



# Attitudes of Anesthesiology Postgraduate Residents Toward the Influential Factors in Their Success in the Iranian National Board Exam

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## Abstract

**Background:** One of the prominent indicators of academic success in postgraduate medical education is the “Residents’ Pass Rate” in the “National Board Exam.”

**Objectives:** This study was designed and implemented to assess the attitudes of the anesthesiology residents toward factors affecting their success in the National Board Exam.

**Methods:** After the Institutional Review Board (IRB) approval, in an attitude assessment study, 20 of the 21 recently graduated anesthesiology residents were asked about the factors affecting their success quantitatively and qualitatively. A self-administered questionnaire with 19 closed questions and a personal virtual WhatsApp Messenger<sup>®</sup> interview were used for the study.

**Results:** The respondents’ viewpoints demonstrated that a step-by-step multifaceted integrative program in combination with psychological support (both from the family and the department) and individual motivation positively affected their success and their endurance to overcome the high load of the mandatory texts. In contrast, unplanned stressors leading to program shifts (mainly due to COVID-19) had adverse effects on their success.

**Conclusions:** Anesthesiology residents believed that a well-designed and appropriately implemented study plan with psychological support and personal motivating factors could facilitate passing the National Board Exam, and unplanned external stressors could hinder it.

**Keywords:** Graduate, Medical Education, Anesthesiology, Mentor, Residency, Iran

## 1. Background

Motivational factors have always attracted the attention of medical education researchers, both in undergraduate and postgraduate training (1). Motivational theories are discussed under different names and philosophies with important methods for their application, including the following (2, 3):

- Expectancy-value
- Attribution
- Social-cognitive
- Goal orientation
- Self-determination

Besides, motivational factors are known as intrinsic vs. extrinsic motivation (2). Whatever we choose from a list of different explaining theories, the outcome assessment is not a simple task and mandates measurement tools (2-4) such as the “learners’ perception” (5).

There are different approaches to increasing graduate medical students’ motivation (4). Motivation is both an “independent factor” affecting the outcome and a “dependent factor” regulated by a list of variables (3, 4, 6). Previous studies in Iran confirmed the positive role of a supportive environment in improving education outcomes (7-9).

The residency program in the Department of Anesthesiology and Critical Care (DACC), School of Medicine, Shahid Beheshti University of Medical Sciences (SBMU), Tehran, Iran, had a Medical Education Reform Project (MERP, DACC; SBMU) (8-10). One of the main areas of this reform plan was the anesthesiology residency program; among the prominent indicators of academic success in postgraduate medical education, the “Residents’ Pass Rate” in the “National Board Exam” (8-11) and the “Relative Annual Pass Rate” (RAPR) in the National

Board Exam (NBE) were considered as an important indicator and was defined as:

The Relative annual pass rate (RAPR) = pass rate of SBMU anesthesiology residents/pass rate of the National Board of Anesthesiology (8).

The MERP led to a stepwise increase in RAPR over four years (8). In the final year of this four-year interval, the success rate increased to 100%, while it was 50% in the first year, as presented and discussed in detail in other studies (8-10). However, among the factors leading to this result, the residents' viewpoints were the most important ones (8, 11-14). Therefore, to investigate the "learners' view," we conducted this study.

## 2. Objectives

This study was designed and implemented to assess the experiences and attitudes of the recently graduated anesthesiology residents regarding motivational factors affecting RAPR in NBE of anesthesiology.

## 3. Methods

This study was approved by the Research Ethics Committees of the Vice-Chancellor in Research Affairs, Shahid Beheshti University of Medical Sciences (approval date: 2021-05-02).

The current cross-sectional study included a self-administered written questionnaire with closed questions and a personal virtual WhatsApp Messenger® interview which was performed at the Department of Anesthesiology and Critical Care (DACC), Shahid Beheshti University of Medical Sciences (SBMU), Tehran, Iran in October 2021.

### 3.1. Ethical Approval

Ethical approval for this study (Ethical Committee IR.SBMU.SME.REC) was granted by the Research Ethics Committees of Vice-Chancellor in Research Affairs, Shahid Beheshti University of Medical Sciences, Tehran, Iran (Chairperson Prof. M. Rezaei Tavirani) on 2 May 2021, and was registered as [IR.SBMU.RETECH.REC.1400.074](#).

### 3.2. Sampling Method

The target population was all graduate "anesthesiology residents" who participated in the NBE of anesthesiology in September 2020, i.e., 21 residents. All were considered subjects except one who refused to participate. Others agreed to take part in the study. Therefore, we used a census method for sampling, and the "target population" and the "sample size" became equal

(i.e., including all people in the target population). It would increase the internal validity of the results, though due to the small number of the target population, the external validity may not be strong enough.

In this medical education research study, two methods of assessment were used: The quantitative method included an attitude assessment questionnaire with closed questions, and the second step was the qualitative method which included individual interviews with open questions. The questions in the interview were considered short-sentence questions with an open format; the reply to these questions was not predesigned, and the participants could use their own words, ideas, and reply templates. These questions covered areas not included in the closed attitude assessment questionnaire. Also, these open questions were performed as a separate interview to let the respondents feel free for any needed potential individual explanations which might be too lengthy to be written in the questionnaire as open questions.

Using a Delphi study (15, 16), the main topics related to positive and negative factors for the residents' success were asked. Then, among the responses, a list of statements was retrieved. These statements were divided into supporting and hindering factors, which were integrated into the anonymous questionnaire. The questionnaire was sent to all 20 participants electronically and was sent back anonymously by the subjects. Using a five-point Likert scale, the questions ranged from strongly agree to strongly disagree. The questionnaire did not have any identifying section.

A self-administered anonymous questionnaire was used for the quantitative part of the study (Appendix 1 in the Supplementary File). The questionnaire included 19 open questions for the quantitative part of the study. Still, the open question of the questionnaire and the individual interviews were used for the qualitative part of the study. However, the respondent's age and gender were not included in the questionnaire to maintain the anonymity of the replies.

Regarding the qualitative attitude assessment, we used a "grounded theory" approach, i.e., the trainee was asked to answer a personal virtual interview performed by WhatsApp Messenger®. The rationale for using this messenger was the need for individual interviews with the respondents considering the need for social distancing during the COVID-19 pandemic. These interviews included two main voice questions:

(1) Please name the main facilitating factors leading to your success (both personal and team success, with a maximum of the three most important ones)

(2) Please name the main discouraging barriers against your success (both personal and team success, with a

maximum of the three most important ones)

All 20 residents replied individually and in a virtual conversation privately.

### 3.3. Statistical Analysis

Data entry and analysis were performed using SPSS (version 11.5, SPSS Inc, Chicago, IL, USA). The study results in the quantitative part (i.e., the responses in the questionnaire) were collected and analyzed as a cumulative data set. We used “mean  $\pm$  standard deviation” for each question. However, Cronbach’s alpha was calculated to test the reliability of the questionnaire.

## 4. Results

The study results are presented as quantitative (Table 1) and qualitative (Box 1) results.

According to Table 1, among 19 questionnaire questions, only three of the respondents’ mean attitudes scores were less than 3 (neutral). However, the mean results for the respondents’ attitudes scores were more than 3 from 5 (i.e., they were neutral in this item).

The results of Q1 and Q9 demonstrated that a step-by-step inclusive program was important in the residents’ success, including a constant and programmed physical site (Q1), the daily scheduling for studies, and the periodical in-training exams (Q9).

The results of Q16 and Q19 partly demonstrated the impact of COVID-19 on the participants. Q16 demonstrated the role of unplanned changes in the board exam schedule due to COVID-19 urgency. However, the results of Q19 could not determine the clear role of the potential stress due to the designed program for the residents. It seems that Q19 was not a discriminating question, and both positive and negative impressions could be drawn due to the less than three results based on the Likert scale.

Meanwhile, the challenges imposed by COVID-19 on the exam schedule significantly affected the respondents’ exam performance, as mentioned in Q15. This included the potential and real stresses that occurred in the exact timing of the inclusive program, and Q18 addresses the psychological stress caused by uncertain exam fate due to COVID-19. Both questions demonstrated the potentially hazardous role of a definitive and change-free schedule for the residency program.

The results of Q2, Q3, Q6, Q10, and Q11 demonstrated that motivational factors significantly affected the residents’ success. Intrinsic motivations, the desire to be prominent among academic peers (Q2, Q3, and Q6), motivational support sessions, support team sessions, and personal psychological support by mentors and the department head (Q10 and Q11) were important.

On the other hand, the results of Q4 and Q5 demonstrated the role of family support for residents’ success in their viewpoints (including both parental support and spousal support). However, the results of Q7 and Q8 were in favor of the positive role of the exam on the future fate of the respondents’ careers and marriage. At the same time, the potential stress due to the impact of exam results on the future marriage fate in the single subjects was considered a significant determining role (Q12). Meanwhile, the majority of the respondents believed that the potential stress imposed by the exam on the future fate of their family (spouse and children) and their professional career was a significant determinant of their success/failure (Q13 and Q14). Q17 demonstrated the role of social media (mainly WhatsApp Messenger® groups) in implementing the step-by-step inclusive program and creating a support milieu.

The qualitative trainee attitude assessment results in the personal virtual WhatsApp Messenger® interview demonstrated the most important supporting and discouraging factors leading to residents’ success (personal and team success). The main supportive factors included the study program and its “supporting items,” especially the program to overcome the high load of the mandatory exam texts. The main discouraging factors included the main obstacles and challenges in the proper implementation of the continuity of the study, which COVID-19 generally generated, and the great ambiguous effect of the exam fate on the study program (Box 1).

## 5. Discussion

The results of this study demonstrated that based on the attitudes of the anesthesiology residents, DACC, SBMU, the implementation of an integrated, multifaceted, step-by-step, all-inclusive program was associated with a full psychological, family, and departmental supportive milieu and a significant role in their performance in passing the National Board Exam. These findings are generally consistent with domestic and international studies (6, 8-10, 13, 17, 18).

Mental concentration is an influential factor in all the latter concepts, including a continuous stepwise mentor-based program with daily feedback and psychological support, known as “system-based interventions” associated with “psychological support.” This multifaceted integrated approach is one of the best stress-easing strategies for anesthesiology residents, which can improve brain health and functions (19, 20). Our results were consistent with the previous hypotheses that trainees believed these strategies helped them ease tensions and achieve their educational goals. The study’s

**Table 1.** The Quantitative Assessment Results, i.e., Answers to a Self-administered 5-Scale Likert Questionnaire with 19 Closed Questions of 20 Participants: 1= Strongly Disagree, 5 = Strongly Agree

Variables	Mean ± SD
Q1	3.70 ± 1.418
Q2	3.95 ± 1.146
Q3	3.75 ± 1.020
Q4	4.15 ± 1.137
Q5	4.25 ± 1.070
Q6	4.25 ± 1.020
Q7	4.50 ± 0.607
Q8	2.55 ± 1.050
Q9	4.70 ± 0.470
Q10	4.00 ± 1.026
Q11	4.70 ± 0.470
Q12	2.80 ± 0.768
Q13	3.40 ± 1.273
Q14	3.45 ± 1.395
Q15	4.15 ± 1.268
Q16	4.25 ± 1.164
Q17	3.90 ± 1.334
Q18	4.10 ± 1.119
Q19	2.50 ± 1.051

**Box 1.** The Results of the Two Qualitative Questions in the Private Interview by WhatsApp Messenger®

Details
The main supportive factors leading to your success (both personal and team success a maximum of the three most important ones).
The main supportive factors leading to your success (both personal and team success a maximum of the three most important ones). The regular daily program for studying with ongoing feedback from mentors and department managers Perseverance in daily studying according to the program to overcome the high load of the mandatory texts. The supportive role of mentors. The supportive role of department managers. The supportive role of the family.
The main discouraging factors hindering your success (both personal and team success a maximum of the three most important ones). Psychological stresses of the COVID-19 pandemic. Unplanned changes in the exam calendar due to the COVID-19 surges. Significant uncertainty of the influence of the exam outcomes on the study program.

quantitative and qualitative results confirmed this (Table 1 and Box 1).

This study was one of the topics related to MERP. As discussed in another study, MERP included four major domains: Education, research, services, and personal and professional development (6, 8-10, 15, 16). The first field, i.e., education, is subdivided into the following items: Teaching method, passing comprehensive exams, mentorship, assessment methods, faculty development, professionalism in medical education, integration in education, crisis management, and competency-based medical education (6, 8-10, 15, 16). The current study dealt with the aspects mainly related to the education fields of MERP, especially those related to graduate learners.

Previous local and international studies supported some results of this study, though there were some inconsistencies (8-10, 13, 14, 16, 21). These findings were supported by the qualitative trainee attitude assessment results in the virtual WhatsApp Messenger® interview (Box 1).

For example, the residents' attitudes towards Q1 demonstrated one of the tangible measures of this concentration, i.e., "programmed schedule for studying in a specific and constant library-study hall." On the other hand, the "psychological support by the family members, mentors, and department heads" were indices of the basic concept of concentration. The unplanned changes in the exam schedule due to COVID-19 were indexes of

the negative effects of stressors on the trainees. These findings paragraph are supported by similar studies (22-26). Also, the results of Q9 and Q16 favored the importance of supportive stepwise programs, while Q15 and Q18 addressed the role of stressors on final success. Meanwhile, the qualitative study results favored the role of supportive stepwise programs. However, some studies concluded that “although trainee stress could be controlled by good health, mental health, and multimodal support, this stress cannot be completely overcome” (22).

Since the respondents were postgraduate trainees, their social life patterns had special considerations, including family support (both parental and spousal support), being single or married, and the role of the exam in their professional future (Q4, Q5, Q7, Q8, Q12, Q13, and Q14). Social networks can provide psychological support, as Q17 demonstrated. Here, we mainly studied the role of WhatsApp Messenger® which was in concordance with similar studies (27-29).

Although some controversies exist, several studies demonstrated that motivational factors work in concordance with psychological factors in improving academic performance and success in medical education studies. Meanwhile, the design and implementation of a “study strategy” can lead to improved “motivation and academic performance” (3, 30-32).

The current study was in concordance with other similar studies regarding the role of motivational factors, psychological support, and implementation of a stepwise multifaceted program affecting the success, including the results of Q2, Q3, Q6, Q10, and Q11 and the results of the qualitative interview (13, 17, 19, 20, 31).

However, the improved success rate in passing the national board exam was one piece of a larger puzzle. The academic reform program, or simply the academic improvement policy (33-35), and the experience of previous studies in DACC, SBMU are generally consistent regarding the educational outcomes after several years of the reform process (8-10, 16).

Finally, regarding the practical implications of this study, the results of this study on the attitudes of the anesthesiology residents (DACC, SBMU) demonstrated the important role of an integrated, multifaceted step-by-step all-inclusive approach which was associated with full psychological, family, and departmental support, leading to a decisive role in improving their performance in passing the National Board Exam. Regarding the theoretical contribution of this study, many supportive elements could be considered in the training of adult-age trainees.

### 5.1. Study Limitations

(1) The sample size of our study was only 21, while 20 residents took part. However, since this was an attitude assessment study of the effect of a targeted educational program, only those who were in the program were asked to express their attitudes or participate in the interviews.

(2) Although this study demonstrated the benefits of the mentioned approach, this program needs to be practiced for several years to be upgraded and maintain the results.

(3) Assessment of the practice of the residents after their graduation can be a good supplement to this study which was not implemented at the time of the research.

(4) The external validity of the study was not strong, mainly due to the small number of the target population.

### 5.2. Conclusions

Passing the National Board Exam is among the most important targets in residency programs. Based on the viewpoints of the trainees (i.e., residents of DACC, SBMU), the late significant results in DACC, SBMU were considered as an aggregate outcome of an integrated, multifaceted step-by-step program, added with psychological support and motivational factors. This can conquer the formidable barrier of a 100 percent pass rate in the National Board Exam (compared with a rate of about 50% nationally).

### 5.3. Recommendations for Future

We propose the following agenda for future studies:

(1) Design studies at a national level both to increase the sample size and to improve the external validity

(2) Future studies could improve the questionnaire using the results of this study

(3) This study could be designed and performed for several years to assess long-term results

(4) Clinical performance after graduation is an important factor that could be assessed in future studies to assess the effect of such supportive programs on the clinical performance of the residents.

### Supplementary Material

Supplementary material(s) is available [here](#) [To read supplementary materials, please refer to the journal website and open PDF/HTML].



## Footnotes

**Authors' Contribution:** S. A. participated in the study design, preparation, and final manuscript review. Z. K. participated in the study design, preparation, and final manuscript review. A. D. participated in the study design, study implementation, study preparation, data collection, data analysis, primary manuscript draft preparation, and final manuscript review.

**Clinical Trial Registration Code:** It was not declared by the authors.

**Conflict of Interests:** The authors declare that they have no conflict of interest.

**Data Reproducibility:** The dataset presented in the study is available on request from the corresponding author during submission or after publication. The data are not publicly available because they include the study participants' opinions.

**Ethical Approval:** Ethical approval for this study (Ethical Committee IR.SBMU.SME.REC) was granted by the Research Ethics Committees of Vice-Chancellor in Research Affairs, Shahid Beheshti University of Medical Sciences, Tehran, Iran (Chairperson Prof M. Rezaei Tavirani) on 2 May 2021 and coded [IR.SBMU.RETECH.REC.1400.074](https://doi.org/10.1007/s10073-021-00074-4).

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