

MAC Check Professional Practice Analysis (PPA) Executive Summary

NBCRNA conducted a Professional Practice Analysis (PPA) for the Maintenance of Anesthesia Certification (MAC) Program, collecting data between November 1, 2024 to January 31, 2025. This innovative study used an embedded, longitudinal approach within MAC Check to ensure the assessment reflects current CRNA practice while reducing survey burden.

How it was conducted:

The National Board of Certification and Recertification for Nurse Anesthetists (NBCRNA) conducts a Professional Practice Analysis (PPA) about every five years to ensure its certification assessments remain valid and aligned with clinical practice. The most recent PPA focused on the Maintenance of Anesthesia Certification (MAC) Program and its assessment, the MAC Check. The findings will guide the design and administration of MAC Check for the next five years.

Why this PPA was different:

Traditional PPAs often rely on separate surveys, which can suffer from low response rates and limited data. For MAC Check, NBCRNA adopted a Principled Assessment Design (PAD) approach integrated into the longitudinal assessment format. Instead of sending a separate survey, we embedded a short frequency rating after each MAC Check item, allowing us to collect real-time data on how often knowledge is used in practice. This method increased engagement, reduced survey fatigue, and provided detailed, item-level validation.

How we collected the data:

A PPA Panel of subject matter experts reviewed and updated the MAC Check content outline, which organizes the assessment into four core domains:

1. Airway Management
2. Applied Clinical Pharmacology
3. Physiology and Pathophysiology
4. Anesthesia Equipment, Technology, and Safety

Participants from six MAC Check syllabus groups completed quarterly knowledge checks. After each question, they rated how frequently they used the related knowledge in practice using a four-point Likert scale:

1. Never or rarely (Up to one or a few times a year)
2. Monthly (Once or twice a month)

3. Weekly (Once or twice a week)
4. Daily (Daily or almost daily)

These ratings were mapped to the content outline and analyzed to identify patterns of knowledge use. Areas where 50% or more of respondents selected “Never or rarely” were flagged for review by the PPA Panel.

Key Results:

The embedded approach delivered more representative data than traditional surveys and demonstrated higher engagement. Over a three-month period, 21,338 participants provided 573,297 frequency ratings across 1,737 MAC Check items. Those values were then collected and averaged across our four major domains, with the following results (Table 1).

Table 1. Core Domain Weight Calculations

Core Domains in Nurse Anesthesia	Count	Average	Domain Weight Calculation	Domain Weight
Domain 1: Airway Management	133,544	2.18	=2.18/8.41	26%
Domain 2: Applied Clinical Pharmacology	134,049	2.00	=2.00/8.41	24%
Domain 3: Physiology and Pathophysiology	159,094	1.93	=1.93/8.41	23%
Domain 4: Anesthesia Equipment, Technology, and Safety	146,610	2.29	=2.29/8.41	27%
Overall Average	573,297	2.10		25%
Sum of Average Ratings		8.41		

The four domains showed similar frequency of use, supporting equal weighting of 25% each in MAC Check.

Content Outline Updates:

From the initial PPA meeting, several revisions to the content outline were made. After the PPA validation meeting, all flagged areas remained unchanged after discussion, as the panel members concluded that they included critical knowledge for exam candidates to have, even if the use of that knowledge in the field is typically infrequent.

From the initial PPA Panel meeting, several changes were made to the current content outline.

Domain 1: Combined and reorganized subdomains for better alignment with CRNA workflow; added new examples:

- Subdomain 1.3 *Airway equipment* and Subdomain 1.4 *Management concepts* were combined into a new Subdomain 1.3 *Airway management concepts*. Subdomain 1.3 was then reorganized to better reflect the true sequential order of events for CRNAs.

- New examples for review were added to knowledge areas 1.1.1 (trigeminal nerve, glossopharyngeal nerve) and 1.1.2 (vocal cord dysfunction).

Domain 2: Merged related knowledge elements; moved medication safety to Domain 4; added examples.

- Knowledge element 2.1.1 *Physiological factors* were combined with knowledge element 2.1.2 *Pathophysiological/comorbidity factors* and renamed *Pathophysiological/comorbidity factors and anesthetic considerations*. Subdomain 2.2 *Medication safety/infection prevention* was moved to Domain 4.
- New examples for review were added to knowledge area 2.1.1 (cardiac disease, seizures, recreational drugs) and 2.1.2 (chronic pain polypharmacy, posttraumatic stress disorder, cognitive dysfunction), as well as Subdomain II.C (protamine, bronchospasm/histamine release, chest wall rigidity, pseudocholinesterase deficiency).

Domain 3: Consolidated subdomains, added new elements (e.g., nerve injury prevention), removed redundant content, and introduced a new subdomain on regional and neuraxial anesthesia; added examples.

- Subdomains 3.1 through 3.7 had all previously been split into two knowledge elements, *Physiologic processes and anesthetic considerations* and *Pathophysiologic disease processes and associated disorders*. These were all combined into one knowledge element per subdomain, *Pathophysiologic disease processes and anesthetic considerations*. In Subdomain 3.3, two additional knowledge elements were added: *Nerve injury prevention* and *Neuromuscular diseases*. Subdomain 3.8 *Musculoskeletal* was removed entirely, as the panel determined that all provided examples could fit elsewhere in the outline. A new subdomain *Regional and neuraxial anesthesia considerations and complications* was added. Knowledge elements 3.1.2 *Assessment and interpretation of perioperative data* and 3.9.3 *Ordering and interpretation of laboratory and diagnostic studies, and consultation as appropriate* were combined into a new knowledge element, *Assessment and interpretation of perioperative data including laboratory and diagnostic studies*.
- New examples for review were added to knowledge areas 3.1.1 (valvular disease and management, recent cardiac interventions), 3.2.1 (bronchitis, acute respiratory distress syndrome [ARDS], vaping, pulmonary embolism), 3.5.1 (GLP-1 agonists, SGLT-2 inhibitors), 3.6.1 (hemorrhage management, factor V Leiden, von Willebrand factor), 3.7.1 (pituitary disorders, adrenal insufficiency), and 3.9.1 (older adults, obstetrics, pediatrics, delirium, gender-diverse care).

Domain 4: Fully reorganized to emphasize technology and safety, with five new or renamed subdomains.

- The subdomains were completely reorganized and renamed to better focus this domain on technology use and safety protocols, and less on the anesthetic process.
- This domain now consists of 5 new or renamed subdomains: 4.1 *Equipment and technology*, 4.2 *Operating room safety*, 4.3 *Non-operating room anesthesia (NORA) safety*, 4.4 *Medication safety and infection prevention*, and 4.5 *Ethical/medicolegal issues*.

After collecting frequency ratings, five subdomains or knowledge elements were flagged because at least 50% of respondents reported that they “never or rarely (up to one or a few times a year)” use the knowledge in that area in practice. The flagged subdomains or knowledge elements were 2.2 *Adverse pharmacological reactions and treatments*, 3.3.3 *Neuromuscular diseases*, 3.6.1 *Pathophysiologic disease processes and anesthetic considerations* (under *Hematological*), 3.7.1 *Pathophysiologic disease processes and anesthetic considerations* (under *Endocrine*), and 4.3 *Non-operating room anesthesia (NORA) safety*.

After the PPA Panel validation meeting discussed the frequency ratings were that were flagged were presented, and the decision was made to remove “factor V Leiden” and “von Willebrand factor” from knowledge element 3.6.1. Along with being flagged for infrequent use from the collected frequency ratings, these content areas weren’t deemed critical enough by the panel to be included in the exam. Otherwise, all flagged areas remained unchanged after discussion, as the PPA Panel concluded that they all included critical knowledge for exam candidates to have, even if use of that knowledge in the field is typically infrequent.

Conclusion: This PPA demonstrates the value of an embedded, longitudinal approach to maintaining the validity of nurse anesthesia certification. By integrating data collection into MAC Check, NBCRNA ensures the assessment evolves with practice while minimizing additional burden on certificants. The result is a more accurate, comprehensive understanding of professional practice supporting patient safety and professional standards until the next PPA.