



Brief Communication



Thoracic surgery - An underestimated dream job?

Romina Maria Roesch^{a,b,*}, Raffaella Griffo^a, Isabella Metelmann^c, Lena Brendel^a,
Maria Ada Presotto^d, Katrin Welcker^e, Hauke Winter^{a,b}, Laura Valentina Klotz^{a,b}

^a Department of Thoracic Surgery, Thoraxklinik Heidelberg, University Hospital Heidelberg, Roentgenstrasse 1, 69126 Heidelberg, Germany

^b Translational Lung Research Center Heidelberg (TLRC), University Hospital Heidelberg, Neunheimer Feld 130.3, 69120 Heidelberg, Germany

^c Department of General, Visceral and Thoracic Surgery, University Hospital Leipzig, Liebigstrasse 20, 04103 Leipzig, Germany

^d Department of Pneumology, Thoraxklinik Heidelberg, University Hospital Heidelberg, Roentgenstrasse 1, 69126 Heidelberg, Germany

^e Department of Thoracic Surgery, Kliniken Maria Hilf GmbH, Viersener Strasse 450, 41063 Moenchengladbach, Germany

HIGHLIGHTS

- In Germany and Europe, a significant shortage of qualified and motivated surgical residents is expected.
- We therefore need to assess the current clinical situation and improve the recruitment and training of surgeons.
- The development, implementation and monitoring of an objective and structured training could be a helpful method.
- Regular and well-documented educational meetings should be established to evaluate the defined objectives.
- The implementation of a mentoring program could help to identify clear contacts and share responsibilities.

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ABSTRACT

Background: Thoracic surgery is an expanding surgical specialty, but a shortage of qualified and motivated thoracic surgery residents is expected. It is estimated that around 23 % of all surgical specialist jobs will be vacant by 2030. We therefore need to assess the current clinical situation and urgently improve the recruitment and training of our next generation of surgeons.

Methods: Using the online survey (Lime Survey), a questionnaire (28 questions) was created to analyze the current nationwide situation of residency in thoracic surgery. The survey was sent to all postgraduate trainees in thoracic surgery departments in Germany. The current status on residency-programs, scientific interest, the attractiveness of thoracic surgery, and the demographics of the participants were evaluated. The survey also evaluated specific ways to increase attractiveness.

The survey was conducted in collaboration with “Frauen in der Thoraxchirurgie” by the “Junges Forum der Deutschen Gesellschaft für Thoraxchirurgie”. The survey was sent to all residents and young specialists in Germany. A total of 187 participants responded.

Results: Out of 187 participants, 123 questionnaires (65.8 %) were completed. Mean age was 36.3 ± 6.9 years. 62.6 % of the participants were male. About 70 % work in an independent thoracic surgery department, while the rest is affiliated with another specialty department. 50 % have completed a doctorate in medicine.

Conclusion: The development of an objective and structured training plan could define the roles and responsibilities of the senior surgeon and the trainee, leading to improved training and, at the very least, ensuring good recruitment of junior thoracic surgeons.

Introduction

Like other surgical specialties, thoracic surgery faces a shortage of qualified and motivated residents. However, innovative and high-

quality medicine is based on a structured and well-founded training of the young generation. It is estimated that by 2030, approximately 23 % of all specialist positions in surgery will remain unfilled. Specifically, a shortage of approximately 7300 surgeons is expected by 2030, including

* Corresponding author at: Roentgenstrasse 1, 69126 Heidelberg, Germany.

E-mail address: romina.roesch@med.uni-heidelberg.de (R.M. Roesch).

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general, thoracic, trauma, and orthopedic inpatient surgeons [1].

The basic interest in surgical specialties is high at the beginning of medical school, but we often lose students along the way. Typical reasons are the criteria we all are familiar with: poor work-life balance, mainly due to the enormous workload, lack of flexibility and the inability to reconcile family and career. Unfavorable teaching conditions at medical school and during medical training are also frequently mentioned. These developments underline the importance of improving training and teaching [2–4].

The Federal Association of Medical Students in Germany (bvmd) postulates that there is still a lack of image campaigns for surgery. Because of its prestige, many medical students want to become surgeons. According to the Allensbach Occupational Prestige Scale, the medical profession has the highest prestige among the German population [4].

In 2018, only 6.2 % of medical students (evenly split between female and male students) reported choosing a surgical specialty for their residency, compared to 8.3 % in 2014 [2].

As a result of these developments, the various surgical societies have placed increasing emphasis on the recruitment of young surgeons in recent years. The future of surgery, and of thoracic surgery in particular, will depend on our ability to recruit qualified young surgeons [5].

Since surgery in general has not lost its attractiveness, the causes of the corresponding shortage of junior staff are to be found in training and practice [5]. Students and postgraduate surgical trainees know how to increase the attractiveness of surgical specialties. According to various surveys, the most important aspects are [1] having a fixed contact person (mentor) throughout the entire training period [2], accompanying specialty-specific training opportunities [3], flat hierarchies, and [4] flexible childcare - provided by the employer [2].

The training of future thoracic surgeons should be addressed in view of the upcoming institutional changes and personnel development due to the new regulations on minimum volumes for anatomical lung resections. In order to obtain an objective overview of the current situation of this generation of residents and specialists in thoracic surgery in Germany, the Young Forum of the German Society for Thoracic Surgery (DGT) and the working group Women in Thoracic Surgery initiated a survey in February 2022.

The aim of this study was to analyze the status quo of specialist training in thoracic surgery and to evaluate specific areas for improvement.

Methods

The questionnaire was developed in collaboration between the Young Forum of the German Society for Thoracic Surgery and the working group Women in Thoracic Surgery using the online survey system LimeSurvey (LimeSurvey GmbH, Survey Services & Consulting; Hamburg, Germany). The online survey was conducted from February to April 2022. All members of the German Society for Thoracic Surgery were emailed the access data to participate in the survey. Heads of thoracic surgery departments or sections were asked to forward the survey to their residents. The survey was specifically addressed to thoracic surgery residents and young thoracic surgery specialists.

A 28-item questionnaire was designed to collect data on the following issues: demographics of the participants, medical education, science and research, surgical training and practice, satisfaction, and the attractiveness of thoracic surgery were included in the online survey. In addition, the survey evaluated specific ideas to increase the attractiveness of training and education in thoracic surgery. A detailed information sheet explaining the purpose of the study and the data management policy was part of the electronic consent form.

Responses could be given on a five-point scale or as a nominal response, depending on the type of question. There was also an option to provide comments.

Statistical analysis was performed using Microsoft Excel, Numbers, and IBM SPSS Statistics 26. Descriptive statistics are reported for each

variable.

Results

Demographic data

A total of 187 physicians participated in the online survey. Of these, a total of 123 questionnaires were completed and could be used for further analysis. Of these, 82 (60.0 %) were residents or consultants in training to become thoracic surgeons.

The gender distribution showed that just over half of the participants were male (62.6 %). Females accounted for 36.6 %, and one person identified as a third gender. The mean age was 36.3 ± 6.9 years. Respondents were on average in their fourth year of training. About 65 % of the participants have a fixed-term employment contract. Almost half of the participants (49.6 %) were parents of two children, with an average of 1.9 ± 0.8 children. About 70.7 % of the participants were German, 8.1 % had another nationality besides German, 4.9 % came from other European countries and 16.3 % from non-European countries. A total of 71.5 % completed their medical studies in Germany.

According to the demographics of the major lung clinics in Germany, 39.9 % of the participants reported that they were employed in a university hospital, 13.8 % in a public hospital, 17.9 % in a private hospital, 11.4 % in a municipal hospital, and 17.1 % in a denominational hospital. The on-call duties to be performed are purely thoracic surgery services while the other half share their night duties with another specialty department. Overall, 70 % of the participants work in an independent thoracic surgery department. The remaining 30 % are affiliated with another specialty department including visceral surgery (14 %), cardiac surgery (7.3 %), and vascular surgery (6.5 %). Further details and demographics are shown in Table 1.

The average age of all residents was 33.7 ± 5.4 years and 45 % were female. 44 % of the residents in postgraduate training were married and more than one third had two children. Only 9.8 % of the residents had a permanent contract. Approximately 51 % had an academic title. On average, participants were in their fourth year of training. The majority of participants were “satisfied” to “very satisfied” with the working environment in their department, with the best relationships reported with senior consultants or other residents. On average, the respondents to the survey worked 52.3 ± 10.8 h per week.

Training goals and areas of interest

The survey was open to residents and specialists in thoracic surgery departments. The majority of participants were in training to become specialists in thoracic surgery (89 %). Others were in training to become specialists in visceral surgery (N:3, 2.4 %), cardiac surgery (N:1, 0.8 %), oncology (N:1, 0.8 %), and in another specialty (N:9, 7.3 %).

Regarding their academic title, 50 % reported a doctorate in medicine. Another doctorate in natural sciences was reported in 2.4 %. Half of the participants indicated a “high” to “very high” interest in scientific research, while a quarter (24 %) indicated “very low” to “no” interest. Overall, interest in scientific activities was considered to be high.

The first question was about overall satisfaction with the training situation. Just over half of the respondents said they were “satisfied” to “very satisfied” with their training. However, a total of 14 % of the participants stated that they were “not at all” satisfied with their current training situation. Respondents indicated that training was mainly dependent on the head of department (67 %) or on the surgeon (62 %). The lack of objective, transparent and, above all, structured training was also a frequently cited characteristic of residency training. Only about a third of respondents reported that surgical training was dependent on the recommendations of the German Medical Association or characterized by regular training meetings. Only 16 % of the participants work according to a structured education curriculum. Further characteristics are shown in Fig. 1.

Table 1
Demographic data of physicians.

Demographics	N(%); M ± SD
Female	45 (37 %)
Male	77 (63 %)
Divers	1 (0,8 %)
Age	36 ± 7
Single	55 (45 %)
Married	67 (55 %)
Divorced	1 (0,8 %)
Parents	61 (50 %)
Number of children	2 ± 1
Nationality	87 (71 %)
- German	10 (8 %)
- German and one other (European foreign country)	6 (5 %)
- Non-European foreign country	20 (16 %)
Medical School	
- Germany	88 (72 %)
- European foreign country	12 (11 %)
- Non-European foreign country	22 (18 %)
Employment (institution)	
- University Hospital	49 (40 %)
- Public Hospital	17 (14 %)
- Hospital with private sponsor	22 (18 %)
- Denominational Hospital	21 (17 %)
- Municipal Hospital	14 (11 %)
Position at the hospital	
- Resident for Thoracic Surgery	74 (60 %)
- Resident on clinical rotation (other specialty)	2 (2 %)
- Specialist for thoracic surgery	41 (33 %)
- Specialist of another field	6 (5 %)
Weekly working hours (h)	53 ± 11
Education year	4 ± 4
Temporary employment contract	80 (65 %)
Academic title	
- Dr. med.	50 %
- Dr. (other specialty e.g. Dr. dent.)	2 %
- PD (Private Lecturer)	4 %
Aimed medical specialist	
- Thoracic surgery	109 (87 %)
- Visceral surgery	3 (2 %)
- Cardiac surgery	1 (0,8 %)
- Oncology	1 (0,8 %)
- Others	9 (7 %)
Thoracic surgery department	
- Independent	87 (71 %)
- Joint with Visceral Surgery	17 (14 %)
- Joint with Cardiac Surgery	9 (7 %)
- Joint with Vascular Surgery	8 (7 %)
- Joint with other department	2 (2 %)
Thoracic surgery services	
- Pure thoracic surgical	61 (50 %)
- With another department	62 (50 %)
Member of DGT (German Society of Thoracic Surgery)	78 (63 %)

Surgical experience

Overall, all participants reported a mean of 77 anatomic resections. For thoracic surgery residents, the mean number of anatomical resections was 16 ± 24. Fig. 2 shows anatomical resections by year of residency. Seventeen participants (21 %) had completed all residency procedures. The guideline number for anatomical resections specified according to the current medical training regulations was 35 (30 lobectomies and 5 segmental resections) during the period of the online survey. When asked about the appropriate length of residency, the respondents answered with 5.3 ± 1.2 years, which is in line with the current training regulations.

Attractiveness of thoracic surgery

The most common reason was unfavorable training conditions, which made thoracic surgery less attractive. The high workload and lack of opportunities for professional development were also cited by around half of the respondents. Income not related to performance was cited by

40 %, an unfavorable work-life balance by 37 %, and a lack of future prospects by 30 %. Interaction and communication between the colleagues was cited by 23 % as a reason for a loss of attractiveness. Reasons for dissatisfaction can be found in Fig. 3.

Possibilities for improvement

The question also raised how to counteract the loss of attractiveness of the specialty. Residents and specialists know exactly what is needed to increase the attractiveness of thoracic surgery. The implementation of a mentoring program (74 %) and the creation of attractive positions below the level of chief physicians (72 %) were considered appropriate measures. In order to cope with the enormous workload, 68 % of respondents favored delegating paramedical tasks, such as blood sampling and documentation tasks, to physician assistants. In addition, more than 60 % would like to see the introduction of an objective assessment of the quality of training, recommendations and curricula from the Society of Thoracic Surgeons, and mandatory rotations limited in time and content for specialist training in thoracic surgery. The most important aspects are listed in Fig. 4.

Approximately 75 % of respondents and 79 % of those in post-graduate training would choose their chosen career path in thoracic surgery again.

Discussion

Summary of the training situation in thoracic surgery

In a recent survey of prospective thoracic surgeons, about 90 % of the participants aspired to a career in this specialty. A significant number of respondents had an academic title and showed a high level of interest in research activities. This motivation for specialization is also reflected in the professional conditions: Around a quarter of the participants work at university hospitals in Germany, while the majority work in independent thoracic surgery units.

Workload and training situation

As in many other studies on surgical training, the participants show an average workload of 50 h per week. Despite this commitment, the training situation in thoracic surgery departments is perceived as inadequate. The main points of criticism are unstructured training conditions and the small number of practical procedures that prospective surgeons can perform. This situation raises the question of whether the current number of procedures performed as part of the training is sufficient to ensure adequate surgical training.

Particularly alarming is the fact that only 42 % of trainees in their final year of training performed the required number of anatomic resections. However, it has been shown in various studies that standard thoracic surgeries can be performed by trainees without increased risk to the patient [6–9], which underscores the need to improve training standards.

Lack of structured training

The majority of survey participants reported unstructured training during residency. This is often due to the absence of a written curriculum or inadequate use of the internal curriculum in the departments. In addition, training is heavily dependent on the respective department heads or operating surgeons. To improve the quality of training, structured training with clear objectives and transparent classifications of surgeries are essential. Such approaches were identified in this survey as well as in a nationwide survey by the National Association of Surgeons [5].

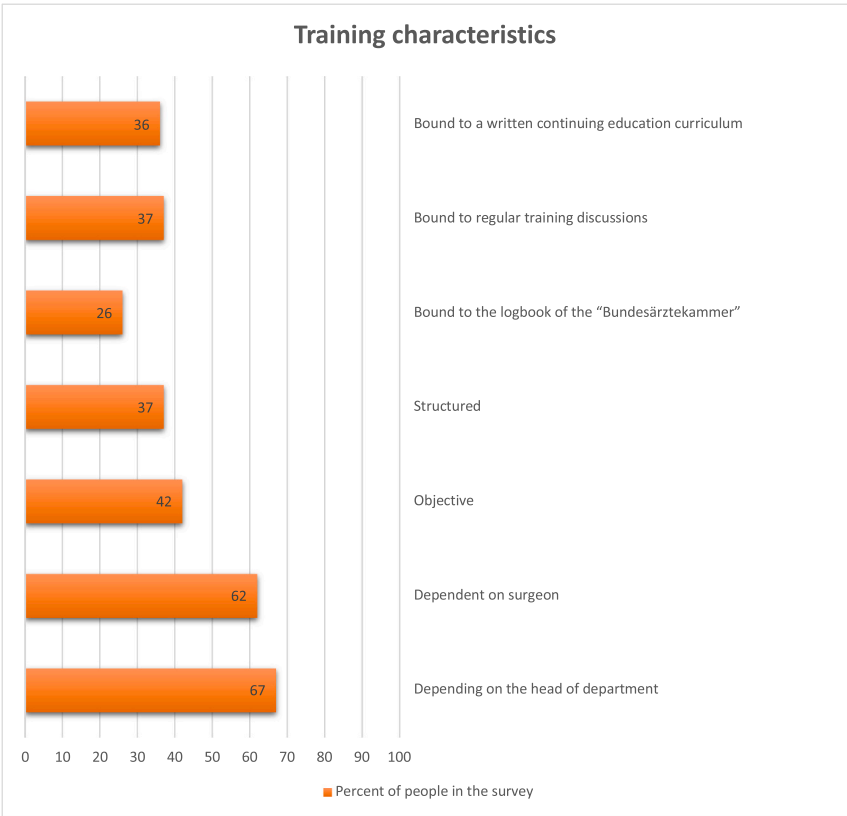


Fig. 1. Training characteristics.

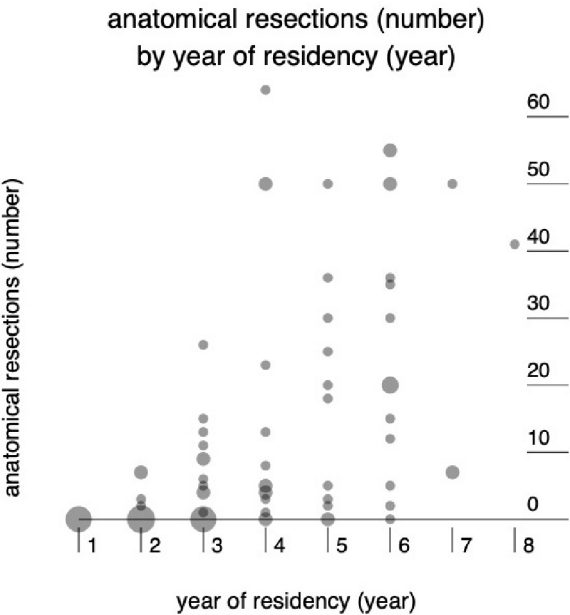


Fig. 2. Anatomical resections by year of residency.

Suggestions for improving training

A structured and specified training structure, including annual meetings between trainers and residents, could improve the documentation of the training process and support its implementation [10,11]. Didactic skills should be regularly trained to meet curricular requirements. Binding guidelines for the development of systematic

training programs are necessary, as are evaluation tools to promote continuous professional development [12].

A comparison with US residency programs shows how a clear and structured approach might look. The American Board of Thoracic Surgery defines both the required operations and the time frame in which the curriculum must be completed [13]. This structuring places the responsibility for successful training on the hospitals, whereas in Germany the responsibility often lies with the trainees and their respective trainers [14].

In addition, the USA has a system for monitoring the level of knowledge of assistant doctors, which includes annual exams to ensure progress in specialist training [14]. Such systems could also be introduced in Germany to achieve the necessary changes in training.

International examples of training quality

The Intercollegiate Surgical Curriculum Program in the United Kingdom also shows how fixed structures, regular monitoring and feedback sessions can ensure training quality and satisfaction [15]. An important feature is the national selection process for training positions, which digitally documents and monitors the qualifications of trainees and lecturers. This could serve as a model for a similar review in Germany.

Importance of feedback and communication

Another crucial aspect is regular communication between residents and training physicians. Exchanges about learning needs and experiences should take place at regular intervals to ensure transparency and goal orientation [16]. Continuous feedback and clear goal agreements are of great importance for training. An objective definition of the training content and regular, well-documented training meetings could help to create a clear structure.

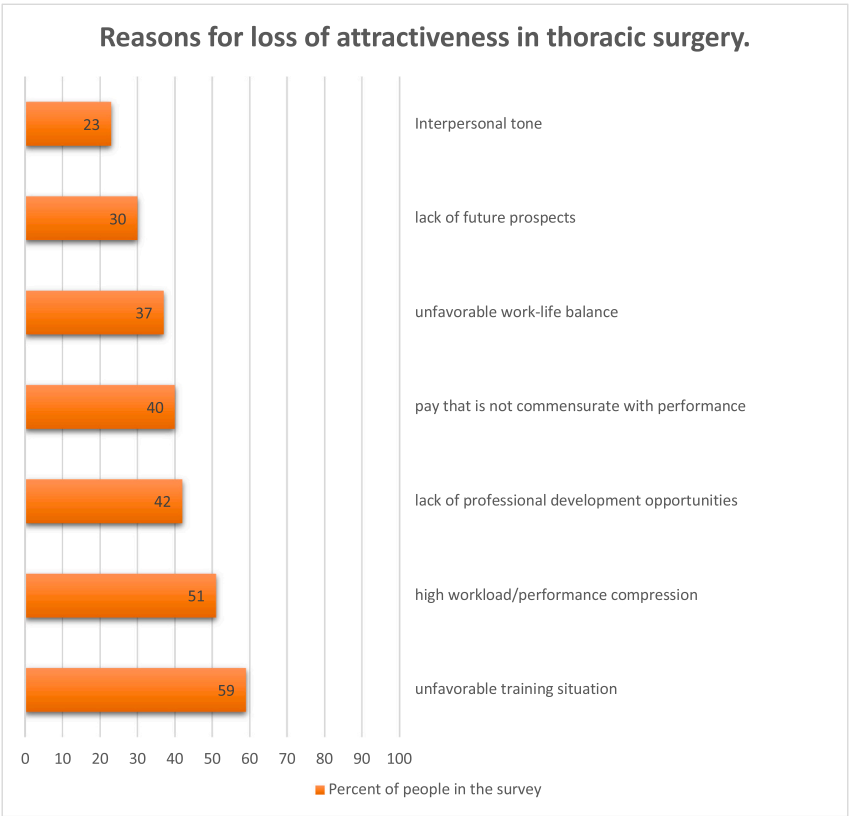


Fig. 3. Reasons for loss of attractiveness in the specialty of thoracic surgery.

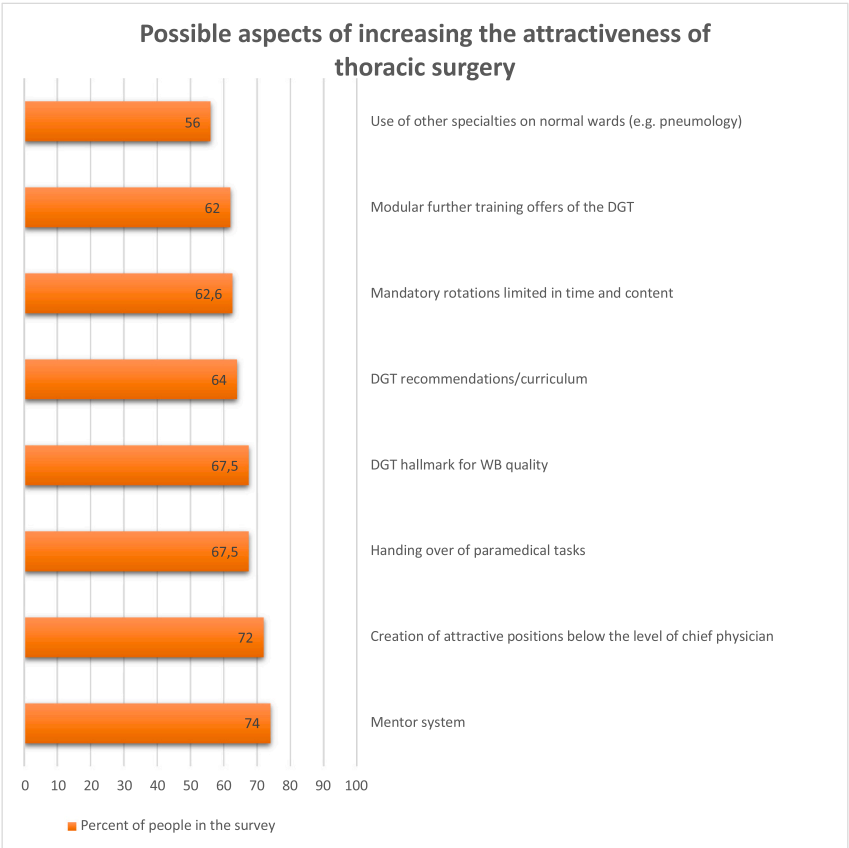


Fig. 4. Possible aspects of increasing the attractiveness of the specialty of thoracic surgery.

Simulation training as a key to improvement

Simulation training is increasingly recognized as necessary to improve surgical skills, especially in the face of reduced working hours and less available teaching time in the operating room. In some hospitals, simulation is already used in various medical specialties, with studies showing that it improves the skills of young doctors and shortens the time to independent performance of procedures [17–21].

The availability of simulators for thoracic surgery that simulate both thoroscopic and open and robot-assisted procedures is a promising advance [20–23]. The integration of “virtual reality” into simulation could further enhance the quality of training, which also makes the future combination with “artificial intelligence” an exciting field of research [24–27].

Conclusion

There is an urgent need to adequately challenge and develop the next generation of surgeons, as residents are generally willing to pursue a surgical career if the requirements are met.

The development of an objective and structured training curriculum could define the role and responsibilities of the senior surgeon and the resident. In addition, regular and well-documented educational meetings should be established to evaluate the defined objectives. The implementation of a mentoring program could help to identify clear contacts and share responsibilities.

Statement of ethics

This online survey was a voluntary and anonymized survey; therefore no ethics approval was required.

CRediT authorship contribution statement

Romina Maria Roesch: Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Raffaella Griffo:** Software, Data curation. **Isabella Metelmann:** Validation, Data curation. **Lena Brendel:** Validation, Data curation. **Maria Ada Presotto:** Validation, Data curation. **Katrin Welcker:** Writing – review & editing. **Hauke Winter:** Writing – review & editing, Validation, Supervision, Methodology. **Laura Valentina Klotz:** Writing – review & editing, Writing – original draft, Visualization, Methodology, Formal analysis, Conceptualization.

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Declaration of competing interest

None.

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