

Simplified add-on protocol to aid independent performance during necropsy exercises in Special Pathology

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Context of the project

The project is centred around the practical part of the course “Special Pathology and Poultry Diseases” (SVEB13031U; SVEB13032U), which is mandatory for veterinary students during the third year of the Veterinary Medicine education.

From the practical part of the course involving mammals, which this project concerns, the students are expected to gain the practical skills and competencies described in the learning outcomes below (SVEB13031U):

- 1) Perform a correct necropsy and organ preparation as part of the post-mortem examination of domestic animals
- 2) Evaluate gross lesions and reactions in tissue, organs and organ systems in order to determine the aetiology, pathogenesis, complications, differential diagnosis, and make a pathoanatomical diagnosis

The practical exercises take place at the necropsy hall at Frederiksberg Campus and are performed in groups of approximately 10-14 students utilising animals that have died spontaneously or have been euthanised at the University Hospitals, collaborating farms or material collected at Danish slaughterhouses. Necropsies performed on large animals (horses and ruminants), as well as cats and dogs, are often carried out in groups of two to six students, depending on the size of the animal, whilst small piglets and pigs are often necropsied by the students individually. Still, the necropsies are carried out around large tables, keeping the students in close physical proximity to each other, thus facilitating collaboration and

peer-support among the students.

Each group of students has five consecutive days with exercises running in parallel to the theoretical part of the course, followed by three days later in the course. In preparation for the exercises, the students are provided with a curriculum containing both a textbook (Jensen, 2011) and a video walk-through of necropsies carried out on various species available on Absalon from the beginning of the course. During the exercises, two teachers are present, i.e., a senior and an assistant, with the latter being my part. The students are also provided with a physical checklist for each animal subjected to post-mortem examination allowing them to keep track of their progress during the exercises.

As a novel initiative from the academic year 2023/2024, New Zealand White rabbits, obtained from a vendor of research rabbits and antibody production, have been added to the course. This species represents an animal classified into the category of exotics – and also a family pet consistently gaining ground in veterinary clinics.

The present assignment is based on an intervention performed during practical exercises with 8 students on day two of the five initial exercise days, and with rabbits as subjects for the necropsies.

Motivation

For teachers on the practical part of the course, it is often surprising how difficult it can be for the students to perform a complete necropsy or even just apply the standard cuts to an organ. Despite the fact that videos are available prior to the exercises and full sets of laminated protocols from the textbook (Jensen, 2011) are provided during the exercises – i.e., text and figures are physically available whilst performing the cuts – there seems to be a barrier hindering efficient execution of even simple steps.

Study purpose

The intervention aimed to examine whether a simplified add-on to the curriculum could help the students to comfortably perform a complete necropsy with a high degree of independence.

Methods

Simplified add-on

In order to facilitate independent performance during the exercises, a simplified add-on protocol (Appendix A) to chapter 10 (Necropsy of the Rabbit) of the textbook (Jensen, 2011) was created. The add-on focussed on minimising the amount of written text whilst simultaneously adding figures characterised by simplicity. As an example, the exact location for cuts to the pelvis was indicated on a figure (Fig. 1, Appendix A).

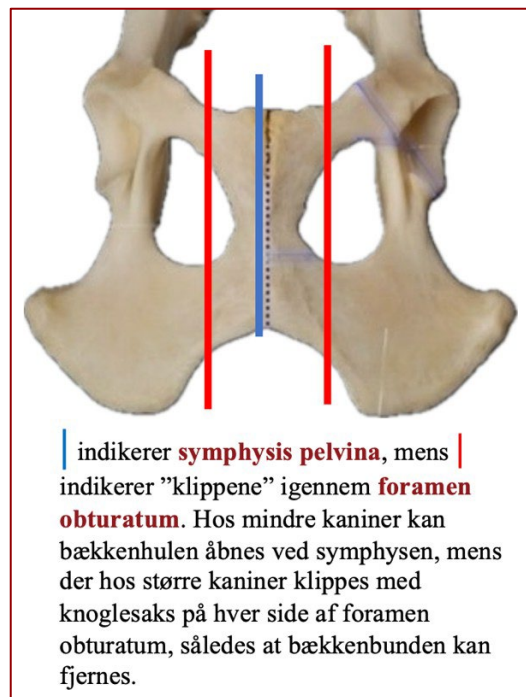


Fig. 1. Illustration from the add-on protocol created for the day of the intervention (Appendix A). The standard necropsy cuts to pelvis are clearly indicated.

Intervention day

On the day of the intervention, the students (n=8) were divided into two groups, receiving either the standard protocol from the textbook or the intervention protocol. The two groups were then allocated to separate tables, allowing collaboration *within* but not *between* the groups. The individual students received a rabbit each.

Evaluation

Questionnaires

To evaluate the students' perception of the exercises, a questionnaire was handed out at the end of the intervention day, focusing on providing open-ended questions in addition to "easier" tick-based answers (Appendix B). A second questionnaire was handed out at the end of exercise day five (Appendix C). Hence, the students' perception of the exercises was also evaluated after they had gained additional experience performing the necropsies. The questionnaires were anonymous and were answered during the scheduled teaching time.

Question registration

On the intervention day, questions asked by the two groups were counted and categorised into one of the following categories: necropsy-related, pathology-related or other (Appendix D).

Necropsy evaluation

For evaluation of the students' performance during exercises, a registration sheet was created and used to assess the degree of necropsy completion (Appendix E). Proper completion of the individual necropsy steps, partial completion or complete lack of initiation were given 2, 1 or 0 points, respectively.

Results

In the standard protocol group, an extra student had to be added, as a student, who had not attended the exercises on the previous day, showed up last minute. Thus, this group consisted of five students instead of four. The extra student primarily assisted another student and read out loud, as only four rabbits per group were available. In the standard protocol group, two of the students had performed a necropsy on a cat the previous day.

Questionnaires

All students answered the questionnaire on the day of the intervention and day five of the exercises. Generally, the questionnaires were filled out completely, with only few missing answers.

In the open-ended questions from the intervention day questionnaire, some students expressed positivity towards the opportunity to work independently with a rabbit, whilst others stated that it would be better to work in pairs. Among the questionnaires answered by the standard protocol group, it was commented that “it was easier to ask than to read the text”. Generally, the intervention protocol group seemed to spend less time answering the open-ended questions compared to the standard protocol group. Still, positivity towards the simplified illustrations was a general comment. Simultaneously, the group with the standard protocol stated that they would have liked the protocol with additional illustrations. A recurring comment among the open-ended questions on day five was a wish for additional exercise days and that there was too little time. Table 1 and 2 present questionnaire highlights.

Table 1. Highlights from the intervention day questionnaire

Question	Standard necropsy protocol	Intervention protocol
Did you have time to prepare prior to the exercises?	No 4/4, yes 0/4	No 4/4, yes 0/4
Did you experience frustration during the exercises?	Not at all 3/4, Moderate frustration 1/4	Slight frustration 4/4
Did you find it easy to initiate the exercise?	To some extent 2/4, yes 2/4	To some extent 2/4, yes 2/4

Table 2. Highlights from the day 5 questionnaire

Question	Standard necropsy protocol	Intervention protocol
Did you have time to prepare prior to the exercises?	Watched the videos 3/4, Watched the videos and read in the textbook 1/4	Watched the videos 4/4
How did you find the level of difficulty?	Appropriate 4/4	Appropriate 4/4

Question registration

In total, 63 questions were asked during the intervention. Generally, the intervention group asked fewer questions (n=19) compared to the standard protocol group (n=44), and less questions were related to necropsy techniques (Figure 2). Independent of group, the category “other” accounted for a high percentage of the questions. This category consisted *solely* of questions related *directly* to anatomy.

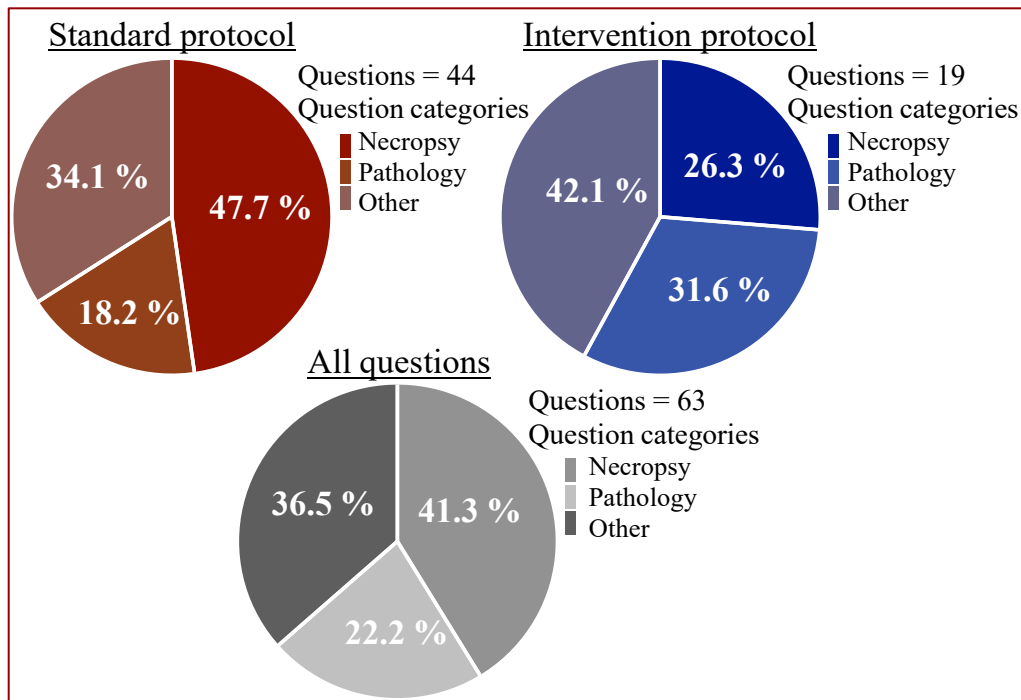


Fig. 1. The figure displays the number of questions asked during the intervention as well as the question category: necropsy-related, pathology-related or other. In the “other” group, all questions were related to anatomy.

Necropsy evaluation

Following evaluation, the standard group obtained a total of 56 points, whilst the intervention group received 42 points. The latter group seemed to focus on, e.g., proper opening of joints with less focus on applying the standard necropsy cuts to for instance the liver and lungs. Contrary, the standard group tended to neglect the joints but consistently prepared, e.g., kidneys properly.

In the intervention protocol group, the estimated completion of the necropsy checklist was 50%, 60%, 70% and 100%, and 2%, 10%, 20% and 100% in the standard protocol group.

Discussion

In general, the intervention protocol group asked fewer questions than the standard protocol group, and the proportion of necropsy-related questions was lower. Also, the students expressed positivity towards the additional illustrations. During the traditional teaching situation, the teachers will often point towards the specific structures or areas of the cadaver where cuts are needed, thus serving in a similar manner to the illustrations. Despite the fact that less questions were asked by the intervention protocol group, this did not necessarily equal a higher extent of necropsy completion.

It should be emphasised that the intervention day was a special and somewhat artificial set-up, thus, the students could be biased towards a positive impression of the intervention protocol. This assumption is underlined by the standard protocol groups' expression of a desire to have the intervention protocol – a protocol and illustrations that they *had not* actually seen themselves. In fact, the vast majority of the illustrations were also available in the standard protocol.

One student expressed discomfort towards the quantification and categorisation of questions asked on the day of intervention. This was due to the fact that the student became very self-aware in regard to asking “too many” or “stupid” questions. Furthermore, the student became cautious about the fact that the teachers might remember the student negatively if the questions were unfitting or exposed a knowledge-gap. These obvious – and to some extent debilitating – concerns are well-known issues that can only be counteracted by creating a safe learning environment (Rienecker et al., 2015) . This is also important in order to lessen the detrimental effects of stress on learning capacity (Langebæk et al., 2012; Sorg & Whitney, 1992).

Another student stated that she preferred that the teachers intervene more actively instead of upholding a relatively passive role if the students did not ask for help. To us as teachers, the day of intervention left us utterly passive compared to the normal teaching situation, as we would normally be in an almost constant dialogue and interaction with the students. This is often necessary to ensure that the necropsies are completed, which is an important responsibility for our research group as

the hospitals, authorities, etc., must be provided with post-mortem results. Thus, the students are involved in real-life cases as part of their education – an effective way of learning (Dutta, 2020)! This can possibly also be sensed as a stressor due to time pressure – but simultaneously acting as a motivator as it underlines the relevance of the exercises.

Whether the students found it exciting to work with an animal independently, or would have preferred to operate in pairs, differed. Working and presenting their findings independently sometimes feels intimidating to the students, and thus, some prefer the consolation of a “colleague”.

Interestingly, the category “other” consisted *solely* of anatomy-related questions, and this category was the second largest independent of group affiliation. Thus, anatomy – a first-year subject already passed by the students – accounted for more hesitation and questions than the actual subject of the main course – i.e. pathology. For the experienced pathology teacher, this is hardly a surprise, yet the visualisation of the problem provided by this quantification should urge a focus towards the challenge constituted by the breach in day-one competencies. During the necropsy exercises, simplified illustrations might compensate for the inadequate understanding of anatomy. Yet, the issue should ultimately be dealt with during the courses that provide the students with the day-one competencies necessary to advance to the next level of their education.

Needless to emphasise to readers familiar with Veterinary Medicine, the lack of time to prepare and often overwhelming workload (Skandov, 2024) influenced the exercises, with none of the students having prepared prior to the intervention day. On day five, though, all the students had watched the videos. This might be explained by several factors, e.g., that day five followed a weekend, and therefore, the students might have had spare hours to prepare that are not available during the weekdays. Another reason could be that the initial questionnaire strengthened the students’ attention towards the available videos.

Several limitations apply to the study described in this assignment, e.g., the size of the study population. Also, data collection for evaluation was difficult to ascertain in an objective manner. Inherent differences also existed between the two study groups due to, e.g., the bias towards favoring the intervention protocol described above, the fact that the

students had access to the standard protocol prior to the exercises, and the fact that some students had attended the day prior (day one of their exercises) and had already carried out a necropsy on a small animal which in many aspects is comparable to that of the rabbit. Also, an additional student joined the exercises last minute, and one group therefore had more participants than the other. Lastly, a “table effect” seemed to exist as performance commonalities within the groups could easily be ascribed to the exchange of knowledge and experiences across the table.

In conclusion, a shortage of preparation time constitutes a major problem for veterinary students. The teachers must strive to encourage a learning environment dominated by curiosity and combat the students’ concern for “failing” publicly or being perceived as unknowledgeable. Importantly, focus should be directed towards day-one competencies necessary for succeeding in the Special Pathology course, as a lack of basic anatomy knowledge was a common obstacle for the students.

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Appendices

- A. Bilag til sektion af kanin
- B. Spørgeskema til studerende – *interventionsdag*
- C. Spørgeskema til studerende – *sidste øvelsesdag*
- D. Optællingsskema til spørgsmål
- E. Opsamlingsliste til undervisere

