RESEARCH ARAŞTIRMA

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Self-Efficacy Perceptions of Ophthalmology Residents on Cataract Surgery: A Qualitative Case Study

Göz Hastalıkları Asistanlarının Katarakt Cerrahisi Üzerine Öz Yeterlik Algıları: Nitel Bir Olgu Çalışması

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ABSTRACT Cataracts continue to be an important cause of blindness in the world. The unique treatment of cataract is surgery. Self-efficacy plays an important role in learning new skills and knowledge. Since surgical outcomes depend on the skills and confidence of the ophthalmologist who performed the operation, it carries a crucial role in improving self-efficacy in ophthalmology residents. The aim of the study is to reveal ophthalmology residents' self-efficacy and needs in cataract surgery in a university hospital. Qualitative research designed to reveal ophthalmology residents' self-efficacy in cataract surgery. Individual interviews were conducted with 7 residents and one expert. The interviews were held between April and May 2023. Four themes emerged after thematic analysis. 1) The value of cataract surgery for ophthalmology residents; 2) The factors affecting self-efficacy; 3) The structure of postgraduate medical education in ophthalmology; 4) The role of self-directed learning on self-efficacy in postgraduate medical education. The results show that cataract surgery is the major surgery for residents and experts for an ophthalmologist. The self-efficacy perceptions are based on the cataract surgery number which primarily residents managed. The international recommendations on the number of cataract surgeries for ophthalmology training were similar to residents' expectations. The structure of ophthalmology residency may need to be considered again. Self-directed learning is one of the factors affecting self-efficacy in residents. Simulation-based training in residents training may be the best way to ensure gaining and assessing competency in cataract surgery.

Keywords: Self-efficacy; residency; medical education; professionalism

ÖZET Katarakt dünyada körlüğün önemli bir nedenidir ve tek tedavisi ameliyattır. Ameliyat sonuçları, ameliyatı gerçekleştiren cerrahın becerisi ve kendine olan güvenine bağlı olduğundan, oftalmoloji asistanlarının öz yeterliliğini artırmada katarakt cerrahisi becerisinin kazandırılması önemli bir rol oynamaktadır. Araştırmanın amacı bir üniversite hastanesinde göz hastalıkları asistanlarının katarakt cerrahisi konusundaki öz yeterliliklerini ve ihtiyaçlarını ortaya koymaktır. Oftalmoloji asistanlarının katarakt ameliyatındaki öz yeterliliğini ortaya çıkarmak için nitel desende bir araştırma tasarlanarak 7 asistan ve bir uzmanla bireysel derinlemesine görüşmeler gerçekleştirilmiştir. Tematik analiz sonucunda 4 tema ortaya çıkmıştır. 1) Göz hastalıkları asistanları için katarakt ameliyatının değeri; 2) Öz yeterliliği etkileyen faktörler; 3) Oftalmolojide mezuniyet sonrası tıp eğitiminin yapısı; 4) Mezuniyet sonrası tıp eğitiminde öz yeterlilik üzerinde kendi kendine öğrenmenin rolü. Sonuçlar katarakt ameliyatının asistanlar ve uzmanlar için bir göz doktoru için en önemli ameliyat olduğunu göstermektedir. Öz yeterlik algıları öncelikle asistanların yönettiği katarakt ameliyatı sayısına dayanmaktadır. Oftalmoloji eğitimi için katarakt ameliyatı sayısına ilişkin uluslararası öneriler, asistanların beklentilerine benzerlik göstermektedir. Öz yönetimli öğrenme, asistanların öz yeterliliğini etkileyen faktörlerden biridir. Asistan eğitiminde simülasyona dayalı eğitim, katarakt cerrahisinde yeterliliğin kazanılması ve değerlendirilmesi için önerilmektedir.

Anahtar Kelimeler: Öz yeterlik; asistanlar; tıp eğitimi; profesyonellik

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Cataract is a cause of blurred vision due to the loss of the lens's transparency. Cataracts continue to be an important cause of blindness in the world. Worldwide, blindness due to cataract has increased from 12.3 million in 1990 to 20 million in 2010.[1] The unique treatment of cataract is surgery.[2]

Ophthalmology education is structured for four years in Turkiye. There are 90 core diseases and 108 interventional competencies in "Tıpta Uzmanlık Kurulu Müfredat Oluşturma ve Standardizasyon Belirleme Sistemi (TUKMOS)/Medical Speciality Board Curriculum Creation and Standard Setting" for ophthalmology education. There are four levels for interventional competencies: 1-Can't perform but can give instructions about the procedure, 2-Perform under guidelines if needed to perform, 3-Performs under normal circumstances, 4-Performs under complicated situations. Cataract surgery is level 3 in Türkiye.[2]

Self-efficacy is described as an individual's belief in his or her capacity to execute behaviours necessary to produce specific performance attainments.[3] Self-efficacy is also accepted as a predictor of well-being for physicians.[4] It plays an important role in learning new skills and knowledge. Since surgical outcomes depend on the skills and confidence of the ophthalmologist who performed the operation, it carries a crucial role in improving self-efficacy in ophthalmology residents.[5] Interestingly, medical students expect to have have higher self-efficacy levels when they become surgeons.[4] A study showed that even final year general surgical residents still had gaps in self-efficacy regarding performing operations, and it recommends structuring surgical residency programs to provide self-efficacy in residents.[6] Additionally, mentorship programs are recommended to increase self-efficacy in surgical trainees.[7] Gender difference is seen as a factor affecting self-efficacy in surgical trainees. According to Van Boerum et al., women tend to have lower self-efficacy compared to men.[7]

Simulation-based education, especially in surgery is one of the recommendations for improving self-efficacy.[8] The literature emphasizes the improvement in self-efficacy with simulation-based education, especially in senior surgeons.[9] With simulation training, residents learn the operating procedures and become more successful with real patients, thereby decreasing the possibility of complications. Studies conducted with various eye simulators, each with different qualifications, found that practising with simulators before surgical operations is an effective method to improve the success of residents.[10,11] There are three different eye simulator models for training, and the studies show these simulators have high validation for cataract surgeries and vitreoretinal surgeries.[10] The validity studies are recommended to evaluate other procedures in ophthalmology that these simulators are capable of.[10] None of these simulators are currently used in ophthalmology residency programs in Türkiye. Current training in cataract surgery in Türkiye relies on observations, learning by doing with the guidance of an educator, and limited training with animal cadavers.[2]

Aim: The aim of the study is to reveal ophthalmology residents' self-efficacy and needs in cataract surgery in a university hospital.

Research questions:

1. How do the ophthalmology residents evaluate themselves in the management of cataract surgery?

2. What are the self-efficacy perceptions of the ophthalmology residents in cataract surgery?

3. How do the experts evaluate competency in cataract surgery for ophthalmology residents?

MATERIAL AND METHODS

Creswell explained qualitative research as an approach to understanding the meaning that individuals or groups give to a variety of situations.[6] The interview method is used to gain a deep understanding of individuals' thoughts.[12] Qualitative research was designed to reveal ophthalmology residents' self-efficacy in cataract surgery. Individual interviews were conducted with 7 residents and one expert. Voice recordings were made during the interviews and were deleted after the data was transcribed for ethical reasons. The interviews were conducted between April and May 2023.

There were a total of 16 residents in the ophthalmology clinic. The inclusion criteria were being

a resident for at least one month, and volunteering to participate. Individual interviews were conducted, and at the 7th interview, data saturation was reached, so the interviews were concluded. Consent inform forms were obtianed from each participant.

The semi-structured interview questions for residents are:

1. What kind of specialist training do you receive? Could you tell us about the characteristics of your specialist training?

a. How are you involved in the period of specialization, training, outpatient clinic, service and operating room operation?

b. How do you evaluate your conditions in specialist training? (infrastructure facilities etc.)

2. Have you been involved in cataract surgery before? If yes, how, if no, why?

3. What is the process when complications occur during cataract surgery (where you are an observer or manager)? Can you tell us about your experience?

4. Based on your experience, how would you rate yourself in performing cataract surgery? Can you explain?

The semi-structured interview questions for the expert are: 1) How do you define ophthalmology education? What are the critical learning milestones? 2) How do you evaluate the surgical competencies in ophthalmology education? 3) What do you expect from a new specialist in cataract surgery? For these expectancies, how the residency education should be structured?

Thematic content analysis was performed by the two authors. First, the interviews were transcribed. Then, the codes and themes were determined by two authors. After the two authors agreed on the codes and themes, the thematic content analysis was finalized. The last author has a supervising role in the conceptual framework of the study.

Ethical approval was taken from Karadeniz Technical University Science Research Ethical Committee with the approval num: 24237859-236 on date: March 29, 23. This study is conducted in compliance with the Helsinki Declaration.

RESULTS

Seven residents and one educator participated in the study. Most of the residents in the ophthalmology department were female, and six of the residents in our study were also female. Two participants were final-year residents, one was a junior resident and the remaining four had completed their outpatient clinical rotations and were waiting to begin the surgical training portion of their education. The educator is the senior professor of ophthalmology and is responsible for the educational aspects of the residency training program.

Four themes emerged after thematic analysis. 1) The value of cataract surgery for ophthalmology residents; 2) The factors affecting self-efficacy; 3) The structure of postgraduate medical education in ophthalmology; 4) The role of self-directed learning on self-efficacy in postgraduate medical education (Figure 1).

Under the theme of "the value of cataract surgery for ophthalmology residents" most residents and the expert emphasized the importance of cataract surgery for an ophthalmology specialist. Only one resident indicated a preference for working as an ophthalmologist in an outpatient clinic.

"Each assistant graduates having performed a certain amount of cataract surgery. It's mandatory." Participant 1

"When I searched about the ophthalmology residency programs, I learned that the number of cataract surgeries we performed during our residency has a major role on our competency." Participant 3

"For example, final-year residents like me can do the surgery from start to finish, but usually the simple cases, not complicated cases. We're allowed to perform complicated cases almost the end of our residency." Participant 2

"I think cataract surgery is optional for an ophthalmologist. I have the opportunity to work at outpatient clinics without any surgery. That's why I don't think it has a very important place for me in residency training." Participant 7

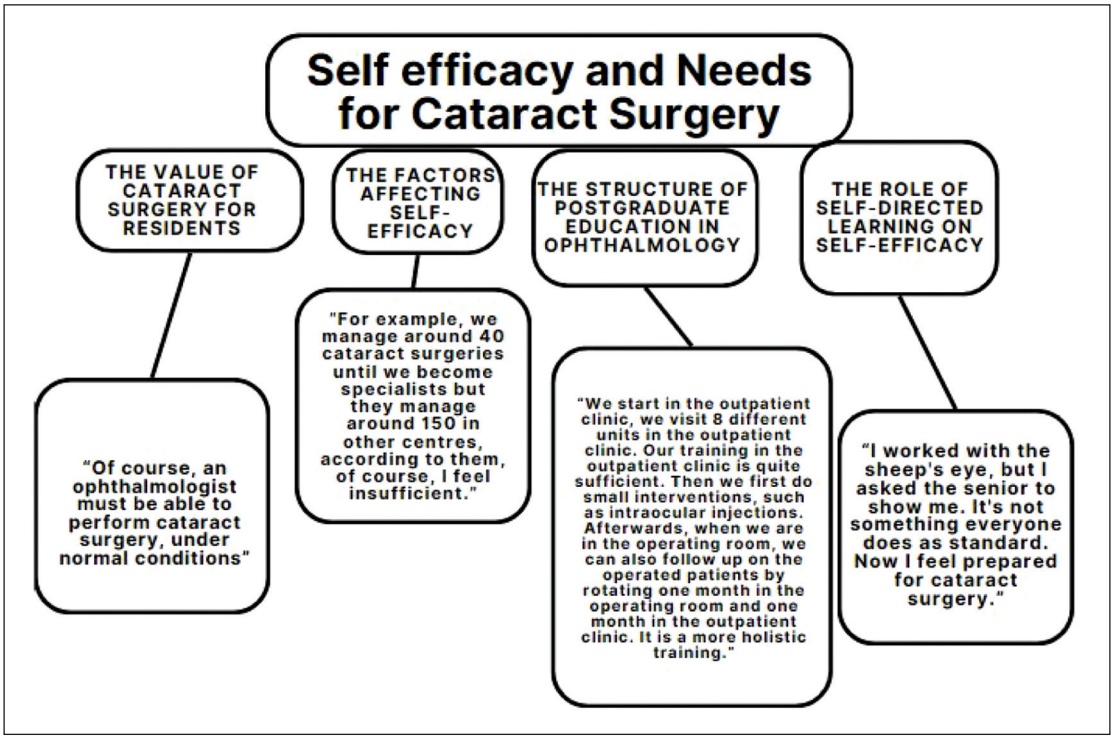

FIGURE 1: Shows the themes and examples of the quotes.

"Of course, an ophthalmologist must be able to perform cataract surgery, under normal conditions. Also, the complications are not acute, they can also refer the patients with complications to another centre, but the residents who cannot perform a simple cataract surgery cannot be ophthalmologists." Educator

Under the theme of "the factors affecting self-efficacy" the experience in cataract surgery, primary management of cataract surgery and the availability of getting support when needed were the major factors affecting the self-efficacy perceptions of the residents.

"If I perform around 80 cataract surgeries, I think I will feel competent." Participant 3

"For example, we perform around 40 cataract surgeries until we become specialists but the residents in other ophthalmology clinics perform around 150, I feel incompetent when I compare myself with them."Participant 5

"In case of the existence of a senior ophthalmologist who can guide me when I need, I can perform cataract surgery without hesitation." Participant 1

"When we graduate from here, we'll be qualified for cataract surgery but we won't be fully qualified for other surgeries." Participant 4

"I expect from a newly graduated specialist to perform simple, uncomplicated cataract surgery." Educator

"Performing 20 cataract surgeries in postgraduate education is sufficient to become competent. This is our opinion as the association in Türkiye." Educator

Under the theme of "the structure of postgraduate medical education in ophthalmology" the perceptions of the participants were the need for more experience in surgical training. They mentioned that their surgical training is not equal to their outpatient clinical training.

"We used to complete our training in 5 years. We could spend more time in the operating room. Now, the training was reduced to 4 years, and our time in the operating room was shortened." Participant 1

"We started in the outpatient clinic, we had rotations eight different units in the outpatient clinic. Our training in the outpatient clinic is quite sufficient.

Then we performed intraocular injections etc. to be prepared for major surgical procedures. When we are seniors, we have one-month surgery and one-month outpatient clinic rotations to the end of the residency training. This allows us to follow the patients we are involved in surgical processes. It is a holistic training." Participant 2

"We have an operating room microscope in the service. We can practice on the sheep's eyes. But of course, this is up to our initiative, it is not compulsory."Participant 3

"They must reach a certain level in the simulator before moving to the operating room. Training in the simulator is very valuable for both patient safety and the development of students' competencies. It's not compulsory to have a curriculum with an eye simulator but it's recommended by the national board." Educator

Under the theme of "the role of self-directed learning on self-efficacy in postgraduate medical education" the residents need to receive additional education for improving competency in cataract surgery.

"There are also different training outside, like simulation training etc. I am thinking of attending them to improve myself. I don't want to limit myself, and I want to improve myself with alternative training programs." Participant 5

"I asked the senior resident to guide me on the sheep's eye, It's not something everyone does as standard." Participant 1

"I watched a lot of the videos on how to do cataract surgery. It contributed to improving myself and feeling competent." Participant 4

"I do not hesitate to ask for support. In other words, I can ask someone who can teach me. I go through the operations with him/her." Participant 5

"The simulator will give feedback, so, the residents will be able to evaluate themselves and realise their progress on their initiative. Those who wish can study on the simulator again and again." Educator

DISCUSSION

It is expected from an ophthalmology specialist to demonstrate competence in cataract surgery, contact lenses, cornea and external diseases etc.[13] The Accreditation Council for Graduate Medical Education's (ACGME) Ophthalmology Milestones describe the assessment levels and methods for each competency.[13] The ACGME's recommendations for assessment competencies in ophthalmology residents are not mandatory in Türkiye. In Türkiye, the TUKMOS for ophthalmology residents' training is based on the guidelines International Council of Ophthalmology.[2] Our study shows that the residents and educators are aware of the value of cataract surgery similar to the literature.

Psychomotor skills are crucial for performing cataract surgery. The domains for psychomotor skills are as follows: The first domain is visuospatial skills; the second domain refers to knowledge to demonstrate performance; the third domain is interpersonal skills like leadership and inter-team communication; the fourth domain refers to personal resourcefulness of insight; and the fifth domain refers to advanced cognitive skills like management of crises.[14] Practising on a cadaver for cataract surgery has a positive impact on gaining competency.[15,16] Our study shows that there is an opportunity for animal cadaver practice but only a few of the residents have a chance to perform on it because it's not always possible to get an animal cadaver. However, performing cataract surgery on cadaver has some significant drawbacks due to the differences in anatomical structure. A human head simulator is preferred over an animal cadaver because it more closely resembles a real eye.[15]

Self-efficacy is one of the key points for improvement in performance in ophthalmology training. The recent improvements in performance and the total duration of the task are stated as factors affecting self-efficacy in ophthalmology residents.[17] The ACGME recommendation for gaining competency in performing cataract surgery is to primarily manage a minimum of 86 cataract surgery.[18] The participants in our study stated the number and quality of the cataract surgeries they primarily managed affected their self-efficacy. Although the high number of real patient experiences thought as mandatory for feeling self-efficient in residents, it should be noted that it is crucial to prevent patients from any harm. In this regard, simulation-based training becomes prominent

because of its repeatability and contribution to gaining competency without any real patient interaction.[8,11] So, simulation-based training should be taught to gain competency.[8,10,11]

Motivation is defined as one of the major factors affecting self-efficacy in individuals. The expectancy of achieving the task, and the positive emotional feelings about the experience (environment, educator, and other students) are effective in starting a task.[19] In our study, participants emphasised they would be able to perform cataract surgery after graduation. The participants' perceptions were training during residency and the opportunities to receive support from other experts on cataract surgery after graduation will be satisfactory for their performing cataract surgery. As a result, they believe that they will be able to perform cataract surgery after graduation, even though they have performed fewer surgeries compared to residents in other institutions.

Learning is crucial for all ages, independent of the explicit direction. Most learning occurs outside the classroom.[20] Self-directed learning is defined as individuals taking responsibility for their learning by determining their needs to improve themselves, planning, building networks, adapting the new circumstances when needed, and evaluating themselves.[21] Self-efficacy is one of the determinants of self-motivation and decision for starting a task. Motivation is a predictor for using self-directed learning skills.[19,20] Studies showed that high self-efficacy levels contribute to high self-directed learning and high academic achievement. Also, the small achievements during the tasks increase self-efficacy by increasing motivation.[22-24] In our study, the participants reported feeling motivated when they completed surgical procedures. They expressed a willingness to perform complex procedures related to cataract surgery, such as vitrectomy in order to improve their skills in managing complications.

Self-directed learning contributes to learning by giving the opportunity to the individuals for informal learning beyond the structured training program they are involved. Simulation-based education is engaged in self-directed learning because it provides feedback which allows individuals self-evaluation. Individuals have the opportunity to use simulators when and how much they need.[25,26] In our study, the participants defined the learning opportunities as peer-assisted education, receiving support from other experts in the field, engaging networks for receiving support when needed, and individual learning opportunities like simulation-based courses.

One of the limitations of self-directed learning is the risk of poor self-evaluation. The literature shows that the faculty-based assessment has more accuracy than self-assessment in ophthalmology residents.[27] To ensure the appropriate use of self-directed learning skills it's essential to evaluate each individual for competency in self-directed learning.[21,28] This can be provided by mentoring programs.[29] Mentoring programs contribute to learning by guiding individuals with personalized goals. The major recommendation for implementing self-directed learning is the use of mentoring programs.[29] The participants stated that they would be more motivated to perform cataract surgery with the guidance of an expert.

A survey study designed to identify the characteristics of the residency programs in ophthalmology training in the United States of America shows that 93% of the programs have at least one resident who struggles with surgery.[30] This situation emphasizes the importance of a national well-structured standardized training program with effective assessment strategies. The TUKMOS specifies the elements for a competent ophthalmologist. The accredited clinics ensure the training programs correlate with TUKMOS.[2]

Further studies need to improve the national curriculum to contribute to residents' training. The simulation-based training is one of the recommended methods for improving performance in cataract surgery. So, including simulation-based training in residents training may be the best way to ensure gaining and assessing competency in cataract surgery. In this way, complications that may occur during surgery on the patient can be reduced to a minimum with simulation training. Another benefit of simulation training is that the resident can perform surgeries unlimitedly and in different scenarios until he/she feels competent. This will contribute to the development of more experienced specialists.

The study was conducted in one university hospital, so the participant numbers were limited. The educator and the residents were in the same clinic. The researchers were interviewed with participants and educators independently, and the transcripts were held anonymous to ensure ethical considerations.

CONCLUSION

In conclusion, self-directed learning is one of the factors affecting self-efficacy in residents and should be implemented in ophthalmology residency training. Simulation-based training in residents maybe the best way to ensure gaining and assessing competency in cataract surgery.

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Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

Idea/Concept: *Hale Cepe, Bilge Delibalta, Hidayet Erdöl;* ***Design:*** *Hale Cepe, Bilge Delibalta, Hidayet Erdöl;* ***Control/Supervision:*** *Bilge Delibalta, Hidayet Erdöl;* ***Data Collection and/or Processing:*** *Hale Cepe, Bilge Delibalta, Hidayet Erdöl;* ***Analysis and/or Interpretation:*** *Hale Cepe, Bilge Delibalta;* ***Literature Review:*** *Hale Cepe, Bilge Delibalta, Hidayet Erdöl;* ***Writing the Article:*** *Hale Cepe, Bilge Delibalta, Hidayet Erdöl;* ***Critical Review:*** *Hale Cepe, Bilge Delibalta, Hidayet Erdöl;* ***References and Fundings:*** *Hale Cepe, Bilge Delibalta, Hidayet Erdöl.*

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