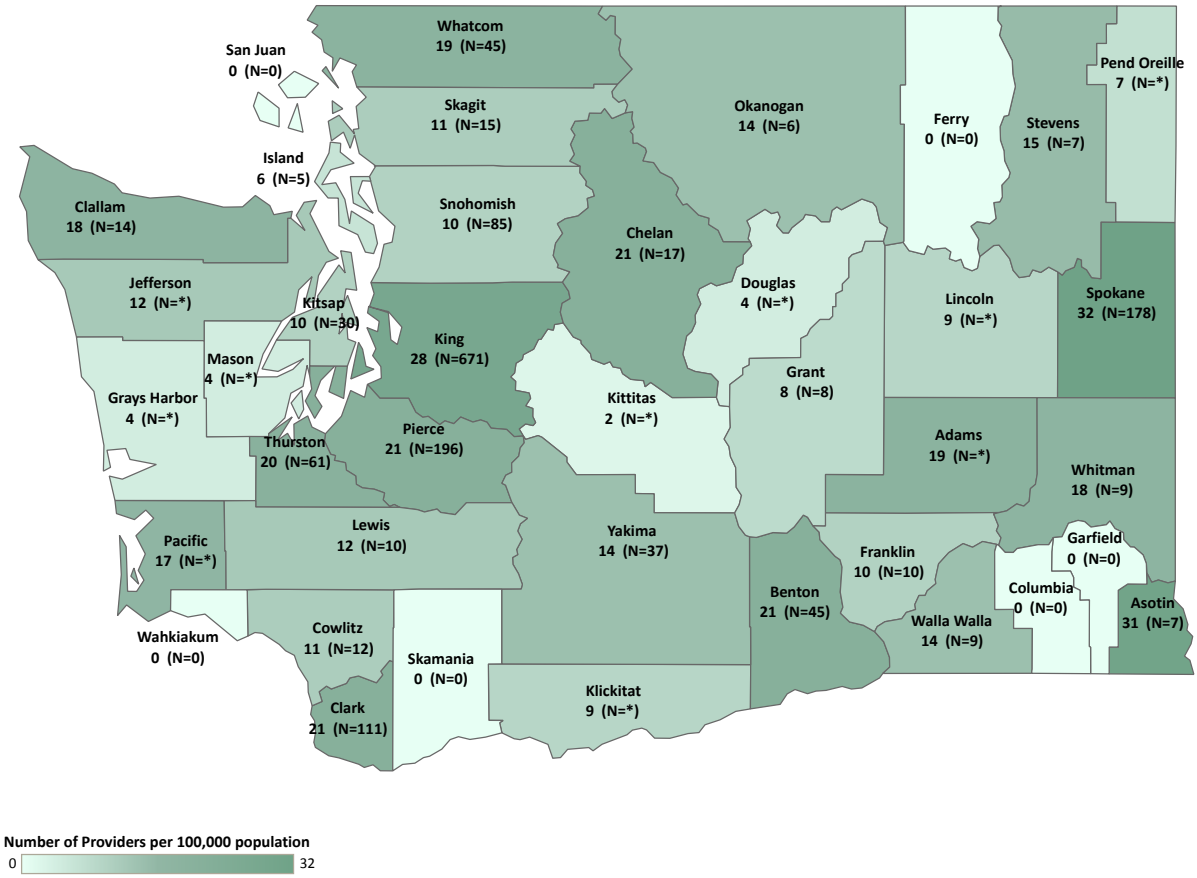
Figure 6. Estimated count and density per 100,000 population of anesthesiologists practicing in each county in Washington State as of March 2025



Data source: April 1, 2024 Official Population Estimates. Washington Office of Financial Management (county population data);[31] Physician Demographic Census survey for Workforce Planning from the Washington Medical Commission (MDs); and the Washington Health Workforce Survey (DOs).

Note: Density and counts shown represent anesthesiologists who completed the demographic and employment surveys and indicated a primary or secondary practice location in Washington state. Location is mapped according to employer or practice location ZIP Code. In the count data, a count of N=5 or fewer practicing anesthesiologists is suppressed for privacy reasons (represented as N=*). Because survey response rates are less than 100%, these estimates may undercount supply in some areas.

Figure 7. Estimated count and density per 100,000 population of combined total of anesthesiologists and CRNAs practicing in each county in Washington State as of January 2025 (CRNAs) and March 2025 (MDs and DOs)



Data sources: April 1, 2024 Official Population Estimates. Washington Office of Financial Management (county population data);[31] Physician Demographic Census survey for Workforce Planning, WA Medical Commission (MDs); and the Washington Health Workforce Survey (DOs); CRNA licensure data linked with demographic and employment survey data, WA Board of Nursing.

Note: Density and counts shown represent CRNAs and anesthesiologists who completed the demographic and employment surveys and indicated a practice location in Washington state. Location is mapped according to employer or practice location ZIP Code. In the count data, a count of N=5 or fewer providers is suppressed for privacy reasons (represented as N=*). Because survey response rates are less than 100%, these estimates may undercount supply in some areas.

In Washington state, Asotin, Chelan, and King counties have the highest density of anesthesiologists (22, 21, and 20 per 100,000 respectively), seventeen counties have either no anesthesiologists or none who completed the employment survey, and the remaining counties range from 1-18 anesthesiologists per 100,000 population (**Figure 6**). The counties with the highest density of anesthesiologists and CRNAs combined are Spokane, Asotin, and King at 32, 31, and 28 providers per 100,000 population, respectively (**Figure 7**). Nine counties have a density between 18 and 21 providers per 100,000, another seventeen counties have 6-17 providers per 100,000, four counties have fewer than 5 providers per 100,000, and six counties have no anesthesiologists or CRNAs represented in the data.

Physician Assistants Who Work in Anesthesia

As of March 2025, there were 26 actively licensed PAs in Washington state who reported their primary or secondary specialty as being in anesthesiology, 85% of whom practice in Washington state and 95.4% of whom report living in Washington state. Four of these PAs were excluded from further analysis due to missing primary work location data or practicing outside Washington, leaving 22 actively credentialed PAs who report anesthesiology as their specialty working in the state and with data available for analysis. All PAs in the sample work in urban settings. On average, PAs are 42.5 years of age (SD=10.8), with most identifying as female (68.2%) and White (72.7%). PAs report working an average of 45.1 (SD=13.5) hours per week across all work activities (clinical, administrative, research, education, and volunteer).

Dentists

There were 7,071 actively licensed dentists in Washington state in 2024, with 12.1% of those (n=859) holding some type of anesthesia permit (3.3% general anesthesia, 4.6% parenteral sedation and 4.3% enteral sedation) (Table 6). Dentists holding general anesthesia permits tended to be slightly older than dentists with either type of moderate sedation permit. Dentists with general anesthesia permits were less likely to have a mailing address in Washington or in a rural location than dentists with other permits.

Table 6. Demographic characteristics of dentists actively licensed in Washington state who also have either a general anesthesia, moderate sedation with enteral agents, or moderate sedation with parenteral agents permit, 2024.

	Among dentists with active WA licenses (n=7,071):		
	Dentist general anesthesia permits in WA	Dentist moderate sedation with parenteral agents permits in WA	Dentist moderate sedation with enteral agents permits in WA
	n=231	n=323	n=305
Age			
Mean years(SD)	50.5 (11.7)	48.4 (11.2)	46.2 (10.4)
29 and younger	0.0%	0.6%	1.3%
30 – 39	18.6%	22.3%	25.9%
40 – 49	34.2%	35.9%	40.3%
50 – 59	25.1%	25.7%	21.6%
60+	22.1%	15.5%	10.8%
Gender			
Female	12.6%	23.5%	40.7%
Male	87.4%	76.5%	59.3%
Mailing address state			
Washington	87.0%	93.2%	93.4%
Oregon	4.3%	2.8%	2.0%
Idaho	1.7%	0.6%	0.7%
Other	7.0%	3.4%	3.9%
Mailing address location of WA residents[1]	**n=201**	**n=301**	**n=285**
Rural	2.5%	3.7%	6.0%
Urban	97.5%	96.3%	94.0%

Source: Washington State Licensure data – analyzed in collaboration with the Washington Oral Health Tracking Program within the Center for Health Workforce Studies. Calculations exclude missing values. Missing counts: gender [general anesthesia], 1; gender [moderate sedation with parenteral], 4; gender [moderate sedation with enteral], 5.
[1] Rural/urban practice location determined by RUCA code assigned to mailing address ZIP Code; RUCAs 1-3 were defined as urban and RUCA greater or equal to 4 as rural.[2]

Dental Anesthesia Assistants (DAAs)

In 2024, there were 301 DAAs registered in Washington state with an average age of 38.7 years and 95% female (Table 7). Most DAAs have mailing addresses in the state; approximately 95.0% in urban areas and 10% in rural areas. As stated previously, this indicates the number of actively certified DAAs but is not an indicator of how many are practicing.

Summary of the Analyses of Washington's Anesthesia Workforce Supply, Sociodemographic Characteristics, and Geographic Distribution:

The available data in Washington state show the following:

- Based on our estimates, there are approximately half as many CRNAs as there are anesthesiologists practicing in Washington state, with smaller numbers of other occupations providing anesthesia services. Because of data limitations, however, these numbers underestimate the actual number of practicing anesthesia clinicians in the state.
- In rural settings, a much higher percentage of the combined total number of anesthesiologists and CRNAs known to be actively practicing are CRNAs (78.0%) compared with anesthesiologists (22.0%). These numbers represent 12.6% of all CRNAs and 1.9% anesthesiologists known to be working in the state.
- An estimated 82% of CRNAs with active licenses have prescriptive authority.
- Nearly half of anesthesiologists (45.0%) report working in more than one primary practice setting, while 26.2% of CRNAs hold more than one position.
- Most anesthesiologists report either working in a single specialty group (54.9%) or working as hospital employees (24.4%).
- Most CRNAs (76.3%) report working in hospitals as their primary setting, with a smaller proportion in ACSs (16.0 %).
- Anesthesiologists, CRNAs, and PAs report similar working hours (48.5 hours/week, 40.3 hours/week, and 45.1 hours/week, respectively).
- Among all DAAs in the states, 9.9% (n=30) have a rural license mailing address while 4.1% (n=35) of dentists have a rural license mailing address (practice ZIP Code not available).

Table 7. Demographic characteristics of dental anesthesia assistants actively certified in Washington State, 2024; N=301.

	Dental Anesthesia Assistants in WA
	n=301
Age	
Mean years(SD)	38.7 (10.5)
29 and younger	20.9%
30 – 39	39.5%
40 – 49	21.3%
50 – 59	13.3%
60+	5.0%
Gender	
Female	95.0%
Male	5.0%
Mailing address state	
Washington	94.0%
Oregon	2.7%
Idaho	2.7%
Other[1]	0.6%
Mailing address location of WA residents[2]	**n=283**
Rural	9.9%
Urban	90.1&

Source: Washington State Licensure data – analyzed in collaboration with the Washington Oral Health Tracking Program within the Center for Health Workforce Studies.
Calculations exclude missing values. Missing counts: gender, 19.
[1] Other mailing address includes: SC, UT
[2] Rural/urban practice location determined by RUCA code assigned to mailing address ZIP Code; RUCAs 1-3 were defined as urban and RUCA greater or equal to 4 as rural.[2]

RESULTS: ANESTHESIA OUTCOMES AND WORKFORCE TRENDS

The following section summarizes the peer-reviewed and gray literature related to the anesthesia workforce, from 2010 onward, including limitations of the literature. This section is divided into two parts: 1) impact of regulations and practice models on care delivery and the anesthesia workforce, and 2) anesthesia workforce demand, supply, distribution, and training. In the first section we identify five key areas of literature: a) anesthesia practice models, b) scope of practice and access to anesthesia care, c) safety and quality, d) cost effectiveness, and e) temporary regulations during COVID-19 pandemic. In the second section, we identify two key areas of the literature: a) factors contributing to supply and demand of the anesthesia workforce and b) geographic and sociodemographic variation of the anesthesia workforce. **Appendix 4** provides detailed descriptions of the studies included in this literature review.

Limitations of the literature

It should be noted that the overall number of studies addressing the anesthesia workforce is limited. Where studies are available, there are several limitations including potential for bias due to funding, limited data sources available to study the anesthesia workforce, use of varied outcomes across studies, and not accounting for contextual factors which impact patient outcomes. First, many studies have potential for bias due to funding by professional organizations with advocacy agendas, such as the ASA and the AANA. Second, some studies rely on review of CMS billing codes and modifiers in claims data to identify which practice model was used in a given case, while others use electronic medical record data, and each of these may miss instances when multiple occupations were involved with a case without either billing or documenting their involvement. Third, systematically assessing results across these studies is difficult due to inconsistent or limited choice of outcomes to represent anesthesia care quality and the relatively low rates of anesthesia-related complications.[34,35] Finally, many studies do not account for the myriad contextual factors that impact patient outcomes, particularly when assessing longer term outcomes such as mortality that may include an inpatient hospital stay. It should be noted as well that we found relatively few recent studies comparing the outcomes of anesthesia workforce models. This report prioritized studies that examined similar outcomes and utilized a similar approach in comparing practice models. Specific limitations to studies assessing quality and cost effectiveness are detailed in those sections.

Part 1: Literature on Regulations and Practice Models in Anesthesia Care Delivery

Federal, state, and organizational guidelines determine different conditions for the practice of anesthesia care across the US and create complexity for studying the outcomes of different models of care. While opt out status, scope of practice, and practice models are distinct concepts, they have an intertwined relationship such that a model where CRNAs practice independently relies on a state having opt out status and the state's specification that CRNAs can practice without a physician relationship (see **Box 2** for details regarding opt out and scope of practice). This section summarizes the literature regarding practice models, the impact of regulations on practice models and access to care, and the impact of practice models on care delivery and outcomes for patients and the anesthesia workforce.

Anesthesia practice models

Across the US, anesthesia providers work in various practice models and employment configurations. Some anesthesiologist and/or CRNA group practices are privately owned and contract their services to facilities such as hospitals or ASCs. Other individuals are employed by healthcare organizations. In operating rooms and procedural settings such as where an endoscopy is performed, common practice models include anesthesiologist-alone, CRNA-alone, and team-based practices where anesthesiologists supervise other occupations (i.e. CRNAs and CAAs) and/or anesthesiologist residents.

- **Anesthesiologist-alone:** In this model, an anesthesiologist practices independently without supervising other occupations. This model and the physician-led team-based care model are the two models identified and supported by ASA and the AAAA. In the anesthesiologist-alone model, CMS rules allow physicians to bill for 100% of the anesthesia care.

- **CRNA-alone:** In 15 states, CRNAs are authorized to provide anesthesia care independently without anesthesiologist involvement. This model is endorsed by AANA, which promotes Efficiency-driven Anesthesiology Modeling to increase access to care, improve efficacy, and reduce costs.[36] CMS rules allow CRNAs practicing under this model to bill for 100% of the anesthesia care.[37] Reimbursement rates may differ from anesthesiologists.[38]
- **Physician-led teams:** This practice model refers to an anesthesiologist providing some level of oversight for care with a team that may include CRNAs, CAAs, and/or anesthesiologist residents. An anesthesiologist may provide and bill for medical direction of up to four cases where anesthesia is administered by a CRNA or CAA, or provide and bill for supervision of more than 4 CRNAs without a defined ratio.[39,40] See **Box 4** for specific definitions and billing parameters.
- **Dental office settings:** In dental settings, dentists and OMFSs may perform procedures and administer anesthesia independently at the level of their anesthesia permit in dental settings. Those who are permitted to administer general anesthesia may also direct or supervise a dental anesthesia assistant during procedures.

At the national level, practice models have shifted over the last decade, with increased use of CRNAs overall[41,42] and increased use of team-based care models compared with anesthesiologist-alone models, particularly in areas where CAAs are present and those with more limited CRNA scope of practice.[42]

Box 4: Medical Direction and Supervision

Medical direction and medical supervision are terms used in CMS billing to indicate if and to what level an anesthesiologist is involved during a case when anesthesia is administered by a CRNA. Medical direction requires a higher level of anesthesiologist involvement in the delivery of anesthesia care and is always required for CAAs.

For the purposes of CMS billing:
Medical direction of a CRNA or CAA indicates that an anesthesiologist is immediately available and directing up to 4 CRNAs or CAAs who are administering anesthesia to different patients. In models using medical direction, CMS billing codes allow the anesthesiologist to bill 50% of each case they are overseeing while the CRNA or CAA bills for 50% of the case.[39,40]

Medical supervision indicates a model where an anesthesiologist is supervising one or more CRNAs without a defined ratio.[39,40] When an anesthesiologist is providing supervision, they receive a flat fee for service plus a time-based fee while the CRNA bills for 50% of the case[39,40]

These terms are not consistently used in legislation and medical staff bylaws. For example, the rules on CAAs in Washington (WAC 246-921 Proposed rules)[14] consistently use the term 'supervision' to describe an anesthesiologist working with a CAA in what CMS defines as medical direction. These terms can also lead to confusion over how opt out status and independent practice are related, as recently seen in California where an issue with the CMS condition of participation indicating that hospital anesthesia services must be directed by a physician has been interpreted by some to mean that CRNAs cannot function independently despite the state having opt-out status.[43]

Scope of practice and access to anesthesia care

A state's opt out status (a state's decision to opt out of the CMS requirement for physician supervision as part of the Conditions of Participation – see **Box 2** above) has not been found to be significantly associated with a change in the use of CRNAs[44] or access to anesthesia services[45,46,47] compared to states that did not opt out. Hospital or surgery center bylaws tend to have a larger effect on use of CRNA-alone models compared to opt out policy.[48] While Washington state has opt out status and allows for independent CRNA practice for those CRNAs with prescriptive authority, hospital and surgery center bylaws also influence

the practice model under which CRNAs work and may result in CRNAs working under anesthesiologist supervision. Factors influencing whether a state opts out of the CMS physician supervision requirement include a strong presence of professional group advocacy in the state and proximity to other states which have opted out.[49]

One study found that areas with more restrictive supervision requirements were less likely to be using CRNA services compared to areas without any supervision requirements.[45] Other studies report that the removal of physician supervision requirements was associated with expanded CRNA practice[48] and a greater supply of CRNAs in rural counties.[50] Researchers have also found that, specific to anesthesia care in obstetrics, CRNAs were more likely to practice independently in areas with fewer maternity care services.[51] **Box 5** provides an overview of the rural pass-through program, which may also impact access to care.

Box 5. Rural Pass-Through Payment Program

One regulation likely impacting access to care is the Medicare rural pass-through payment program, however rigorous studies relating this payment program to the availability of anesthesia services or the anesthesia workforce do not exist. To ensure the availability of anesthesia services for Medicare beneficiaries in rural areas, some hospitals participate in a pass-through program in which the costs of anesthesia services provided by CRNAs are not billed directly but are instead included in the annual Medicare Cost Report used to determine if Medicare appropriately paid the hospital, and to prospectively set rates. In this program, Medicare pays the hospital a lump sum during the next calendar year, supplemented by additional funding beyond reported costs as an incentive to continue the program.[52] Currently, anesthesiologist services are ineligible for rural pass-through funding. ASA advocates for this to change as a mechanism to increase access to anesthesia care in rural areas, while AANA opposes the change citing the increased costs of hiring anesthesiologists over CRNAs.[52,53]

Several additional studies have aimed to link opt out policies to anesthesia care costs and access but these studies are limited because they do not identify suitable comparison groups,[54] do not examine anesthesia service changes specifically[47,55] or do not have a strong study design to account for time since opt out when examining before and after trends.[54,56] These limitations make it difficult to draw conclusions regarding a relationship between opt out policy and anesthesia service changes.

Quality and safety of anesthesia care

Multiple studies have examined anesthesia practice models and anesthesia-related patient outcomes including mortality or complications. When comparing physician-alone, CRNA-alone, or directed/supervised CRNA models, several studies found no difference in mortality related to provider type[57,58,59] or procedure type.[57] Additional studies found no difference in complications between various practice models or in states with different opt out strategies.[58,60] When comparing physician-led teams that included CAAs to physician-led teams that included CRNAs, one study found no significant difference in mortality, inpatient length of stay, or cost of inpatient care.[59]

Among obstetric patients, studies noted no difference in C-section rates, a primary measure of obstetric care quality,[61] and no systematically poorer maternal outcomes, including complications or mortality, between hospitals using different anesthesia practice models (e.g., anesthesiologist-alone, CRNA-alone, physician-led team).[62] Broad scope of practice for CRNAs (i.e. independent practice) has not been shown to have any negative effects on patient outcomes when compared to a more limited scope (physician relationship required).[58,63]

In addition to the general limitations of the literature previously mentioned, as we reviewed studies, we did not include in this report several studies on safety and quality because of the following limitations: 1) inability to accurately identify which occupations are providing care,[64,65,66] or 2) a choice of outcomes inconsistent with other literature, such as disposition following surgery.[67] A survey of organizational leaders noted that differences in quality and safety among anesthesia care models were not prioritized when selecting anesthesia care models for their facility[38]; the quality and consistency of the studies in the literature may be a contributing factor.

Cost effectiveness of anesthesia care

It is difficult to compare cost effectiveness between practice models due to data challenges in measuring actual costs within and between hospitals.[68] Two studies report that the least costly practice model is a CRNA-alone model, which captures the most revenue for hospitals, followed by a supervision model with a physician to CRNA ratio greater than 1:4.[69,70] These studies estimate a cost reduction of approximately 38% if physician-directed teams in fixed ratios were replaced with CRNA-alone models. Costs were estimated based on CRNA and anesthesiologist salaries, patient workload, case complexity, and reimbursement for the procedure (based on payer and type of delivery model used). Other data suggest that there were no significant differences in spending between physician-led teams using CAAs versus CRNAs[71] and that greater use of CRNA-alone models in regions with high physician-led team model usage would increase productivity and lessen apparent provider shortages.[42]

Temporary changes to state regulations related to anesthesia care during the COVID pandemic

During the COVID-19 pandemic, some states temporarily lifted supervision requirements and CRNAs reported expanding their practice to settings outside of the operating room.[72] Despite the state's expanded practice environment, some CRNAs reported being limited by facility policies or demoted to work that did not maximize their training and education such as ICU nursing.[72] In an additional qualitative study done during the pandemic, some CRNAs reported being able to operate as intensivists, especially in situations where intensivists were understaffed, and others took on leadership roles.[73] Broadly, CRNAs in this study reported that removing restrictions resulted in positive change within the profession and an enhanced view of CRNAs' policy, management, and leadership expertise within organizations.[73]

Part 2: Literature on Anesthesia Workforce Demand, Supply, Distribution, and Barriers to Training

The supply of anesthesia providers is dependent on multiple complex factors including demand for services and recruitment and retention of providers. Available supply of anesthesia providers is also dependent on an understanding of the geographic variations in workforce distribution, barriers to anesthesia workforce training, and varying practice laws in each state. Some of these factors are unique to the anesthesia workforce, but many are common challenges faced across multiple professions including those in healthcare. As such, there are few studies which focus specifically on the anesthesia workforce. Here we summarize the literature as it relates to the anesthesia workforce given the large body of work comparing physicians with advanced practice RNs.

Geographic and socioeconomic variation in workforce distribution

Studies exist which examine the supply of CRNAs and anesthesiologists, but none specifically link anesthesia care demand to anesthesia workforce supply in the US. Regional variation in the distribution of the anesthesia workforce exists, with previous estimates highlighting an imbalance in anesthesia providers (CRNAs and anesthesiologists) between rural and urban areas (7.7 versus 16.4 CRNAs and anesthesiologists per 100,000 population respectively).[50] Estimates also tend to show that rural areas have more CRNAs than anesthesiologists,[50,74] with CRNAs estimated to provide 80% of anesthesia care in rural communities.[50] When practicing independently, rural CRNAs may fill a critical gap for obstetric anesthesia care in communities with limited access to maternity care.[51] CRNAs are also more likely to practice in areas with lower incomes and higher concentrations of Medicaid-eligible, uninsured, and unemployed individuals, while anesthesiologists are more commonly found in higher-income regions.[45,75,76] Employment trends among CRNAs and anesthesiologists also suggest shifts away from permanent roles toward temporary or flexible contracted positions with higher reimbursement rates.[77,78]

Barriers to increasing anesthesia workforce training

Both anesthesiologists and CRNAs share some constraints for training, including limited academic and clinical faculty and insufficient funding for program expansion to meet growing demand.[79,80] Issues impacting faculty supply include provider burnout and resulting turnover and higher rates of compensation in clinical practice compared to academics (for both CRNAs

and anesthesiologists).[81-84] Increasing flexibility in schedules and clinical responsibilities and improving communication and efficiency in the workplace may help address common causes of attrition such as burnout, stressful work environments, and heavy workloads.[60,77,85]

Specific to the CRNA student body, reports indicate challenges with CRNA student retention in some institutions that contribute to vacant training spots and limited resources for faculty recruitment; however, it is unclear how common student attrition is nationally.[84,86] CRNA programs also face significant challenges in finding and maintaining clinical training sites.[87] One reason is the complexity of establishing relationships with organizations and anesthesiologist preceptors. Another reason is related to CMS providing funding for anesthesiologist residents, but not CRNAs, which may result in competition for clinical sites that prioritizes resident placements over CRNA placements.[84]

Summary of Findings from the Literature Review

In reviewing studies which met inclusion criteria and which provided information on practice models, scope of practice, quality and safety, cost effectiveness, and temporary changes due to the pandemic, we found the following:

- Anesthesia providers work within various practice models, including independent anesthesiologist-only and CRNA-only models, team-based care where anesthesiologists direct or supervise CRNAs, CAAs, and/or anesthesiologist residents, or team-based models where a physician (not limited to anesthesiologists) supervises a CRNA.
- Nationally, there is increased use of CRNAs, with different regional and local impacts on access depending on the scope of practice and supervisory models being used in hospitals and surgery centers.
- Research has not established a clear association between a state's decision to opt out of physician supervision requirements and increased access to anesthesia services. Instead, facility bylaws may have a larger effect on use of CRNA-alone models.
- Systematically assessing outcomes across existing published research is difficult due to the studies' inconsistent or limited choices of outcomes used in the analyses to represent anesthesia care quality, and because anesthesia-related complications are relatively rare and large sample sizes are required to be detected.
- The quality and safety of anesthesia care has not been found to be significantly different in regulatory environments that allow full independent practice for CRNAs compared to those with more restrictive regulations which require a physician relationship for CRNA practice.
- Where evidence is available, increased use of CRNA-alone models has the potential to lower anesthesia healthcare costs and ensure availability of anesthesia services in rural areas
- Barriers to educating CRNAs and anesthesiologists include low supply of clinical faculty, insufficient funding to expand programs, and, specific to CRNAs, challenges in finding and maintaining clinical training sites.

CONCLUSION

This report provides a summary of findings identified from the first (FY 2025) and only funded year of ESSB 6286 (originally described by the legislation as a five year study). Per Section 3 of ESSB 6286, UW CHWs made progress towards addressing objectives:

a) identifying the factors and barriers to entry into the profession of nurse anesthesiology,
b) evaluating and assessing the current training and pipeline for certified registered nurse anesthetists (CRNAs), and
e) identifying the number of qualified anesthesia providers, including, at minimum, physician anesthesiologists and CRNAs, who may practice independently in the state of Washington at each facility providing anesthesia services.

UW CHWS aimed to meet these objectives by: 1) describing the current workforce providing anesthesia care, the current practice models, and the regulations related to this workforce; 2) using publicly available data, where available, to identify the current supply and distribution of the anesthesia workforce in Washington state, and 3) examining the literature to identify high-quality studies related to the anesthesia workforce. As described elsewhere in the report, there were data limitations, in addition to time constraints due to truncated funding, that did not allow our team to fully address these three objectives. The work in this report may help to inform future research and policy discussions related to the remaining three objectives, which UW CHWS was not able to fully address due the truncated timeline for its charge as described in ESSB 6286. These areas still in need of examination include:

c) developing recommendations that reduce barriers for individuals who want to become CRNAs and increasing the available clinical training slots for nurse anesthesia residents,
d) creating and maintaining an implementation plan to improve the pipeline of CRNAs in the state, and
f) providing policy recommendations to expand the nurse anesthesia workforce and optimize the cost of providing anesthesia services, including initiatives for all practicing independent anesthesia providers to practice at the top of their license.

There are ongoing gaps in knowledge related to the anesthesia care workforce in Washington state. The UW CHWS team provides the following suggested areas of further research for consideration by state policymakers:

- There is a lack of employment and demand data regarding exactly where anesthesia care needs are unmet and the availability of qualified anesthesiologists and CRNAs willing to meet those needs. Further exploration is needed to understand the incentives that draw CRNAs and anesthesiologists to rural versus urban practice including how rates of reimbursement may differ, particularly in more rural areas with or without pass-through funding.
- While CRNAs are legally allowed to practice independently in Washington, it is unclear how many CRNAs are practicing at this level. More information is needed to understand the nature of facility bylaws and how they may impact CRNA practice, such as requiring physician supervision at some level. This includes information regarding the impact of practice models, cost differences associated with varied practice models, and the number of CRNAs practicing independently versus within a physician-led team.
- Data are needed to assess the number of CRNA-owned practices and their impact on access to anesthesia care. Further work is needed to understand the resources available to promote establishment of CRNA-owned practices, such as post-graduate residencies or mentorship programs.
- Washington currently has a single nurse anesthetist education program, admitting 24 students per year. It is also the only CRNA education program in the WWAMI region (Washington, Wyoming, Alaska, Montana, Idaho). In Washington, two anesthesiology residencies have a combined total of 32 residency positions and two OMFS residencies are accredited for a combined total of 5 residents per year. Information about the percent of in-state program graduates who practice in Washington, and in turn the percent practicing who receive their education out-of-state is needed to inform education planning and policy.

- More information is needed regarding unmet demand and associated issues, including procedures that go unperformed and patients being redirected to other facilities due to insufficient anesthesia staff. Additionally, an assessment of the required clinical training spots necessary to address this demand is essential.
- Along with assessment of clinical training spots, more information is needed regarding barriers which exist for CRNAs entering educational programs, including financial barriers.
- When the role of CAAs is implemented in Washington state, research will be needed to assess the process for the incorporation of the role into hospital systems, CAA distribution and demographics, the outcomes associated with CAA care, associated changes in the availability of anesthesia care services, and any impacts on anesthesiologist and CRNA clinical training availability.
- The reported national increase in both anesthesiologists and CRNAs moving to more contract-type work (versus regular employment) indicates the importance of better understanding how this may affect Washington state's workforce. Comparative data are needed to understand the differences in FTEs and hours worked among contract vs. employed anesthesia groups and how this may impact supply or the availability of services.

REFERENCES

1. Washington Senate Bill. An act relating to addressing the anesthesia workforce shortage by reducing barriers and expanding educational opportunities to increase the supply of certified registered nurse anesthetists in Washington. Senate Bill Report SSB 6286. 2/7/24. Accessed May 19, 2025. https://lawfilesext.leg.wa.gov/biennium/2023-24/Pdf/Bill%20Reports/Senate/6286-S.E%20SBR%20APS%2024.pdf?q=20240727014317
2. US Department of Agriculture Economic Research Service. Rural-Urban Commuting Area Codes - Documentation. Updated 5/8/2025. Accessed May 19, 2025. https://www.ers.usda.gov/data-products/rural-urban-commuting-area-codes/documentation
3. StataCorp. College Station, Texas. 2020.
4. National Institute of General Medical Sciences. Anesthesia. Accessed June 3, 2025. https://www.nigms.nih.gov/education/fact-sheets/Pages/anesthesia
5. Washington State Legislature. WAC 246-919-601. Safe and effective analgesia and anesthesia administration in office-based surgical settings. Accessed April 9, 2025. https://app.leg.wa.gov/wac/default.aspx?cite=246-919-601
6. Abhyankar RS, Jessop KM. From Craft to Profession: The Development of Modern Anesthesiology: Part II. *Mo Med*. Jan-Feb 2022;119(1):14-20.
7. Ray WT, Desai SP. The history of the nurse anesthesia profession. *J Clin Anesth*. 2016;30:51-58. doi:10.1016/j.jclinane.2015.11.005
8. American Society of Anesthesiologists. Statement on Certified Anesthesiologist Assistants (CAA): Description and Practice. (2022). Accessed March 25, 2025. https://www.asahq.org/standards-and-practice-parameters/statement-on-certified-anesthesiologist-assistants-description-and-practice
9. Amburgey B, Fordham M, Payne B, Trebelhorn M. *A study of anesthesiologist assistants*. Legislative Research Commission; 2006.
10. Washington State Legislature. RCW 18.71. Physicians. Accessed June 20, 2025. https://app.leg.wa.gov/rcw/default.aspx?cite=18.71&full=true
11. Washington State Legislature. RCW 18.57. Osteopathy—Osteopathic Medicine and Surgery Accessed June 20, 2025. https://app.leg.wa.gov/rcw/default.aspx?cite=18.57
12. Washington State Legislature. WAC 246-840-300. ARNP scope of practice. Accessed May 28, 2025. https://app.leg.wa.gov/WAC/default.aspx?cite=246-840-300
13. Washington State Legislature. RCW 18.79.240. Construction. (Effective until June 30, 2027.) Certified on 7/12/2024. Reviser's note: The reference to "nursing care quality assurance commission" was changed to "board of nursing" by 2023 c 123. Accessed March 13, 2025. https://app.leg.wa.gov/RCW/default.aspx?cite=18.79.240

14. Washington State Legislature. WAC 246-921. Anesthesiologist Assistants. Accessed May 28, 2025. https://wmc.wa.gov/sites/default/files/rules/CAA%20Rules%20Draft%2011.18.2024.pdf

15. Washington State Legislature. WAC 246-918-055. Collaboration and practice agreements. Accessed May 28, 2025. https://app.leg.wa.gov/wac/default.aspx?cite=246-918-055

16. Washington State Legislature. WAC 246-817-755. Moderate sedation with enteral agents. Accessed May 28, 2025. https://app.leg.wa.gov/WAC/default.aspx?cite=246-817-755

17. Washington State Legislature. Accessed May 28, WAC 246-817-760. Moderate sedation with parenteral agents. https://app.leg.wa.gov/WAC/default.aspx?cite=246-817-760

18. Washington State Legislature. WAC 246-817-770. General anesthesia and deep sedation. Accessed May 28, 2025. https://app.leg.wa.gov/wac/default.aspx?cite=246-817-770

19. Washington State Legislature. RCW 18.32.020. Practice of dentistry defined. Accessed May 28, 2025. https://app.leg.wa.gov/rcw/default.aspx?cite=18.32.020

20. Washington State Legislature. WAC 246-817-771. Dental anesthesia assistant. Accessed July 4, 2025. https://app.leg.wa.gov/wac/default.aspx?cite=246-817-771

21. Centers for Medicare & Medicaid Services. CMS.gov. Conditions for Coverage (CfCs) & Conditions of Participation (CoPs). Accessed March 20, 2025. https://www.cms.gov/medicare/health-safety-standards/conditions-coverage-participation

22. American Association of Nurse Anesthesiology. Practice in Your State. Accessed May 31, 2025. https://www.aana.com/practice/practice-in-your-state/washington/

23. American Association of Nurse Anesthesiology. AANA State Government Affairs Division. (2024) Fact Sheet Concerning State Opt-Outs and November 13, 2001 CMS Rule. Originally prepared November 9, 2001/Updated June 2024. Accessed March 13, 2025. https://www.aana.com/wp-content/uploads/2023/10/Fact-Sheet-Concerning-State-Opt-Outs-10.pdf

24. National Conference of State Legislatures. State Overview: District of Columbia. Accessed June 6, 2025. https://www.ncsl.org/scope-of-practice-policy/state/district-of-columbia

25. National Archives. Code of Federal Regulations. National Archives. Code of Federal Regulations. Title 42. § 482.52 Condition of participation: Anesthesia services. Accessed March 18, 2025. https://www.ecfr.gov/current/title-42/section-482.52

26. American Association of Nurse Anesthesiology. AANA State Government Affaires Division. State Dental Board Permit Status for CRNA Practice in Dental Offices. Accessed March 19, 2025. https://www.aana.com/wp-content/uploads/2025/01/Dental-Board-Permit-Requirements-1-25.png

27. American Academy of Physician Associates. PA State Practice Environment. 2025. Accessed March 20, 2025. https://www.aapa.org/advocacy-central/state-advocacy/state-maps/pa-state-practice-environment/

28. American Academy of Anesthesiologist Assistants. Certification. 2024. Certified Anesthesiologist Assistants Practice Authorization. Accessed March 19, 2025. 32. https://www.anesthetist.org/certifcation-practice-map

29. Simon NB, Barnett KM, Sweitzer B, et al. Dental Anesthesia Guidelines and Regulations of US States and Major Professional Organizations: A Review. *J Patient Saf.* Feb 3 2025;doi:10.1097/pts.0000000000001320

30. Association of American Medical Colleges. Facts. Accessed May 31, 2025. https://www.aamc.org/data-reports/students-residents/data/facts-glossary

31. Washington State Office of Financial Management. April 1 Official Population Estimates. Updated September 25, 2024. Accessed June 6, 2025. https://ofm.wa.gov/washington-data-research/population-demographics/population-estimates/april-1-official-population-estimates

32. Stubbs BA, Skillman SM. Washington State's 2019 Advanced Registered Nurse Practitioner Workforce. Center for Health Workforce Studies, University of Washington, Mar 2020. Accessed May 28, 2025. http://familymedicine.uw.edu/chws/wp-content/uploads/sites/5/2020/04/WA_ARNP_Survey_2019.pdf)

33. Kaplan L, Brown MA, Andrilla H, Hart LG. The Washington State Nurse Anesthetist Workforce: a case study. *AANA J.* 2007;75(1):37-42.

34. Lewis SR, Nicholson A, Smith AF, Alderson P. Physician anaesthetists versus non-physician providers of anaesthesia for surgical patients. *Cochrane Database Syst Rev.* Jul 11 2014;2014(7):Cd010357. doi:10.1002/14651858.CD010357.pub2

35. Newhouse RP, Stanik-Hutt J, White KM, et al. Advanced practice nurse outcomes 1990-2008: a systematic review. *Nurs Econ.* Sep-Oct 2011;29(5):230-50; quiz 251.

36. American Association of Nurse Anesthesiology. AANA Statement on Efficiency-driven Anesthesia Modeling. 2022. Accessed June 23, 2025. https://crnas4safeanesthesia.com/wp-content/uploads/2022/07/Efficiency-Driven-Anesthesia-Modeling-white-paper.pdf

37. Massachusetts Association of Nurse Anesthesiology. Centers for Medicare & Medicaid Services (CMS) Basic billing for Anesthesia services provided by MD Anesthesiologists and Certified Registered Nurse Anesthetists (CRNAs). Accessed May 31, 2025. https://www.masscrna.com/assets/docs/2025Billing%20Chart.pdf

38. Mills A, Sorensen A, Gillen E, et al. Quality, Costs, and Policy: Factors Influencing Choice of Anesthesia Staffing Models. *J Healthc Manag*. Jan-Feb 2020;65(1):45-60. doi:10.1097/jhm-d-18-00186

39. American Society of Anesthesiologists. Standards and Practice Parameters. Statement on the Anesthesia Care Team. Accessed May 31, 2025. https://www.asahq.org/standards-and-practice-parameters/statement-on-the-anesthesia-care-team

40. National Government Services. Anesthesia. Accessed June 2, 2025. https://www.ngsmedicare.com/ar/web/ngs/anesthesia?lob=93617&state=97256&rgion=93623&selectedArticleId=1628657

41. Quraishi JA. Anesthesia Medicare trend analysis shows increased utilization of CRNA services. *AANA J*. 2017;85(5):375.

42. Hoyem RL, Jordan L, Lukyanova VV, Legaspi T. Practice Model Trends in Medicare Payments Across States and Regions. *AANA J*. Oct 2023;91(5):327-340.

43. JDSUPRA, Whiteford. California Department of Public Health's (CDPH) Limits On CRNA Scope of Practice Reminds Hospitals Nationwide to Revisit Anesthesia Staffing. Accessed June 13, 2025. https://www.jdsupra.com/legalnews/california-department-of-public-health-6329569/).

44. Coomer NM, Mills A, Beadles C, Gillen E, Chew R, Quraishi JA. Anesthesia Staffing Models and Geographic Prevalence Post-Medicare CRNA/Physician Exemption Policy. *Nurs Econ*. Mar/Apr 2019;37(2):86-91.

45. 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*. 2021/09/01 2021;37(4):684-691. doi:https://doi.org/10.1111/jrh.12487

46. Chen AJ, Munnich EL, Parente ST, Richards MR. Provider turf wars and Medicare payment rules. *J Public Econ*. 2023;(218):104812. doi:https://doi.org/10.1016/j.jpubeco.2022.104812.

47. 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*. Mar 2017;126(3):461-471. doi:10.1097/aln.0000000000001504

48. Greenwood JE, Biddle C. Impact of legislation on scope of practice among nurse anesthetists. *J Nurse Pract*. 2015;11(5):498-504. doi:10.1016/j.nurpra.2015.03.004

49. Vitale CM, Lyons KS. The State of Nurse Anesthetist Practice and Policy: An Integrative Review. *AANA J*. Oct 2021;89(5):403-412.

50. Martsolf GR, Baird M, Cohen CC, Koirala N. Relationship Between State Policy and Anesthesia Provider Supply in Rural Communities. *Med Care*. May 2019;57(5):341-347. doi:10.1097/mlr.0000000000001106

51. Palmer A, Sawyer J, Beeson A, Rosner S, Padhye I, Andrilla HA. An examination of factors contributing to different anesthesia models in underserved areas. *Nurs Outlook*. 2025;73(2):102352. doi:https://doi.org/10.1016/j.outlook.2025.102352

52. American Association of Nurse Anesthesiology. *AANA News Bulletin. AANA Division of Federal Government Affairs. Issue briefs on reimbursement and nurse anesthesia*. 2022. https://www.aana.com/file-download/aana-issues-briefs-on-reimbursement-and-nurse-anesthesia/

53. American Society of Anesthesiologists. Rural Pass Through Legislation. Advocating for You: Ensuring access to safe, physician-led anesthesia care in rural communities. Accessed June 13, 2025. https://www.asahq.org/advocating-for-you/rural-pass-through

54. 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*. Dec 2017;7(1):10. doi:10.1186/s13561-017-0146-6. Epub 2017 Feb 28. PMID: 28243888; PMCID: PMC5328901

55. 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

56. 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

57. Pine M, Holt KD, Lou YB. Surgical mortality and type of anesthesia provider. *AANA J*. Apr 2003;71(2):109-16.

58. Dulisse B, Cromwell J. No harm found when nurse anesthetists work without supervision by physicians. *Health Aff (Millwood)*. Aug 2010;29(8):1469-75. doi:10.1377/hlthaff.2008.0966

59. 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

60. Negrusa B, Hogan PF, Warner JT, Schroeder CH, Pang B. Scope of practice laws and anesthesia complications: No measurable impact of certified registered nurse anesthetist expanded scope of practice on anesthesia-related complications. *Med Care.* Oct 2016;54(10):913-20. doi:10.1097/mlr.0000000000000554

61. Simonson DC, Ahern MM, Hendryx MS. Anesthesia staffing and anesthetic complications during cesarean delivery: a retrospective analysis. *Nurs Res.* Jan-Feb 2007;56(1):9-17. doi:10.1097/00006199-200701000-00002

62. Needleman J, Minnick AF. Anesthesia provider model, hospital resources, and maternal outcomes. *Health Serv Res.* Apr 2009;44(2 Pt 1):464-82. doi:10.1111/j.1475-6773.2008.00919.x

63. Baumle D. Center for Public Health Law Research. Temple University Beasley School of Law. Certified Registered Nurse Anesthetist Scope of Practice Laws. September 2022. https://www.va.gov/STANDARDSOFPRACTICE/docs/CRNA_PolicyBrief_Temple.pdf

64. Burns ML, Saager L, Cassidy RB, Mentz G, Mashour GA, Kheterpal S. Association of Anesthesiologist Staffing Ratio With Surgical Patient Morbidity and Mortality. *JAMA Surg.* Sep 1 2022;157(9):807-815. doi:10.1001/jamasurg.2022.2804

65. Howie WO, Zangaro G, Howie BA, McMullen PC, Dutton RP, Zimmerman L. Anesthesia-Related Malpractice Claims in Maryland 1994-2017. *AANA J.* Dec 2022;90(6):455-461.

66. 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. PMID: 10861159

67. 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. Epub 2012 Feb 4. PMID: 22305625; PMCID: PMC3303976.

68. Hoyem RL, Quraishi JA, Jordan L, Wiltse Nicely KL. Advocacy, Research, and Anesthesia Practice Models: Key Studies of Safety and Cost-Effectiveness. *Policy Polit Nurs Pract.* Nov 2019;20(4):193-204. doi:10.1177/1527154419874410

69. Hogan PF, Seifert RF, Moore CS, Simonson BE. Cost effectiveness analysis of anesthesia providers. *Nurs Econ.* May-Jun 2010;28(3):159-69.

70. Cintina I, Hogan PF, Schroeder C, Simonson BE, Quraishi JA. Cost effectiveness of anesthesia providers and implications of scope of practice in a Medicare population. *Nurs Econ.* 2018;36(2):67-73.

71. Sun EC, Dutton RP, Jena AB. Comparison of anesthesia times and billing patterns by anesthesia practitioners. *JAMA Network* Open. 2018;1(7):e184288-e184288. doi:10.1001/jamanetworkopen.2018.4288

72. Callan V, Eshkevari L, Finder S, et al. Impact of COVID-19 Pandemic on Certified Registered Nurse Anesthetist Practice. *AANA J.* Aug 2021;89(4):334-340.

73. Everson M, Wilbanks BA, Hranchook AM, et al. From the Operating Room to the Front Lines: Shared Experiences of Nurse Anesthetists During the Coronavirus Pandemic. *AANA J.* Apr 2021;89(2):109-116.

74. Cohen C, Baird M, Koirola N, Kandrack R, Martsolf G. The Surgical and Anesthesia Workforce and Provision of Surgical Services in Rural Communities: A Mixed-Methods Examination. *J Rural Health.* Jan 2021;37(1):45-54. doi:10.1111/jrh.12417

75. Liao CJ, Quraishi JA, Jordan LM. Geographical imbalance of anesthesia providers and its impact on the uninsured and vulnerable populations. *Nurs Econ.* Sep-Oct 2015;33(5):263-70.

76. Giron SE, Bordi SK. California Certified Registered Nurse Anesthetist Workforce Study. *Nurs Outlook.* Nov-Dec 2023;71(6):102057. doi:10.1016/j.outlook.2023.102057

77. Abouleish AE, Pomerantz P, Peterson MD, et al. Closing the chasm: Understanding and addressing the anesthesia workforce supply and demand imbalance. *Anesthesiology.* 2024:238-249. doi:10.1097/ALN.0000000000005052

78. American Association of Nurse Anesthesiology. Flexibility vs. Stability: Exploring 1099 and W2 Employment Arrangements. February 26, 2025. Accessed June 13, 2025. https://www.aana.com/news/flexibility-vs-stability/

79. Menezes L, Zahalka C. Anesthesiologist shortage in the United States: A call for action. *J Med Surg Public Health.* 2024;2(100048) doi:https://doi.org/10.1016/j.glmedi.2024.100048

80. Fitch M, Brent K, Jones-Oyefeso V, Deaver J, McMullan S. Barriers to effective clinical preceptorship in nurse anesthesiology. *J Prof Nurs.* Sep-Oct 2024;54:10-16. doi:10.1016/j.profnurs.2024.05.013

81. Afonso AM, Cadwell JB, Staffa SJ, Sinskey JL, Vinson AE. U.S. attending anesthesiologist burnout in the postpandemic era. *Anesthesiology (Philadelphia).* 2024;140(1):38-51. doi:10.1097/ALN.0000000000004784

82. Malina DP, Izlar JJ. Education and practice barriers for certified registered nurse anesthetists. *Online J Issues Nurs*. May 31 2014;19(2):3.

83. Lee R, Bonanno L, O'Sullivan C, et al. Analysis of a Needs Assessment Survey to Develop an Online Resource Repository Supporting Nurse Anesthesia Educators. *Nurse Educ*. 2024;49(3)

84. Connecticut Anesthesia Associates, LLC. Educational and Clinical Barriers for CRNAs. Accessed June 1, 2025. https://ctanesth.com/educational-and-clinical-barriers-for-crnas/

85. Morgan B, Jordan L, Rivera LA. Considerations for an aging nurse anesthetists workforce. *Geriatr Nurs*. Nov-Dec 2020;41(6):1017-1019. doi:10.1016/j.gerinurse.2020.10.010

86. Conner M. Self-efficacy, stress, and social support in retention of student registered nurse anesthetists. *AANA J*. Apr 2015;83(2):133-8.

87. Phoenix LM. *Identification of Barriers to Student Registered Nurse Anesthetist Participation in Independent Certified Registered Nurse Anesthetist Clinical Rotation Sites*. University of Michigan-Flint; 2020.

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APPENDIX 1: OCCUPATIONAL BRIEFS ON THE WASHINGTON STATE ANESTHESIA WORKFORCE

APPENDIX 2: EDUCATION AND LICENSING REQUIREMENTS FOR WASHINGTON STATE ANESTHESIA OCCUPATIONS

APPENDIX 3: CREDENTIALING AND MEDICAL BYLAWS

APPENDIX 4: ANNOTATED ANESTHESIA WORKFORCE LITERATURE REVIEW