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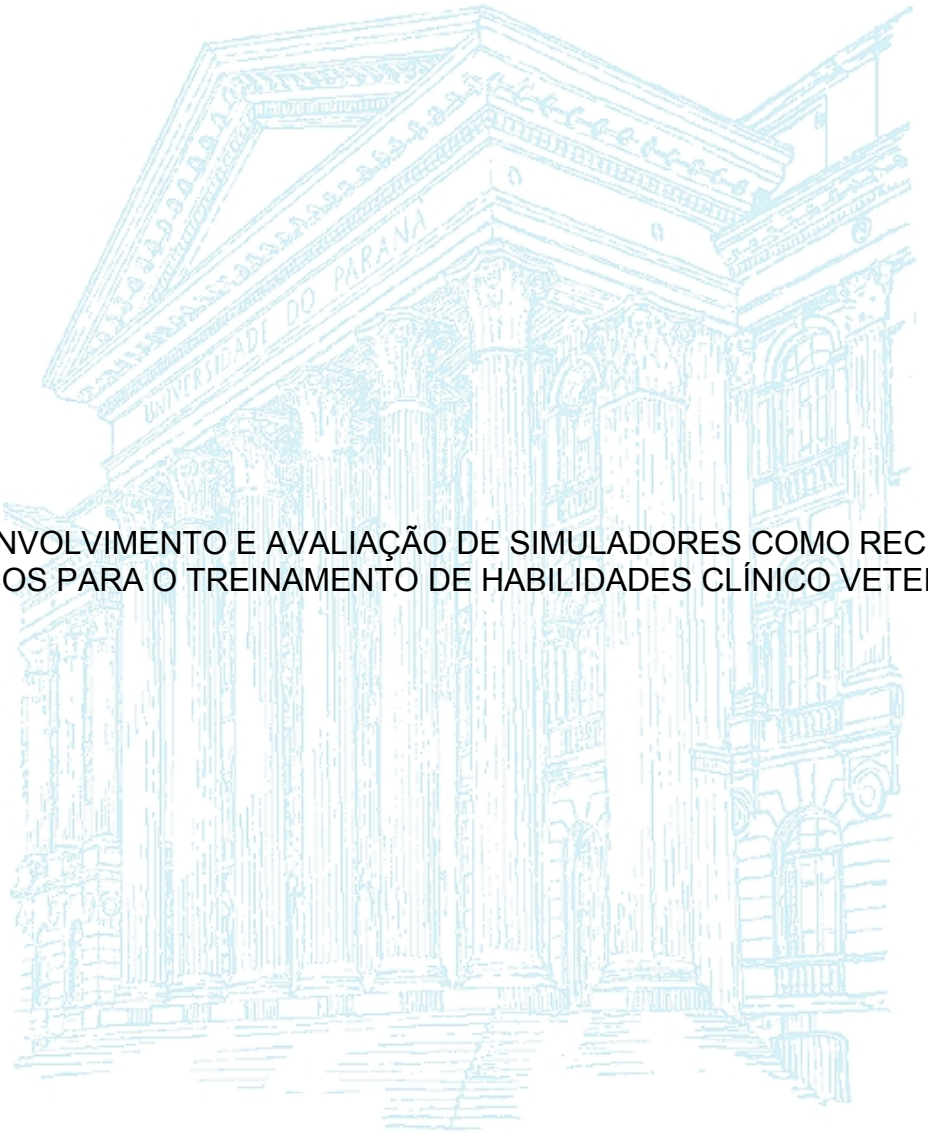

DESENVOLVIMENTO E AVALIAÇÃO DE SIMULADORES COMO RECURSOS DIDÁTICOS PARA O TREINAMENTO DE HABILIDADES CLÍNICO VETERINÁRIAS

CURITIBA
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Dissertação apresentada ao Programa de Pós-Graduação em Ciências Veterinárias, do Setor de Ciências Agrárias, da Universidade Federal do Paraná, como requisito parcial para obtenção de título de Mestre em Ciências Veterinárias.

Orientador (a): Professora Dra. Simone Tostes de Oliveira Stedile
Co-orientador (a): Professora Dra. Carla Forte Maiolino Molento.

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A Comissão Examinadora da Defesa da Dissertação intitulada **"DESENVOLVIMENTO E AVALIAÇÃO DE SIMULADORES COMO RECURSO DIDÁTICO PARA O TREINAMENTO DE HABILIDADES CLÍNICO-VETERINÁRIAS"** apresentada pela Mestranda **KARYNN VIEIRA CAPILÉ** declara ante os méritos demonstrados pela Candidata, e de acordo com o Art. 79 da Resolução nº 65/09–CEPE/UFPR, que considerou a candidata aprovada para receber o Título de Mestre em Ciências Veterinárias, na Área de Concentração em Ciências Veterinárias.

Curitiba, 24 de março de 2015

Professora Dra. Simone Tostes de Oliveira Stedile
Presidente/Orientadora

Professora Dra. Rita Leal Paixão
Membro

Professora Dra. Rita de Cassia Maria Garcia
Membro

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Para os animais não importa o que você pensa ou sente. Para eles importa o que você faz.

Excerto do site do instituto Nina Rosa

RESUMO

O uso de métodos alternativos para o treinamento de procedimentos clínicos na Medicina Veterinária constitui uma possibilidade de superar dois grandes problemas atuais: um de ordem ética, que é a utilização de animais vivos como recursos didáticos, e outro de ordem técnica, que é a oportunidade limitada de os estudantes desenvolverem e exercitarem suas capacidades clínicas. Simultaneamente, o desenvolvimento de métodos alternativos possibilita a implementação do princípio ético dos 3Rs, substituição, redução e refinamento do uso de animais no ensino. Considerando-se as vantagens do uso de métodos alternativos, desenvolveu-se um simulador de paciente canino que permitiu aos estudantes o treinamento da técnica de palpação prostática. O uso de métodos alternativos para o treinamento clínico ainda é um assunto negligenciado em muitos cursos de Medicina Veterinária, o que motivou a segunda parte deste trabalho, a elaboração de um guia para a realização de uma oficina sobre métodos alternativos com o intuito de expandir o conhecimento ético e técnico dos participantes. A oficina resultou em um notável envolvimento dos participantes com o tema e na criação de quatro modelos alternativos para o treino de procedimentos clínicos.

Palavras-chave: educação humanitária, substituição, aprendizado prático, métodos alternativos, ética.

ABSTRACT

The use of alternative methods for clinical training in veterinary medicine is an opportunity to overcome two major issues in contemporary practice: an ethical one, which is the use of live animals as teaching resources, and a technical one, which is the limited opportunity for students to develop and exercise their clinical skills. Simultaneously, the development of alternative methods enables the implementation of the ethical principle of the 3Rs, replacement, reduction and refinement of animal use in teaching. Considering the advantages of using alternative methods, we developed a canine patient simulator that allowed students to train the prostate palpation technique. The use of alternative methods for the clinical training is still a neglected subject in many veterinary medicine courses, which led us to the second part of this work, the development of a guide for conducting a workshop on alternative methods in order to expand ethical and technical knowledge of the participants. The workshop resulted in a notable participant involvement with the topic and the creation of four alternative models for training of clinical procedures.

Keywords: humane education, replacement, practical learning, alternative methods, ethics.

SUMÁRIO

1 APRESENTAÇÃO

Espera-se que todo Médico Veterinário, ao concluir sua graduação, esteja apto a realizar diversos procedimentos clínicos cuja execução adequada requer, além de estudo aprofundado e observação, treinamento prático. Do ponto de vista técnico, o treinamento prático ocorre de forma satisfatória quando possibilita ao estudante o desenvolvimento das habilidades clínicas propostas. Do ponto de vista bioético, o treinamento prático ocorre de forma apropriada quando contempla as necessidades e interesses de todos os envolvidos, professores, alunos e, frequentemente, animais não humanos, sem causar dano, desconforto, constrangimento, estresse ou dor a nenhuma das partes, independente de sua espécie biológica.

Atualmente, a educação médico-veterinária passa pela transição de um paradigma tradicional, com enfoque prioritariamente técnico, para um paradigma humanitário, que para atingir seus objetivos técnicos leva em consideração a senciência dos animais não humanos e busca estratégias educacionais que favoreçam seu bem-estar e os considere como sujeitos. É neste contexto que os métodos alternativos assumem um papel de fundamental importância: são recursos didáticos que podem fazer com que tanto os objetivos técnicos como os critérios bioéticos sejam considerados, sem que um comprometa o outro.

Uma vez que experiências práticas são indispensáveis para o aprendizado de procedimentos e técnicas médicas, a formação profissional pode ser incompleta se o estudante não tiver oportunidade de perceber textura, consistência, tamanho, posição, mobilidade, irregularidades e a pressão que se deve exercer sobre determinados tecidos em diferentes exames (JUKES; CHIUIA, 2003). O treinamento destas habilidades não depende de animais vivos e pode ser feito por meio de métodos alternativos que permitem este tipo de experiência.

Métodos alternativos são elementos didáticos que substituem o uso prejudicial de animais ou estimulam, favorecem e valorizam a educação humanitária (JUKES; CHIUIA, 2003; SMITH; SMITH, 2004; WOON, 2011). Neste contexto, usa-se “alternativos” em oposição a “tradicionais” e esta oposição envolve uma série de considerações éticas. No campo das ciências biológicas, “educação humanitária” é a abordagem educacional que encoraja uma postura respeitosa e compassiva perante

a vida humana e não humana, na qual o uso de animais como recursos didáticos é injustificável. Opostamente, a educação considerada tradicional tende a reforçar uma postura especista, na qual o uso de animais como recursos didáticos é justificável. O termo “humanitário” começou a ser usado com sentido de compassivo e anti-especista pelo filósofo Jeremy Bentham, em 1781, na obra *Uma Introdução aos Princípios da Moral e da Legislação* (TRINDADE, 2013).

A partir dos conceitos acima citados, enquadram-se como métodos educacionais humanitários para o aprendizado clínico veterinário o uso de simuladores, o uso de cadáveres e envolvimento dos alunos notratamento de pacientes.

1.1 Uso de Simuladores

Simuladores são sistemas que permitem o treinamento de determinadas técnicas ou procedimentos clínicos, sem necessariamente reproduzir fielmente a aparência de um animal. Podem produzir sons, conter elementos computadorizados, sistemas de feedback ou ser totalmente virtuais. Há diversos modelos comerciais e há também a possibilidade de construí-los a partir de materiais facilmente encontrados (JUKES; CHIUIA, 2003).

Os simuladores podem variar de extremamente simples a extremamente complexos. Para otimizar o uso dos simuladores de pacientes, também chamados de manequins, recomenda-se a criação de um “ambiente completo de simulação” - FES (Full Enviroment Simulation), a exemplo das simulações de voo. Os simuladores de voo têm três características vantajosas que também se encontram nos simuladores para treinamento clínico: são seguros, flexíveis e economicamente viáveis (BALCOMBE, 2004).

O desenvolvimento de um FES requer um simulador de paciente, equipamentos e pessoas necessárias para replicar o ambiente clínico de forma realista. Tanto detalhes exagerados como sutis podem ser usados para compor o cenário e pode-se enriquecer a simulação com histórias clínicas fictícias (OKUDA *et. al.,* 2009). Os simuladores proporcionam um treinamento seguro e tranquilo para os alunos, sem o estresse e ansiedade que podem estar presentes em situações envolvendo animais. Além disso, permitir que alunos inexperientes treinem em

animais pode ser uma situação de risco tanto para o aluno quanto para o paciente, que pode sofrer danos irreversíveis evitáveis com o treinamento prévio do aluno em simulador (CROSSAN *et.al*., 2001; BALCOMBE, 2004). Um simulador pode ser avaliado por sua fidelidade e discriminação, medidas de baixa, média ou alta similaridade entre modelos vivos e simuladores. A fidelidade mede o quanto a aparência do simulador como um todo é realista. A discriminação mede o quanto determinadas estruturas específicas, fundamentais para a simulação são realistas, independente da aparência geral do simulador.(RUSSELL; BURCH, 1992). São considerados de alta fidelidade os simuladores que têm aparência muito realista e que possuem sistemas dinâmicos de feedback, como dispositivos sonoros ou visuais que indicam erros e acertos durante o treinamento (SEROPIAN, 2004; GRADY, 2008).

Instituições acadêmicas têm desenvolvido simuladores, geralmente de baixo custo em relação a modelos comerciais, e usado como recurso didático para o treinamento prático dos estudantes. Tanto a metodologia envolvida na confecção desse tipo de simulador, como os resultados de seu uso têm sido publicados em periódicos científicos podendo ser reproduzidos por outras instituições de ensino, conforme os seguintes exemplos: modelo para treinamento da técnica de acesso à veia jugular em cavalos (EICHEL *et. al*., 2013); simulador de alta fidelidade de paciente canino para treinamento clínico veterinário de ressuscitação cardiopulmonar (FLETCHER *et.al*., 2012); modelo dentário de cão para treinamento de retirada de cálculo e limpeza (LUMBIS; GREGORY; BAILLIE, 2012); simulador para injeção intra-articular em cavalos (FOX *et.al*., 2013); modelo para treinamento de acesso vascular em pequenos animais (RIBEIRO, 2013); simuladores de palpação prostática canina (CAPILÉ *et.al*., 2015, submetido a publicação); simulador de palpação retal bovina (BAILLIE *et.al*., 2005); modelo caseiro simples para o ensinamento de cricotirotomia (VARADAY; YENTIS; CLARKE, 2004); treinamento de acesso venoso guiado por ultrassom (DI DOMENICO, *et. al.,* 2007).

1.1.1 Validação

A Organização Mundial da Saúde Animal (OIE) seguindo o princípio dos 3Rs, proposto por Russel e Burch em 1959 (RUSSELL; BURCH, 1992), destaca a importância de substituir, reduzir e refinar o uso de animais no ensino e na pesquisa e enfatiza a necessidade de um tratamento humanitário para os animais (OIE, 2014).

A Diretiva do Parlamento Europeu e do Conselho 2010/63, sobre a proteção de animais usados para fins científicos, proíbe o uso de animais quando há alternativas, de forma semelhante ao Art.32 da lei 9.605/98, contra crimes ambientais, no Brasil., De maneira mais detalhada e específica, a Lei brasileira 11.794/08, complementada pelo Decreto 6.899/09, regulamenta o uso de animais no ensino e na pesquisa. De acordo comeste Decreto, Métodos Alternativos são os “procedimentos validados e internacionalmente aceitos que garantam resultados semelhantes e com reprodutibilidade para atingir, sempre que possível”, a mesma meta dos procedimentos tradicionais. O Conselho Federal de Medicina Veterinária (CFMV), por meio da Resolução n°722/02, Art. 25, inciso IV, considera justificável o uso de animais para fins didáticos e científicos somente quando esta prática “resultar em beneficio da qualidade de ensino, da vida do animal e do homem, e apenas quando não houver alternativas cientificamente válidas”.

Apesar destes princípios inequívocos não é claro em quais casos pode-se declarar que há métodos alternativos válidos para o desenvolvimento de habilidades clínicas na Medicina Veterinária. A validação é o que confere confiabilidade a um método alternativo, distinguindo o que pode ser considerado eficiente como recurso didático do que não pode; é o que deve fundamentar o julgamento de qualquer pessoa que alegue que determinado método alternativo não cumpre seu propósito ou não o faz de forma satisfatória. Desta forma, estabelecer critérios de validação adaptados especificamente para os simuladores veterinários é uma questão fundamental. O estabelecimento de critérios objetivos impede que critérios baseados em tradição, conveniência, preferências pessoais e preconceitos justifiquem a não adoção dos métodos alternativos. A validação não deve ser vista como uma barreira que dificulte o desenvolvimento e a adoção de métodos alternativos, mas como uma forma de legitimar e fortalecer o uso de métodos alternativos com respaldo legal.

Ainda não existem regras formais estipuladas para validação de simuladores veterinários, porém alguns critérios têm sido utilizados, como comparar os resultados de aprendizagem de um grupo de estudantes que usou simulação com um que não usou; submeter o modelo à avaliação de médicos veterinários experientes antes de usá-lo com os alunos, o que se chama de *validade de conteúdo* (REZNEK; RAWN; KRUMMEL, 2002), ou avaliar se o desempenho do aluno ao utilizar um simulador é similar ao desempenho esperado do aluno em uma situação real, o que se chama

de *validade de constructo* (DEVITT *et.al*., 1998; BALCOMBE, 2004; SIDI; GRAVENSTEIN; LAMPOTANG, 2014)

1.2 Uso de cadáveres

O pressuposto ético para que cadáveres sejam cogitados como recurso didático é que eles sejam de animais que, devido a questões de saúde, morreram naturalmente ou sofreram eutanásia e foram doados pelos seus responsáveis, por clínicas ou hospitais veterinários para propósitos didáticos; estas condições caracterizam os “cadáveres éticos” (MARTINSEN; JUKES, 2007). Em algumas Universidades dos Estados Unidos existem programas formais de doação de cadáveres, os “Cadaver Donation Programs” (CDP), baseados no sistema de doação de corpos humanos. A Universidade norte americana Tufts, elaborou um guia com recomendações para a criação de CDP em hospitais veterinários enfatizando que os cadáveres sejam eticamente obtidos e explica desde procedimentos administrativos importantes quanto técnicas de embalsamamento e conservação dos cadáveres para uso didático (KUMAR *et.al*., 2001).

A realização de exames clínicos em cadáveres permite que o estudante se familiarize com a anatomia dos órgãos que pretende avaliar, desenvolva sensibilidade à palpação e aprenda a identificar diferenças entre estruturas normais e alteradas (MARTINSEN; JUKES, 2007).

1.3 Auxílio no tratamento de pacientes

A consolidação de uma educação humanitária pressupõe o reconhecimento de que animais não são objetos e o uso de animais como recurso didático é um caso particular do uso de animais como objeto. Porém, situações em que os animais são pacientes, isto é, tratados como sujeitos, se conduzidas de forma adequada, podem contribuir para o aprendizado dos alunos. A interação entre os estudantes de Medicina Veterinária e seus pacientes em potencial pode e deve ser valorizada e e estimulada por parte dos educadores.A participação do estudante em situações em que o animal precisa passar por um procedimento que visa primeiramenteo seu bem-estar constitui um método de ensino humanitário, no qual o aprendizado do aluno é uma possível consequência da situação que envolve o animal e não uma condição para se criar uma situação que envolva o animal (SPINDEL, *et. al.*, 2008).

O contato com os animais precisa acontecer, porém, além dos 3Rs, um quarto R, respeito, deve ser preconizado. Não há necessidade de se evitar o contato com o animal, mas o tratamento desrespeitoso e a instrumentalização (TIPLADY, 2012).

Simuladores e cadáveres-éticos são recursos que podem ser usados em aulas de semiologia veterinária e clínica médica veterinária, ou para treinamento dos alunos em qualquer momento de sua formação. O objetivo deste trabalho é tratar principalmente do uso de simuladores como recursos didáticos para treinamento de habilidades clínicas. O uso de cadáveres também é um tema presente, especialmente no segundo capítulo.

O primeiro capítulo deste trabalho é um artigo que relata o desenvolvimento e uso de um simulador de palpação prostática canino (APÊNDICE A). O simulador desenvolvido contém um mecanismo original que está passando por um processo de patenteamento (APÊNDICE B). Este projeto foi apresentado no III Congresso Brasileiro de Bioética e Bem-estar Animal realizado pelo Conselho Federal de Medicina Veterinária (CFVM) em parceria com a Universidade Federal do Paraná (UFPR) (APÊNDICE C). Trata-se de um exemplo de como é possível construir simuladores a partir de materiais baratos e facilmente encontrados. O artigo foi aceito para a publicação no periódico científico Journal of Veterinary Medical Education (JVME) (ANEXO). Com relação à validação, o protocolo de avaliação da eficiência do simulador como recurso didático se baseou principalmente em quanto o simulador foi considerado realista por veterinários com experiência em palpação prostática e quanto foi considerado útil pelos alunos.

O segundo capítulo deste trabalho é um guia para a realização de um workshop sobre métodos alternativos e a descrição de uma atividade acadêmica baseada neste guia (APÊNDICE D). A ideia do workshop surgiu como uma forma de compartilhar as técnicas aprendidas a partir da construção do simulador de palpação prostática e de outros modelos desenvolvidos paralelamente, a fim de estimular outros estudantes a desenvolver simuladores para treinamento de habilidades clínico veterinárias. A realização do workshop resultou no envolvimento ativo dos participantes com o tema abordado e na criação de quatro modelos alternativos por parte dos estudantes: um simulador de coleta de sangue em cão, um simulador de cateterização e desobstrução uretral em gato macho, um simulador de cistocentese

em cão e gato e um modelo para a explicação da técnica de entubação endotraqueal em cão. Os dois primeiros modelos tiveram custo médio de R$10,00 e os dois últimos, de R$ 30,00.

2 CANINE PROSTATE PALPATION SIMULATOR AS A TEACHING TOOL IN VETERINARY EDUCATION

Karynn V. Capilé, Gabriela M. B. Campos, Rafael Stedile, Simone T. Oliveira

ABSTRACT

Adult dogs, especially the elderly ones, are commonly affected by prostate diseases. Performing rectal palpation during physical examination in dogs is important in small animal clinical diagnosis. The exam allows students to learn how to correctly introduce the finger into the rectum and identify the location, size, symmetry and consistency of the prostate. Alternative methods are needed to teach this technique without using live dogs. Thus, our aim was to develop a canine prostate palpation simulator to provide students with the opportunity to learn the prostate palpation technique in dogs, and to assess their opinion about this simulator as a teaching tool. The inner part of the canine mannequin contains a rotation system with three types of prostate which can be exchanged during the exam. From a total of 64 students, 81% had never used alternative methods and 92.2% had never performed any prostatic palpation. According to the students' opinions, performing a clinical examination on a simulator allowed them to be prepared and familiarized with the palpation technique. They felt satisfied learning a practical method in a harmless way. Both 3Rs and dog welfare principles were present in most of the students' concerns. We conclude that the simulator can help students to develop clinical skills for prostate palpation in dogs.

Key words: 3Rs, alternative model, animal welfare, humane education, reproductive tract

INTRODUCTION

Adult dogs, especially intact elderly ones, are commonly affected by prostate diseases, ranging from the most common, such as prostatic hyperplasia and cysts, to the rarer conditions, such as neoplasia and prostatic abscesses. These alterations may show similar clinical signs, such as increased prostatic volume, inflammation, tenesmus, hematuria and bloody urethral discharge, fever, discomfort, caudal

abdominal pain or locomotion abnormalities.[1] Clinical prostate exam can be performed through rectal palpation allowing access to size, shape, symmetry, consistency of this organ and the presence of pain on palpation. A normal canine prostate has smooth consistency, regular surface, with a distinct dorsal median groove and mild mobility.[2]

Although performing other specific tests such as diagnostic imaging and/or analysis of prostatic fluid may be required, veterinary clinicians should be able to perform prostate physical examination as an initial evaluation, allowing the perception of possible prostate abnormalities.[1,3] Prostate palpation training (PPT) helps veterinary students to develop a required clinical skill to perform prostate palpation in dogs. However, due to the lack of suitable teaching resources, untrained students may remain without any ability to perform prostate palpation when they perform this technique for the first time on a living dog. The use of animals in teaching and research should be based on humane education and following the 3R principles (Replacement, Reduction and Refinement).[4] Thus, our objective was to develop a canine patient simulator (CPS) with different types of prostate to perform PPT and to assess the students' opinion about the use of a CPS as a teaching tool.

MATERIAL AND METHODS

This study was performed in two phases: (a) the development of CPS for training PPT and its evaluation by expert veterinarians, and (b) the didactic use of CPS for training PPT in a practical class and its evaluation by students.

Simulator development and its evaluation by expert veterinarians

A PPT simulator was developed from a commercial canine mannequin that imitates a small dog used as a clothes exhibitor at pet stores. A rotation system containing three types of prostate was developed and introduced inside the simulator: the first one had the size, symmetry and consistency of a normal prostate; the second had a symmetrical increase compared to the first one and a regular surface, suggesting hyperplasia; and the third type had an asymmetric increase, irregular surface and nodules with a firm consistency, suggesting the presence of a cyst, abscess or neoplasia. The three prostates were molded using dough made of propyl paraben

and water, covered with latex. A rectum made of latex was introduced inside an opening imitating a dog's anal orifice (Figure 1). A soft consistency structure made of foam was used to simulate muscles surrounding the rectum and the anal sphincter.

Veterinary clinicians, experts in clinical practices and/or small animal surgery, performed the palpation in the simulator and judged its teaching effectiveness. They highlighted the positive and negative aspects and suggested alterations regarding the pelvic floor and anal sphincter in order to create a more realistic simulator. Alterations were made until the simulator was considered adequate by veterinary clinicians. A second simulator was built from the first one, with the same features in order to provide students with two identical simulators. Ethically-sourced animal cadavers were used in order to observe the dog's prostates and practice palpation before creating the simulator. The study was approved by the Ethics Committee on Animal Use (CEUA) of the Federal University of Parana.

Didactic simulator use in practical class and students' evaluation

Two groups of Veterinary students of the Federal University of Paraná, Paraná, Brazil, were selected to use and evaluate the PPT. One group was in the first year and the other was in the final year of the program. This activity was performed during a curricular class, so all of the students who were present students had to participate. They had no previous knowledge about the activity that they would engage in before the class started. The students attended a 10-minute-theoretical-class including explanations on the anatomy, location, size, symmetry and consistency of a prostate, as well as the most common prostate alterations in dogs and how to perform a digital rectal PPT. After the class, students were taken to a clinical laboratory, where they received instructions about the procedure as if they were facing a real patient (Figure 2). After palpation, students anonymously answered an online survey with 23 questions (13 closed and 10 open-ended questions) about the class in which they performed PPT. The survey was conducted with the aim of investigating the simulator's acceptance by the students, how they qualified the experience, how they felt by training in a simulator instead of a live dog, and what they thought about using live dogs in practical classes, in addition to other questions on learning and ethical positioning.

Statistical analysis

Normality of quantitative variables (Shapiro-Wilk test) was checked. For symmetrical distribution, data were analyzed by t-test/ANOVA and the Mann-Whitney or Kruskal-Wallis tests were used for non-symmetrical distribution. Qualitative variables were calculated using Chi-square or Fisher tests. Results were considered statistically significant when $p \leq 0.05$.

RESULTS

Using the simulators for prostate palpation technique training

The logistic of the simulators use was simple; they were easily transported to different locations. There was no materials damage, nor structure alterations during or after manipulation by students. The duration of PPT was 5 to 10 minutes for each student, varying according to their curiosity and level of interest. As CPS had three different prostates it was possible to discuss hypothetical clinical cases during the palpation. A clinical history was mentioned in each prostate alteration case before the students knew which prostate they were palpating.

Students' opinion

All students who were present in class participated in this research, with 48/67 (71.5%) from the first year and 16/25 (64%) from the final year being included, comprising 64 students in total. As it was at the end of the academic semester the attendance was expected to be lower than number of the enrolled students. Only four percent of the first year students and 18% of the final year students had performed a prostate palpation before, all of them during internships, except for one final year student who had performed palpation in a cadaver during an anatomy class. The results are summarized in Table 1. According to the students' opinions regarding palpation in CPS, all of them gave positive answers, mentioning that the simulator increases experience with prostate palpation and enables training for a real situation. Using a score from 0 to 10 to assess the effectiveness of the simulator on palpation training, the median was nine for both groups, although there was no statistical difference between them ($p=0.27$).

Considering the simulator's features, 95.9% of the students mentioned positive aspects such as the fact that it is realistic (25/64), it is didactic (27/64), it has different

prostates (20/64), it allows multiple attempts (9/64), it avoids dog's suffering (20/64), and it gives physical and emotional safety to students (6/64). Negative aspects were mentioned by 42.2% of the students, including the fact that it is static, meaning that it is not possible to observe reactions of pain (12/64), it is not realistic (7/64), it is not possible to compare it with a live animal (6/64), and the material or mechanism has imperfections (4/64).

Concerning the experience with the simulator, 13.5% of the students were neutral or showed no opinion, 6.8% felt unsatisfied with training in a simulator rather than a live dog, and 79.7% considered it positive for learning. From those respondents who considered the experience positive, 32.2% highlighted the importance of learning in a harmless way. Regarding the use of live dogs in practical classes of prostate palpation, 13.3% of the students were in favor of it, 46.7% demonstrated discomfort with the possibility of animal suffering, suggesting a reduction or demanding conditions that prioritize their comfort, 20% were against it because of the suffering caused to the animals, and 20% demonstrated some discomfort with suffering, but did not clearly position for or against it. Comparing the effectiveness of the simulator scores and the distinct opinions about the use of live dogs in practical classes for prostate palpation, no significant difference was found ($p = 0.1459$).

The options of methods chosen by students for practical prostate palpation, in descending order, were: mannequin (45.3%); indifference between cadaver and simulator (23.4%), cadaver (10.9%), own dog (7.8%), shelter dog (6.3%), indifference among live animals (1.6%) and indifference among all methods (4.7%). There was no statistical difference between answers from the first and final year students ($p=0.08$).

The respondents were questioned about their security in performing palpation on a patient (from 0, which is completely insecure, to 10, indicating completely secure) and the average of answers was 5.8 for the first year and 7.4 for the final year students ($p=0.0068$).

DISCUSSION

It is unusual that students have the possibility to practice prostate palpation because of a lack of ethically and logistically suitable didactic resources available in Brazilian colleges. Internships at hospitals or veterinary clinics and training with cadavers are good opportunities for developing practical abilities during under graduation, but there are limitations involved and the clinical practice is unpredictable. Therefore, the prostate palpation simulator containing three different prostates can be an advantageous alternative for the first contact of the student with the technique. Regarding humane prostate palpation training, there are some options for training[5,6] such as commercial models,[a,b] but no reference of a prostate palpation alternative method for dogs was found in the literature, a fact that highlights the importance of the present study.

According to the fidelity scale that categorizes simulators, static mannequins are used to demonstrate specific abilities often provide low fidelity simulation.[7] Nevertheless, besides fidelity, another important evaluation criterion of similarity between an imitation model and the original one is discrimination. While fidelity is related to the features, discrimination refers to similarity measured on specific properties or characteristics.[4] CPS for PPT is static, and therefore defined as low fidelity, which was considered a negative aspect by students, since the simulator does not show pain reactions nor demand contention. However, due to the similarity of procedures and structures involved specifically in prostate palpation, recognized by both experts and students, we considered this model to provide moderate to high discrimination.

In the present study, the evaluations for learning purposes were mostly positive, a result that was observed in other researches with alternative methods for veterinary training.[8,9,10,11,12,13] Positive aspects of the mentioned papers include learning in a safe environment, less animal suffering, stress and/or fear, students' preparation for a future performance in a live patient and reproduction of the structures or situation in a realistic way. The absence of emotions such as anxiety, stress and insecurity could be beneficial for students' knowledge since emotional states induced by harmful practices directly affect learning and memory.[14,15,16]

Participation and interaction with models and mannequins for clinical skills development have shown a positive evaluation for most of the students.[8,9,10,11,12,13] Such results agree with those observed in the present study. Especially when teaching clinical skills, mannequins are more interesting tools than videos or computer programs, since the student needs to practice in order to develop expertise.

Students were concerned about practicing and learning in a realistic way and they considered, in some cases, the presence of live animals acceptable to acquire the necessary knowledge; however, they were also concerned about avoiding the harmful use of dogs. Either learning in a realistic way or avoiding harm to animals are important concerns for the qualification of professionals who are competent and responsible, considering technical and ethical issues.

CONCLUSION

It was possible to develop a prostatic palpation simulator and assess the students' perception of its use, which was mostly positive. Thus, using the simulator as a first contact with the technique contributes to the development of necessary clinical skills for the prostatic palpation exam in dogs and constitutes a feasible teaching tool for humane education.

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NOTES

a Life/form® Prostate Examination Simulator is a model with three interchangeable prostates which allows teaching or training prostate examination without harm or embarrassment to real patients.

b Zack® Multipurpose Male Care Simulator is a full-size male lower torso with an internal bladder for catheterization, four interchangeable prostates, realistic penis and scrotum which allows teaching or training of prostate examination without harm or embarrassment to real patients.

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Table 1. Qualitative evaluation of 64 students about the simulator of dog transrectal palpation to evaluate a normal, a hyperplasic and a neoplasic prostate.

Student's opinion	**Answer n (%)**					
The experience with the simulator	Satisfied 47 (79.7%)	neutral or no opinion 9 (13.5%)		unsatisfied on training in a simulator not in a live dog 3 (6.8%)		
Model's positive aspects* 62 (95.9%)	Realistic 25 (39.1%)	Didactic 27 (42.2%)	Avoid dog's suffering 20 (31.2%)	Different prostates 20 (31.2%)	Allow multiple attempts 9 (14.1%)	Students' physical and emotional safety 6 (94%)
Model's negative aspects* 27 (42.2%)	Static, not allowing dog's reactions 12 (18.7%)	Not so realistic 7 (10.8%)		Not possible to compare with a live animal** 6 (9.4%)	Have material or mechanical imperfections 4 (6.2%)	
Classes using live dogs for prostate palpation	Favorable but uncomfortable due to the possibility of animal suffering 28 (46.7%)	Favorable to it 8 (13.3%)		Neutral 12 (20%)	Against due to animal suffering 12 (20%)	
Preference for practical prostate palpation training	Mannequin 29 (45.3%)	cadaver or simulator 15 (23.4%)	Cadaver 7 (10.9%)	Live dog 9 (15.7%)	Any (all) method 3 (4.7%)	

* Allowed more than one answer
**It was a study design limitation

Figure 1: Dog transrectal palpation model using 3 different prostates. A) Rotatory prostate system inside the simulator. B) Simulator's artificial prostates, from left to right: normal; hyperplasic; with alterations suggesting neoplasia. C) Student performing prostate palpation while an instructor rotates the mechanism composed by different prostates. D) Prostate palpation simulation.

3 RUNNING A WORKSHOP ON THE USE OF ALTERNATIVE MODELS IN VETERINARY CLINICAL SKILLS TRAINING

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ABSTRACT

The current ethical development in education has increased the demand for teaching systems that avoid uncomfortable conditions for animals. It follows that alternatives to the use of live animals in teaching are an essential topic to be addressed. An academic workshop is an opportunity to tackle subjects relating to alternative methods more thoroughly than standard curricular frameworks have allowed. This paper provides a guideline on how to perform a workshop about the use of models in veterinary clinical skills training, and also reports on a workshop based on these guidelines.

Key words: 3Rs, humane education, veterinary teaching, practical abilities.

INTRODUCTION

Artificial models, manikins and simulators have been shown to be effective teaching tools in veterinary education.[1,2,3,4,5,6,7] However, such devices are not yet present in every veterinary training curriculum, which may imply a lack of opportunity for students to experience this way of learning. The use of animals in teaching is a topic which involves both ethical and technical issues. Replacing the use of animals as a standard education policy requires not just a change in ethical values, but also requires a range of accessible teaching resources which allows this replacement without adversely affecting the learning process in veterinary training. In order to stimulate this approach within the veterinary scholar program, the intent of this paper is to provide directions, instructions, and tips on how to lead a workshop on the use of alternative methods in veterinary clinical skills training, and it also reports on the experience of a workshop based on these guidelines.

PLANNING THE WORKSHOP

The initial mission is to plan the workshop according to common academic practices, such as forming a workshop team and defining who will be the tutor and who will perform which tasks (see Table 1); defining the workshop goals and the resources required for them; who is the target audience and how many students can be afforded without compromising teaching quality. The tutor is the one who must take primary responsibility for all activities. After defining these points it is possible to more clearly visualize the work to be done and build an action plan according to the objectives previously defined. Regarding course subjects that involve practical questions, these can be better assimilated by the students if they are stimulated in intellectual and practical ways, thus it is important to organize the workshop making sure that both kinds of activities will be provided. Taking this into account, we propose arranging the workshop in different steps or stages and using questionnaires to assess attendees' feedback at each step. A detailed planning of the workshop allows the team to estimate the duration of each step (see Table 2) and how much time is required to achieve the outlined objectives.

How we planned

Our workshop team was composed of the members of a study group on alternatives to animal use in veterinary teaching from the Federal University of Paraná (UFPR), Southern Brazil, who have been researching and developing alternative models since 2012. The work team was spearheaded by a postgraduate student (the tutor) under the supervision of a professor (supervisor), and accompanied by two undergraduate students (support staff). The workshop goals were defined as: a) present to attendees the principal topics, concerns, possibilities and current realities related to this subject in Veterinary Science; b) encourage attendees to familiarize themselves with the alternatives and provide the opportunity for them to see, touch and use models, to foster an understanding of how they can be useful in veterinary clinical procedures training; c) give attendees the task of creating by themselves an alternative model under supervision and support; d) facilitate a final meeting for the attendees to demonstrate their created models, try out each other's models, and report their experiences. According to these four goals the course was planned to run in four steps: a lecture about using models in veterinary clinical skills training (step 1); a practical demonstration of using models for veterinary clinical skills training (step 2);

a supervised creation of a self-made model for practice or to explain some clinical procedure (step 3); a presentation of the models created in step 3 to the whole group (step 4).

CONDUCTING THE WORKSHOP

After planning, the first action is publishing basic information about the course such as teaching content, location, duration, date and time by means of a publicity poster printed and displayed to reach the target audience, or digitalized and spread on social networks and electronic mailing lists at least one month before the event date. Students must also be aware if there will be any costs, prerequisites or impediments to participation. The next action is preparing each step of the workshop according to the plan. We highlighted important points to be remembered at each step (see Table 3).

How we conducted the workshop

We only produced a digitalized publicity poster and publicized it on social networks and electronic mailing lists among veterinary undergraduate and graduate students from UFPR. It offered 20 places to be filled in order of registering. The publicity poster gave essential information such as teaching content, location, duration date and time. The students were warned that in order to receive the certification they would have to take part in all the workshop steps: to attend the lecture, to perform clinical procedures on alternative models, to create an alternative model by themselves, and finally to demonstrate their own model to the other workshop attendees. The tutor held the main responsibility for all tasks, while the supervisor accompanied and complemented the tutor, supporting and advising in the workshop development process as well as assisting throughout all the steps. Undergraduate students were responsible for the classroom and projection equipment reservations at UFPR for the lecture at step 1, and classroom reservation for the practical demonstration at step 2. They also carried out the registrations of the attendees before step 1, organized a coffee break between step 1 and step 2, assisted in setting out the classroom models to execute step 2, took photographs at all steps, produced and sent by e-mail the certificates to the participants who accomplished all the steps. The following is a more detailed report of each step.

Step 1: Introductory Lecture on Using Models in Clinical skills Training

Step 1 took place after class. There were 10 attendees present, four graduate students and six undergraduate students. Before the lecture began, the attendees answered a questionnaire about their motivation for participating in the workshop, their expectations of it, their previous knowledge and opinions about using alternatives in veterinary clinical skills training. The lecture, prepared and taught by the tutor, focused on four main topics: 1) how animals have been used for teaching in human history and which values and concepts are involved[8]; 2) humane education, ethical themes such as the moral status of animals and intrinsic value as opposed to instrumental value,[9, 10,11, 12,13] and the adoption of the 3Rs principles (replacement, reduction, refinement) in teaching[14]; 3) commercial models for clinical skills training available on the market, and findings of studies on using alternatives in veterinary teaching around the world [1,2,3,4,5,6,7]; 4) clinical procedures for which it would be useful to have available models for training and potential ways to create self-made models to simulate these procedures. We have listed some of the important clinical procedures which should be available at Veterinary school for students practicing, such as cystocentesis, orogastric intubation, blood collection, skin scraping, subcutaneous and intravenous drug administration, urethral unobstructing in male cat, transrectal palpation, urethral catheterization, otologic examination, emptying anal sacs, enema, nasogastric tube placement, thoracentesis, abdominocentesis, arthrocentesis, pericardiocentesis, bandaging and splinting and bone marrow collection.[15] In order to give a rest break to attendees and stimulate social interaction between them we had a coffee-break before step 2.

Step 2: Practical Activity with Models for Clinical Skills Training

The workshop team previously arranged a classroom with models developed by the study group from UFPR on alternatives to animals used in veterinary teaching, commercial models and materials for building models. The models developed by the study group were simulators for canine cephalic venipuncture, simulators for canine jugular venipuncture, simulators for canine prostate palpation and simulators for urethral catheterization in female dogs. Simulations in development were also displayed. The commercial models were canine forelegs for cephalic venipuncture,[a] a canine head for jugular venipuncture[b] and a rat for endotracheal intubation and tail blood collection.[c] The main materials used in model development were alginate to

make negative molds, silicone to make positive molds, propylparaben dough to reproduce organic structures, latex to be added as covering on structures, filling material such as foam or polystyrene and preserved organic material from ethically-sourced cadavers for the study and reproduction of their anatomy or direct use in a model development. Ethically-sourced refers to cadavers from animals that have been euthanized for medical reasons or that have died naturally or accidentally but have not died specifically for teaching purposes.[13,16]

At the beginning of the activity the tutor explained how the models were created by the study group on alternatives to animal use in veterinary teaching, how to use them and how to create other models with these materials. After that the attendees were invited to practice on the models: blood collection, prostate palpation, and urethral catheterization. Subsequently they had some time to handle silicone, latex, alginate and other materials previously mentioned to understand how they work. At the end of step two, the attendees were asked to work, preferably in pairs, on step 3 to develop a self-made model to teach or practice some veterinary clinical procedure. They were informed that they would soon receive an e-mail from the tutor with information about step 3. Before closing step 2, the attendees received a second questionnaire asking if the contents of steps 1 and 2 were satisfactory and what should be different next time.

Step 3: Supervised Development of Self-Made Models

Following the second step, the workshop tutor sent an e-mail to the attendees with instructions to go ahead with step 3, thus creating a communication path between the tutor and the attendees, which was essential for the progress of step 3. The attendees were asked to form pairs, to choose together a model to be developed by them, and then to communicate by e-mail their names and the model they wish to develop. They were encouraged to report any difficulties in forming pairs or determining the models as they would be assisted in these cases. We initially stipulated two months as a time limit for completing the model development after which each pair would demonstrate their created model at the final workshop activity (step 4).

The first pair of attendees to make contact (pair 1) was planning to develop a model to practice cystocentesis technique, so they were invited to a meeting with the tutor

to define details and go ahead with the model creation. Firstly they made a dog model, as it worked well they used the same system to make a cat model. The second pair (pair 2) had not decided on a model when they made contact, but after a meeting with the tutor they decided to develop a model to practice endotracheal intubation. The third pair (pair 3) initially had decided to develop a model for endotracheal intubation but it was not working as expected so they began another model: a dog foreleg for cephalic venipuncture using a cadaver foreleg. The final pair to make contact decided to develop a model for urethral catheterization and unobstructing for male cat, at the very beginning one of the attendees of this pair withdrew participation reporting lack of time. The other attendees did not get in touch and did not participate in step three or four. The tutor and the professor were available to be called whenever necessary during all the model creation process. Each pair needed 3 to 4 meetings to complete the model development (see Table 4).

Step 4: Attendees Demonstrate their Self-Made Models

After all the pairs had finished their models, the last step was scheduled by e-mail according to the availability of all attendees. They were asked to prepare a 30 minute presentation, in such a way that it was possible to understand the proposal of the model, its usefulness, the creation process, and how the model could be used. The last step also took place outside class hours. After all the presentations, the attendees tested each other's models and shared their impressions and comments on step 3. We discussed the step-by-step development of each model, as well as some problems which were encountered and potential solutions. At this time some issues emerged: what are the advantages and disadvantages of using cadaver parts? Is using synthetic material preferable to using organics ones? And what is more important in building models, efforts to improve fidelity or to improve discrimination? Subsequent to all workshop participants testing all the models, we discussed the usefulness of the models as teaching tools (see Table 4). Before the workshop closed, the participants received a third questionnaire asking for their feedback on the experience to develop a self-made model.

ATTENDEES' FEEDBACK AND WORKSHOP OUTCOMES

Although 20 students signed up by e-mail to take part in the workshop just 10 of them were present at the day, of which 7 took part in all the steps of the workshop. Steps 1 and 2 happened successively in the same day, one after the other, after class, with a duration of 4 hours, step 3 had a duration of 6 weeks and step 4, 2 hours. The attendees were 6 undergraduate students and 4 graduate students. In the first questionnaire (at step 1), all attendees declared themselves as favorable to alternatives methods and motivated to take part in the workshop to increase their knowledge in this area, 6 of them declared they were also motivated to devise ways to learn without causing animal suffering, and 9 of them declared that the subject was insufficiently addressed during their veterinary training. In the second questionnaire (at the end of step 2), all attendees considered that steps 1 and 2 surpassed their expectations, 9 of them considered their alternative methods knowledge had improved having completed steps 1 and 2. The development process of all models at step 3 lasted 6 weeks, the time spent and the number of meetings needed varied depending on the pair and chosen technique (see Table 4). Four attendees have held their interest in the subject even after the workshop was over, engaging themselves in other activities related to alternative methods. Some attendees' remarks from questionnaire 3 about the experience of creating models can be seen in Table 5. All attendees who had participated in the model development wanted to make their created model available to be used in classes and were willing to publish their experiences.

CLOSING COMMENTS

Albeit there are plenty of commercial models for clinical skills training, the costs and reservations about their effectiveness may create barriers to taking these teaching methods from being the exception to mainstream in any veterinary school. Accordingly, publishing the outcomes of studies using models and developing low cost models may contribute to making models for clinical skills training the mainstream in veterinary education. The format of the workshop proposed here will increase understanding about the use of models and also produces self-made models for clinical skills training.

In relation to teaching approaches we have centered on problem based learning (PBL), an experiential learning model based on constructivist assumptions from philosophy of education which has been employed in medical education from the fifties until today.[17] It is supposed that the involvement of the learner in a problem solving context triggers an active and solid learning. The PBL model is appropriately applied in small groups and ideally stimulates collaborative interactions between learners.[18,19] At step 3 of the workshop the attendees faced a challenging task: create a model for clinical skill training even without having previous experience of it. They worked in pairs to solve concrete problems that emerged during the model development, mostly related to simulating anatomy. To solve these problems they had to flawlessly understand the physiology and the anatomy associated with the clinical procedure that they were trying to simulate as well as the technical details about the clinical procedure. The conspicuous involvement of the attendees at step 3, their maintenance of interest on alternative models even after the workshop was over, and their positive attitude toward the workshop as a whole, endorsed our predictions about the suitability of PBL in this context.

Also regarding the educational purpose of the workshop, we suppose that addressing the themes of alternative methods often implies addressing humane education.[10,12] Thus, the workshop may be an enabling environment to ally humane perspectives to veterinary education. Once more the PBL is a pertinent teaching tool here as it stimulates reflective and critical thinking.[20,21] From the first workshop activity at Step 1 we have often put emphasis on ethical concerns, supposing that throughout the workshop the attendees would integrate this thinking into their attitudes, which indeed has occurred. For instance, the use of ethically-sourced cadavers in building models brought some debate at step 4: one of the pairs felt quite uncomfortable with this aspect of their model as it was made with cadaver parts. Discussing their feelings, ethical concerns naturally came up: could the use of even an ethically sourced cadaver in building models be disrespectful of the animal's life? Could this practice somehow endorse instrumentalist perspectives toward non-human animals? Moreover, are models made with cadaver parts actually as or more adequate than artificial materials to simulate real procedures in such a way that would justify taking the risk of making an impression opposed to that desired? Even though the use of cadavers may cause some debate especially where not all cadavers are ethically-

sourced, ethically-sourced cadavers remain one of the most humane options in current veterinary teaching.[13] Supposedly because this option fulfils many roles, cadavers are realistic; their procurement is feasibly in veterinary hospitals of educational institutions, mainly in those where there is a Cadaver Donation Program[13]; their use is inexpensive, disregarding the costs required for cadaver preservation; their use is generally endorsed even by students and teachers who approve the use of living animals and it is not harmful to animals. As cadavers generally are well accepted in veterinary teaching,[13] we suppose that the discomfort revealed by one of the pairs with respect to their model looking like a cadaver might have occurred due to the model being of a hybrid type: it is not exactly a dummy and it is not exactly a cadaver, nevertheless as a whole it resembled a cadaver.

As was expected and wanted, the fidelity and discrimination subject arose at Step 4 when the attendees had evaluated each other's models. Fidelity and discrimination are criteria of comparison between a simulated model and their original; fidelity measures how accurately a simulated model reproduces the original's appearance as a whole, and discrimination measures how accurately a model reproduces a specific characteristic of the original. These criteria were used by Russell and Burch when they defined "replace, reduce and refine" as ethical requirements for research involving animals.[14] The fidelity and discrimination criteria refer mainly to the first and the second R: replacement and reduction, whose accomplishment may require the use of models. We have furthermore discussed how fidelity and discrimination matter for simulations for clinical skills training. Similarly to considerations found in the literature,[3,14,22,23,24,25] at step 4 of the workshop some attendees assumed that in dealing with clinical skills training, the most important is high discrimination. However, they have observed that if a model has low fidelity, the learning process may be hindered due to the first impression caused by the external unrealistic appearance even if it is able to simulate specific characteristics needed for performing some procedure. Of course, ideally a model should have both high fidelity and high discrimination, but in cases when resources are restricted, high discrimination should be prioritized, focusing on the key features that would allow the development of clinical abilities.

As was proposed here, the performance of step 2 requires the availability of some models, but even if there are insufficient resources, it should not be an impediment.

We recommend seeking assistance from neighboring institutions that may have a set of alternative models or a simulation laboratory that could lend some material. There is also the possibility of asking for support from organizations promoting alternative methods, for instance the InterNICHE[d] that has developed the Alternative Loan System,[e] a borrowing scheme in which the borrower only pays for return shipping costs.

CONCLUSION

We came to the conclusion that the workshop held at UFPR accomplished the purpose of addressing the subject of alternative methods in veterinary training. In addition, the workshop added to the set of models for clinical training and triggered a remarkable enthusiasm among the attendees for the subject matter. Taking into account the positive repercussions of the workshop at UFPR, we suppose that the workshop guidelines proposed here may be useful for other Veterinary Schools as a means to bring up the theme and, as a bonus, initiate or increase their set of alternative methods. Furthermore, experiences of following these workshop guidelines are still needed in order to validate their educational relevance.

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NOTES

a- http://www.vetmed.ucdavis.edu/products/vatm.cfm

b- http://www.vetmed.ucdavis.edu/products/vatm.cfm

c- http://www.braintreesci.com/prodinfo.asp?number=KOKEN

d- http://www.interniche.org/

e- http://www.interniche.org/en/loansystem

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Table 1. Directions, reports and tips in planning the workshop

What to do	How we did this	Tip
Form a workshop team including at least two professionals who are knowledgeable in the topic area – one of them as the tutor, and students, who are interested in this area, as support staff.	Our team was formed by a master's degree veterinary student (tutor), a professor of veterinary (supervisor) – both knowledgeable in alternatives for veterinary clinical skills training and two veterinary students (support staff) actively involved in this area	The tutor should be available to assist the attendees until the close of the workshop and take primary responsibility for all activities.
Write a workshop project following the regulations of the ethical committee of the educational institution where the workshop will be run.	We had submitted the learning project to the UFPR ethical committee informing them that we will possibly use ethically sourced animal cadavers[11] for model building, and assess students' feedback by questionnaire	Submit the project to the committee for evaluation well before the chosen workshop date and only publicize it after getting the approval, as the ethical committee may take a long time to examine your request and may even refuse it.
Publicize to students previously defined as the target audience the relevant information about the workshop such as teaching content, date and time, location and duration, at least one month before the workshop starts.	We have publicized among UFPR veterinary students using a digitalized publicity poster with essential information about the workshop on social networks and electronic mailing lists. We offered 20 places to be filled by online registering.	If the registered number exceeds the places offered, create a waiting list and contact the registered attendees two days before the workshop starts to confirm their attendance. Go ahead with the waiting list if necessary.

Table 2. Example of how to conduct a workshop on alternatives to animal use in veterinary clinical skills training in four steps

Time	Step 1	Facilitator
2 hours	Receive the attendees and verify their names on the register. Give attendees a questionnaire asking: what are their motivations to take part in the workshop, their expectations, and their previous knowledge and opinions related to using alternatives in veterinary clinical skills training.	Support staff
	Give a lecture to introduce them to relevant issues, concerns, possibilities and current reality related to alternatives to animal use in veterinary teaching.	Tutor
2 hours	**Step 2**	All the team
	Invite attendees to familiarize themselves with the alternatives providing them the opportunity to see, touch and use some models and understand how they can be useful in veterinary clinical procedures training. Stimulate them to discuss the limitations and disadvantages of the models showed.	
	Give attendees a questionnaire asking if the contents of steps 1 and 2 were satisfactory and what they thought should be different next time.	Support staff
4-6 weeks	**Step 3**	Tutor
	Provide to attendees the opportunity to develop a self-made model, supporting them as often as necessary. Help them to choose the model taking into account accessible resources. Reserve enough time at the educational institution especially to deal with the attendees, inform them about your schedule. Also be available to support them by e-mail and cellphone. Stay tuned to their problems and difficulties and supervise the progress and the attendee's participation during the model development	
2 hours	**Step 4**	Tutor
	Ask each pair to explain the development of the model and how to use it. Encourage them to talk about technical aspects and also about how they feel about the activity. Ask each pair to allow the others pairs to use their model.	
	Give to attendees a questionnaire asking: which problems and difficulties they found at step 3 and their opinion, suggestions and commentaries about the other models and about the workshop as a whole.	Support staff

Table 3. Tips for performing steps.

Step	Tip
1	Do not allow the lecture to exceed 90 minutes to avoid exhausting the attendees especially if step 2 follows on from step 1. Allow for questions during the lecture, use images, encourage the attendees to participate with questions and commentaries.
2	Prepare conditions to show them some techniques: making molds with alginate, making objects from silicone, covering preserved material with latex. Allow them to manipulate the materials and let them try to make some pieces by themselves
3	Invite the attendees for meetings to check their progress. Contribute with ideas: show them anatomy and physiology books to illustrate structures and procedures, search for images and similar models on the Internet. Allow the use of laboratory materials. Share related websites and papers often using the mailing list. Ask them to take pictures and to keep notes of each detail of their model development. If available, stimulate them to visit an anatomy and pathology laboratory to study anatomy details such as size, topography and consistence of organic structures. Remember to obtain entrance authorization from each department.
4	Encourage the attendees to share their difficulties and successes with the others. Suggest they prepare their presentation as if they were going to give a class for students who were going to use their models for clinical skills training.

Table 4: Some aspects about the progress of the model development during step 3 and perceptions from attendees about the models at step 4.

Pair	**Model**	**During step 3**		**At step 4**	
		Choosing the Model	**Duration/ meetings required**	**Usefulness**	**Limitations**
1	Canine and feline cysto-centesis simulators	Did not need help	4 weeks/ 2 meetings	It was perfectly possible to carry out the urine collection technique.	The models looked like plush toys.
2	Canine Endo-tracheal intubation simulator	Needed help	6 weeks/ 5 meetings	It showed the structures and gave an understanding of the technique of the examination.	It was not possible to actually perform the examination because the structures were too rigid.
3	Canine cephalic veni-puncture simulator	Needed help	6 weeks/ 4 meetings	It was perfectly possible to carry out the blood collection technique.	The artificial cephalic vein inserted inside the foreleg was more palpable than a real one, making the collection much easier than it actually is.
4*	Male cat urethral unobstructing simulator	Did not need help	4 weeks/ 3 meetings	It was perfectly possible to carry out the unobstructing technique and also the catheterization technique.	The obstruction must be replaced often, and as the artificial penis is fragile it must be replaced after every 4 exam practices.

*One of the attendees who composed this pair withdrew

Table 5. Answers from questionnaire 3, completed by the attendees at step 4, before the close of the workshop: attendees' commentaries about the experience of developing a self-made model

Model developed	*Canine and feline cystocentesis simulators*	*Canine Endotracheal intubation simulator*	*Canine cephalic venipuncture simulator*	*Male cat urethral unobstructing simulator*
Degree of difficulty*	High	High to very high	Medium	Medium
Motivation for choosing the model	Risk of puncturing the bladder and difficulty in palpating.	The possibility of frequent use by students and because it is painful for live animals to be used for training.	To carry out blood collection correctly to avoid stressing both the vet and his/her patient, so s/he must be trained until it becomes natural.	Previous experience with cats and because it is difficult to perform this routine examination.
Main difficulties arising	Avoid leaks of the liquid inside the model and simulate the structures around the bladder.	Simulate the epiglottis movement. Also, the hardness of the tissues preserved in formol** made it difficult to simulate the technique.	To place the artificial structures exactly as the real ones.	To develop an artificial penis and bladder that are durable to be manipulated many times.
Main benefits identified	To develop the model attendees researched and learned about risks, indications, physiology and concerns related to the technique.	Realizing difficulties in model creation and identifying aspects to be improved next time.	Revising the venipuncture technique, the anatomy related and to practice venipuncture on a cheap and realistic model.	The development of a realistic model.

* Low, very low, medium, high, very high
** A 10% solution of formaldehyde in water

Figure 1: Pair 1 at step 4 showing the cistocentesys simulator developed by them.

Figure 2: An attendee at step 4 testing the canine endotracheal intubation simulator developed by pair 2.

Figure 3: An attendee at step 4 practicing blood collection in the canine cephalic venipuncture simulator developed by pair 3.

Figure 4: A male cat urethral unobstructing simulator developed by an attendee from pair 4.

Figure 5: Attendees and their models at the close of the workshop.

4 CONSIDERAÇÕES FINAIS

A partir de diversos estudos que foram citados neste trabalho, é possível observar uma crescente preocupação global em relação ao uso de animais no ensino, que parece apontar para uma efetiva mudança de paradigma. O processo de conscientização sobre a importância dos métodos alternativos para o treinamento de procedimentos clínicos veterinários parece estar acontecendo initerruptamente, haja vista a grande quantidade de publicações com resultados favoráveis à utilização de simuladores no ensino, o que configura um cenário profícuo para a substituição do *uso* de animais. Não apenas do uso prejudicial, mas do simples *uso*, pois usar animais equivale a tratá-los como objeto. Se o objetivo é uma educação humanitária, laboratórios de simulação devem se tornar tão relevantes na formação dos médicos veterinários quanto os laboratórios de análises clínicas, anatomia, patologia, parasitologia. Para tanto, as instituições de ensino podem adquirir modelos desenvolvidos por outras universidades ou por empresas especializadas, bem como envolver pesquisadores de áreas como engenharia, computação, design e medicina veterinária no desenvolvimento de simuladores de alta fidelidade e alta discriminação. Há diversas opções para que a formação clínica do médico veterinário aconteça sem envolver os animais em situações desconfortáveis ou tratá-los como objeto sem prejuízos no aprendizado. Conforme mostrado neste trabalho, há muitos métodos alternativos capazes de cumprir o propósito de desenvolver habilidades clínicas dos estudantes com resultados de aprendizagem iguais ou superiores aos métodos tradicionais (SMITH; SMITH, 2004; SCALESE; ISSENBERG 2005; MAGALHÃES; ORTÊNCIO FILHO, 2006; DINIZ *et. al*., 2006; MCGAGHIE, 2011; BALCOMBE, 2004), o que torna completamente injustificável o *uso* de animais para o treinamento de habilidades clínicas. Desta forma, a substituição completa do *uso* de animais como recursos didáticos no ensino de Medicina Veterinária deve ser tratada como uma exigência legal. A relação entre o estudante de Medicina Veterinária e o animal deve, inequivocamente, ser como a relação entre um médico e seu paciente, ou seja, sujeito-sujeito.

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APÊNDICES

APÊNDICE A

Simulador de palpação prostática canino

Fotografia 1- processo de revestimento com látex dos diferentes tipos de próstata para o simulador

Fotografia 2- estudantes do curso de Medicina Veterinária da UFPR realizando palpação prostática nos simuladores

APÊNDICE B

Patente requerida sob o número BR1020140294821 atualmente em período de sigilo no INPI, por no mínimo 18 meses.

REIVINDICAÇÃO

1. MECANISMO GIRATÓRIO DE TRÊS PRÓSTATAS ARTIFICIAIS PARA TREINAMENTO DE PALPAÇÃO PROSTÁTICA CANINA é um simulador de palpação prostática canina, inserido em um manequim(7) de cão, caracterizado por compreender três estruturas que imitam a consistência, tamanho e forma de uma próstata normal(1), de uma próstata que sugere hiperplasia prostática benigna(2) e de uma próstata com irregularidades que poderiam ser encontradas em casos de abcesso, cisto prostático ou neoplasia prostática(3), e as três próstatas(1, 2 e 3) serem fixadas em hastes individuais(4) que convergem para uma única haste(5) formando uma triangulação, e esta única haste(5) sustenta as hastes individuais(4), atravessa longitudinalmente o corpo o manequim(7) de cão de modo que uma das extremidades(6) fica na região torácica cranial e é acoplado a um dispositivo que permite o movimento giratório manual da única haste(5), no qual há três marcas, cada uma indicando a próstata correspondente, e a haste principal(5) ser sustentada por dispositivo(9) preso na barriga do manequim(7) de cão, e a outra extremidade da única haste(5), com as três próstatas, estar posicionada na região(8) onde se localiza a próstata do manequim(7) de cão.

RELATÓRIO

1/3

MECANISMO GIRATÓRIO DE TRÊS PRÓSTATAS ARTIFICIAIS PARA TREINAMENTO DE PALPAÇÃO PROSTÁTICA CANINA

[001] Descreve mecanismo relacionado à semiologia veterinária. Trata-se de um simulador de palpação prostática canina com um mecanismo giratório de três próstatas artificiais cuja finalidade é auxiliar os estudantes de Medicina Veterinária no desenvolvimento das habilidades clínicas necessárias para a realização do exame em pacientes caninos.

[002] A palpação prostática canina é feita por via retal e permite ao médico veterinário avaliar tamanho, consistência, posição e mobilidade da próstata. Atualmente os estudantes de Medicina Veterinária, de forma geral, não têm a oportunidade de treinar a técnica de palpação prostática durante a graduação, devido à falta de alternativas adequadas para este fim.

[003] O simulador de palpação prostática com o mecanismo giratório de três próstatas, descrito neste relatório é uma alternativa viável na medida em que permite que os estudantes treinem a técnica de palpação prostática experimentando três diferentes próstatas e comecem a desenvolver a habilidade clínica necessária para a realização do exame em um paciente canino. O simulador ajuda a diminuir o uso prejudicial de animais em aulas, é um recurso disponível para o estudante em qualquer momento do curso e não envolve estresse ou risco para os estudantes durante o treinamento, como costuma ocorrer quando se usa animais para o mesmo fim. O efeito pretendido com o uso do simulador é melhorar a qualidade do ensino em Medicina Veterinária tanto por fornecer aos estudantes a oportunidade de desenvolver uma habilidade clínica importante quanto por promover o ensino humanitário, reforçando para os

estudantes a importância de se evitar o uso prejudicial de animais quando houver métodos alternativos.

[004] O mecanismo giratório possui três próstatas artificiais que imitam próstatas caninas. As próstatas artificiais simulam uma próstata normal e duas com diferentes alterações, como hiperplasia e neoplasia prostáticas. Este mecanismo foi inserido em um manequim de cão originalmente usado como expositor de roupa em loja de produtos veterinários.

[005] Para complementar a descrição do invento e com o objetivo de facilitar a compreensão de suas características é apresentada uma série de figuras com caráter ilustrativo e não limitativo.

[006] A figura 1 mostra três próstatas artificiais imitando uma próstata normal de cão (1), uma próstata que sugere hiperplasia prostática benigna (2) e uma com alterações que sugerem abcesso ou neoplasia (3)

[007] A figura 2 mostra o mecanismo giratório com três próstatas presas em hastes(4) que convergem e ficam presas a uma haste principal(5), visto lateralmente (2a), obliquamente (2b) e visto por cima (2c).

[008] A figura 3 mostra o mecanismo giratório com três próstatas inserido pela região torácica do manequim(7). Uma das extremidades(6) fica na região torácica para ser girada e a outra extremidade, com as três próstatas fica na região(8) onde se localiza a próstata do cão.

[009] A figura 4 mostra a visão interna do cão com o mecanismo giratório apoiado por uma haste(9) disposta transversalmente na região abdominal do manequim(7).

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[010] O mecanismo giratório de próstatas consiste em três estruturas moldadas com material sintético de consistência semelhante a da próstata de um cão. As três estruturas imitam a consistência, tamanho e forma de uma próstata normal(1), uma próstata que sugere hiperplasia prostática benigna(2) e uma próstata com irregularidades que poderiam ser encontradas em casos de abcesso, cisto prostático ou neoplasia prostática(3). As três próstatas são fixadas em hastes individuais(4) que convergem para uma única haste(5) formando uma triangulação. Esta única haste(5) que sustenta as hastes individuais(4), atravessa o corpo de um manequim(7) de cão de modo que uma das extremidades(6) fica na região torácica cranial e a qual é acoplado um dispositivo que permite o movimento giratório manual, no qual há três marcas, cada uma indicando a próstata correspondente, de forma que quando a marca no dispositivo fica na posição dorsal, a próstata indicada por esta marca está posicionada imediatamente abaixo do reto, na posição onde estaria a próstata real de um cão. Desta forma, quando, durante a simulação de palpação, um instrutor gira o dispositivo para outra marca, outra próstata ocupa a posição da anterior e o dedo do aluno que está realizando a palpação toca outra próstata. Um dispositivo(9) preso a barriga do cão sustenta a haste principal(5) permitindo que a mesma se mantenha sustentada porém permitindo o movimento giratório.

[011] A palpação é feita por um reto(10) que também foi modelado com material elástico e inserido no manequim. As estruturas criadas têm elasticidade, mas não

são friáveis, as próstatas são macias porém com consistência firme de modo que não deformem ou desmanchem durante a palpação.

DESENHOS

1/2

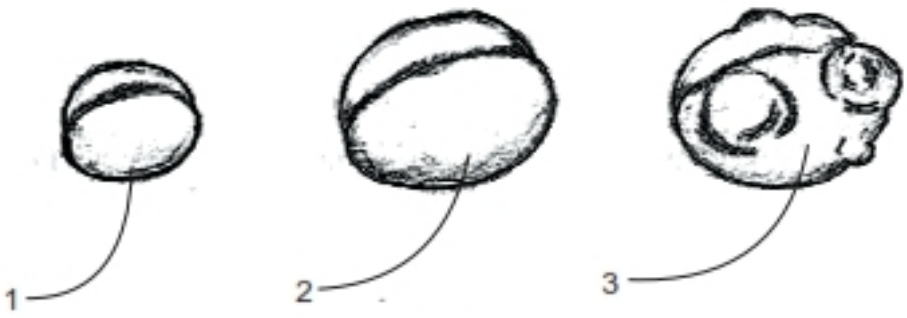

Fig. 1

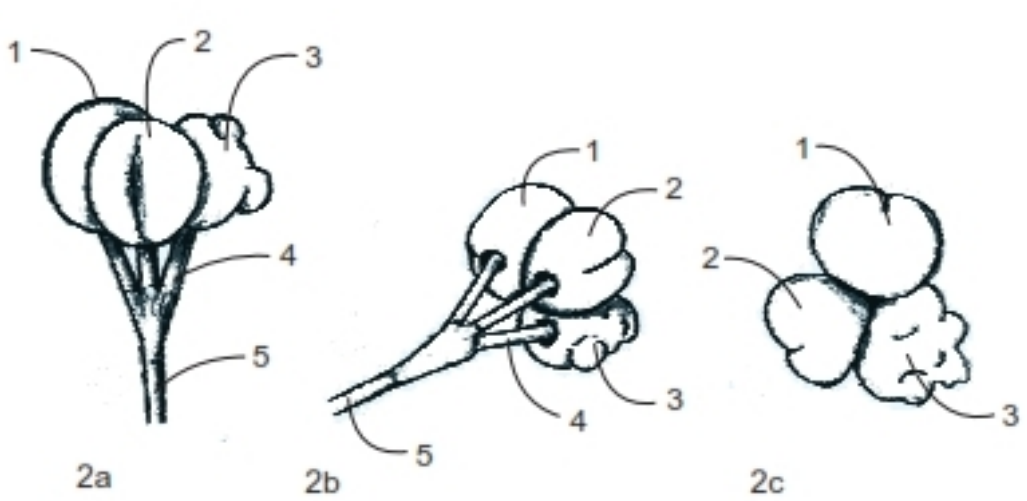

Fig. 2

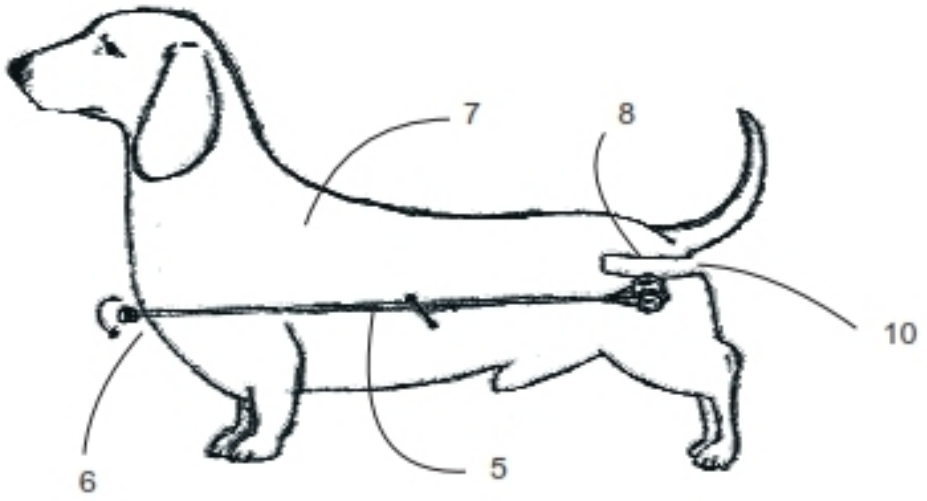

Fig. 3

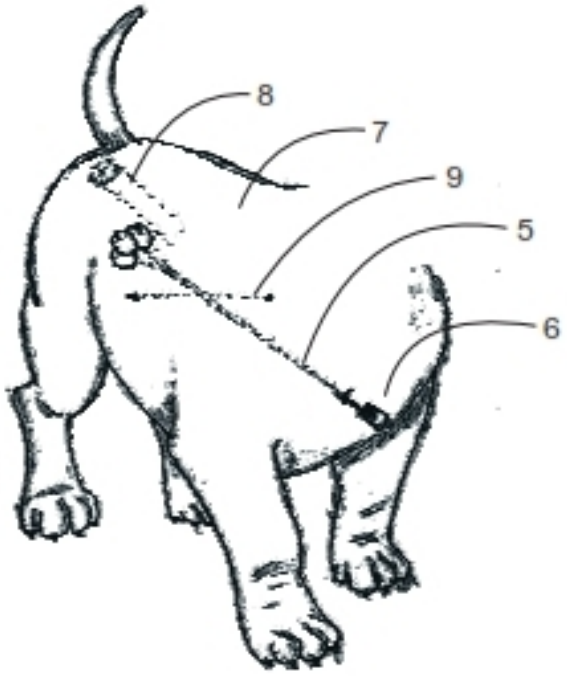

Fig. 4

APÊNDICE C

Pôster apresentado no III Congresso de Bioética e Bem-estar Animal realizado em 2014

SIMULADOR DE PALPAÇÃO PROSTÁTICA EM CÃO COMO RECURSO DIDÁTICO

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Introdução

Afecções prostáticas acometem cães adultos e, principalmente, idosos. A palpação retal permite ao veterinário detectar possíveis anomalias relacionadas ao tamanho, forma, simetria e consistência da próstata auxiliando na indicação de exames complementares, como diagnóstico por imagem e aspirado prostático. A habilidade clínica de perceber características prostáticas pela palpação retal depende de treinamento e experiências práticas. Com o intuito de contribuir para o desenvolvimento desta habilidade durante a graduação minimizando o uso de animais, o objetivo deste estudo foi desenvolver um simulador para o treinamento da técnica de palpação prostática e avaliar a percepção dos estudantes sobre seu uso.

Material e métodos

O simulador foi criado a partir de um manequim de cão no qual foi inserido um mecanismo giratório com 3 próstatas diferentes e passou por adaptações até que a palpação fosse considerada verossímil por médicos veterinários experientes (Fig. 1). A palpação no modelo foi realizada por 64 alunos do primeiro e do quinto anos da graduação em medicina veterinária da UFPR (Fig. 2). Após a palpação os alunos responderam a um questionário sobre suas percepções a respeito do simulador.

Figura 1: A- próstata normal, hiperplásica e com irregularidades B- mecanismo giratório. C- simulando a palpação

Figura 2: Alunos realizando a palpação prostática no simulador

Resultados e discussão

Apenas 4,0% dos estudantes do primeiro ano e 18,7% do quinto já haviam feito palpação prostática. Estágios em hospitais ou clínicas veterinárias e treinamento em cadáveres são boas oportunidades para o desenvolvimento de habilidades clínicas na graduação porém, há limitações envolvidas e a casuística é imprevisível. Com isto, o simulador pode ser uma alternativa vantajosa. Todos os alunos consideraram que treinar no simulador é útil para melhorar o desempenho em futura realização da palpação prostática em um paciente (Tabela 1). Houve boa aceitação do simulador por parte dos estudantes (fig.3, 4 e 5), o que corrobora os resultados de outros estudos com métodos alternativos para o treinamento de procedimentos médico-veterinários. O crescente desenvolvimento de métodos alternativos, somado à postura positiva dos alunos, configuram um cenário propício para a implementação de um modelo de ensino humanitário, no qual o interesse e empenho dos professores tem papel fundamental. Quanto às características do simulador, 95,9% dos estudantes mencionaram um ou mais pontos positivos e 57,5% dos estudantes mencionaram algum ponto negativo (Tabela 2)

Conclusão

Foi possível desenvolver um simulador de palpação prostática e a avaliação dos estudantes sobre seu uso foi majoritariamente positiva. Assim, o uso do simulador para o primeiro contato com a técnica contribui para o desenvolvimento da habilidade clínica necessária para a realização do exame de palpação prostática em pacientes, constituindo uma ferramenta de ensino humanitário viável.

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MARTINSEN, S.; JUKES, N. Toward a humane veterinary education. Journal of Veterinary Medical Education, v.32. n. 2. p. 454-460, 2005.
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Tabela 1: justificativa dos estudantes sobre a utilidade do simulador

Justificativa	% Alunos
Permite familiarização com a técnica	46,6%
Permite preparo para realização futura do exame em um paciente	50%
Aumenta experiência	3,4%

Figura 3: Opinião dos estudantes sobre a experiência de realizar palpação prostática no simulador

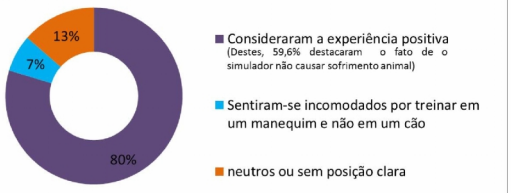


Tabela 2: Pontos positivos e negativos do simulador segundo os alunos

Pontos positivos	% alunos	Pontos negativos	% alunos
Ser didático	42,2	Não reagir	18,7
Ser realista	39,1	Possuir defeito no mecanismo ou no material	15,5
Possuir diferentes próstatas	31,2	Não ser realista	10,8
Evitar o sofrimento dos cães	31,2	Não permitir comparação com um cão	9,4
Garantir segurança física e emocional ao estudante	9,4		
Permitir várias tentativas	6,2		

Figura 4: Opinião dos estudantes sobre o melhor método para treinamento de palpação prostática em aula prática

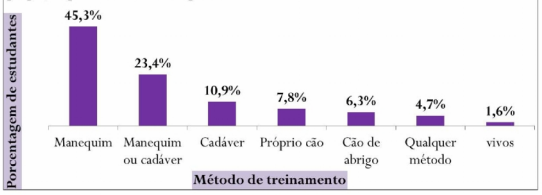
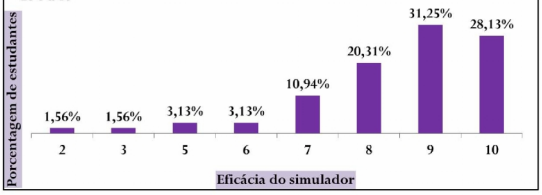


Figura 5: Opinião dos estudantes sobre a eficácia do simulador, em uma escala de 0 a 10



APÊNDICE D

Segunda etapa do workshop, na qual os participantes conhecerama e usaram alguns métodos alternativos e materiais usados no desenvolvimento dos simuladores de palpação prostática canina e de sondagem uretral em cadelas.

Fotografia1- apresentação de alguns modelos alternativos e de materiais usados na confecção dos modelos.

Fotografia 2- modelos comerciais e simuladores de palpação prostática com patente requerida

Fotografia 3- simulador, ainda em fase de desenvolvimento, de sondagem uretral em cadelas sendo testado pelos participantes do workshop

Fotografia 4- Participante do workshop realizando palpação prostática no simulador.

Fotografia 6- participantes do workshop conhecendo os simuladores e materiais usados para confeccioná-los.

ANEXO

Aceite de publicação da revista Journal of Veterinary Medical Education

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Karynn Capilé <karynn.capile@gmail.com>

JVME 1214-120R1 Capilé Decision Letter

1 message

jvme@aavmc.org <jvme@aavmc.org> Tue, Feb 24, 2015 at 3:54 PM
Reply-To: jvme@aavmc.org
To: karynn.capile@gmail.com
Cc: jvme@aavmc.org

Dear Miss Capilé,

I am pleased to inform you that your manuscript "1214-120R1, Canine Prostate Palpation Simulator as a Teaching Tool in Veterinary Education" is accepted for publication in the Journal of Veterinary Medical Education (JVME).

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Editor-in-Chief
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