

A SURVEY-BASED EVALUATION OF THE IMPACT OF VARIOUS TEACHING METHODS ON DAY-ONE COMPETENCIES IN VETERINARY ANAESTHESIA

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Abstract

For veterinary medicine, day one competencies such as performing first aid in emergencies and safely administering general anaesthesia demand both theoretical understanding and practical expertise. Endotracheal intubation has been identified as a challenging clinical skill for students. This study aimed to assess veterinary students' confidence levels in performing endotracheal intubation in anaesthesia, document their previous experiences with the procedure, and describe their emotional states during the training. Students completed a survey evaluating the usefulness of high-fidelity models and cadavers in acquiring intubation skills. The training curriculum progressed from lectures and non-animal practice to hands-on work with high-fidelity models and cadavers, culminating in performing anaesthesia on dogs and cats in a university clinic. The feedback related to the necessary practical teaching training is crucial for tailoring the teaching process to ensure students develop the required competence before progressing to the next stage of training on live animals.

Key words: competencies, anaesthesia, intubation, students.

INTRODUCTION

The principles guiding the use of animals in research and education are rooted in the three Rs: reduction, replacement, and refinement. In veterinary medical training, these principles have significantly decreased the frequency of multiple-survival surgeries. Instead, students are increasingly practicing on cadavers and different models.

Key anaesthesia skills, recognized as essential for entry-level veterinarians, include general anaesthesia induction, endotracheal intubation, aesthetic depth assessment, pain evaluation, and expertise in local aesthetic techniques.

Ethical and financial concerns have been raised about using live animals solely for practicing these skills (Burzumato et al., 2020).

In response, significant advancements have been made in recent years to develop non-animal teaching models, with numerous innovations highlighting this progress (Gee et. al., 2025).

Utilizing skill lab mannequins and cadavers is essential for developing day-one competencies in veterinary anaesthesiology. The present study aimed to determine to what extent third-year

students, who take both theoretical and practical courses in veterinary anaesthesiology, acquire the necessary day-one competencies by the end of their studies. Additionally, it sought to identify the most effective methods for achieving the desired outcomes.

MATERIALS AND METHODS

A total of 190 undergraduate veterinary students from the same academic year (third-year were invited to complete a series of two surveys over a 4-month period, corresponding to one teaching semester, beginning in February 2024. The first survey was conducted at the start of the second semester of the third year, coinciding with the anaesthesia theory course. The second survey was conducted at the conclusion of the teaching period, covering both theoretical and practical components. Of the 190 students, 141 participated, representing 74.21% of the third-year students in the Romanian section of the veterinary medicine program, University of Agronomic Sciences and Veterinary Medicine of Bucharest.

RESULTS AND DISCUSSIONS

The demographic profile of the responding students showed that 83.3% were women, 14.9% were men, and 1.8% identified as another gender. The participants' ages were distributed as follows: 66.7% were aged 20-22, 26.3% were aged 22-25, and 7% were over 25 years old. The evaluation of students' educational potential based on their prior academic performance revealed that the majority (83.3%) demonstrated moderate achievement, with general averages between 7 and 9. A smaller proportion (12.3%) showed weaker performance with averages below 6, and only a minority (4.4%) excelled with averages between 9 and 10. These findings highlight the diverse academic backgrounds within the cohort and suggest the need for tailored teaching strategies to address varying levels of preparedness, ensuring all students have the opportunity to build on their existing knowledge and achieve competency in the subject matter. Given that this group of students experienced disruptions to their education during the COVID-19 pandemic, when restrictions overlapped with their first year of university, the study also investigated how their learning experiences were affected (figure 1). Analysis revealed that 85.35% of students faced significant challenges due to pandemic-related measures, and 17.5% reported they were still working to recover from the impacts on their education similar with other data for veterinary medicine profession (Muresan et al., 2020).

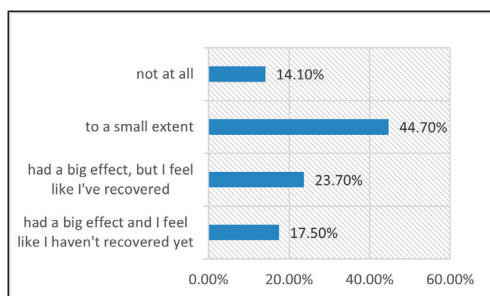


Figure 1. Do you think that in the context of the measures taken during the COVID19 pandemic, you're learning experience in previous semesters was affected?

These findings opened the way for further research to assess the competencies of students who did not experience disruptions to their education during the COVID-19 period. To

explore students' perspectives, we asked about their ability to understand the anaesthesiology course material with or without prior foundational knowledge. Specifically, students were asked, to what extent they believe the concepts presented in the anaesthesiology course can be understood without a solid level of knowledge from previous semesters, acquired in anatomy, physiology, and physiopathology? Only 28.1% of respondents (Figure 2) believed that no prior knowledge was necessary. This highlights the positive impact of the teaching approach, which includes a review of concepts from previous years at the start of each course, helping to bridge any gaps in understanding.

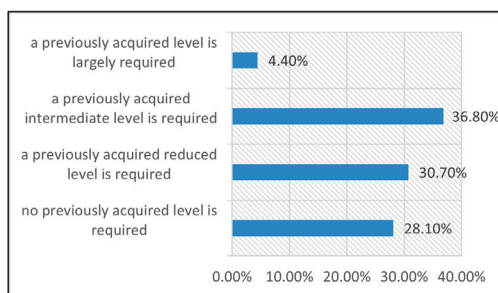


Figure 2. To what extent do you consider that the notions presented in the anaesthesiology course can be understood without having a good level of knowledge acquired in the previous semesters?

Students were also questioned about their practical experience prior to the anaesthesiology course, particularly regarding endotracheal intubation skills. The majority (77.2%) reported having no prior practical experience. Before beginning the course, we assessed students' confidence levels in their theoretical understanding of endotracheal intubation. Results showed that only 22.1% felt confident, while 77.9% expressed low or no confidence in their knowledge.

In the next phase of the questionnaire, we assessed students' practical experience by comparing two methods of teaching endotracheal intubation: using cadavers and a plastic canine model. Students were asked for their opinions on the use of cadavers in anaesthesia training (Figure 3). Before beginning the practical module with cadavers, 16.7% of students expressed feelings of fear, mistrust, or compassion, while the remaining

83.3% reported feeling confident and eager to practice intubation on cadavers.

These findings highlight the varied emotional responses students have towards cadaver-based training, emphasizing the importance of addressing concerns to ensure a supportive learning environment while maintaining the effectiveness of this teaching method.

After completing the practical sessions on intubation using cadavers and a plastic canine model, students were asked to compare the two methods and indicate which they found more effective for developing intubation skills in domestic animals (Figure 4).

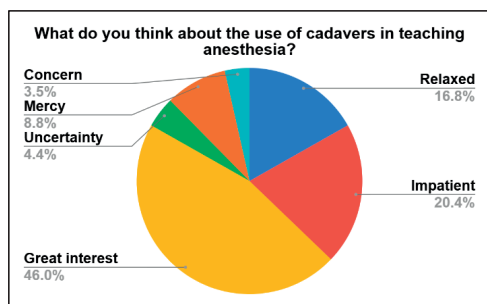


Figure 3. The use of cadavers in anaesthesia training

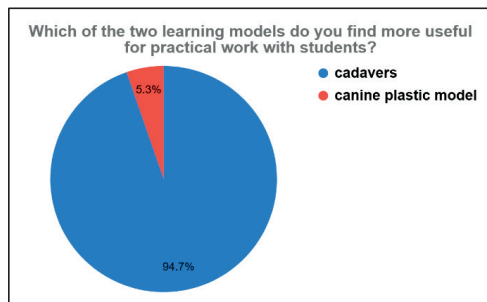


Figure 4. Comparing the two methods for developing intubation skills in domestic animals

The majority of students favoured cadaver-based practice as the more useful method for acquiring intubation competency, with only 5.3% preferring the plastic canine model. This preference may correlate with the small percentage of students who expressed feelings of compassion or discomfort when using cadavers in the educational process.

After completing two hours of practical training on cadavers and plastic models, students were asked to suggest how many hours they felt were

necessary to become competent in endotracheal intubation (Figure 5). A majority, 57.5%, believed the allocated time was sufficient to acquire the skill, while 23% indicated they needed more practice time. Following the completion of the entire practical training, students were asked if they felt prepared to perform endotracheal intubation on live animals. Only 6.2% reported feeling unprepared (Figure 6). Notably, this percentage aligns closely with the group that felt more than four hours of training was necessary, highlighting a strong correlation between training duration and confidence in working with live animals.

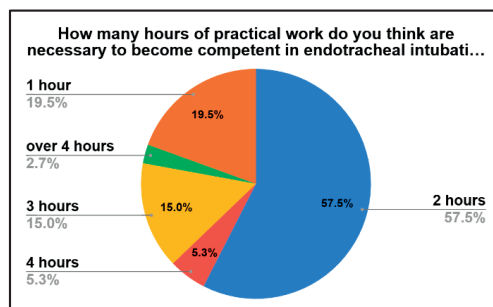


Figure 5. Hours necessary to become competent in endotracheal intubation

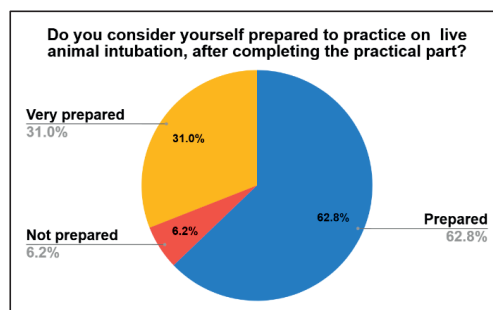


Figure 6. The level of confidence following the completion of the entire practical part

At the beginning of the teaching period, 22.1% of students reported being confident in their theoretical knowledge of endotracheal intubation, while 78.9% felt only slightly confident or not confident at all.

After completing the teaching period, with both theoretical and practical components of the anaesthesiology course, the percentage of confident students rose to 64.6%, with 3.5% feeling slightly confident and 31.9% still not

confident. Although the proportion of confident students tripled following the training, 35.4% indicated that they needed additional preparation to feel fully confident.

The final confidence level for theoretical knowledge (64.6%) closely aligns with the confidence in practical performance (62.8%), emphasizing the complementary role of both theoretical and practical teaching methods. This small difference highlights the need for an integrated approach, where both aspects are equally prioritized to ensure the effective transfer of knowledge and the acquisition of competency (Musk et al., 2017).

It is important to distinguish between acquiring a skill and performing it with professional confidence (Varner et al., 2021).

The analysis highlighted the significant impact of pandemic-related disruptions on students' education, suggesting the need for continued support and adjustments in the educational process to help students fully recover and succeed. The strategy to incorporate a review of foundational concepts from previous years at the beginning of each course plays a crucial role in bridging knowledge gaps and ensuring that students are better equipped to support their learning process.

CONCLUSIONS

The varied academic backgrounds within the cohort indicated the necessity for customized teaching strategies, in order to ensure that all students can build on their prior knowledge and develop the required day one competency in the subject.

While cadaver-based training is generally regarded as more effective (94.7%), addressing emotional concerns for many students (54%) remains essential to optimize their learning experience.

The majority of students (77.2%) lacked prior practical experience with endotracheal intubation, and this was reflected in their initial confidence levels. The close alignment between the final confidence levels for theoretical knowledge and practical performance underscores the interdependence of these two components in skill acquisition, 62.8% declaring that they feel prepared to practice on live animals. This emphasizes the importance of an integrated teaching approach, where theoretical instruction and practical training complement each other to reinforce understanding and competency.

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EXPERIMENTAL MEDICINE

