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The impact of a clinical anatomy training and research unit in graduate and postgraduate medical education

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Abstract

Objectives: Continuing medical education practices are activities that ensure the continuity of medical education. The aim of these activities is to improve the knowledge and skills of medical doctors for better health care for patients and community. The purpose of this study was to present the feedback received from the participants in the first clinical education and research unit in Turkey in workshops held between 2008–2020.

Methods: Medical students, and specialist physicians in continuing medical education attended the workshops. Knee, shoulder and hip arthroscopical procedures, surgeries related with temporomandibular joint, peripheral nerve dissection, ear surgery, nail surgery and cadaver aesthetic application techniques were some of the organized courses. Feedbacks regarding the anatomy unit were received from the participants and instructors at the end of the courses, regarding the education period of 2008–2020. A total of 443 participants and 97 instructors filled the questionnaire.

Results: 79.2% of the participants who filled out the questionnaire had very positive expectations prior to the course; the rate of expectations met was 97.4% at the end of the course. The ratio of satisfied participants was 88.3%. Among the instructors, the level of positive expectations prior to the training was 83.5%, and the rate of expectations met was 97.5% following the end of the course. The rate of satisfaction from the quality of the training was 91.8%.

Conclusion: The Clinical Anatomy Training and Research Unit in Akdeniz University School of Medicine was assessed as of highly beneficial for both undergraduate medical students and specialist physicians in continuing medical education. The majority of the participants were satisfied with the applications, quality of training, and available resources.

Keywords: clinical anatomy; questionnaire study; training

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sIntroduction

Continuing medical education applications are activities that ensure the continuity of medical education. The purpose of these activities is to enhance knowledge and skills of medical doctors for the better health of patients and society.[1,2] There are numerous courses and workshops in Turkey and all around the world, with the purpose of enhancing knowledge and skills within the scope of continuing medical education. One of the important elements of these courses/workshops, particularly in the surgical field, is training on cadavers and plastic models in clinical anatomy laboratories.[3–8]

Anatomy, which teaches the normal morphology of the human body, is one of the core courses in medical education, and an essential field for good medical practice. The concept of clinical anatomy became widespread in the late 1970s. Integrated courses have especially taken part in continuing education activities.

Clinical anatomy is the study of human anatomy with regard to clinical applications and focuses on special tissues and structures. Medical doctors make use of the field of clinical anatomy in the process of gaining new experiences in their own fields. Many surgeons and scientists enhance their knowledge and skills necessary for their fields through applied cadaver dissections. Through these courses, required efforts of clinicians decrease while efficacy increases. These courses also ensure safe surgical procedures and patient safety, contribute to determining surgical strategies, and help surgeons identify anatomical variations and be prepared for unexpected situations. Despite the vast number of techniques, the human cadaver is widely accepted as the gold standard for surgical training prior to performing surgical procedures on patients.[3,9] It is also important for the training courses in clinical anatomy units to allow the transfer of knowledge to skill and support meaningful learning. Meaningful learning supports the connection of current knowledge with newly learned materials and ensures its permanence. Feedback received from the participants of the trainings at the clinical anatomy laboratories revealed a high rate of gladness and satisfaction regarding the efficacy of the courses.[3,6,9]

The studies on clinical anatomy in Akdeniz University School of Medicine started in 2000. In the year 2006, the Akdeniz University School of Medicine Clinical Anatomy Education and Training Unit was founded to ensure the continuity of national and international symposiums and courses, workshops and contribute to the scientific studies. The purpose of this study was to present the feedback received from the participants in the first clinical education and research unit in Turkey. Thus, we aimed to conclude on the level of satisfaction of the participants.

Materials and Methods

In the Akdeniz University School of Medicine Clinical Anatomy Education and Training Unit, three courses were perfomed in 2007, followed by 9 in 2008, 11 in 2009, 6 in 2010, and 13 in 2011, 14 in 2012, 10 in 2013, 7 in 2014, 9 in 2015, 10 in 2016, 9 in 2017, 7 in 2018, 11 in 2019, and 2 in 2020. Participants consisted of medical students pursuing their medical residencies, as well as specialist physicians. Courses included wrist, ankle, knee, shoulder and hip arthroscopic surgeries, peripheral nerve dissection, ear surgery, therapeutic injections, ultrasound guided injections, microsurgical course, laparoscopic anatomical dissection course, interventional ultrasound course, temporomandibular joint course, advanced airway support course, neurostimulation course, endoscopic skull base surgery course, algology pain course, transoral medical robotic surgery courses, nail surgery, cadaver aesthetic application techniques.

Feedbacks regarding the anatomy unit were received from the participants and instructors at the end of the courses. A total of 443 participants and 97 instructors have filled the questionnaire. All feedbacks were recorded regarding the education period of 2008–2020. There were seven items in the questionnaire: the specialty fields of the participants, years of experience as a specialist, previous participation in a similar course, expectations from the anatomy laboratory, expectations met at the anatomy laboratory, available resources, satisfaction from the training, and whether the participants would recommend this training to others or not. A 10-point Likert scale was used to evaluate the three items regarding the participants' expectations from the anatomy laboratory, expectations met at the anatomy laboratory, and their satisfaction from the training (0 = no expectations prior to the training, no expectations met, and unsatisfactory; 10 = very positive expectations prior to the training, all expectations met, and very satisfactory, respectively), while a five-point Likert scale was used to evaluate the item regarding available resources. For the analyses of the responses, responses to the 10-point Likert scale was used to evaluate expectations prior to the training, expectations met, and satisfaction from the training were grouped as "Bad: 0, 1, 2, 3", "Undecided: 5, 6, 7", and "Very good: 8, 9, 10". The participants' responses to the five-point Likert scale regarding available resources were groups as "Bad: 1, 2, 3" and "Good: 4, 5". The participants' years of experience were evaluated as "<10 years" and "≥11 years".

Feedbacks regarding the facility were received *via* interviews with the participants and instructors at the end of the course. Descriptive tables, chi-square test, and correlation analysis were performed and SPSS for Windows (version 22.0, Chicago, IL, USA) software was used for statistical analysis.

Results

98.6% of the participants were Turkish citizens. Of these, 38.8% (n=172) were specialists of orthopedics, 8.8% (n=39) internal medicine, 12.6% (n=56) anesthesiology, 7.7% (n=34) otorhinolaryngology, 6.5% (n=29) urology, 10.6% (n=47) dermatology, 8.6% (n=38) emergency medicine, and 6.3% (n=28) were dentists. Approximately half of the participants (54.4%; n=241) stated that they participated in a similar course before.

92.7% of the instructors were Turkish citizens (n=90). 53.6% (n=52) were specialists of orthopedics, 11.3% (n=11)

internal medicine, 7.2% (n=7) anesthesiology, 4.1% (n=4) otorhinolaryngology, 6.2% (n=6) urology, 5.2% (n=5) dermatology, 6.2% (n=6) emergency medicine, and 6.2% (n=6) were dentists. 85.6% (n=83) had prior instructing experience.

While 79.2% of the participants who filled out the questionnaire had very positive expectations prior to the training, the rate of expectations met was 97.4% at the end of the course. The ratio of satisfied participants was 88.3%.

Among the instructors, the level of positive expectations prior to the training was 83.5%, and the rate of expectations met was 97.5% following the end of the course. The rate of satisfaction from the quality of the training was 91.8% (**Figure 1**).

Evaluation of the distribution of the responses regarding the training resources revealed that 98% of the participants were satisfied with the available resources, 98.4% were satisfied with the plastic model, 97.5% were satisfied with the cadavers, 97.7% were satisfied with the instruments and materials, and 100% were satisfied with the location.

Evaluation of the responses of the instructors regarding the training resources showed that 97.9% of the instructors were satisfied with the available resources, 99% were satisfied with the plastic models, 98% were satisfied with the cadavers 97% were satisfied with the instruments and materials, and 100% were satisfied with the location (**Figure 2**).

"Would you recommend this course to others?" question was responded as "Absolutely." by 98.7% of the participants and 96.9% of the instructors. The average work experience of the instructors was 16.5 years, while it was 8.6 years for the participants. There was a statistically significant correlation between years of experience and expectations met (p=0.007). It was also determined that participants and instructors with an experience of more than 10 years had higher levels of expectations met. While the rate of expectations met was 64% in participants and instructors with an experience of 10 years or below, it was 91.7% in participants and instructors with an experience of 11 years and over.

Even though there was no statistically significant relationship between the expectation levels of the participants prior to the course, and years of experience and prior training, there was a statistically significant relationship between the levels of expectation and satisfaction (p=0.025). The group with higher expectations also had higher satisfaction at the end of the course. There were also statistically significant relationships between the level of satisfaction, and being satisfied with the resources (p=0) and cadavers (p=0.004), though there was no statistically significant relationship between being satisfied with the plastic model and years of experience.

Evaluation of the correlation between the expectations of the participants prior to the training, expectations met at the end of the training, and overall satisfaction with the training revealed that there were statistically significant relationships between each of the three variables. Accordingly, the higher the expectations of the participants prior to the training, the significantly higher were the levels of expectations met (p=0.02) and overall satisfaction (p=0.011). In parallel, meeting the expectations of the participants resulted in a significant and

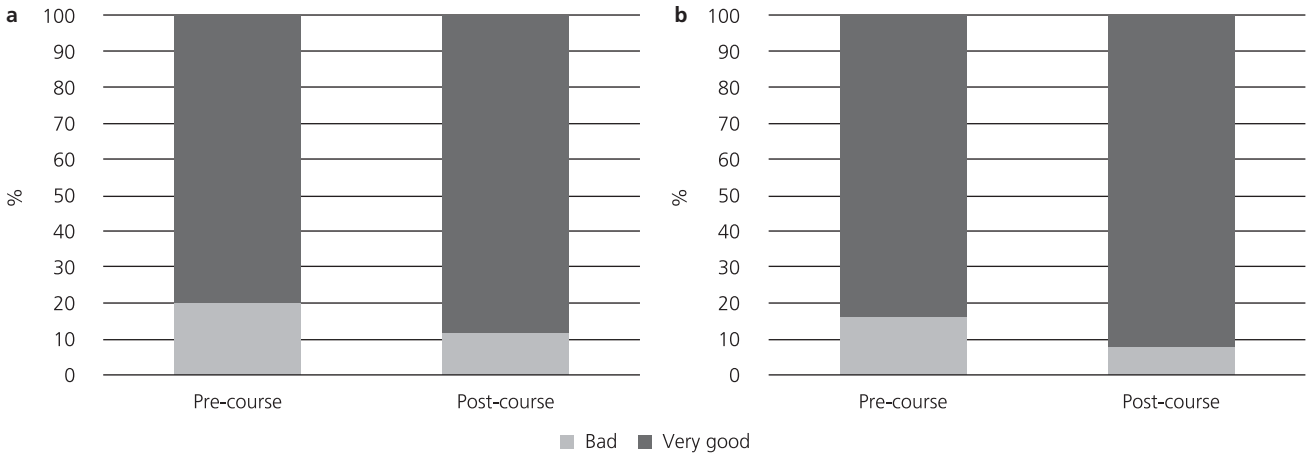

Figure 1. Expectations of the participants (**a**) and instructors (**b**) prior to the training, expectations met at the end of the course, and satisfaction rates.

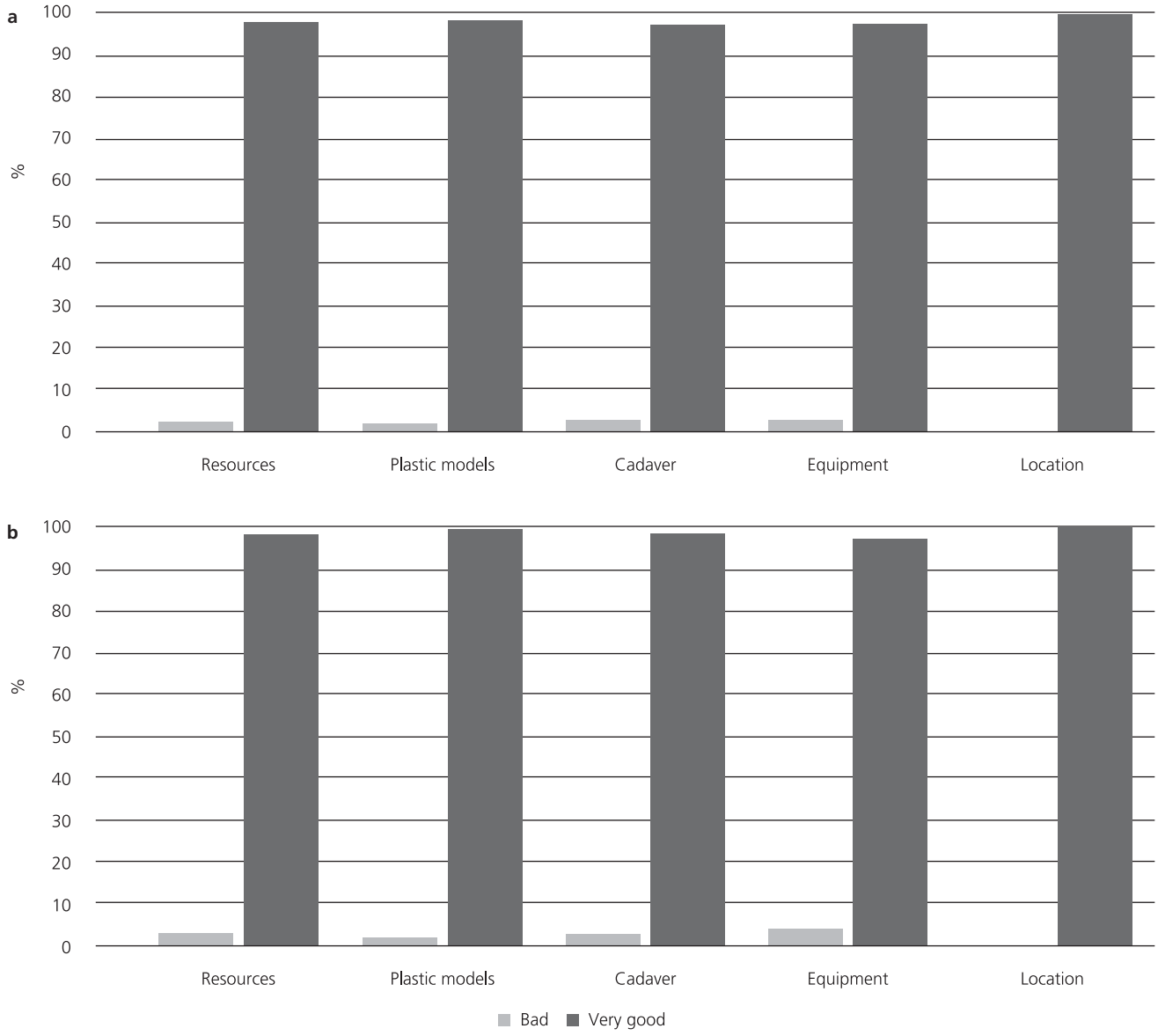

Figure 2. Distribution of responses of the participants (**a**) and instructors (**b**) regarding training resources.

drastic increase in overall satisfaction from the training (p=0; r=0.652).

A medium level of significant relationship was determined between the instructors' levels of expectations met and satisfaction from the training (r=0.577; p=0.001).

Below are some of the feedbacks received following the courses at the clinical anatomy education and research unit: "The skill training quality has increased with the unit"; "We only had the opportunity to work with plastic models before these applications. The clinical anatomy education and research unit gave us the opportunity to maximize the practical training quality with the fresh cadaver trainings"; "Your center presents the opportunity for basic and clinical science studies"; "The laparoscopic anatomic dissection training using a fresh cadaver was the best training I have ever participated in"; "I felt like as if this center unifies the basic and clinical sciences".

Discussion

The majority of the participants and instructors stated that their expectations from the courses were met. More than

half of the participants mentioned that their expectations prior to the training were positive. The vast majority of the instructors stated that their expectations prior to the training were very positive. We believe that offering courses and improving them over the years at the clinical anatomy unit might have significantly contributed to the satisfaction rates. Satisfaction rate was higher at the end of the course. The increased values were due to the undecided participants. Also, trainings with cadavers still being accepted as the gold standard, despite all the 3-dimensional techniques and improvements, might be leading to increased satisfaction rates.[3,9] Almost all of the participants and instructors were satisfied with the available resources. Plastic models, available resources in each course, and the experience levels of the instructors have all played an important role in the rate of overall satisfaction.

The relationship between the expectations of the participants prior to the training and levels of satisfaction at the end of the course is line with the outcomes of adult learning techniques. The need-oriented behaviors of adults, their eagerness to learn, and high expectations from the training might have been effective.[10] Studies have shown that, in general, expectations of participants are met when courses are designed using the adult learning techniques. The satisfaction rates are high in all courses designed in accordance with the adult learning techniques. In a study by Unalan et al.,[6] the satisfaction score on a 5-point scale was 4.36 for the arthroscopy course. In another study, feedback received following a minimally invasive surgical training with a cadaver revealed a satisfaction rate of 72.7%. Similarly, nearly all the participants from surgical fields yielded a very good/perfect satisfaction rate in a training in which a cadaver was used.[3] Some feedback from the participants mentioned that training with human cadavers in these courses boosted confidence, particularly in surgical application that require skill, and that the participants mastered certain skills throughout these courses.[11,12]

Anatomy is a science that is based on the dissection of the human body, and it is well-known that the use of cadavers is essential in surgical trainings.[13] However, very few people donate their bodies for this purpose.[14] Certain actions are being taken to increase the use of cadavers in surgical studies in order to increase cadaver donations and their use for these purposes. Although the Department of Anatomy in Akdeniz University School of Medicine is one of the leading institutions in terms of cadaver number, the lack of cadaver donations remains one of the biggest obstacles for anatomy training at our unit, as well. Training with cadavers at our unit allows surgeons to learn new techniques and improve their skills without endangering human lives. By using protocols that provide more genuine colors and elasticity compared to traditional formaldehyde fixation in the upcoming years, we aim to minimize to a certain extent the difficulties in storage and short-term usage of frozen cadavers, and use available cadavers more efficiently. As researchers, we believe that clinical anatomy units possess very positive attributes, such as creating a safe frame for improving skills in applications, enhancing skills in applications, reducing costs, and preventing applications on real patients without mastering certain skills. There is a crucial mission for clinical and basic sciences in this regard. It is clear that increasing the number of similar units will allow surgeons to acquire new skills and improve them, as well as increase collaboration and communication between basic, surgical, and clinical sciences.

Conclusion

The Clinical Anatomy Education and Research Unit of Akdeniz University School of Medicine, the first of its kind in Turkey, was assessed as highly beneficial in continuing medical education at pregraduate and postgraduate levels that also enabled multidisciplinary studies. The majority of the participants were satisfied with the applications, quality of training, and available resources.

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