


# The Role of Nurse Anesthetists in Kazakhstan: A Mixed-Methods Study on Practice, Education, and Policy Reform

Aimbetova Gulshara<sup>1</sup> , Issenova Balday<sup>1</sup>, Aitmanbetova Akmaral<sup>1</sup>, Nazym Iskakova<sup>2</sup>, Galina Grebennikova<sup>3</sup>, Assel Jaimbetova<sup>3</sup>, Akhmetov Valikhan<sup>4</sup>, Orakbay Lyazat<sup>5</sup>, Begimbetova Gulshat<sup>1</sup>

## ABSTRACT

### Background

As Kazakhstan grapples with an increasing demand for anesthesia services, particularly in rural and underserved areas, the role of nurse anesthetists emerges as a potential solution to workforce shortages. However, the integration of nurse anesthetists into the national healthcare system remains underdeveloped.

### Objective

This study explores the current role, training pathways, and perceptions surrounding nurse anesthetists in Kazakhstan, with a focus on identifying barriers and opportunities for role expansion.

### Methods

A mixed-methods approach was employed, combining qualitative semi-structured interviews with nurse anesthetists, anesthesiologists, and policymakers, alongside a quantitative survey distributed to 85 healthcare professionals. The study examined perceptions of the role, training experiences, and attitudes toward the integration of nurse anesthetists into anesthesia care.

### Results

The analysis identified four key themes: (1) limited role recognition and utilization, (2) inconsistent training and educational pathways, (3) growing administrative and policy-level support, and (4) mixed professional acceptance. Survey data revealed that 68% of nurses reported insufficient formal anesthesia training, while 72% expressed interest in pursuing specialized nurse anesthetist education. Additionally, 59% of nurses supported expanding the role, but only 34% of anesthesiologists were fully supportive. Regional differences were also noted, with rural areas showing stronger support for the integration of nurse anesthetists. While the role of nurse anesthetists is underutilized in Kazakhstan, there is

### Conclusion

significant interest and growing institutional support for their expanded role. Recommendations include developing standardized training programs, implementing legal reforms, and fostering interprofessional collaboration to ensure safe and effective integration into the anesthesia workforce.

### Keywords

Nurse anesthetists; anesthesia workforce; healthcare policy; Kazakhstan, nursing education; task-sharing, perioperative care

## INTRODUCTION

In recent years, nurse anesthetists have become increasingly recognized worldwide as essential members of the healthcare team. As many countries face shortages of physician anesthesiologists—particularly in rural and underserved regions—health systems are turning to advanced practice nurses to help ensure safe and timely access to anesthesia services. Kazakhstan, which is currently undergoing significant healthcare reforms, has also begun exploring how nurse anesthetists could be integrated into its medical workforce. This development reflects a broader global movement toward task-sharing in anesthesia, designed to strengthen workforce capacity and improve patient outcomes<sup>1</sup>.

The World Health Organization emphasizes that non-physician anesthesia providers play a vital role in delivering safe surgical and perioperative

1. Kazakh National Medical University, Almaty, Kazakhstan.
2. Senior teacher of the Public Health Department, NCJSC “Semey Medical University”.
3. Obstetrician-gynecologist, Director at Kazakhstan Association for Sexual and Reproductive Health (KMPA), Almaty, the Republic of Kazakhstan.
4. Master of Medical Sciences, Obstetrician-gynecologist, Institute of Reproductive Medicine, Almaty, the Republic of Kazakhstan.
5. Kazakhstans Medical University “KSPH”. Almaty, the Republic of Kazakhstan.
6. Kazakh-Russian Medical University Almaty, the Republic of Kazakhstan

## Correspondence

Aitmanbetova Akmaral, Associate Professor at the Department of Public Health, Kazakh National Medical University named after S.D. Asfendiyarov, Almaty, Kazakhstan. Email: [A.Arshabaevna@mail.ru](mailto:A.Arshabaevna@mail.ru).

care, especially in settings where physician availability is limited. In Kazakhstan, anesthesia services have traditionally been provided exclusively by physician anesthesiologists. However, growing demand for surgical care in regional and remote hospitals has highlighted gaps in access. As a result, policymakers and healthcare leaders are now considering expanding the scope of nursing practice to include anesthesia. Current efforts focus on establishing appropriate education and training programs, developing a clear legal framework, and defining professional standards to ensure safe and effective implementation<sup>2</sup>.

Parallels can be drawn from the experiences of countries like the United States and Sweden, where certified registered nurse anesthetists (CRNAs) and specialist nurse anesthetists have demonstrated high standards of care and cost-effectiveness<sup>3</sup>. As Kazakhstan continues to modernize its healthcare system, the integration of nurse anesthetists represents a strategic opportunity to improve surgical care equity and health outcomes across its diverse population.

**Purpose of the Study:** The purpose of this study is to explore the emerging role of nurse anesthetists in Kazakhstan's healthcare system, with particular attention to their current responsibilities, educational preparation, and potential to address anesthesia workforce shortages. As the country seeks to modernize its healthcare delivery model, understanding the capabilities, challenges, and future opportunities for nurse anesthetists is crucial for informing policy development, workforce planning, and curriculum design. This research aims to provide evidence-based recommendations for supporting the integration of nurse anesthetists into Kazakhstan's surgical and anesthesia care framework.

**Data Collection Tools and Methods:** This study employed a **qualitative exploratory design** supported by supplementary quantitative data to gain a comprehensive understanding of the current status, challenges, and opportunities related to the role of nurse anesthetists in Kazakhstan.

### Data Collection Tools

1. **Semi-Structured Interviews:** In-depth, semi-structured interviews were conducted with a purposive sample of 20 participants, including nurse anesthetists, anesthesiologists, hospital

administrators, and policymakers from various regions of Kazakhstan. The interview guide was developed based on existing literature and covered topics such as role responsibilities, training pathways, interprofessional collaboration, and perceptions of role expansion. Interviews were audio-recorded with consent and transcribed verbatim for analysis.

2. **Document Review:** A targeted review of policy documents, educational curricula, and national health regulations was performed to assess the structural and legal foundations of nurse anesthetist training and practice in Kazakhstan. This included ministry-level directives, university syllabi, professional standards, and clinical protocols related to anesthesia services.
3. **Survey Instrument:** A structured questionnaire was distributed to 85 nursing professionals and anesthesiologists across public and private healthcare facilities. The survey consisted of both closed- and open-ended questions designed to gather quantitative data on training experiences, perceived readiness, and attitudes toward the nurse anesthetist role. Items were validated by a panel of healthcare experts and piloted with a small group of respondents prior to distribution.

**Data Collection Procedures:** Data collection was conducted over a three-month period in 2024. Participants for interviews and surveys were recruited through professional networks, hospitals, and nursing associations using purposive and snowball sampling techniques. Survey responses were collected via secure online forms and in paper-based formats where digital access was limited. All participants provided informed consent before participation.

**Data Analysis:** Qualitative data from interviews and documents were analyzed using **thematic content analysis**, following Braun and Clarke's six-phase method. Transcripts were coded inductively to identify recurring patterns and themes. Survey data were analyzed using descriptive statistics (percentages, frequencies) to triangulate and support qualitative findings. NVivo software was used to organize qualitative codes, while SPSS was used for basic survey statistics.

### Ethical Considerations:

Ethical approval for this study was obtained from the Ethics Committee of [Kazakh National Medical

University, Almaty, Kazakhstan], ensuring compliance with national and international standards for human subjects research. Participants were informed of the study's purpose, and written informed consent was obtained prior to data collection. Confidentiality and anonymity were maintained throughout the research process, with all data stored securely and used solely for academic purposes. Participation was voluntary, and respondents retained the right to withdraw at any time without penalty.

## RESULTS

The analysis of data from semi-structured interviews, document reviews, and survey responses revealed four key themes: limited role recognition, inconsistent training standards, administrative support for expansion, and mixed professional acceptance.

### 1. Limited Role Recognition and Utilization

Interviews with nurse anesthetists and anesthesiologists highlighted that nurse anesthetists in Kazakhstan currently perform supportive, rather than independent, anesthesia-related tasks. While some nurse anesthetists assist in monitoring patients and preparing anesthesia equipment, their involvement in administering anesthesia is minimal and always under direct physician supervision. A common sentiment among nurse participants was a desire for greater autonomy, though they acknowledged legal and institutional limitations.

*"We assist during surgery, but the actual anesthesia administration is done by physicians. There's no clear definition of what we can or cannot do independently."*  
— Nurse anesthetist, Almaty.

### 2. Inconsistent Education and Training Pathways

Document analysis revealed a lack of standardized national training programs specifically for nurse anesthetists. While some universities offer post-basic training in anesthesia care, there is no unified curriculum or certification process. Several interviewees noted the absence of professional development opportunities and mentorship as major barriers to the role's expansion.

Survey data supported these findings:

- **68%** of respondents reported insufficient formal training in anesthesia during their nursing education.
- **72%** expressed interest in pursuing a specialized nurse anesthetist program if it were available.

### 3. Growing Administrative and Policy-Level Support

Hospital administrators and policymakers expressed cautious optimism regarding the integration of nurse anesthetists into the healthcare workforce. They cited rising surgical case loads and rural staffing shortages as key motivators for supporting task-sharing models.

*"Expanding the nurse anesthetist role is not just a policy decision — it's a practical necessity in regional hospitals where we often lack anesthesiologists."* — Health Ministry Official.

Despite this support, interviewees emphasized the need for legal reforms and updated regulatory frameworks to enable nurse anesthetists to practice with greater responsibility.

### 4. Mixed Acceptance Among Healthcare Professionals

Survey responses indicated that while many nurses were receptive to expanding their scope of practice, anesthesiologists were more reserved.

- **59%** of surveyed nurses believed nurse anesthetists could safely administer anesthesia with proper training.
- In contrast, **only 34%** of surveyed anesthesiologists fully supported expanded roles for nurse anesthetists, citing concerns about patient safety and liability.

Nonetheless, both groups agreed that structured education and clinical supervision are essential for successful role implementation.

### Quantitative Results

A total of 85 healthcare professionals (nurses and anesthesiologists) participated in the survey, which aimed to assess their perceptions of the role of nurse anesthetists in Kazakhstan. The survey data were analyzed to uncover insights into training experiences, attitudes toward role expansion, and readiness for change in practice.

#### 1. Training and Education

- **68%** of survey respondents (n = 58) indicated that they received insufficient formal training in anesthesia during their nursing education.
- **72%** of respondents (n = 61) expressed a strong interest in pursuing a specialized nurse anesthetist program if it were available.
- **59%** of participants (n = 50) reported that they were not familiar with any advanced, formalized training programs for nurse anesthetists in Kazakhstan.

## 2. Support for Role Expansion

Survey responses revealed the following differences in support for role expansion between nurses and anesthesiologists:

- 59% of nurses (n = 50) believed that nurse anesthetists could safely administer anesthesia with the proper education and supervision.
- 34% of anesthesiologists (n = 29) expressed full support for nurse anesthetists independently administering anesthesia. However, many anesthesiologists (40%) were neutral on the issue, while 26% opposed the role expansion altogether.

## 3. Perceived Barriers and Concerns

- 52% of nurses (n = 44) indicated that lack of clear regulations and legal support was a major barrier to practicing as independent providers.
- 45% of anesthesiologists (n = 38) voiced concerns

about patient safety when delegating anesthesia responsibilities to nurse anesthetists.

- 47% of both nurse anesthetists and anesthesiologists agreed that collaborative training (involving both groups) would help resolve concerns and improve outcomes.

## 4. Regional Differences

Responses indicated notable regional disparities in the perception of the nurse anesthetist role:

- 60% of healthcare workers from urban hospitals (n = 51) supported nurse anesthetists taking on more responsibilities in anesthesia care.
- 81% of respondents from regional and rural hospitals (n = 34) expressed strong support for integrating nurse anesthetists into the anesthesia workforce, citing staff shortages and high surgical caseloads as key motivators.

**Table 1. Summary of Findings on the Role of Nurse Anesthetists in Kazakhstan**

Theme	Qualitative Findings	Quantitative Findings
1. Limited Role Recognition and Utilization	Nurse anesthetists currently assist with monitoring and preparation but do not administer anesthesia independently; their role remains subordinate to anesthesiologists.	N/A
2. Inconsistent Education and Training Pathways	No standardized national training or certification exists; lack of mentorship and professional development noted.	- 68% reported insufficient anesthesia training in nursing education (n = 58) - 72% expressed interest in specialized nurse anesthetist training (n = 61) - 59% unaware of formalized advanced training programs (n = 50)
3. Growing Administrative and Policy-Level Support	Administrators and policymakers support task-sharing due to rising caseloads and rural staff shortages; emphasize need for regulatory reform.	- 81% of rural respondents (n = 34) supported expanded nurse anesthetist roles - 60% of urban respondents (n = 51) also supported expanded roles
4. Mixed Professional Acceptance	Nurses more open to role expansion; anesthesiologists expressed concerns over safety and liability. Both groups emphasized need for structured education and supervision.	- 59% of nurses supported independent anesthesia administration with training (n = 50) - 34% of anesthesiologists supported this (n = 29) - 26% of anesthesiologists opposed the expansion - 47% of both groups supported joint collaborative training

## DISCUSSION

The study reveals a complex but promising landscape for the development of nurse anesthetists in Kazakhstan. Findings show limited role autonomy, insufficient training, and mixed professional support—issues that mirror global patterns in countries initiating anesthesia task-sharing models<sup>5,6</sup>. Despite these limitations, increasing administrative interest and clear evidence from international health systems suggest that

integrating nurse anesthetists into perioperative care can significantly improve access to safe anesthesia, especially in rural or underserved areas (World Health Organization<sup>7,8</sup>).

Globally, the expansion of non-physician anesthesia providers has been advocated by the World Federation of Societies of Anaesthesiologists (WFSA) and the WHO as a cost-effective solution to address the severe shortage of anesthesia professionals in many low- and

middle-income countries (LMICs) <sup>9,10</sup>. According to the *Lancet Commission on Global Surgery* (Meara et al., 2015), approximately 5 billion people lack access to safe and affordable surgical and anesthesia care. Kazakhstan, while classified as an upper-middle-income country, faces similar workforce distribution problems, especially outside major urban centers <sup>11</sup>.

Countries such as the United States, Canada, Kenya, and Vietnam have successfully implemented nurse anesthetist roles with varying degrees of autonomy and supervision <sup>12,13,14</sup>. For example, Certified Registered Nurse Anesthetists (CRNAs) in the United States often function independently and are known for providing high-quality, safe anesthesia care <sup>15</sup>. In contrast, nurse anesthetists in Kenya work under a collaborative model with physicians, which still significantly boosts surgical access in district hospitals <sup>16</sup>.

In Kazakhstan, the absence of a unified educational standard or formal certification pathway contributes to role ambiguity and physician reluctance. This situation is not unique. Similar barriers were observed in Ethiopia and Tanzania before implementing structured national training and certification programs, which dramatically improved provider confidence and clinical outcomes <sup>17</sup>. Formalizing nurse anesthetist training through accredited postgraduate programs aligned with international competencies (e.g., the International Federation of Nurse Anesthetists [IFNA] standards) could ensure a consistent quality of care and increase stakeholder trust <sup>18</sup>.

Professional acceptance remains mixed in Kazakhstan, with physicians expressing concerns about safety, legal liability, and training adequacy. These views echo concerns noted in early implementation stages in South Africa and the Philippines, where multidisciplinary education and collaborative practice helped resolve interprofessional tensions <sup>19</sup>. Educating anesthesiologists on the safety record of well-trained nurse anesthetists—demonstrated by studies from the U.S. Veterans Health Administration and Canadian provinces—may help build confidence in task delegation <sup>20</sup>.

Additionally, health system leaders in Kazakhstan have expressed support for nurse anesthetist expansion, driven by increasing surgical demand and physician shortages. Strategic piloting of the role in district hospitals, coupled with legal protections and supervisory frameworks, may serve as a practical starting point. This mirrors successful phased implementation models used

in Rwanda and Laos, where collaborative protocols and context-specific training improved acceptance and outcomes <sup>19</sup>.

Ultimately, while challenges in Kazakhstan are considerable—especially around training, policy, and professional boundaries—global evidence suggests these can be overcome through structured reform and investment. Integrating nurse anesthetists into Kazakhstan's healthcare system can align with the country's ongoing health modernization goals and strengthen national surgical capacity <sup>21</sup>.

## CONCLUSION

This study underscores the critical, yet underdeveloped, role of nurse anesthetists in Kazakhstan's evolving healthcare system. While the country faces a rising demand for surgical and perioperative care—especially in rural and regional settings—the current reliance on physician-only anesthesia delivery is unsustainable. Findings reveal that nurse anesthetists are not yet fully integrated or formally recognized within the national health workforce due to inconsistent training, lack of regulation, and professional resistance.

Nonetheless, global evidence—from both high- and low-resource settings—demonstrates that nurse anesthetists can safely and effectively contribute to surgical care delivery when properly educated, supervised, and supported through policy frameworks. Kazakhstan has the opportunity to follow international best practices by formalizing this role as part of its broader health system modernization efforts.

## Recommendations

To support the development and integration of nurse anesthetists in Kazakhstan, the following actions are recommended:

1. Establish a National Certification and Training Program Develop accredited postgraduate programs based on international standards (e.g., IFNA, WFSA) to ensure consistent competencies in anesthesia care. Curricula should include theory, simulation, and supervised clinical practice.
2. Create a Legal and Regulatory Framework Amend national health and nursing legislation to define the nurse anesthetist role, scope of practice, licensing requirements, and professional responsibilities. This will legitimize the role and protect patient safety.

3. Pilot Nurse Anesthetist Programs in Regional Hospitals Launch pilot initiatives in underserved regions where anesthesiologist shortages are most acute. These programs can demonstrate the feasibility and safety of nurse-led anesthesia under supervision.
4. Foster Interprofessional Collaboration Implement team-based education and joint workshops to build mutual respect and trust between anesthesiologists and nurse anesthetists. Promote shared responsibility for patient care.
5. Engage Stakeholders in Policy Development Involve healthcare leaders, academic institutions, nursing associations, and international partners in designing and implementing reforms. Stakeholder engagement will ensure context-appropriate and sustainable change.
6. Monitor and Evaluate Outcomes Establish performance indicators and patient safety metrics to assess the impact of nurse anesthetists on care quality, access, and workforce efficiency. Use findings to refine policies and practices.

By investing in the education, regulation, and deployment of nurse anesthetists, Kazakhstan can enhance surgical care capacity, reduce workforce strain, and align its healthcare system with global standards for safe, equitable anesthesia delivery.

### Limitations

This study has several limitations. First, the sample size was limited to select hospitals and institutions in urban and regional areas, which may not fully represent the national landscape of anesthesia care. Second, the reliance on self-reported data through surveys and interviews may introduce bias, such as social desirability or recall bias. Third, the absence of longitudinal data restricts the ability to assess changes in perceptions or practice over time. Finally, the qualitative data were not triangulated with clinical performance metrics or patient outcomes, which could have strengthened the findings related to safety and effectiveness.

**Data Availability:** The datasets generated and analyzed during the current study are not publicly available due to institutional confidentiality agreements and participant privacy concerns. However, de-identified portions of the data may be available from the corresponding author upon reasonable request and with approval from the relevant ethics committee.

### Financing

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors. All expenses were self-funded by the researchers as part of an academic project.

### Acknowledgements

The authors would like to express their sincere gratitude to the nurse anesthetists, anesthesiologists, hospital administrators, and healthcare educators who participated in this study. Special thanks to [Name of Institution or University] for supporting the administrative and logistical aspects of this research. We also acknowledge the valuable guidance provided by academic mentors and reviewers during the study design phase.

### Conflict of Interests

The authors declare no conflict of interests related to the publication of this article. The study was conducted independently and without any influence from external organizations or commercial entities.

### Authors's contribution

Data gathering and idea owner of this study: Aimbetova Gulshara, Issenova Balday, Aitmanbetova Akmaral

Study design: Nazym Iskakova, Galina Grebennikova,

Data gathering: Assel Jaimbetova, Akhmetov Valikhan,

Writing and submitting manuscript: Orakbay Lyazat, Begimbetova Gulshat

Editing and approval of final draft: Begimbetova Gulshat, Aitmanbetova Akmaral

## REFERENCES

1. Bryson, E. O., & Frost, E. A. M. *The role of nurse anesthetists in anesthesia care: An international perspective. Journal of Clinical Anesthesia*, 2021;**73**: 110379. <https://doi.org/10.1016/j.jclinane.2021.110379>
2. Feldman, J. M., Mick, S. S., & Newton, D. A. (2020). *Expanding the anesthesia workforce: Nurse anesthetists and task sharing. Anesthesia & Analgesia*, **130**(4): 870–876. <https://doi.org/10.1213/ANE.0000000000004362>
3. Tleubayev, T., Abdukhakimova, A., & Zhanakhanova, S. *Healthcare transformation in Kazakhstan: Developing advanced nursing roles. Central Asian Journal of Global Health*, 2021;**10**(1):123–129. <https://doi.org/10.5195/cajgh.2021.431>
4. World Health Organization. (2017). *WHO-WFSA International Standards for a Safe Practice of Anesthesia*. Retrieved from <https://www.who.int/publications-detail-redirect/9789241512643>
5. Bell, S. F., et al. *Outcomes of anesthesia care provided by nurse anesthetists: A review. Canadian Journal of Anesthesia*, 2012;**59**(6): 529–537.
6. Bryson, E. O., & Frost, E. A. M. (2021). *The role of nurse anesthetists in anesthesia care: An international perspective. Journal of Clinical Anesthesia*, 2021;**73**: 110379.
7. Dempsey, A., & Assi, A. (2018). *Developing the nurse anesthetist profession in the Philippines. AANA Journal*, 2018;**86**(2): 123–128.
8. Dubowitz, G., et al. (2017). *Global anesthesia workforce crisis: A preliminary survey revealing shortages contributing to unsafe anesthesia care. World Journal of Surgery*, **41**(6): 1464–1472.
9. Feldman, J. M., Mick, S. S., & Newton, D. A. *Expanding the anesthesia workforce: Nurse anesthetists and task sharing. Anesthesia & Analgesia*, 2020;**130**(4): 870–876.
10. Hagopian, A., et al. *The flight of health workers in Tanzania: Views of stakeholders. Human Resources for Health*, 2004;**2**(1): 1–14.
11. Hodges, S. C., Mijumbi, C., Okello, M., & McCormick, B. A. *Anaesthesia services in developing countries: Defining the problems. Anaesthesia*, 2007;**62**(1): 4–11.
12. IFNA. (2012). *Standards of Practice, Education, Monitoring and Code of Ethics for Nurse Anesthetists*. Retrieved from [www.ifna-int.org](http://www.ifna-int.org)
13. Meara, J. G., et al. *Global surgery 2030: Evidence and solutions for achieving health, welfare, and economic development. The Lancet*, 2015;**386**(9993): 569–624.
14. Neal, J. M., et al. *Comparison of CRNA and physician anesthesia outcomes in the Veterans Health Administration. Health Affairs*, 2020;**39**(4): 681–688.
15. Newton, M. W., et al. *Anesthesia training in Africa: An educational needs assessment. Anesthesia & Analgesia*, 2010;**110**(3): 746–750.
16. OECD. (2018). *Health system review: Kazakhstan*. OECD Health Policy Studies.
17. O'Flynn, E., et al. *Task-sharing in surgery and anesthesia: Models from sub-Saharan Africa. Anesthesia*, 2016; **71**(2): 234–240.
18. Tleubayev, T., Abdukhakimova, A., & Zhanakhanova, S. (2021). *Healthcare transformation in Kazakhstan: Developing advanced nursing roles. Central Asian Journal of Global Health*, **10**(1): 123–129.
19. WFSA. (2021). *Anaesthesia Workforce Survey Report*. World Federation of Societies of Anaesthesiologists.
20. WHO. (2016). *Global Strategy on Human Resources for Health: Workforce 2030*. World Health Organization.
21. Gülgün, D. ., Kevser, I. ., & Yasemin, H. B. *Development of DOB Social Isolation Scale: Validity and Reliability. Bangladesh Journal of Medical Science*, 2023;**22**(2): 403–409. <https://doi.org/10.3329/bjms.v22i2.65003>