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Experiences of Clinical and Academic Anesthesia Professionals of the Essential Competencies Required for a BSc Degree in Anesthesia: A Qualitative Content Analysis

Zahra Yousefi[1], Solmaz Halakou[2*], Fozieh Bakhsha[2], Zahra Heidari[3], Fatemeh Rayeji[4]

[1]Department of Community Health and Aging, School of Nursing and Midwifery, Tehran University of Medical Sciences, Iran
[2]Department of Anesthesia and Emergency Medicine, Faculty of Paramedicine, Golestan University of Medical Sciences, Gorgan, Iran
[3]Department of Internal Medicine and Surgery, School of Nursing and Midwifery, Golestan University of Medical Sciences, Gorgan, Iran
[4]Department of the operating room, 5 Azar Hospital, Golestan University of Medical Sciences, Gorgan, Iran

***Corresponding Author:** Solmaz Halakou, Email: solmazhalakou@gmail.com

Abstract

Background: Anesthesia has undergone significant changes in recent years. Healthcare providers are required to assume multiple advanced roles due to increasingly complex patient needs and the expansion of anesthesia care, necessitating deeper knowledge and skills in anesthesia practice. This study aimed to explore the experiences of clinical and academic anesthesia professionals regarding the essential competencies required for a bachelor›s degree in anesthesia.

Methods: This qualitative content analysis was conducted in educational and medical centers of Golestan University of Medical Sciences in Iran from 2020 to 2021. Data were collected through semi-structured individual interviews with 16 clinical and academic anesthesia professionals, selected via purposive sampling. The interviews were transcribed and analyzed using conventional content analysis via MAXQDA-10 software.

Results: Data analysis yielded 24 subcategories, which were classified into 5 main categories including, core skills related to practical care, united effort to foster a positive interpersonal climate, ethical accountability, commitment to the hierarchy of learning and research, and physical appearance and potency.

Conclusion: Providing care to patients under anesthesia requires technical and critical skills that are inherently collaborative and multidisciplinary. Identifying current issues and trends concerning the competencies essential for a bachelor's degree in anesthesia can improve future preparedness for professionals in this field.

Keywords: Anesthesia, Competence, Professionals, Qualitative research, Iran

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Introduction

Approximately eight percent of people worldwide need anesthesia care annually for surgical and diagnostic procedures (1). Over the past 50 years, anesthesia has transformed significantly, evolving into modern practices that involve complex processes comprising thousands of micro-tasks (2,3). The nature of anesthesia care varies across countries due to geographical, legal, and organizational factors (4). Anesthesia was first professionally introduced in surgical procedures in the late 19th century in the USA, primarily administered by medical students or nurses (5). In Iran, Anesthesia was first proposed by Professor Jakob Eduard Polak, with anesthesia practices commencing in 1998, shortly after the establishment of Tehran Medical School (6). Sanclemente-Dalmau et al emphasized that the training and regulation of anesthesia professionals differ widely across countries (5).

In Australia, the anesthesia team typically consists of an anesthetist and a nurse anesthetist (7). In Spain, nurse anesthetists are not recognized as specialists, and their training and practice are illegal (5). In Iran, a Bachelor of Science in Anesthesia is equivalent to a nurse anesthetist (8), a branch of paramedical sciences. Graduates work in educational and treatment centers under the direct supervision of anesthesiologists (9). In many low-income countries, such as Ethiopia, Kenya, and Liberia, non-physician anesthesia providers are the only providers of anesthesia care, ensuring safe anesthesia for thousands of patients annually (7). The skills required for this profession vary widely around the world, influenced by

national history, training, regulations, and laws (5).

Despite the complexity of anesthesia management (10,11), bachelor's programs in anesthesia in Iran do not require a nursing background, and graduates often enter clinical practice without fully established professional competencies, presenting significant challenges (9). Given the increasing complexity of patient needs and the expansion of anesthesia services, healthcare providers are required to assume multiple advanced roles and gain deeper knowledge and skills in anesthesia practice (12,13). Despite improvements, the risk of mortality remains a concern, even among healthy individuals undergoing anesthesia with full facilities (14). It is essential in this profession to ensure healthcare providers have essential competencies in terms of knowledge, skills, and performance (15). Accordingly, this study aimed to explore the experiences of clinical and academic anesthesia professionals regarding the essential competencies required for a bachelor's degree in anesthesia.

Methods

This qualitative content analysis was conducted in the educational centers of Golestan University of Medical Sciences in Iran from 2020 to 2021. Participants included 16 clinical and academic anesthesia professionals selected through purposive sampling (Table 1). Inclusion criteria were having at least five years of clinical experience and the ability to articulate the experiences as either a professional in anesthesia or a colleague of one.

Data were collected through semi-structured individual interviews. A member of the research team, who was a faculty member in the Anesthesia Department of the Faculty of Paramedical Sciences, conducted the interviews. Before the formal interview sessions, participants were provided with necessary explanations about the objectives of the study, and consent for recording the interviews was obtained. Participants were allowed to choose the time and place of the interviews at their convenience to facilitate a comfortable environment for sharing their experiences and perceptions. Each interview lasted between 50 and 75 minutes (average: 62.5). Interviews continued until data saturation was achieved.

The researcher initiated each interview with a general question to encourage participants to share their experiences. The first open-ended question served as a warm-up: "Would you please describe your experience of working as an anesthesia professional in the bachelor's program?". Then, the main question was asked: "What are the essential professional competencies required for the bachelor's degree in anesthesia in a clinical setting based on your experience?" To clarify any ambiguities, further probing questions such as "What do you mean?" were asked.

Data were implemented and analyzed using MAXQDA-10 software. The interviews were analyzed using conventional content analysis, which involves analyzing written, verbal, and visual messages. The analysis process followed three phases: preparation, planning, and reporting (16).

Based on Granheim's analysis steps, the preparation stage involved treating qualitative data as the unit of analysis. Data were reviewed multiple times, paragraph by paragraph and line by line, to develop a general and comprehensive understanding. Selected segments of the interviews were analyzed for meanings and codes. Codes with semantic similarity were grouped to form subcategories. Main categories were then created based on the arrangement of subcategories, ensuring high

Table 1. Demographic characteristics of participants

Participant code	Occupation	Setting	Gender	Level of education	Experience (year)	Age (year)
1	BSc in anesthesia	OR	Male	Masters's degree	20	42
2	BSc anesthesia	OR	Male	Bachelor's degree	23	45
3	Anesthesiologist	OR	Male	MD	18	43
4	Faculty member	Paramedical School	Male	Masters's degree	28	54
5	Faculty member	Paramedical School	Female	Masters's degree	28	56
6	Faculty member	Nursing School	Male	Masters's degree	29	55
7	BSc anesthesia	OR	Female	Bachelor's degree	7	30
8	Faculty member	Nursing School	Male	Masters's degree	29	51
9	Faculty member	Paramedical School	Male	Masters's degree	27	56
10	Faculty member	Paramedical School	Female	Masters's degree	10	35
11	Anesthesiologist	OR	Male/Man	MD	18	45
12	Anesthesiologist	OR	Female	MD	16	44
13	BSc anesthesia	OR	Female	Bachelor's degree	6	30
14	BSc anesthesia	OR	Male	Bachelor's degree	14	35
15	BSc anesthesia	OR	Female	Masters's degree	11	33
16	BSc anesthesia	OR	Male	Bachelor's degree	5	27

OR, Operating room

homogeneity within categories and heterogeneity among different groups (17,18). According to this approach, the text of the interviews served as the unit of analysis. Meaning units and codes were extracted from the manuscripts, with similar codes clustered into subcategories. By contrasting the subcategories, related ones were merged to create main categories.

To ensure rigor and validity, the criteria proposed by Lincoln and Guba were applied (19,20). To enhance credibility, the researcher established prolonged engagement with the data, dedicating sufficient time to collect and analyze the data for more accurate and deeper insights. Furthermore, through an external check, the results and analyses were presented to external observers for feedback to ensure that the researcher's interpretations aligned with others' understandings. Supplementary opinions from research team members were also utilized. For dependability, other members of the research team reviewed and re-read the categories to compare them with the initial categorizations. Moreover, the researcher provided a detailed description of the research context, including participant characteristics, sampling methods, and the time and place of data collection, allowing readers to assess the transferability of the findings. To increase confirmability, the researcher meticulously documented all stages of the research, enabling others to review the steps and audit the process.

Results

The mean age of the participants was 43.18 ± 10.82 years, with a minimum age of 23 and a maximum of 51. Their clinical experience ranged from 5 to 29 years. The participants' demographic characteristics are presented in Table 1.

A total of 24 subcategories and 5 main categories were identified (Table 2). Due to limitations in presenting all open codes, the category formation process is detailed in Table 3.

Core skills related to practical care

This category comprised 7 subcategories including "nursing practice ability", "the ability to work with anesthesia equipment", "recognition and use of anesthetic drugs and emergency trolley", "airway management skills", "proper patient admission in the pre-anesthesia stage", "appropriate patient care and monitoring during anesthesia", and "specialization in the recovery unit".

Participants emphasized the practical nature of the anesthesia profession. One participant noted the importance of proficiency in basic nursing skills:

"In the bachelor's program in anesthesia, some skills are similar to those of the nursing profession indicating acquiring enough nursing knowledge. For example, we know how to obtain a thorough patient history, insert the IV line, perform blood transfusions, monitor vital signs, etc." (Participant 2).

Table 2. Overview of main categories and subcategories

Number	Category	Subcategory
1	Core skills related to practical care	Nursing practice ability The ability to work with anesthesia equipment Recognition and use of anesthetic drugs and emergency trolley Airway management skills Proper patient admission in the pre-anesthesia stage Appropriate patient care and monitoring during anesthesia Specialization in the recovery unit
2	United effort to foster a positive interpersonal climate	Effective communication Holistic view in patient care Cultural interaction Appropriate leadership behavior Stress management skills Supportive behavior in caring Teamwork
3	Ethical accountability	Ethical knowledge and respectful demeanor Responsiveness to the patient's ethical needs Adherence to ethical principles
4	Commitment to the hierarchy of learning and research	Theoretical and factual anesthesiology and nursing knowledge Commitment to lifelong learning Involvement in education and teaching Evidence-based learning Adherence to transformative learning/ research
5	Physical appearance and potency	Absence of physical disability Adequate physical strength

Participants highlighted essential aspects of anesthetic care, including pre-anesthesia patient admission, patient transfer, monitoring, resuscitation, and the recognition and application of various oxygen masks. They also emphasized airway management techniques such as intubation and the use of laryngeal mask airway (LMA), including the selection of appropriate models and sizes. In addition, the participants discussed the identification and utilization of laryngoscopes, including different blade types and models, as well as maneuvers for maintaining airway patency across diverse patient populations, including adults, infants, children, and pregnant individuals. Proficiency in the use of nasogastric (NG) tubes, as well as techniques for gavage and suction, was also highlighted.

"Airway management is a broad term. It includes everything from a baby's oxygen needs to the use of ventilators and related devices. As a professional in anesthesia, I can manage these aspects; for example, when a patient suffers from hypoxia or shortness of breath, I must know how to connect the oxygen cannula and determine the appropriate flow rate" (Participant 1).

United effort to foster a positive interpersonal climate

This category included some subcategories such as "effective communication", "holistic view in patient care", "cultural interaction", "appropriate leadership behavior",

Table 3. An example of a category creation process

Meaning unit	Condensed meaning unit	Code	Subcategory	Main category
"I, as a professional in anesthesia, first consider the patient as a human being with multiple psychosocial and physical dimensions" (Participant 11).	Attention to psychological, social, and physical dimensions	Attention to all dimensions of the client	Holistic view in patient care	Interpersonal climate
"The ability to communicate is an important issue implying that a BSc in anesthesia must be able to communicate well with the patient or the patient's companion, because this person may be one of the first who deals with the patient, and he/she should know the art of communication, which helps to get the proper information from patients and calm them" (Participant 1).	Ability to communicate with the patient or the patient's companion by receiving appropriate information from the patient and creating a comfortable environment	Creating a pleasant atmosphere through the art of communication	Effective communication	

"stress management skills", "supportive behavior in caring", and "teamwork".

"I, as a professional in anesthesia, first consider the patient as a human being with multiple psychosocial and physical dimensions" (Participant 11).

Participants emphasized the importance of providing clear explanations about anesthesia procedures and educating patients on recovery and equipment.

"For example, when I conduct spinal anesthesia, I inform the patient about the advantages and disadvantages of this method compared to others" (Participant 15).

Managing stress for optimal performance, the impact of patience and tolerance on performance, time management, cultural sensitivity, being intelligent, being able to properly recognize weaknesses, defects, and problems, being interested in the profession, and paying attention to psychosocial dimensions were also pointed out.

«Psychologically, We should not keep patients alone and isolate them. We should be able to ask questions in simple language and with cheerful behavior to gain their trust, which is influenced by surgeons and anesthesiologists. This stems from psychological issues" (Participant 13).

Ethical accountability

The subcategories related to ethical accountability were "ethical knowledge and respectful demeanor", "responsiveness to the patient's ethical needs", and "adherence to ethical principles".

Participants emphasized the importance of altruism, respect for patient rights, conscientiousness, maintaining patient privacy, demonstrating commitment and responsibility, adhering to appropriate professional attire, respect for patients, adherence to ethical human considerations and confidentiality, avoiding the misuse of drugs and materials, respecting colleagues, and being honest.

"A BSc in anesthesia considers the patient's condition and privacy. For instance, when a woman is on the operating table, the male staff must be aware of the need to respect her privacy. This reflects various aspects of professional and scientific beliefs, such as discipline and ethical commitment" (Participant 10).

Commitment to the hierarchy of learning and research

This category consisted of 5 subcategories including "theoretical and factual anesthesiology and nursing knowledge", "commitment to lifelong learning", "involvement in education and teaching", "evidence-based learning", and "adherence to transformative learning/research".

Participants expressed the need for continuous training programs to improve clinical skills, particularly regarding advanced equipment. They suggested revising the educational curriculum to align with job descriptions.

"Unfortunately, there are several flaws in the curriculum; for example, neurological diseases are covered in one semester, followed by anesthesia considerations for those diseases, which is pointless. When I do not know something, I have to study. We need to align the curriculum with practical applications" (Participant 3).

"Currently, there are updated, advanced equipment models available, such as fiber optic devices and arterial line monitoring systems. While devices that measure the depth of anesthesia have been in use, they are now becoming more common in our practice, resulting in increased accessibility. However, many staff members experience challenges in using these technologies. Therefore, training programs should be developed to facilitate ease of use with these devices" (Participant 15).

Participants emphasized the importance of optimizing the use of their skills and abilities to enhance the effectiveness of the workforce. They highlighted the need for improved conditions for education and employment in areas such as pain management and nursing. Furthermore, they advocated for ongoing education, professional development, and the promotion of psychological, scientific, and educational competencies. Participants also stressed the significance of obtaining professional licenses, conducting scientific and practical evaluations, and making ethical decisions regarding recruitment and promotion after graduation.

«Graduation alone is not enough; everyone must receive training to obtain a work permit in their field" (Participant 2).

«When I am not monitoring the patient as an anesthesiologist in the operating room, I expect the anesthesiologist to at least know how to reliably change the blood pressure of an anesthetized patient by 25% or avoid administering ketamine to a patient experiencing seizures. Unfortunately, we have graduates who struggle

to apply their learning in practice» (Participant 3).

Regarding adherence to transformative learning and research, participants emphasized the need to improve research capabilities among anesthesiologists.

"Research is primarily focused on universities, and unfortunately, very little attention is given to research in hospital settings; specific cases require further investigation" (Participant 12).

Physical appearance and potency

The extracted subcategories included "absence of physical disability" and "adequate physical strength". Participants noted that individuals pursuing this profession must meet certain physical criteria to ensure effective performance. Specifically, continuous care would lead to health maintenance.

"Sometimes the process of anesthesia becomes long and tedious; in these cases, it appears that a person who is physically disabled and has poor physical strength does not perform well, which affects their overall performance" (Participant 7).

"A few years ago, I had a student who always covered her hands and refused to show them. Later, I found out that one of her hands was completely paralyzed. She struggled with tasks such as inserting the angiocath and masking the patient. Another student had very poor eyesight. Although he was very intelligent, his vision impairment led to a change in his field of study based on the educational system's recommendations and my talks with his parents. To avoid these problems, comprehensive physical examinations must be done for people who want to enter this profession - examinations which are unfortunately lacking in our country. Those who become anesthesiologists mustn't have significant physical limitations. Currently, one of our colleagues in the hospital has difficulty walking which severely hampers her ability to perform effectively in emergency situations (Participant 5).

Discussion

This study explored the experiences of clinical and academic anesthesia professionals regarding the necessary competencies required for a bachelor's degree in anesthesia. The main extracted categories included *core skills related to practical care*, *united effort to foster a positive interpersonal climate*, *ethical accountability*, *commitment to the hierarchy of learning and research*, and *physical appearance and potency*.

Professional competencies are vital for the quality of anesthesia care and patient safety (1). Vand Tamadoni et al reported that clinical skills are essential competencies for nurses (21). Jeon et al. also emphasized the need for anesthesia team nurses to possess sufficient knowledge about anesthesia techniques, care priorities, and the evaluation of anesthesia-related problems (22). These findings align with the results of the current study. Shondell et al. noted that nurses often lack sufficient awareness of various aspects of anesthesia and its complications (23). It has been established that clinical competence alone is insufficient for ensuring safe performance. Essential competencies should also include non-technical and interpersonal skills that contribute to safe and efficient clinical practice (24).

One of the key categories identified in this study was the united effort to foster a positive interpersonal climate. LYK Jensen et al. highlighted the significance of social, cognitive, and emotional skills as non-technical skills for nurse anesthetists in the operating room (25). The operating room is a high-stress environment where patients are exposed to aggressive actions, and interpersonal conflicts may arise as healthcare professionals from different fields work together in the operating room (26). Patient safety in the operating room relies on the cordial and efficient working relationships among all members of the anesthesia and surgical teams (27, 28).

In the complex operating room environment, postoperative team members must communicate effectively and collaborate as a cohesive unit to ensure safe, high-quality care. The lack of collaboration among specialists can lead to inefficiency, increased stress, and suboptimal patient care (29). Stucky et al reported that perioperative nurses play a critical role in providing safe and effective surgical care. While nurses do not bear sole responsibility for patient care outcomes, they are essential in fostering a culture of safety, prevention, and protection in the operating room. Supporting patients during their most vulnerable moments post-surgery is a fundamental duty of nurses (28).

Another critical competency identified in this study was ethical accountability. Participants stressed the importance of adhering to ethical standards in patient care, including acquiring ethical knowledge, showing a respectful demeanor, having a sense of responsibility for patients' moral needs, and complying with religious principles.

Given the unique job characteristics in nursing and anesthesia, the necessity for ethical behavior is especially pronounced among anesthesiologists and their patients (26). Healthcare providers need to develop a broad understanding of their values and predict the effects of ethical principles on their professional performance. This understanding is crucial for defending their decisions in ethical dilemmas, while striving to improve and expand the quality of patient care (26). Overall, education should be built upon these principles to ensure that practitioners are familiar with the ethical, legal, and professional standards of their field and act in accordance with these standards in clinical settings.

One of the main categories identified in this study was

commitment to the hierarchy of learning and research. Averlid asserted that professional promotion is grounded in evidence-based research and performance. Continuous improvement of professional skills in response to ongoing technical changes and innovative team-based methods is essential for healthcare systems (30). Nichting emphasized that managers should create an appropriate environment for continuing education and professional development based on the skills and knowledge of healthcare providers (31). These findings are in line with the current study's results.

Nowadays, all professions require evidence-based research for progress and maturity (32). Participants in the present study identified empowerment in research as a necessary competency for anesthesiologists. Nurses should base their practices on credible evidence and research-informed care. In a study on nurse anesthetists, Sjöberg found that research and quality improvement scored low, indicating their limited importance to the nurses surveyed (33).

Finally, participants highlighted physical appearance and potency as a significant competency. The focus was primarily on the absence of physical disability, proper height, and sufficient strength to perform the duties. The findings from this study suggested that as anesthesia professionals are responsible for critical tasks, physical fitness is an important competency required for this profession. Melnyk et al. reported that physical health is closely related to mental health, and personnel with better physical health can deliver higher-quality services (34). These findings align with those of the present study.

Limitations of the study

The limitations of this study were the time-consuming nature of the interview process resulted in some potential participants declining to participate due to their workload. Consequently, participants were asked to select a time convenient for them for conducting the interviews.

Conclusion

Identifying professional competencies is essential for developing more successful and efficient educational, therapeutic, and research programs. Caring for patients under anesthesia requires highly technical approaches and effective multi-professional teamwork. Therefore, individuals interested in pursuing a career in this field must acquire the necessary professional competencies. Understanding current issues and trends regarding the competencies required for a bachelor's degree in anesthesia can enhance future insights and better prepare individuals for roles in this profession.

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Authors' Contribution

Conceptualization: Solmaz Halakou, Fozieh Bakhsha
Data curation: Solmaz Halakou, Zahra Yousefi
Formal analysis: Solmaz Halakou, Zahra Yousefi
Investigation: Solmaz Halakou, Zahra Yousefi, Fozieh Bakhsha
Methodology: Solmaz Halakou, Zahra Yousefi
Project administration: Solmaz Halakou, Zahra Yousefi
Resources: Fozieh Bakhsha, Zahra Heidari, Fatemeh Rayeji.
Software: Solmaz Halakou, Zahra Yousefi.
Supervision: Solmaz Halakou, Zahra Yousefi.
Validation: Solmaz Halakou, Zahra Yousefi.
Visualization: Solmaz Halakou, Zahra Yousefi, Fozieh Bakhsha, Zahra Heidari, Fatemeh Rayeji.
Writing–original draft: Solmaz Halakou.

Competing Interests

The authors declare that there is no conflict of interest.

Ethical Approval

This study is part of a larger research project approved by the Deputy for Research of Golestan University of Medical Sciences, with the ethical code IR.goums.REC.1395.251.

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