Progress in Nutrition 2021; Vol. 23, Supplement 1: e2021132 DOI 10.23751/pn.v23iS1.11441

Original article

Determining veterinary interns' attitudes towards surgical applications using a new scale

Kamuran Pamuk[1] and İbrahim Kılıç[2]

[1]Afyon Kocatepe University, Faculty of Veterinary Medicine, Department of Surgery, Afyonkarahisar, Turkey; [2]Afyon Kocatepe University, Faculty of Veterinary Medicine, Department of Biostatistics, Afyonkarahisar, Turkey

Abstract. *Study Objectives:* The aim of this study was to establish cognitive, affective and behavioral attitudes of senior veterinary students (interns) towards surgical applications by developing a new attitude scale. *Methods:* The questionnaire, prepared as a data collection tool, was administered to 392 interns who were senior students of six faculties of veterinary medicine in Turkey. The study data were analyzed using descriptive statistics, validity-reliability analyses, cluster analysis and ANOVA. Exploratory Factor Analysis (EFA) and Cronbach's alpha results revealed the Surgical Applications Attitudes Scale (SAAS) to be a valid and reliable scale. The overall attitude of the students towards surgical applications was above the medium level but not at the ideal level. *Results:* The affective attitudes of interns in particular were more negative than their cognitive and behavioral attitudes. The cluster analysis revealed three groups of veterinary interns based on their attitudes towards surgical applications. The red group was the most negative and the green group was the most positive attitude group. *Conclusion:* The scale developed in this study is considered important in terms of revealing the current situation regarding surgical applications in veterinary medical education, contributing to the literature, and establishing certain standards for the relevant institutions-boards.

Key words: Veterinary medical education, Surgical applications, Veterinary interns, Attitude scale, SAAS

Introduction

Veterinary medical education aims to teach professional and clinical skills as well as the knowledge required to eliminate animal diseases in general and to examine the connections between human, animal and environmental health (1). Training veterinary students is a long and complex process as it requires the internalization of knowledge, the development of attitudes, and the acquisition of values and skills (2). Unfortunately, the prevailing pedagogical attitude in education and training is conventional. This means that students cannot develop a sense of reasoning and are not empowered to improve their clinical reasoning skills on their own (3). It cannot be assumed that students will develop these skills automatically. In veterinary medicine, clinical training is an important component of the professional degree in many countries and is considered one of the basic compentencies (4).

Faculties of veterinary medicine guide their students on clinical knowledge and skills, clinical problem solving-based practices, and the ability to establish appropriate differential diagnoses and to choose appropriate methods and decisions concerning surgical cases. As veterinary surgery is a combination of science and technical skills, training in both areas is of critical importance. Regarding whether students are ready for safe and high-quality practice with technical competence, the strongest emphasis is unquestionably on the field of surgery among several specialties (5, 6). The surgical practice has an important place in clinical skills; it is desired for veterinary students to be well-trained in surgery, and they are expected to perform basic surgical procedures without specialization

training after graduation (7, 8). After graduating from the faculty of veterinary medicine, students need solid basic knowledge of routine surgical and diagnostic skills (9, 10). Thus, one of the basic requirements of veterinary medical education is to provide the skills that new graduates need to become successful clinicians (11). If the faculty of veterinary medicine provides adequate training, new graduates will be substantially self-sufficient in these areas. Since most veterinary students work in private practice right after graduation, one of the main objectives of professional training programs for veterinary medicine is to train students to have the basic competencies upon graduation (12).

There are increasing demands from society and employers for competencies in clinical practice, particularly for surgical skills. Therefore, outcome-based training, which is based on competence and prioritizes patient safety and high-quality health care, should be aimed at surgical skills. Accordingly, this study aims to determine the cognitive (basic surgical knowledge), affective and behavioral attitudes of veterinary interns towards surgical applications by developing a new Surgical Applications Attitudes Scale (SAAS). The study results would guide on collecting evidence about what should be taught to the students and guide clinical academicians to revise their teaching methods.

Materials and Methods

Data Collection and Sample Size

The study utilized a two-part questionnaire as the data collection technique. The first part of the questionnaire included items on individual characteristics (sex, type of high school, type of housing, place of residence) of the veterinary interns. The second part, in turn, included the SAAS developed by the researchers to assess the veterinary interns' attitudes towards surgical applications. The scale was developed by using the Delphi technique first, and then focus group discussions and pilot studies were conducted. The Delphi technique, which is based on experts' opinions, was used first since no similar scale was identified in the literature on the subject. The steps of the Delphi technique include determining the problem, selecting the panelists, and administering the Delphi questionnaires (13). The problem of the research was the determination of the veterinary interns' cognitive, affective, and behavioral attitudes towards surgical applications. The selection criterion for panelists was being an academician in the field of veterinary surgery, and 11 panelists who agreed to participate were selected from different universities. The panelists were asked to offer items to determine cognitive, affective, and behavioral attitudes of interns towards surgical applications (Round 1). The resulting item pool was revised as necessary revisions, and then sent back to the panelists for the second round. According to the feedback of the panelists, the necessary statistical analyses were conducted, and the third round was implemented, resulting in the final item pool of 55 items. Following this step, focus group discussions and pilot studies were conducted at two different times with four students and three academicians. After these steps, a 36-item SAAS scale with three dimensions (cognitive, affective and behavioral, with 12 items in each dimension) was obtained. Each item was rated on a 5-point Likert-type scale, and the students' level of agreement was scored from 1 = strongly disagree to 5 = strongly agree. In addition, the negative items were reverse scored (5 = strongly disagree and 1 = strongly agree), where 1 represented negative attitudes and 5 represented positive attitudes.

The population of this study consisted of interns studying at the Faculties of Veterinary Medicine in Turkey. Due to constraints such as time and cost, sampling was preferred instead of the entire population. For this purpose, the cluster sampling method was used, and six faculties of veterinary medicine in six Turkish cities (Ankara, Balıkesir, Kırıkkale, Burdur, Afyonkarahisar, Kayseri) were identified as clusters. The sampling size was determined using the following formula: $n = s^2.Z_{\alpha}^2/d^2$ (14). In the formula, the standard deviation was taken as s=1, $Z_{0.05}$=1.96 and the effect size as d = 0.1, resulting in a minimum sample size of 384. Considering incomplete, improper, and low-reliable questionnaires, 450 questionnaires were administered face-to-face and 392 questionnaires were evaluated. This study was approved by the Afyon Kocatepe University with the decision number 16.

Statistical Analysis

First, an Explanatory Factor Analysis (EFA) with varimax rotation was conducted to identify the

factor structure of the SAAS. Cronbach's alpha coefficients were calculated for reliability analysis. Items with low validity and reliability were removed from the scale. The attitudes of the interns towards surgical applications were described using arithmetic mean and standard deviation based on item and dimension. In addition, the t-test and analysis of variance were used to compare students' attitudes according to their demographic characteristics. The cluster analysis with the Ward's method was conducted to classify the students according to their attitudes. One-way ANOVA and the Tukey's post-hoc tests were used to compare the groups. The study data were analyzed using the SPSS 21.0 for Windows package program.

Results

This study included 392 veterinary interns, and the distribution of the participants by individual characteristics is presented in Table 1. Accordingly, 37.2% of the students were female and 62.8% were male. A great majority (79.6%) of the students were Anatolian High School graduates, while 58.2% were staying in student houses. Of the participating students, the type of settlement mostly lived in was a metropolis in 48.5%, a province/district in 37.5%, and a village/town in 14%.

Results of EFA and reliability analysis for the SAAS scale as well as some descriptive statistics are presented in Table 2. The KMO and Bartlett's test results revealed the suitability for factor analysis, and sampling adequacy (KMO = 0.887; Chi Square = 7038.13; $p < 0.001$). Accordingly, the 36-item SAAS was grouped into three factors that explained 63.797% of the total variance. The first factor (behavioral) explained 26.185% of the total variance, while the second (cognitive) and third (affective) factors explained 20.501% and 17.111%, respectively. The factor loadings of the items were above 0.40. The Cronbach's alpha coefficient for the SAAS was 0.862. The Cronbach's alpha coefficient was 0.786, 0.761, and 0.811 for the cognitive, affective, and behavioral dimensions, respectively.

The examination of Table 2 revealed that the arithmetic mean for veterinary interns' overall attitude towards surgical applications was 3.65 ± 0.52 (X ± SD). The means were calculated as 3.78 ± 0.72 for the cognitive dimension, 3.35 ± 0.54 for the affective dimension, and 3.82 ± 0.78 for the behavioral dimension. In the cognitive dimension, especially the items 9, 10, 11, and 8 (knowledge on preoperative anesthesia -9-, surgical

Table 1. Distribution of participants by individual characteristics

Variables	Groups	n	%
Sex	Female	146	37.2
	Male	246	62.8
Type of high school	Anatolian HS	312	79.6
	Science HS	24	6.1
	Vocational HS	13	3.3
	Other	43	11.0
Type of housing	Government student dormitory	57	14.5
	Private student dormitory	19	4.8
	Student house	228	58.2
	Other	88	22.4
Type of settlement mostly lived in	Metropolis	190	48.5
	Province-District	147	37.5
	Village-Town	55	14.0
Total		392	100.0

Table 2. Results of exploratory factor analysis, Cronbach's alpha coefficients, and calculated means (± SD) for the SAAS items and dimensions

Dimensions and Items	Factor loadings	Eigenvalues (% of variance)	Cronbach's alpha	Likert-type scale $\bar{X}$ ± SD
Cognitive dimension *(Factor 2)*		7.380 (20.501)	0.786	3.78 ± 0.72
1. Taking an anamnesis from the patient's owner with appropriate questions is the first step of the diagnostic process.	0.575			4.74 ± 0.69
2. Informing the patient's owner before the examination is important to earn trust.	0.575			4.49 ± 0.79
3. The animal must be restrained during the examination for safety.	0.435			4.71 ± 0.71
4. Auxiliary diagnostic methods (radiography, ultrasonography, endoscopy, etc.) should be used to identify whether the case requires any surgical application.	0.488			4.67 ± 0.72
5. I have the knowledge of which auxiliary diagnostic methods should be used for each case.	0.619			3.50 ± 1.04
6. I can identify the case regionally (head-neck, chest, abdominal, locomotor, etc.).	0.625			3.99 ± 1.02
7. I have the necessary knowledge about life-threatening conditions and intervention methods in an emergency.	0.576			3.20 ± 1.11
8. Know which treatment method (operation, medication, etc.) should be used in which case.	0.553			3.25 ± 1.03
9. I have the knowledge of which anesthetic techniques and agents should be used preoperatively in which case.	0.531			3.09 ± 1.08
10. Know where and how to use surgical equipment and techniques intraoperatively.	0.520			3.14 ± 1.15
11. I have sufficient / necessary knowledge of the postoperative treatment process (immobilization, nutrition, medication, etc.).	0.644			3.23 ± 1.09
12. I know appropriate methods when euthanasia is required.	0.425			3.38 ± 1.65
Affective/Emotional dimension *(Factor 3)*		6.160 (17.111)	0.761	3.35 ± 0.54
1. I avoid surgical applications due to some fears and worries (fear of harming the living, blood phobia, etc.).	0.690			2.10 ± 1.27
2. I have a fear of negative evaluation (unsuccessful, incompetent, etc.) towards surgical applications by academicians, my friends and my social circle.	0.565			2.50 ± 1.30
3. Not having sufficient theoretical knowledge causes the fear and anxiety of not being able to perform surgical applications.	0.434			3.21 ± 1.18
4. Lack of sufficient practice in surgical applications worries me professionally.	0.463			4.15 ± 1.14
5. The atmosphere in the surgical application room affects me (high anxiety, silence, calmness, noise or stress, etc.).	0.439			2.88 ± 1.45
6. In applied surgical training, I would like to work with model laboratory equipment (suture sponges, plastic bones, plastic organs, etc.) instead of live animals.	0.472			2.63 ± 1.53
7. I find the use of ethically sourced and donated cadavers in surgical applications reasonable.	0.484			4.29 ± 1.01

Dimensions and Items	Factor loadings	Eigenvalues (% of variance)	Cronbach's alpha	Likert-type scale $\bar{X}$ ± SD
8. The thought of saving the life of the animal reduces my fear and worries, and increases my motivation to learn.	0.425			4.42 ± 0.89
9. My feelings do not change when the animal is euthanized in mandatory situations.	0.758			3.36 ± 1.40
10. I doubt and get afraid during the intervention to the cases in surgical applications.	0.515			2.52 ± 1.16
11. The practice I gained during surgical applications reduced my fears and worries about the operations.	0.432			3.59 ± 1.18
12. Development of complications during surgical operation worries me.	0.547			3.45 ± 1.07
Behavioral dimension *(Factor 1)*		9.427 (26.185)	0.811	3.82 ± 0.78
1. In an emergency, I first establish vascular access and intubate in order to save the animal.	0.548			3.89 ± 1.09
2. I take anamnesis from the patient's owners and confirm the reliability of this information.	0.617			4.32 ± 0.89
3. I implement appropriate handling techniques during the examination of animals.	0.660			4.32 ± 0.89
4. I use auxiliary diagnostic methods (radiography, ultrasonography, etc.) when necessary.	0.674			4.21 ± 1.02
5. I establish the necessary diagnosis by determining the surgical localization of the disease.	0.710			3.58 ± 1.13
6. I apply the necessary anesthesia procedure for the operation.	0.712			3.66 ± 1.15
7. I score the pain and use the appropriate pain medication.	0.623			3.35 ± 1.13
8. I apply the necessary surgical technique according to the disease.	0.695			3.49 ± 1.18
9. During the operation, I apply the necessary operation techniques using surgical equipment.	0.696			3.43 ± 1.26
10. I perform postoperative care and checks according to the surgical application.	0.753			3.91 ± 1.09
11. I use appropriate methods for euthanasia (decapitation, hemostasis, respiratory arrest, high-dose anesthesia, etc.).	0.560			3.36 ± 1.37
12. I act in an evidence-based, conscientious, open, and reasonable manner while making decisions about the treatment of patients.	0.614			4.37 ± 0.94
Overall scale		63.797%	0.862	3.65 ± 0.51

Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) = 0.887
Bartlett's Test of Sphericity: Chi-Square = 7038.130; $p < 0.001$

equipment and techniques -10- postoperative treatment process -11- and necessary treatment methods according to the cases -8-) revealed more negative attitudes compared to the other items. In the affective dimension, especially the items 4, 12, and 3 (professional worry about the lack of sufficient practice in surgical applications -4-, worry about complications during surgical operations -12-, fear and worry in surgical applications due to the lack of sufficient theoretical knowledge -3-) revealed more negative attitudes compared to other items. In the behavioral dimension, in turn, the items 7, 11, 9, 8 (pain scoring and using pain medications -7-,

using appropriate methods for euthanasia -11-, applying necessary intraoperative surgical techniques using surgical equipment -9- applying necessary surgical techniques according to the disease -8-) revealed more negative attitudes compared to the other items.

Figure 1 shows the dendrogram from the cluster analysis of veterinary interns' according to their attitudes towards surgical application. Accordingly, the veterinary interns were divided into three groups at a distance value of 15. The attitudes of the three groups were compared using ANOVA according to cluster membership scores (Table 3). Accordingly, students were classified into low (red), medium (yellow), and high (green) levels according to their cognitive, affective, behavioral, and overall attitudes. As a result, 12.24% of the students had low, 51.53% had medium and 36.22% had a high level of attitudes towards surgical applications.

The students' attitudes towards surgical applications did not statistically differ by sex, type of high school, type of housing and the type of settlement mostly lived in. Therefore, these findings were not included in the study.

Discussion

This study aimed to determine the cognitive (basic surgical knowledge), affective, and behavioral attitudes of veterinary interns towards surgical applications by developing a new attitude scale (SAAS) and included 392 students. When the EFA results for the scale's construct validity and the Cronbach's alpha coefficients for the reliability are compared with the literature (15, 16, 17), the 36- item SAAS scale can be considered a valid and reliable instrument. The study assessed this scale, which was developed to determine the veterinary interns' attitudes towards surgical applications, under three dimensions (cognitive, behavioral, and emotional) known as the ABC (Affective, Behavioral, Cognitive) of attitudes (18). The cognitive dimension included items on some basic knowledge of students about surgical applications, the affective dimension included items measuring students' emotional perception (high anxiety, worry, failure, fear, etc.), and the behavioral dimension included items related to behavioral responses to surgical applications. This scale revealed that the veterinary interns' mean score on overall attitude towards surgical applications was above three, which is the median of a 5-point Likert-type scale (19), but this value was not at the target or ideal level. The study also established students' deficiencies in cognitive, affective, and behavioral dimensions. A remarkable result of the study was that the students' affective attitudes, in particular were more negative than their cognitive and behavioral attitudes. As reported by previous studies, this can be explained

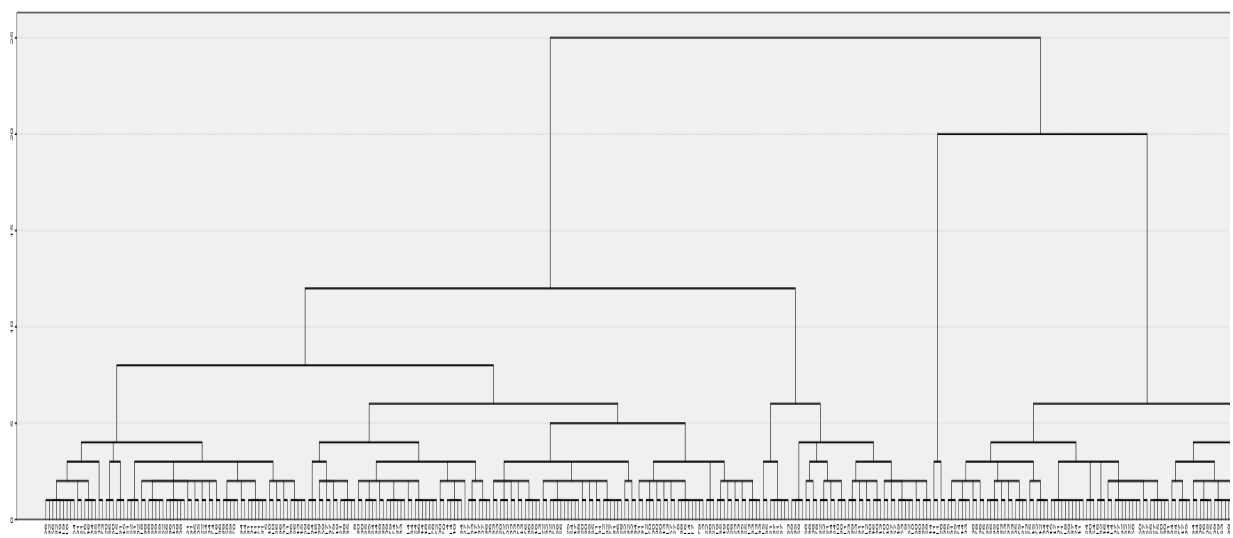

Figure 1. Dendrogram using Ward's hierarchical clustering method

Table 3. Comparison of the groups obtained by cluster analysis

Dimensions	Clusters	n	%	$\overline{X}$	SD	P
Cognitive	Low (red)	48	12.24	2.73[c]	0.45	< 0.001
	Medium (yellow)	202	51.53	3.69[b]	0.37	
	High (green)	142	36.22	4.30[a]	0.37	
Affective	Low (red)	48	12.24	3.02[c]	0.78	< 0.001
	Medium (yellow)	202	51.53	3.26[b]	0.56	
	High (green)	142	36.22	3.59[a]	0.55	
Behavioral	Low (red)	48	12.24	2.59[c]	0.56	< 0.001
	Medium (yellow)	202	51.53	3.65[b]	0.57	
	High (green)	142	36.22	4.49[a]	0.36	
Overall attitude	Low (red)	48	12.24	2.78[c]	0.41	< 0.001
	Medium (yellow)	202	51.53	3.53[b]	0.32	
	High (green)	142	36.22	4.12[a]	0.25	

[a,b,c] Different superscripts in the means column within each dimension indicate statistical difference at $p < 0.01$.

by an increasing concern of new graduates about being less ready for clinical applications, the prevailing view of lack of confidence, competence or both after starting to practice, and a lack of confidence in their skills and abilities (20, 21). Some studies (22, 23, 24) suggest that unpleasant surgeries or negative experiences such as guilt for failing to save an animal's life can negatively affect students' attitudes (emotional detachment, compassion fatigue, burnout) throughout the academic years. Langebæk et al. (25) reported that among students who attended or did not attend basic surgical courses, the most common emotion was anxiety, the second most common emotion was excitement, as well as fear and stress. Lavictoire (26) stated that 76% of 800 new veterinary graduates who responded to the survey expressed that lack of confidence, and competence, or both, were moderately severe or very severe problems. It has been reported that excessive stress reduces attention (27) and concentration (28, 29), preventing decision-making (30), and negatively affects learning by reducing students' cognitive functionality (31). Killenger et al. (32) established that about half (49%) of 1385 veterinary students who participated in the survey experienced at least a moderate level of stress, with female students (51%) having higher stress levels than males (37%), and reported these findings to be consistent with the literature (33, 34).

In the present study, the cluster analysis revealed three groups of veterinary interns based on their attitudes towards surgical applications. One out of every 8 students was in the low-level group, the first group, which was the group with the lowest-level, or the most negative attitudes. Therefore, this group was named the red group. About half of the students were in the medium-level (yellow) group, which had attitudes at neither low nor high levels. Approximately one of every three students was in the third group, the high-level group, and the attitudes of this group towards surgical applications were quite positive compared to the other two groups. Thus, this group was named the green group. The present study identified some critical approaches for all three groups, the red group in particular, based on dimensions, which should be mentioned first. There was a lack of knowledge on preoperative anesthesia, intraoperative surgical equipment and techniques, and postoperative treatment process and necessary treatment methods according to the cases in the cognitive dimension; professional worry about the lack of sufficient surgical practice, worry about complications during a surgical operation, and fear and worry in surgical applications due to the lack of sufficient theoretical knowledge in the affective dimension; and lack of knowledge on scoring pain and using pain medications, using appropriate

methods for euthanasia, applying necessary surgical techniques intraoperatively using surgical equipment, and applying necessary surgical techniques according to diseases in the behavioral dimension. Hedlund et al.'s (35) study including 39 faculties reported that most of the participants (275 (68.4%) of 402 questionnaires) thought that live animal laboratories for practice allowed to recover animals from anesthesia, evaluate surgical wounds, provide postoperative animal care, and identify postoperative complications (36). It is emphasized that those participating in the clinical skills laboratory find more opportunities for practice, the duration and amount of practice rather than the laboratory itself have an anxiety-reducing effect, the use of a clinical skills laboratory utilizing models for realistic practice is a useful approach and can help reduce the anxiety of veterinary surgical students (37, 38). Managing the health of a live animal (under supervision), fear of not fully fulfilling the responsibilities - for example, fear that the animal will wake up, suffer, or die prematurely -were reported as a source of negative emotion by the students. Not being prepared, not being able to control the situation adequately, feeling deprived of personal resources were determined as situations with a negative impact on performance. An unpleasant atmosphere and poor peer relationships in the laboratory or operating room were reported to be an important source of negative emotions. In addition, the applied clinical skills laboratories were expressed to be an important source of psychological safety and to facilitate confrontation with live animal surgery. Many students reported that they would find it difficult to focus on learning and skill in stressful situations such as demanding educators, and competitive peers. A supportive learning environment was reported to be able to reduce the feeling of lack of self-confidence in focus and skills, and to be beneficial for student participation and learning (25).

The findings for the cognitive dimension may be due to the incomplete or incorrect teaching practices in the lectures, courses, activities, and programs related to surgical applications during the education. It is stated that developing / improving clinical practice training programs in faculties of veterinary medicine would contribute positively to students' attitudes towards applications (10). In order to prepare students for surgical practice, it has been reported that arrangements would be beneficial, such as the inclusion of different learning combinations in the curriculum, and the creation of additional operative application programs in cooperation with animal welfare organizations to enable students to perform more surgical applications in addition to existing clinics (39). It has been further reported that student-focused learning areas, which are widely adopted in veterinary medical education, and high-quality veterinary simulators and models to apply clinical skills are effective models for the development of basic clinical skills and these should be established in-house to enable students to practice their skills in a unique way (40). The importance of clinical skills laboratories has been also emphasized by Langebaek et al. (25). Hedlund et al.'s (35) survey revealed that most of the veterinary students close to the senior year wanted seven or more live animal laboratories to facilitate learning surgical skills. It has been emphasized that surgical courses in clinical skills laboratories at faculties have a faster effect on surgical performance and a positive effect on the healing time of any wound (37).

In order to improve the species-specific skills of the senior students of the faculty, it was reported that it would be beneficial to create an appropriate education system for students interested in practice with any kind of species (12). In addition, regarding consultations, it is reported that the development of a student-centered learning method and modeling by academicians for effective clinical reasoning may help students understand the process and thus improve the development of skills. Furthermore, it has been noted that thinking aloud is an effective way to model clinical reasoning (3). According to various studies, the learning method preferred by the current generation of students is a flexible, secure system that is open to communication and collaboration, which gives the students control over their learning (41, 42, 43). It has been reported that the combination of learning materials with e-learning, videos, literature, clinical skills practice laboratory, and cadaver laboratory are effective methods for learning (36).

Behavioral, highly competent skills that require minimal or no supervision are considered as basic surgical skills (basic knot tying and suturing, preparing the patient for surgery, sterilization, treatment of potential

complications, skin closure in atraumatic cases, traumatic manipulation of tissues and internal organs, etc.) (12). In a survey of veterinary graduates, 87 (82%) of 106 people reported that they were able to work frequently or always without supervision, while 46 (43%) always sought the support of other veterinarians in practice. Of the participants, 82 (77%) stated that they made a mistake that was defined as a wrongful act or negligence with negative consequences for a patient (44). Of senior veterinary students, 80.4% reported that the operation they most worried about their ability to perform was canine ovariohysterectomy (OVH) and postoperative bleeding was the main concern for students. Bowlt et al. (45) reported that among 74 senior students, the question, "What surgical procedure do you worry most about than performing as a fresh graduate in your first job?" was responded as OVH by 81% (60/74), gastric dilatation volvulus (GDV) by 12% (9/74), cat ovariohysterectomy by 5% (4/74) and dog cesarean section byprocedure1% (1/74).

In another study (56), more than 90% of 37 graduates reported the skills used to include general anesthesia, tympanic membrane examination, acquisition and interpretation of abdominal radiography, catheterization of male cats, fine needle aspiration of masses, sterilization of dogs and cats, scaling and extraction of teeth, hematoma, and aural treatment. The areas of knowledge used in more than 10% of cases consist of vaccination, anesthesia / sedation, skin/jacket problems, general advice on pet health, sterilization, and musculoskeletal diseases (46).

Regarding the first day competencies of veterinary students, which are very important in both national and international accreditation requirements, issues such as sufficient clinical experience for diagnosis, treatment, and preventing a physical disease, injury, and pain in an animal have been determined as a common vision (47). Hill et al.'s (12) study reported that 67.5% of 1323 general practitioners who answered the questionnaire stated that the most important parameters students should have when they graduate are skills, general procedures, and knowledge. The authors reported that while there is a trend towards teaching students' individual surgery rather than surgical procedures, there is no consensus among faculties of veterinary medicine as to what constitutes a basic surgical skill and what skills are most important for students to demonstrate competence upon graduation.

Conclusion

It is believed that an important data collection tool (SAAS) was developed in the present study in terms of both identifying the current situation regarding surgical applications in veterinary medical education, contributing to the literature in an academic sense, and establishing the criteria and standards of national or international relevant boards and commissions (International and National Accreditation Institutions - EAVAE, VEDEK, etc.). The SAAS revealed that the students had negative attitudes especially in the affective dimension, which includes fear and anxiety. In particular, the students' professional worry about the lack of sufficient practice in surgical applications, worry about complications during surgical operations, fear and worry in surgical applications due to the lack of sufficient theoretical knowledge were demonstrated. In the light of this information, the present study may also play an important key role in identifying deficiencies in the surgical field as well as other veterinary clinical areas (internal medicine, obstetrics, etc.). It is recommended that this research should be conducted in other areas.

In accordance with the study findings, a useful and sustainable teaching strategy that enables students to use the acquired skills in new combinations and under new conditions should be aimed for veterinary basic surgery training. Therefore, behavioral courses, which is an important component of modern practice and a valuable aspect of the core curriculum in veterinary medical education, psychological support and guidance should be included in training in veterinary schools. Innovative alternatives should be created to help students learn basic surgical principles and psychomotor skills. Models, cadavers, and interactive multimedia programs are all valuable in teaching the basic principles and skills required to perform surgery. When students graduate, to ensure that they have the necessary knowledge and skills to be successful in veterinary practices, evaluation of outcomes should be taken into consideration and measures should be

developed and implemented accordingly to determine their competencies and to prove that graduates have achieved these goals. We believe that this study can facilitate the identification of the basic knowledge and skills required to be included in the curriculum for veterinary students and help faculties of veterinary medicine prioritize the teaching of these skills. The results of this study may help to inform academic surgical professionals about the skills that veterinary students perceive as important to have upon graduation.

Conflicts of interest: The authors declare that there is no conflict of interest about this manuscript.

References

1. Beran TN, Donnon T, Hecker KA. Review of Student Evaluation of Teaching: Applications to Veterinary Medical Education. J Vet Med Edu 2012; 39 (1) 6: 71-78.
2. Olivares-Olivares SL, López-Cabrera MV. Self-assessment of problem solving disposition in medical students. J Biomed Edu 2014; 1-6.
3. Humm KR, May SA. Clinical Reasoning by Veterinary Students in the First-Opinion Setting: Is It Encouraged? Is It Practiced? JVME 2017; 1-7.
4. Bell C, Baillie S, Kinnison T, Cavers A. Preparing Veterinary Students for Extramural Clinical Placement Training: Issues Identified and a Possible Solution. JVME 2010; 37 (2): 190-197.
5. Kim SE, Case JB, Lewis DD, Ellison GW. Perception of teaching and assessing technical proficiency in American College of Veterinary Surgeons Small Animal Surgery Residency Programs. Vet Surgery 2015; 44: 790-797.
6. Favier RP, Godijn M, Bok HGJ. Identifying entrustable professional activities for surgical skills training in companion animal health. Vet Record 2019; 1-6.
7. Greenfield CL, Johnson AL, Schaeffer DJ. Frequency of use of various procedures, skills, and areas of knowledge among veterinarians in private small animal exclusive or predominant practice and proficiency expected of new veterinary school graduates. J Am Vet Med Assoc 2004; 224: 1780-1787.
8. Schnabel LV, Maza PS, Williams KM, Irby L, McDaniel CM, Collins BG. Use of a formal assessment instrument for evaluation of veterinary student surgical skills. Vet Surgery 2013; 42: 488-496.
9. Hecker K, Read EK, Vallevand A, Krebs G, Donszelmann D, Muelling CKW, Freeman SL. Assessment of first-year veterinary students' clinical skills using objective structured clinical examinations. JVME 2010; 37 (4): 395-402.
10. Shivley JM, Brookshire WC, Bushby PA, Woodruff KA. Clinically prepared veterinary students: Enhancing veterinary student hands-on experiences and supporting hospital caseload using shelter medicine program. Front Vet Sci 2018; 5 (95): 1-9.
11. Rhind SM, Baillie S, Kinnison T, Shaw DJ, Bell CE, Mellanby RJ, Hammond J, Hudson NPH, Whittington RE, Donnelly R. The transition into veterinary practice: Opinions of recent graduates and final year students. BMC Med Edu 2011; 11: 64.
12. Hill LN, Smeak DD, Lord LK. Frequency of use and proficiency in performance of surgical skills expected of entry-level veterinarians by general practitioners. JAVMA 2012; 240 (11): 1345-1354.
13. Dalkey N, Helmer O. An experimental application of the Delphi method to the use of 430 experts. Management Science. 1963; 9:458- 467.
14. Sekaran U. Research methods for business. New York: John Wiley High Education Press; 2003.
15. Tabachnick BG, Fidell LS. Using multivariate statistics. 5th Ed. Boston. Pearson/Allyn & Bacon, 2007.
16. Cronbach LJ. Coefficient alpha and the internal structure of tests. Psychometrika. 1951; 16: 297-334.
17. Maltby J, Day L, Macaskill A, Personality, individual differences and intelligence. 4th Ed. New York, Pearson, 2017.
18. Edwards AL. Techniques of Attitude Scale Construction. New York (USA). Irvington 438 Publishers, 1983.
19. Likert R. A technique for the measurement of attitudes. Archives of Psychology 1932; 22: 5-55.
20. Lofstedt J. Confidence and competence of recent veterinary graduates- is there a problem? Can Vet J 2003; 44: 359-360.
21. Smeak DD. Teaching surgery to the veterinary novice: The Ohio State University Experience. J Vet Med Edu 2007; 34 (5): 620-7.
22. Herzog HA, Vore TL, New Jr JC. Conversations with veterinary students: attitudes, ethics and animals. Anthrozoos 1989; 2 (3): 181-188.
23. Thomas MR, Dyrbye LN, Huntington JL, Lawson KL, Novotny PJ, Sloan JA, Shanafelt TD. How do distress and well-being relate to medical student empathy? A multicenter study. J of General Internal Med 2007; 22: 177-183.
24. Woloschuk W, Harasym PH, Temple W. Attitude change during medical school, a cohort study. Med Edu, 2004; 38: 522-534.
25. Langebæk R, Eika B, Jensen AL, Tanggaard L, Toft N, Berendt M. Anxiety in veterinary surgical students: A quantitative study. JVME 2012a; 39 (4): 331-340.
26. Lavictoire S. News- Expanding scope of veterinary practice: Members express their views. Can Vet J 2003; 44: 282-284.
27. Smith A. Stress and information processing. In: Johnson M, Wallace L (Ed). Stress and medical procedures. 58-79. Oxford University Press, Oxford, 1990.
28. Collins H, Foote D. Managing stress in veterinary students. J Vet Med Educ 2005; 32 (2): 170-2.
29. Saipanish R. Stress among medical students in a Thai medical school. Med Teach 2003; 25 (5): 502-6.

30. Klein G. The effect of acute stressors on decision making. In: Drisekell J, Salas E (Ed). Stress and human performance. 48-88. Mahwah, NJ, Lawrence Erlbaum, 1996.
31. Shapiro SL, Shapiro DE, Schwartz GER. Stress management in medical education: A review of the literature. Acad Med 2000; 75 (7): 748-59.
32. Killinger SL, Flanagan S, Castine E, Kimberly AS. Howard stress and depression among veterinary medical students. JVME 2017; 44 (1): 3-8.
33. Hugh-Jones M, Kearney M. Student stress: Identification of causes and of groups in the four years at a veterinary school. J Vet Med Educ 1983; 10 (1): 6-8.
34. Dahlin M, Joneborg N, Runeson B. Stress and depression among medical students: a cross-sectional study. Med Educ 2005; 39 (6): 594-604.
35. Hedlund CS, Hosgood G, Naugler S. Surgical Education: Attitudes toward Animal use in teaching surgery at Louisiana State University. J Vet Med Edu 2002; 29 (1): 50-55.
36. Langebæk R, Eika B, Tanggaard L, Jensen AL, Berendt M. Emotions in veterinary surgical students: A qualitative study. JVME 2012b; 39 (4): 312-321.
37. Zeugschmidt EL, Farnsworth CH, Carroll HS, Lucia TA, Hinckley MM, Gay JM, Cary JA. Effects of an optional clinical skills laboratory on surgical performance of third-year veterinary students. J Am Vet Med Assoc 2016; 248 (6): 630-635.
38. Hashizume CT, Hecker KG, Myhre DL, Bailey JV, Lockyer JM. Supporting veterinary preceptors in a distributed model of education: A faculty development needs assessment. J Vet Med Educ 2016; 43 (1): 104-10.
39. Gopinath D, McGreevy PD, Zuber RM, Klupiec C, Baguley J, Barrs VR. Developments in undergraduate teaching of small-animal soft-tissue surgical skills at the University of Sydney. J of Vet Med Edu 2012; 39 (1): 21-29.
40. Seddon JM, Vo ATT, Kempster SR, Lee HJ, Nguyen TT, Munce K, Del Bianco A, Chakitde V, Quang T, Shapter FM. Simulated clinical skills for veterinary students supplement limited animal and clinical resources in developing countries. J Vet Med Edu 2020; 47 (1): 92-98.
41. Freeman JF, Huse D, Lee R, Inoue T, Weil AB, Constable PD. Teaching veterinary anesthesia and surgery: The impact of instructor availability on anesthesia, operative, and recovery times in dogs undergoing ovariohysterectomy or castration. JVME 2014; 41 (4): 390-399.
42. Illeris K. Forskellige læringstyper [Different forms of learning]. Læring [Learning]. Frederiksberg: Roskilde Universitetsforlag. 44-63. 2006.
43. Parasuraman R, Tippelt R, Hellwig L. Brain, cognition and learning in adulthood. In: Della Chaisa B (Ed) Understanding the brain: the birth of a learning science. 211-38. Paris, OECD, 2007.
44. Mellanby RJ, Herrtage ME. Survey of mistakes made by recent veterinary graduates. Vet Rec 2004; 155: 761-5.
45. Bowlt KL, Murray JK, Herbert GL, Delisser P, Ford-Fennah V, Murrell J, Friend EJ. Evaluation of the expectations, learning and competencies of surgical skills by undergraduate veterinary students performing canine ovariohysterectomies. J Small Anim Prac 2011; 52: 587-594.
46. Clark WT, Kane L, Arnold PK, Robertson ID. Clinical skills and knowledge used by veterinary graduates during their first year in small animal practice Aust Vet J 2002; 80 (1-2): 37-40.
47. Calder CD, Albright JD, Koch C. Evaluating graduating veterinary students' perception ofpreparedness in clinical veterinary behavior for "Day-1" of practice and the factors which influence that perception: A questionnaire-based survey. J Vet Behav 2017; 20: 116-120.

Correspondence:
Kamuran Pamuk
Afyon Kocatepe University,
Faculty of Veterinary Medicine,
Department of Surgery, Afyonkarahisar, Turkey
E-mail: kamuranpamuk@gmail.com