

# INVEST 2018 Proceedings



International Veterinary Simulation in Teaching Conference  
October 17-19, 2018 · Knoxville, Tennessee



## About the International Veterinary Simulation in Teaching Conference

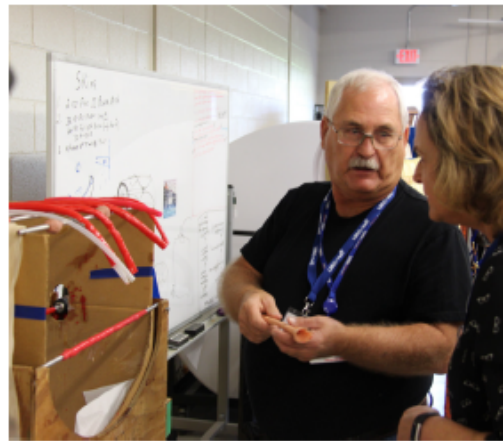
InVeST is an informal group that was started in August of 2011 following a very successful Veterinary Simulation Exchange symposium hosted by the College of Veterinary Medicine and Biomedical Sciences at Colorado State University in Fort Collins, Colorado.

The group has grown immensely through communications on the clinical skills and simulation page hosted by The Network Of Veterinarians In Continuing Education (NOVICE) project, reconvening in 2012, 2014, 2015 and 2017 for the InVeST conference. This conference has provided an international forum for learning and networking between researchers, developers and educational institutions on the rapidly growing use of simulation in veterinary education while encouraging research regarding its use and effectiveness. The number of attendees and countries they represent has grown significantly. We are excited to continue the growth of this group of innovators this week in Knoxville, Tennessee and the beautiful Cumberland Gap Region, hosted by Lincoln Memorial University-College of Veterinary Medicine.

If your institution is interested in hosting or sponsoring a future InVeST conference please review the proposal guidelines listed located at [www.vetedsimulation.com/conferences](http://www.vetedsimulation.com/conferences) and notify the advisory board via email at [invest@vetedsimulaton.com](mailto:invest@vetedsimulaton.com).

# INVEST 2018 Proceedings

Contents	Pages
Program at a Glance	4 - 5
Keynote Abstracts	6 - 9
Workshop Abstracts	10 - 21
Poster Abstracts:	
Small Animal and Surgical Skills Models	22 - 34
Large Animal Models	35 - 45
Virtual and Game-Based Learning	46 - 52
Teaching Methods and Materials	53 - 62



**Program at a Glance**

**Day One – Wednesday, October 17, 2018**

7:00 AM		Registration, check in, & breakfast
8:30 AM	Dr. Jason Johnson	Welcome & Opening Remarks
8:45 AM	Dr. Claire Vinten	Keynote: Developing Clinical Reasoning – Could Simulation Be the Answer?
9:30 AM		Model & poster viewing & networking
11:00 AM	Moderator, Dr. India Lane	Oral Poster Presentations I
12:00 PM		Lunch
1:00 PM	Moderator, Dr. Sarah Baillie	Oral Poster Presentations II
2:15 PM	Ms. Bea Biddinger Dr. Stacy Anderson Dr. Julie Williamson Dr. Ashley Whitehead Dr. Jamie Perkins Dr. Eric Bauman	Workshop Session I
3:45 PM		Model & poster viewing & networking
6:00 PM		Dinner & social event

**Day Two – Thursday, October 18, 2018**

9:40 AM	Mr. Johnathan Greene Dr. Christopher Yonts	Keynote: Effective Delivery of Simulation with Realism & Teamwork
10:45 AM		Tour of LMU-CVM Clinical Teaching Facility
11:45 AM		Lunch
1:00 PM	Moderator, Dr. Robin Farrell	Oral Poster Presentations III
2:00 PM	Ms. Linda Dascanio Dr. Dustin Pulliam Dr. Elpida Artemiou Dr. Beth Dronson Dr. Julie Cary Mr. Bill Collingsworth Ms. Ashley Tipton Dr. Galina Hayes	Workshop Session II
6:00 PM		Dinner & social event



**Day Three – Friday, October 19, 2018**

7:00 AM		Breakfast
8:00 AM	Moderator, Dr. Dean Hendrickson	Oral Poster Presentations IV
9:10 AM	Dr. Claire Vinten Dr. Jamie Perkins Dr. Patrick Welch	Workshop Session III
10:40 AM		Break
11:00 AM		Contest winners announced
11:05 AM	Dr. Julie Cary	Keynote: Facilitation and Debriefing: The Backbone of Simulation-based Education
11:50 AM	Dr. Julie Williamson	Closing Remarks



# Keynotes



## **Developing clinical reasoning - could simulation be the answer?**

**Keynote**, October 17, 2018

Presenter: Claire Vinten BVMedSci, BVM, BVS, PhD, FHEA, MRCVS

Institution: Royal Veterinary College

Abstract:

Development of clinical reasoning is the 'holy grail' of veterinary education. It is a skill that students must master to succeed in their future roles, but is notoriously hard to teach. Workplace-based learning, case-based learning and problem-based learning are used within curricula to develop clinical reasoning, but recent research has suggested that graduates are still struggling with this skill when entering practice (Vinten et al., 2016). Could simulation be the answer?

The use of simulation in veterinary education has grown in the last 10 years. This has been driven by the increasing importance placed on communication training (Gray et al., 2006) and clinical skills teaching, coupled with the overwhelming acceptance of the pedagogical value of simulation within human medicine and nursing. However, simulation use within veterinary schools remains very limited compared to other healthcare fields, particularly regarding development of clinical reasoning.

This talk focuses on the use of simulation to drive clinical reasoning development within veterinary curricula. It will explore current research and recent innovations, and introduce the concept of Situativity; a theoretical lens which emphasises the importance of contextualisation within clinical reasoning development (Durning and Artino, 2011; Patel, Sandars and Carr, 2014). Key elements of Situativity theory include fostering patient responsibility, promoting dual process reasoning, preserving the complexity of 'real-world' clinical problems and encouraging metacognition. Also important is the opportunity to practice managing uncertainty, information overload, anxiety and stress. The talk will finish by proposing a new veterinary curriculum model, where simulation replaces lectures to optimise reasoning development.

## **Effective delivery of simulation with realism and teamwork**

**Keynote**, October 18, 2018

Presenters: Johnathan Greene MBA, NRP, BSN, BSOM

R. Christopher Yonts DO

Institution: Lincoln Memorial University- DeBusk College of Osteopathic Medicine

### Abstract:

Lincoln Memorial University- DeBusk College of Osteopathic Medicine, Center for Simulation and Training and the AHA Training Center delivers quality simulations utilizing state-of-the-art equipment, well-seasoned faculty, staff and instructors from the community who currently work in their specialty areas such as hospital, aeromedical, EMS and other healthcare facilities. Medical simulations provides a safe, controlled and strategically guided education and training to students in any medical field with a range from novice to expert levels. Providing realistic scenarios that are well written by those team members that have experienced many years of real life experiences strengthens the quality of simulations, enhances the excitement for the learner, and makes it easier to understand and perform. Experienced simulation educators can quickly identify scenarios that may have an alternate and correct management regime as the students steer away from the rubric but still provides acceptable, safe and correct treatment. Teamwork faculty, staff, students, standardized patients, operations specialist and other inter-professional educators are very important to a successful simulation. Having well written scenarios that match the situations, patient problems, management techniques and recovery will make is easier to adhere to the rubric that students must follow. Rubrics should flow well and define how the student is expected to perform and provide quick follow-up debriefings. Developing effective rubrics utilizing inter-professional educators creating a framework and important to skills, knowledge and behavioral assessment. This lecture will cover all of these facets discussed above and offer examples of LMU-DCOM's Center for Simulation & Training course simulations.



## **Facilitation and debriefing: the backbone of simulation-based education**

**Keynote**, October 19, 2018

Presenter: Julie Cary DVM, MS, DACVS-LA

Institution: Washington State University College of Veterinary Medicine

Abstract:

Integrating simulation into a veterinary curriculum requires creativity, time, resources, and appropriate personnel. Early efforts and discussion are often focused on the physical resources; models, task-trainers, mannequins, and physical environment, as those are tangible and are easier to “sell” to administration and donors. However, the power of simulation is facilitation and debriefing.

Effective facilitation provides structure, a pattern of self-reflection for participants, and further exploration of skills. Successful facilitators require continuing education and exposure to processes, theories, and best-evidence specific to simulation. While there are similarities between clinical teaching and simulation, there are enough differences that specific training is critical for clinicians and academicians in veterinary medicine. Facilitators must create an environment that supports safety, confidentiality, trust, reflection, and critical thinking while simultaneously encouraging experimentation and pushing boundaries. Facilitators must also consider and manage the influence emotion has on learning and engagement during the simulation.

Effective debriefing ensures simulations are not reduced to a game without real or lasting impact for the learner. Debriefing is crucial for learners to derive meaning from the simulation experience. Running effective and efficient debriefing exercises is as much an art as a science. The debriefing process, when done well allows for deliberate and mindful delivery and receipt of feedback leading to reflection and cognitive reframing. Reflection and cognitive reframing in turn transforms frustration into discovery and confusion into competence.

During this presentation, I will present the theoretical background and best evidence for simulation facilitation and debriefing, using examples from veterinary medicine as illustration.

# Workshops



## **Realistic and reusable skin: multiple layer silicone suturing pad**

**Workshop**, October 17, 2018

Presenter: Bea Biddinger LVT, VTS(ECC)

Institution: Michigan State University

Abstract:

This workshop will guide participants thru prepping, coloring, mixing, pouring, and curing a multiple layer, reusable silicone suturing pad. Each participant will work with the ingredients and construct a take home piece of realistic looking skin. The suture pad has a dermis layer, subcutaneous fatty layer, and a muscle layer. Take home instructions will be available along with product sources. Video will be available. Discussion will be centered around making various models using silicone, resin, and foam products. Interaction is very welcome to see how other institutions use outright ingenuity along with specialized ingredients or common hardware and fabric store items to construct their teaching models.

## **How to run a large scale pre-clinical objective structured clinical examination (OSCE) in a veterinary clinical skills training program**

**Workshop**, October 17, 2018

Presenters: Stacy Anderson<sup>1</sup> DVM, MVSc, PhD, DACVS-LA

Ashley Whitehead<sup>2</sup> DVM, BSc, DACVIM-LA

Julie Williamson<sup>1</sup> DVM, MS, AFAMEE

Institutions: 1 Lincoln Memorial University

2 University of Calgary

**Abstract:**

Objective structured clinical examinations (OSCEs) are commonly used in health sciences to assess proficiency in clinical and professional skills. In the past 10 years, they have been gaining popularity in the veterinary medical education field to assess veterinary medical students as veterinary colleges have enhanced clinical skills training during the pre-clinical curriculum. Most veterinary medical programs throughout the world are increasing class size to offset lack of government funding and to meet the demand for new veterinarian graduates.

The goal of an OSCE is to assess a selection of clinical skills that a student is expected to have mastered during their pre-clinical curriculum. An OSCE may be low stakes, where stations may be remediated and coached to master the skill, or it may be high stakes, where a student must pass the examination in order to move forward in the curriculum. Regardless, OSCEs are comprised of multiple stations to assess any number of clinical skills. Stations can be complex, in that they test multiple related or unrelated skills in one station, or they can be simple, only testing a single skill. Stations may also test a student's procedural and/or theoretical knowledge on the related skill.

This workshop will discuss the challenges of large scale delivery of an OSCE including scheduling, facilities, grading, personnel, exam security, feedback and remediation. Facilitators from three veterinary schools that run large-scale OSCEs will share the different ways that they have met these challenges at their institutions.

## **VUI's from simple to complicated: and their potential role in veterinary education?**

**Workshop**, October 17, 2018

Presenter: Jamie Perkins DVM

Institution: Lincoln Memorial University

### Abstract:

Voice user interfaces (VUI's) allow human interaction with a compute through a voice/speech interface. There are currently several products on the market such as Amazon's Alexa, Google's Home and Apple's HomePod.

This new disruptive technology was designed to offer the user a faster, easier way of interacting with technology in the home. The individual programs on these devices are known as 'skills', and while there are 30,000 skills available in the marketplace, to date, there are few available for the veterinary field and even fewer available for veterinary education.

These devices have the potential to change how education is delivered in the veterinary curriculum. This new form of human-computer interaction moves beyond click and touch interface and allows the user to engage with the computer as if they are speaking with a seasoned clinician or to use the device for independent study and practice testing.

From a design standpoint there are challenges to maintaining this type of processing in a logical flow, to keeping it simple but sufficiently complex to be challenging for the student. While advances in the programs are allowing VUI's to learn and adapt to users speech patterns and preferences through natural language processing, the devices do not 'think'. The experience must be designed in a fashion that allows the user to engage with the device and receive feedback where necessary.

## **Best Practices in Educational Technology: From Games to Virtual Reality**

**Workshop**, October 17, 2018

Presenter: Eric Bauman PhD, FSSH, RN

Institution: AdTalem Global Education

Abstract:

Educational technology like Virtual Reality (VR) will become an extension of the simulation paradigm. Gaba's article, *The Future vision of simulation in health care foreshadowed simulation's trajectory* (1). Characters in the television and movie franchise *Star Trek* leveraged the fictional *Holodeck* for immersive training purposes. The *Holodeck* allowed for suspension of disbelief so that high risk, low incidence events could be rehearsed and debriefed. The *Holodeck* provided an immersive and situated experience for novices to gain competency and experts to maintain and hone skills.

As the educational paradigm catches up to popular culture, we must embrace best practices for GBTL and VR(2). Only recently have we established best practices for simulation and GBTL (3). VR requires educators to reframe teaching and evaluation processes.

This session provides an overview of the simulation GBTL and VR from a layered learning perspective (4). Participants will review GBTL applications and a VR experience to prepare them for analysis of the state of VR as teaching and learning tool.

References:

1 Gaba, David M. "The future vision of simulation in health care." *Quality and safety in Health care* 13.suppl 1 (2004): i2-i10.

2 Bauman, E.B. & Ralston-Berg, P. "Virtual Simulation" *Defining excellence in simulation programs*. Lippincott Williams & Wilkins, 2014.

3 Bauman, Eric B. "Games, Virtual Environments, Mobile Applications and a Futurist's Crystal Ball." *Clinical Simulation in Nursing* 12.4 (2016): 109-114.

4 Bauman, E. B., et al. "Building a better donkey: A game-based layered learning approach to veterinary medical education. *GLS 10 conference proceedings*." (2014): 372-375.

## **The Use of Standardized Clients in Veterinary Communication OSCE: Standardization of Role and Assessment**

**Workshop**, October 18, 2018

Presenters: Linda Dascanio<sup>1</sup> LVT

Dustin Pulliam<sup>1</sup> DVM

Elpida Artemiou<sup>2</sup> BSc, MSc, PhD, AFAMEE

Beth Dronson<sup>3</sup> VMD

Institutions: 1 Lincoln Memorial University

2 Ross University School of Veterinary Medicine

3 University of Pennsylvania

Abstract:

Standardized clients (SCs) offer a valid and reliable approach in assessing learners' communication skills in high stakes examinations such as the Objective Structured Clinical Examination (OSCE). Critical to using SCs in assessment requires standardization of role, use of validated rubrics, as well as training in assessing thus ensuring accuracy and reliability. This workshop will focus on training simulated clients on assessing communication skills including discussion and application of various assessment rubrics. The workshop will begin with an orientation describing baseline communication skills outlined in the Calgary Cambridge Guide (CCG). Following, in small groups, participants will practice assessing communication skills through vignettes and live simulations, as well as engage in discussions on pitfalls surrounding assessment. This workshop will enhance any stage of communications program and will be of interest and value to novice as well as experts in communication skills assessment.

## **Using Serious Play to support Simulation-Based Education**

**Workshop**, October 18, 2018

Presenter: Julie Cary, DVM, MS, DACVS-LA

Institution: Washington State University

### **Abstract:**

The financial and time resources required to develop and implement simulation training are considerable. For some learners, the simulation construct initially can be unnerving and impede learning. Having other experiential learning opportunities to introduce or augment simulation may be useful to bridge the gap for learners. Participants will be invited to engage in Serious Play activities associated with team work and communication for half the workshop. Following the interactive participation, groups will be asked to brainstorm ideas for using Serious Play in their own simulation-based education environments. Participants will have a strong understanding of the impact and potential uses of Serious Play for use in their own contexts and environments.



## **Pros, cons, and how-tos of building models in-house**

**Workshop**, October 18, 2018

Presenters: Bill Collingsworth

Ashley Tipton LVT

### Abstract:

This workshop will be an open discussion on the design, construction, cost, and validation of in-house built clinical skills models. The workshop will be held in the DVTC model building garage. Using LMU-CVM in-house models as props, the group will discuss why models are used, what precipitates the need, and what impacts the design and the degrees of fidelity. The prototype, research, and the WOW factor will be reviewed. A cost comparison with commercially available models and direct cost of in-house construction will be examined. This will include recycling and 'bells and whistles.' A very important part of the group discussion will center around model validation. Are in-house built clinical skills models worth it? (For the students, for the college, for the animals). How do we know?

## **Creation, implementation and assessment of a small animal general abdominal surgery simulation course for veterinary students**

Workshop, October 18, 2018

Presenter: Galina Hayes BVSc, MRCVS, PhD

Institution: Cornell University

Abstract:

**Background/ Objectives:** Final year veterinary students have limited opportunity for hands-on skill acquisition of general abdominal surgical skills beyond routine ovariohysterectomy, yet are expected to have competency in these procedures at graduation. The primary objective of this study was to develop a general abdominal procedures surgical simulation course and determine whether conducting abdominal surgery simulation accelerated general abdominal surgery skill acquisition by final year veterinary students and improved the confidence of student participants in their ability to perform these procedures.

**Methods:** Three custom training models were created for use in the setting of a clinical rotation in a veterinary teaching hospital. A website with training videos and notes was created as a supplement to on-site teaching. Teaching of gastrotomy, gastropexy, enterotomy, intestinal resection and anastomosis and cystotomy on the simulators was supervised by surgical faculty and residents. All participants completed pre and post simulation course knowledge assessment and feedback/confidence surveys.

**Results:** The experience of developing and delivering the course will be described, together with difficulties/ pitfalls encountered. Data from the participants to date will be presented.

**Conclusions:** Simulators appear to offer a practical, efficient and effective solution to providing surgical training. The experience of implementing such a course and the data on the first wave of participants will be presented.

## **Getting started with simulation research**

**Workshop**, October 19, 2018

Presenter: Claire Vinten BVMedSci, BVM, BVS, PhD, FHEA, MRCVS

Institution: Royal Veterinary College

Abstract:

As the use of simulation within veterinary education grows, so does the need for robust evidence of the effectiveness of the methods employed – particularly when there is a start-up cost involved. However, researching the impact of simulation within a veterinary curriculum is fraught with complexities.

This workshop aims to introduce the principles of simulation-based veterinary education research to beginners in the field. The workshop will involve group activities and discussion, examples of best (and worst!) practice, and the opportunity to network and form collaborations with peers. Participants are encouraged to bring along a project idea that they would like to explore with the help of the group (although those without one are very welcome too).

By the end of the workshop, participants should be able to:

- Develop an educational research question
- Design an achievable research project to address that question
- Identify potential threats to validity and reliability, and develop a creative approach to overcoming challenges

## **Beyond iBooks Author**

**Workshop**, October 19, 2018

Presenter: Jamie Perkins DVM

Institution: Lincoln Memorial University

### Abstract:

iBooks Author, released in 2012, has been described in Apple's marketing materials as "a tool that allows educators to create textbooks for the iPad, iPhone, and Mac. These books can contain photo galleries, videos, interactive elements, and more which brings content to life in ways printed books never could." Educators who create content with this development tool now have the potential to move beyond traditional static reference material creation and expand offerings to create truly immersive instructional materials.

While iBooks Author is a very robust tool that allows novice developers, with minimal computer experience, a means to create digital content, it does have a number of limitations. One of these limits, support for smooth animation, can be overcome by the use of the "widget" object combined with an HTML generator. HTML material can be developed by hand coding, as well as with commercially available products for non coders (such as Tumult Hype 3 Professional) to create interactive animation elements that can be output as HTML5 scripts.

Tumult-Hype's software provides a powerful set of features including user controllable animation, timing functions, scene creation and timelines. The basic program does not require extensive coding experience but it does provide support for JavaScript actions to extend its functionality. This software supports implementing an additional layer of interactivity and user engagement in an iBook.

## **The use of Natural Language Processing for Clinical Decision Support: case study, interactive demo and shared exploration of the future**

**Workshop**, October 19, 2018

Presenters: Patrick Welch DVM, DACVO, MBA

Jeff Johnson MEd

Ed Carlson CVT, VTS (Nutrition)

Ken Hubbell MS, ITE

Andrea Looney DVM, DACVAA, CCRP, DACVSMR

Jamie Maher CVT, VTS (ECC, Anesthesia)

Institution: Ethos Veterinary Health and VetBloom

Abstract:

The integration of natural language processing (NLP) into clinical decision support (CDS) provides tremendous opportunity to create hands free, conversational, algorithmic tools to support clinical team members as they provide care to patients in a multitude of environments.

Our team has created a beta platform that utilizes NLP and an algorithmic approach to generate anesthetic risk assessments and drug protocol recommendations based on patient signalment and co-morbidities. We have tested this platform with a group of veterinary technicians in a private practice multi-specialty environment and have integrated the tool with a Learning Record Store (LRS) in order to capture, aggregate and analyze user data.

This session will provide attendees a brief introduction and background to this technology, the ability to explore this tool in an interactive setting, and finally, a facilitated visioning exercise to explore future potential for development focused on data capture and aggregation, utilization in a teaching hospital environment, use of machine learning technology, and integration with hospital information systems.

# Posters



## **A canine prostate palpation model: from prototype to a great teaching and assessment tool**

### **Poster**

Authors: Annett Annandale<sup>1</sup> DrMedVet, MSc, DACT

Liezl Kok<sup>2</sup>

Institutions: 1 University of Pretoria

2 Anatomoulds (Pty) Ltd

### **Abstract:**

A canine prostate palpation model was developed using a standing soft toy dog, silicone parts (anus, rectum, prostates, skin pads) and polyethylene foam ("pool noodle") pieces. The silicone anus and rectum were sewn into the perineal area of the soft toy dog. A variety of normal and abnormal prostates of different sizes and consistencies were placed on soft silicone skin pads that were glued onto 100mm pieces of polyethylene foam. These prostate units were interchangeable by access to the pelvic area through a zipper on the back of the model. Changing prostate units was difficult and took long which complicated the model use for larger student groups and during assessments. The prototype was then changed. Four dog backends, made of artificial fur and with tails, were attached to a 100mm(H)x150mm(L)x 10mm(W) wooden board. The anal areas were cut out and the silicone anuses and rectums placed into the pre-cut spots. The prostate units are held in place with velcro straps in halved plastic tubes that are attached to the opposite side of the wooden board at the level of the anuses. Students can now palpate four prostate conditions on the same board. Another advantage of the updated model is the ease and speed of exchanging prostate units. The development process from a soft-toy dog to a wooden board model shows that an initial idea can be improved dramatically after testing and confirms that a model closely resembling a dog is not the most important feature of a model.

## **Cystocentesis: development of a low cost model**

### **Poster**

Authors: José Luis Ciappesoni DVM

Gabriela C. Semichuch DVM

Viviana B. Negro DVM, PhD

Marcelo S. Miguez DVM, Med

Institution: Buenos Aires University

#### **Abstract:**

Cystocentesis is a relatively simple procedure that is used to take urine samples and to evacuate urine in cases of urethral obstruction. The skills required for this procedure are: correct palpation and fixation of the bladder and performing the puncture aseptically.

The problem that students face is how to acquire the necessary skills and perform the procedure safely. The aim of this work was to develop a low fidelity simulator which could be used by many students, was adequately similar to the task on a live patient, and was easy to build and repair.

Different materials were used: latex pellet, fluid administration roller clamp, seals, latex probe, baby diaper with absorbent gel, a container (stuffed animal or bottle) and artificial urine.

The model was tested by 19 faculty with 89% reporting good or very good usefulness of the model. Work guides were subsequently created with a QR code to access an explanatory video, and the model was used in the 2018 Surgery Course of 120 students. 90 students completed surveys with 80% of students stating the usefulness of the model was good or very good. All of them performed at least one puncture without to replace artificial "bladders".

The use of models is important in surgical learning. It allows the repetition of the procedures, the acquisition of the skills and reduces the student's stress when confronting the patient for the first time.

UBA sponsored this project: UBATIC Veterinary 4.0



## **Low fidelity simulators for mucosal flaps on the hard palate and gingiva of dogs**

### **Poster**

Authors: José Luis Ciappesoni DVM

Diana Rodríguez DVM

Viviana B. Negro DVM, PhD

Marcelo S. Miguez DVM, Med

Institution: Buenos Aires University

#### **Abstract:**

Simulators in surgical teaching are used regularly around the world. Student skills are built through repetition, which favors the use of simulators rather than only live animals. High fidelity simulators, which are more realistic but also more expensive to purchase and replace, are difficult to implement in our environment. The aim of this work was to develop low fidelity simulators, so that advanced veterinary students could acquire expertise in oral surgery techniques.

Silicone was used to simulate the tissue of the oral cavity. Skulls and mandibles were 3-D printed, and a silicone palate and gingiva were added, which allowed students to create and suture gingival flaps. These models were tested by several surgery faculty, who got good results with different techniques. The models will be used in the different courses of the senior year of Veterinary Medicine.

Students will be given a 15 minutes theoretical introduction to the pathologies to be treated, followed by simulator practice. The activity will be complemented with an online case and 3-D videos. The use of low impact simulators allows students to understand and practice different surgical procedures with adequate realism in the pre-graduate and postgraduate programs.

UBA sponsored this project: UBATIC Veterinary 4.0

## **Cutting the Cheese: An economic approach to teaching wound management using personal pizzas**

### **Poster**

Authors: Sara Colopy DVM, DACVS-SA, PhD  
Kristen Cooley BA, CVT, VTS (Anesthesia)  
Robb Hardie DVM, DACVS, DECVS

Institution: University of Wisconsin-Madison

#### **Abstract:**

#### **Challenge:**

Basic wound management is an important part of the veterinary curriculum. However, finding an economical model to teach students how to debride, flush and bandage a wound is challenging and existing commercially available silicone models are relatively expensive with a limited lifespan.

#### **Solution:**

To overcome this challenge, we are currently piloting the use of the personal pizza<sup>1</sup> to simulate an open-wound model for student training in an introductory clinical skills course.

#### **Realism:**

In preparation for the lab, pizzas are baked at 400 degrees for 10 minutes and then secured to a terrycloth towel for ease of manipulation. When prepared in this manner, the pizza provides a relatively realistic model with the various ingredients (peperoni, cheese, sauce, crust) simulating the different layers of a contaminated or necrotic wound.

#### **Psychomotor and decision-making skills:**

With this model, students are taught psychomotor and decision-making skills necessary for proper wound management including: how to assess the viability of wound tissue, how to surgically debride a wound using blunt and sharp dissection techniques, how to flush a wound using a fluid lavage system, and how to apply a 4-layer wet-to-dry bandage.

#### **Feedback and economics:**

Student feedback regarding the use of the personal pizza as a model for teaching wound management has been very positive and it is now an integral part of the clinical skills training for our students. Estimated savings with this model is approximately \$700 per semester compared to a commercially available silicone model.

#### **References:**

1. Sabatasso's Pizza Singles, Costco Wholesale Corporation

## **Deconstructing tasks for suture skills training: instrument handling**

### **Poster**

Authors: Gail Druley

Lizette Hardie DVM, DACVS

Fonda Martin

Abi Taylor BSc, VetMB, MRCVS

Institution: North Carolina State University

#### **Abstract:**

The development of fine motor skills is critical for surgical training. We show three low-cost, low-fidelity models for development of basic hands skills for the commonly used surgical instruments; needle drivers, operating scissors and thumb forceps.

Training novices in basic suturing initially requires heavy feedback to prevent the formation of bad habits. Our models focus on surgical skills deconstruction to the most basic unit, allowing students to work on simple instrument handling without the additional complexity of placing sutures. Myelination of correct motor pathways allows students to later build on 'muscle memory' by adding in more complex skills.

**Buzzer Wire board:** electrical circuit focusing on three-point grip for the needle driver and steadiness of hand using a wire and loop configuration. The wire can be changed into various shapes to increase difficulty. Students are permitted short practice sessions on sequential days to demonstrate the effects of sleep on skills consolidation.

**Scissor Snip:** suture cutting model focusing on three-point grip of operating scissors and the use of scissor tips to facilitate accurate suture trimming. Students are given a specific length to cut to improve their measurement skills. Suture is placed at varying angles to teach comfortable and ergonomic movement of the limb.

**The Bead Plate:** bead manipulation model focusing on pencil grip of the thumb forceps and fine motor movements. Beads are placed in a cup, on a wire and in small divots in a metal tube. We add in variety and an element of competition to improve motivation for learning.

## **Bladder Boxes: Low-fidelity urinary bladder and prostate models for preclinical students**

### **Poster**

Author: India F. Lane DVM, MS, EdD

Institution: University of Tennessee

#### **Abstract:**

**PURPOSE:** Written case-based exercises rely on descriptive text to convey patient findings, including the physical examination findings. In the lower urinary tract, observation and palpation are key to the diagnosis and management of many disorders, including micturition disorders and prostatic disease. In order to provide realistic models and to help students translate descriptive text to realistic tactile experiences, simulated small animal urinary bladders and canine prostate glands were created out of low cost materials.

**OBJECTIVES:** Using a written signalment, patient history and model, students will make presumptive diagnoses and plan initial management for urinary obstruction, urine retention, urinary incontinence and common prostatic disorders.

**METHODS.** Urinary bladder models were prepared using water-filled balloons; prostatic models were developed using modeling clay. Models were placed in small boxes with fabric curtains obscuring visualization. Urinary bladder model boxes also had a tube exiting the box to simulate the urethra. Students reach behind the curtain to “palpate” the bladder or prostate and to attempt to express the bladder.

**RESULTS:** The models are well-received by students as an enhancement to the traditional case-based exercises. Obstructed bladder models and prostate gland models are most realistic. No significant change in performance on related examination questions has been appreciated.

**CONCLUSIONS:** The low-fidelity models described here likely increase student engagement and exposure to palpation findings in the lower urinary tract, but do not increase examination performance in its current format.

## **The Blocked Tomcat: Simulated feline urethral obstruction exercise for preclinical students**

### **Poster**

Authors: India F. Lane DVM, MS, EdD

Elizabeth Lennon DVM, PhD

Institution: University of Tennessee

#### **Abstract:**

**PURPOSE:** Urinary course instructors at UTCVM continually work to manage content explosion and to best utilize lecture and laboratory time. In order to expand feline content and to increase hands-on opportunities, a complex simulation of feline urethral obstruction was developed.

**OBJECTIVES:** Students will practice the approach to acute urinary obstruction and acute postrenal azotemia, including 1) recognizing and treating life-threatening fluid deficits and hyperkalemia; 2) practicing urinary catheterization in male cats; and 3) planning short and long term post-obstructive management.

**METHODS:** Using guiding questions, student teams manage a severely ill cat from presentation to stabilization, indwelling urinary catheter placement, and long term management recommendations. Cadavers, fluids, intravenous catheters, urinary catheter supplies and simulated medications are employed for realism. Simulated ECG, chemistry and urinalysis results are provided when requested.

**RESULTS:** Students enjoy the realistic experience, the teamwork required to manage the case, and the opportunity to tackle the clinical problem from presentation to resolution. Most students report the lab enhances learning and provides useful practice in urinary catheterization and fluid/drug calculation practice. Students and instructors recognized the limitations of cadaver tissues and the need for some additional time and instructional support to fully benefit from the exercise.

**CONCLUSIONS:** The simulated “blocked tomcat” exercise holds promise for enhancing conceptual learning and clinical skill development in urology. Future plans include expanding the laboratory time, providing follow-up ECG and chemistry results, and creating meaningful debriefing and assessment components.

This poster will illustrate the materials, case structure, feedback and challenges of the “blocked tomcat” simulation.

## **Comparison of the technical and decision-making steps of fundoscopy performed on a live dog compared to a 3D printed model**

### **Poster**

Authors: Chantal McMillan<sup>1</sup> DVM, MVSc, DACVIM

Heidi Banse<sup>2</sup> DVM, DACVIM (LAIM)

Matt Read<sup>3</sup> DVM MVSc, DACVAA

Mark Ungrin<sup>1</sup> PhD

Doug Kondro<sup>1</sup> BE, MSBME

Sam Dorosz<sup>1</sup> BE, MSBME

Brian Skorobohach<sup>4</sup> DVM, DACVO

Institutions: 1 University of Calgary

2 Louisiana State University

3 MedVet Columbus, MedVet Hilliard

4 Calgary Animal Referral and Emergency

### **Abstract:**

Developing proficiency in fundoscopy can be challenging for the novice learner. Live animals are often noncompliant subjects, making effective instruction of the procedure challenging for both the teacher and learner. The primary objectives of this study were 1) to develop a high fidelity canine ocular simulator 2) to compare technical and decision steps derived by cognitive task analysis in the live animal versus the simulator and 3) assess realism of the model. 3D printing and replica molding were used to create a canine ocular and head model for indirect ophthalmoscopy with realistic optical and physical properties. This model also allows head manipulation as might be used when examining a live dog. Photographs of the canine fundus were manipulated to allow for incorporation of interchangeable printed images in the simulated globe. Two analysts compared technical and decision steps from four subject matter experts (SMEs) performing indirect ophthalmoscopy in a live dog and simulator. SMEs also evaluated the simulator for realism and usefulness in teaching and student assessment. SMEs performed 86% of the technical and/or decision-making steps on the model compared to the live animal. All missing steps were technical steps related to examination of a live patient (e.g. demonstration of patient restraint and eyelid retraction). Experts either agreed or strongly agreed that the model appeared realistic (median score, 4.5/5) and would be suitable for teaching (5) and assessment (4.5). These findings suggest the model may be a useful tool for teaching novice learners. Further work to validate this model is ongoing.

## **CPR and client communication training with manikins and simulations: does repetition enhance confidence or competence?**

### **Poster**

Authors: Leslie Klis McNeil PhD

Sherrie Lanzo

Alysha McDaniel CVT

Institution: University of Illinois at Urbana-Champaign

### **Abstract:**

Instruction in cardiopulmonary resuscitation along with client communication is deliberately repeated in the first and second years. CPR is first demonstrated on a manikin by a CVT. Students then practice on the manikin in teams of 4. While half of the class of 16-24 students performs or watches CPR, the rest participate in a pair-share role-play to ensure all students articulate to a "client" that the "patient" has died. Once every student has performed CPR for two minutes and has spoken the bad news out loud, the class reconvenes for a situational role-play involving one volunteer student veterinarian who must communicate with the client and a three-student CPR team. A simulated client presents with the manikin patient. The student veterinarian must greet the client, assess the situation, get the patient to the CPR team, direct the client to a private room, and communicate effectively with the client and the CPR team. The role-play is performed 2-3 times with different students and with the client playing one of 10 characters. The class watches the drama, then discusses what went well and what could have gone better. This entire exercise is performed with all students in both the first and second years. Informal feedback from students opens the question of whether this time should be used differently. Effectiveness will be evaluated by surveying students this Fall to compare the summer experiences and attitudes of returning second and third year students, who will have received the training either once or twice, respectively.

## Training Veterinary Students with Immersive Anesthesia Simulation and Evaluating Clinical Skills Outcomes in a Patient Care Environment

### Poster

Authors: Julie Noyes<sup>1</sup> DVM, MS, MA

Robert Keegan<sup>1</sup> DVM, DACVA

Kira Carbonneau<sup>1</sup> PhD

Susan Matthew<sup>1</sup> BVSc, PhD

Mauricio Lepiz<sup>2</sup> DVM, MS, DACVA

David Rankin<sup>3</sup> DVM, MS, DACVA

Institutions: 1 Washington State University

2 Texas A&M

3 Kansas State

### Abstract

This study aimed to determine the effect of anesthesia simulation training on live animal clinical performance of veterinary students. A random, stratified sampling method was used to select 16 second year veterinary students for simulation training from a pool of 54 students signed up for a 6-week clinical simulation elective and a matched control group (n = 32). A simulated operating room environment was constructed using a canine manikin, an anesthesia machine and monitoring equipment, and an interactive patient monitoring computer simulation that depicted changes in multi-parameter vital signs based on student decision-making. Simulation scenarios were created using the 9-Step Approach to Immersive Simulation Scenario Design described by Daniel Fletcher (InVeST, 2014). These consisted of cognitive, technical, and behavioral objectives that focused on core anesthesia topics including induction of anesthesia, monitoring, and anesthetic management of bradycardia, hypotension and painful patients. Student clinical performance was recorded using head-mounted GoPro cameras during their first live animal anesthesia and surgery lab and evaluated by two blinded anesthesiologists from separate institutions using a standardized rubric. Data was analyzed using an ANOVA and demonstrated that the simulation group performed significantly better on clinical tasks,  $F(1,30) = 5.95$ ,  $p = .02$ , with performance almost a full standard deviation above the control group ( $d = 0.86$ ). The simulation group also performed significantly better on professional and communication skills,  $F(1,30) = 4.01$ ,  $p = .04$  ( $d = 0.72$ ). The results of this research suggest that immersive anesthesia simulation training can increase clinical performance in a patient care setting.



## Development of a Feline Urethral Obstruction Teaching Model

### Poster

Authors: Lindsey Ramirez

Megan Preston

Kim Carney DVM

Julie Williamson DVM, MSc, AFAMEE

Stacy Anderson DVM, MVSc, PhD, DACVS-LA

Institution: Lincoln Memorial University College of Veterinary Medicine

### Abstract:

*Introduction:* Urethral obstruction is a common, potentially life-threatening condition of the male feline. Standard treatment includes retropulsion of the urolith and urethral catheterization without causing urethral trauma (Cooper, 2015; O’Hearn and Wright, 2011). Learning to perform these skills requires hands on training and deliberate practice.

*Objective:* The purpose of this study was to develop a feline urethral obstruction model for teaching veterinary students in a clinical skills laboratory.

*Methods:* A stuffed toy cat was modified to include a silicone penis, 8-French red rubber catheter urethra, water balloon bladder, and a clay urolith. The model’s iterations were tested by several LMU-CVM small animal clinical faculty until an acceptable design was reached.

*Results:* The model met the approval of the faculty and allowed students to practice the steps necessary to relieve feline urethral obstruction, specifically the observation of aseptic technique, extrusion of the penis, insertion of a urinary catheter, retropulsion of a urolith, advancement of the catheter to the bladder, and emptying and flushing the bladder. The approximate cost of the completed model was \$70.00. After each procedure, the bladder and urolith can be replaced for pennies.

*Conclusions:* This inexpensive model allows students to deliberately practice these skills to competency while receiving feedback on their performance. Future studies could develop a rubric for scoring the task and collect validation data for the use of the model and rubric with veterinary students.

### References:

Cooper, E.S. (2015). Controversies in the management of feline urethral obstruction. *Journal of Veterinary Emergency and Critical Care* 25(1): 130-137.

O’Hearn, A.K. and Wright, B.D. (2011). Coccygeal epidural with local anesthetic for catheterization and pain management in the treatment of feline urethral obstruction. *Journal of Veterinary Emergency and Critical Care* 21(1): 50-52.

## **Feline Orotracheal Intubation Model: Design and Fabrication**

### **Poster**

Authors: Claudia Smith MASc

Carolyn Kerr DVM, DVSc, PhD, DACVA

John Runciman PhD, PEng

Deep Khosa BSc, BVMS, MANZCVS (SA Med), PhD

Institution: University of Guelph

### **Abstract:**

The need for a realistic, functional model that would permit acquisition of feline oro-tracheal intubation skills was identified. Key desirable features were determined to be anatomical accuracy, realistic tissue properties including colour and elasticity, and mobility of components with capacity for user feedback. CT and MRI scans of a cat were obtained and imported into Amira software to create a virtual structure. SolidWorks software allowed the structure to be further refined using engineering design principles. A unique epiglottis structure was incorporated to allow for realistic epiglottis function. The trachea was designed to be suspended within the body and the model included arytenoid cartilages, a hard palate, canine teeth, and an esophagus to allow for replication of accidental intubation. The model was 3D printed using polymers of various durometers and colours for different tissues, and mounted to allow for independent use without the need for an assistant. The caudal end of the trachea was designed to permit connection to a re-breathing bag replicating function as a lung. With an endotracheal tube in place, users can connect the proximal end of the tube with an anesthetic delivery system and perform cuff inflation to recreate and test a seal. The completed model was evaluated by veterinary faculty and technicians to determine its potential for use for teaching. It was concluded to be useful for instruction and student learning.

## Creation and validation of a bovine castration model

### Poster

Authors: Stacy L. Anderson DVM, MVSc, PhD, DACVS-LA

Julie A. Williamson DVM, MS, AFAMEE

Lynda Miller DVM, PhD, DACVIM

Philippa Gibbons BVetMed, MS, MRCVS, CertEd, DACVIM-LA

Jerry Roberson DVM, PhD, DACVIM-LA, DABVP

Jeffery Raines

Gil Patterson DVM

John J. Dascanio VMD, DACT, DABVP

Institution: Lincoln Memorial University

Abstract:

*Objective:* This study was designed to create and validate a surgical bovine castration model for use in a veterinary clinical skills course.

*Methods:* Custom silicone molds were used to create a synthetic bovine scrotum and testicles that modeled a 300-kg live bull calf. A convenience sample of third year veterinary students ( $n = 19$ ) was divided into two groups: the traditionally trained group (T) performed castration on a live bull calf after receiving a lecture and the model trained group (M) performed castration on a live bull calf after training with the model in addition to a lecture. Students were digitally recorded while castrating a live bull calf. Performance was scored and timed by an investigator blinded to group using a grading rubric. Survey data using Likert scales was collected from the students and experts ( $n = 8$ ).

*Results:* Survey feedback from experts and students was overall positive. Students in group M had higher performance scores than students in group T (M group mean(SD) 80.6(6.0)%; T group 68.2(9.8)%;  $P=0.005$ ). There was no difference in surgical time for live castration between groups (M group mean(SD) 4.5(1.6) min; T group 5.5(2.0) min;  $P=0.12$ ).

*Conclusions:* The surgical bovine castration model was considered useful by experts and veterinary students to learn how to castrate a live bull calf. Students' performance scores after model training were higher than students' scores after traditional training, suggesting that model training was beneficial. These data provide evidence for validation of the model and rubric.

## **The Bovine PD Improvement Exercise App: A novel approach to improve bovine trans-rectal palpation (TRP) and pregnancy diagnosis (PD) skills**

### **Poster**

Authors: Annett Annandale DrMedVet, MSc, DACT

Dietmar E Holm MSc

Institution: University of Pretoria

### **Abstract:**

The fairly unusual and tiring physical activity of bovine TRP requires a novel approach to improve students' TRP and PD skills. A recent study evaluated the effect of a physiotherapy exercise program on students' TRP and PD skills.<sup>1,2</sup> Two important findings were discovered: 1. students who participated in the exercise program, and 2. students who had a grip strength (GS) of more than 30kg performed better in PDs. A subsequent electromyography study showed that hand muscles, extensors and flexors of the forearms, shoulder stabilizers, back muscles and core muscles are strongly activated during TRPs, confirming the role that forearm muscles (GS) play during TRP.<sup>3</sup> It was also seen that muscle endurance is more important than total muscle strength.<sup>3</sup> Based on these findings<sup>1-3</sup> a three month exercise program targeting exactly those muscle groups, was developed with the help of an experienced biokineticist. The program is divided into three levels starting with easier entry level exercises and building up to more advanced exercises. It is available to students as narrated video clips on a mobile application for smart phones and tablets and uses readily available exercise equipment. This enables students to choose when and where they would like to exercise. The program requires the participant to exercise for 15 minutes three times a week and should not only increase GS and improve TRP accuracy but also increase stamina and wellbeing, shape arms nicely and add some fun to busy study schedules.

### **References:**

1 Influence of a physiotherapy exercise program, arm muscle strength, proprioception and arm length on veterinary students' bovine pregnancy diagnosis skills. Annandale, Holm, DE, Fosgate, GT, Bok, HGJ. Currently under review in a veterinary scientific journal.

2 A novel approach to improve undergraduate veterinary training in bovine trans-rectal palpation (TRP) and pregnancy diagnosis (PD) skills. Annandale, A, Holm, DE, Fosgate, GT, Eksteen, C, Bok, HGJ, (2016). In VetEd Symposium. Glasgow, Scotland, 7-8 July. Conference proceedings.

3 Identification of arm muscles used during bovine trans-rectal palpations using electromyography. Annandale, A, Eksteen, C, Holm, DE. To be submitted for review in a veterinary scientific journal.

## **The Mini-Cow Palpation Box: a teaching tip**

### **Poster**

Authors: Annett Annandale DrMedVet, MSc, DACT

Dietmar Erik Holm MSc

Institution: University of Pretoria

### **Abstract:**

Results of a recent study showed that bovine trans-rectal palpation (TRP) objective structured clinical examination (OSCE) scores can predict students' future pregnancy diagnosis (PD) accuracy.<sup>1</sup> Students with "confident palpation skills" on OSCE were more likely to correctly identify non-pregnant cows while students' ability to estimate ovarian size was positively correlated to PD sensitivity (ability to correctly identify pregnant cows). These findings support French et al. who stated that asking students to give quantitative measurements of reproductive organs during bovine TRPs had a positive effect on student TRP training.<sup>2</sup> A locally manufactured "Mini Cow Palpation Box", similar to a palpation box described previously,<sup>2</sup> has been added to the veterinary skills laboratory TRP training sessions to supplement the Breed'nBetsy and Haptic cow simulator training prior to students' first live cow TRPs. It uses 3-dimensional objects varying in size from 2 to 8 cm. All objects are labelled with the correct length, width and height measurements in cm. The objects are placed in a plastic box with hand entrance holes to ensure palpation and size estimation of objects without visualization. A ruler to measure finger width and instructions on how to use the palpation box are attached to the box. The additional teaching tool is hoped to improve students' fine motor, TRP and PD skills before their first live cow palpations. Students and faculty staff perceived the palpation box as a beneficial training tool and a valuable addition to the TRP skills laboratory training circuit.

### **References:**

1 Annandale A, Fosgate GT, Bok HGJ, Holm DE. Ability of a bovine trans-rectal palpation OSCE to predict veterinary students' pregnancy diagnosis accuracy. Currently under review in a Scientific Veterinary Journal.

2 French HM, Dascanio JJ, Gilbert GE, Robinson JQ. Bovine reproductive palpation training: does the cow make a difference? *Journal of Veterinary Medical Education* 45(2):219-23, 2018.

## **Not just a pretty snout- a piglet model for handling, intramuscular injection and tail docking**

### **Poster**

Authors: Annett Annandale<sup>1</sup> DrMedVet, MSc, DACT

Lana Botha<sup>1</sup>

Liezl Kok<sup>2</sup>

Institutions: 1 University of Pretoria

2 Anatomoulds (Pty) Ltd

### **Abstract:**

A decrease in teaching pigs and the discontinuation of the sow breeding program at our facility limited student access to piglet handling (catching and restraint), intramuscular injection and tail docking procedures. To increase exposure and enable repeated practice opportunities, a soft toy piglet was modified using a zipper, silicone pads, a 500g bean bag, a silicone anus and liquorice to create the model.

The zipper was sewn into the abdominal side for ventral access and a silicone ring into the anal region. A small silicone pad was placed into the snout, underneath the piglet sleeve. A big silicone pad was placed into the neck and trunk section. The 500g bean bag was added to the abdomen for additional weight and the original soft toy stuffing was readjusted. The liquorice string is placed through the silicone anus, can be “docked” and is easily set up for the next student by pulling on the liquorice stump. An additional feature is a screaming piglet audio clip that can be activated when the piglet is turned upside down. The model has been implemented for veterinary student use in the Veterinary Ethology module in 2017. Two hundred-and-twenty second year students performed all three procedures during supervised practical sessions and were examined on the model during the module exit examination. In 2018, in addition to second-year veterinary students, the model is also used for first-year veterinary nursing students (n=55) for piglet handling and injections. Teaching staff and student feedback is overwhelmingly positive.

## Using pressure sensor technology to improve bovine trans-rectal palpation training: Development of the “pressure sensor glove”

### Poster

Authors: Annett Annandale, DrMedVet, MSc, DACT

Sean Kruger, MCom

Isak van der Walt

Ruan Heyns

Dietmar E Holm MSc

Institution: University of Pretoria

### Abstract:

Pregnancy diagnosis (PD) by trans-rectal palpation (TRP) in cows is an important competency for veterinarians,<sup>1</sup> due to its economic importance and wide use in practice.<sup>2</sup> However, training requires extensive exposure in TRP of live cows to ensure competency.<sup>3, 4</sup> It is a complex skill to learn and one possible reason for students’ initial lower palpation accuracy is their uncertainty about how much pressure/ force to use during TRPs. To investigate this, a “pressure sensor glove” was developed. The glove makes use of Force Sensitive Resistors (FSR) which can register weights from as little as 18 grams to gather necessary data.<sup>5, 6</sup> These sensors can be calibrated according to users’ requirements. For this project, the FSRs (Ø13mm, 0.1mm thickness) were calibrated to read up to 4kg of force and attached to five silicone rings that can be placed on individual fingertips. An ESP32 microcontroller measures data from the sensors, which is then transmitted via integrated wireless technology to a laptop where it is stored as an excel file for easy rendering and cleanup. Data collected with the FSRs during TRPs done by experienced production animal veterinarians will be used to program the sensors with set boundaries indicating to students how much pressure they should ideally apply during TRPs. A light signal and a “buzzer” will be used as a feedback mechanism indicating to students when using too little or too much pressure. It is anticipated that the programed FSRs will be a useful aid in students’ initial TRP learning experience.

### References:

- 1 Luby CD, McIntyre K, Jelinski MD. Skills required of dairy veterinarians in western Canada: A survey of practicing veterinarians. *The Canadian Veterinary Journal* 54(3):267-70, 2013.
- 2 Morin DE, Constable PD, Troutt HF, Johnson AL. Individual animal medicine and animal production skills expected of entry-level veterinarians in bovine practice. *Journal of the American Veterinary Medical Association* 221(7):959-68, 2002.
- 3 Bossaert P, Leterme L, Caluwaerts T, Cools S, Hostens M, Kolkman I, de Kruif A. Teaching transrectal palpation of the internal genital organs in cattle. *Journal of Veterinary Medical Education* 36:451-60, 2009.
- 4 Annandale A, Annandale CH, Fosgate GT, Holm DE. Training method and other factors affecting student accuracy in bovine pregnancy diagnosis. *Journal of Veterinary Medical Education* 45(2):224-31, 2018.

- 5 Jian M, Xia K, Wang Q, Yin Z, Wang H, Wang C, Xie H, Zhang M, Zhang Y. Flexible and Highly Sensitive Pressure Sensors Based on Bionic Hierarchical Structures. *Advanced Functional Materials* 27(9), 2017.
- 6 Covarrubias M, Bordegoni M, Cugini U. Force sensitive handles and capacitive touch sensor for driving a flexible haptic-based immersive system. *Sensors (Switzerland)* 13(10):13487-508, 2013.



## **Development of a low-cost, low-fidelity equine castration model**

### **Poster**

Authors: Kate Ryman Fiebrandt PhD

Katie Sheats DVM, PhD, DACVIM

Megan Burke DVM, DACVS

Callie Fogle DVM, DACVS

Gail Druley

Institution: North Carolina State University

### **Abstract:**

Castration is one of the most common field procedures that equine veterinarians perform; however there is no standardized method for teaching or assessing this skill in veterinary education. Many veterinary programs allow students to observe and/or practice live-horse castration; however, these opportunities are often variable or limited in frequency. To address these challenges, we set out to develop a low-cost, low-fidelity model that would standardize instruction and allow students to repeatedly practice specific elements of a closed equine castration in a low stress environment. We chose the closed technique because our students are assessed on their performance of a live horse field castration using this method during their 4th year clinical rotations. This assessment satisfies Entrustable Professional Activity (EPA) 6 (AAVMC CBVE 2018) for our equine-focused students.

To our knowledge, there are no equine castration models commercially available or described in the veterinary medical education literature. All of the materials used in the development of this model are readily available, and students are provided with additional pieces and instructions for replacing the non-reusable components. We assert this model will be a valuable tool for helping our students develop competency in the EPA of equine field castration and could be easily adopted into any veterinary curriculum.

AAVMC Working Group on Competency-Based Veterinary Education, Molgaard, L.K., Hodgson, J.L., Bok, H.G.J., Chaney, K.P., Ilkiw, J.E., Matthew, S.M., May, S.A., Read, E.K., Rush, B.R., Salisbury, S.K. (2018) Competency-Based Veterinary Education: Part 2 - Entrustable Professional Activities. Washington, DC: Association of American Veterinary Medical Colleges.

## **Determination of the Effectiveness of an Equine Rectal Palpation Simulation Model for Improving the Confidence of Veterinary Students when Palpating Live Horses**

### **Poster**

Authors: Caroline Johnson

Karen McCormick DVM, DACVIM

Megan McCracken DVM, MS, DACVS

David Anderson DVM, PhD, DACVS

Institution: University of Tennessee

### **Abstract:**

The goals of our veterinary simulation program are to provide opportunities for students to practice clinical veterinary skills, improve students' confidence and competence to perform said skills prior to performing them on live animals, decrease pain and distress experienced by live animals during procedures, and decrease the number of live animals required for students to competently perform procedures. In this study, we aimed to test the hypothesis that palpating an equine simulation model will improve veterinary students' confidence when performing a subsequent rectal palpation in a live horse. Thirty-two first through third year veterinary students were randomly assigned to one of two groups. All students viewed a short didactic presentation first. Group A then palpated the live horse first followed by the simulation horse. Group B palpated the simulation horse prior to the live horse. Following each stage of the study, students answered written survey questions regarding perceived confidence, preparedness, and understanding of rectal palpation in the horse. A clinician observed students during palpation of the simulation model and scored each student on his/her ability to correctly palpate and identify structures rectally. A second blinded clinician scored each student in regards to his/her confidence during rectal palpation of the live horse. Results are currently under review.

## **Development of an ovine Buhner suture model**

### **Poster**

Authors: Liezl Kok<sup>1</sup>

Annett Annandale<sup>2</sup> DrMedVet, MSc, DACT

Institutions: 1 Anatomoulds (Pty) Ltd

2 University of Pretoria

#### **Abstract:**

The Buhner stitch technique for subcutaneous, perivulvar suture is used to prevent vaginal or uterine re-prolapses during the peri-partum period. It is a procedure veterinarians in production animal practice perform frequently. Therefore it is an important technique veterinary students should be able to practice. Since student exposure to ovine or bovine patients with vaginal or uterine prolapses is limited, a Buhner suture model was developed through a collaboration of the University of Pretoria and Anatomoulds (Pty)Ltd. The 210x148.5mm model consists of a silicone perineal area with an anus and a vulva. High density foam representing subcutaneous tissue is covered with silicone skin and placed in a u-tube anodized aluminum frame that is mounted on a wooden block. The frame can be attached to table tops for an upright perineum position during the student practice sessions. Use of a Gerlach's prolapse needle and umbilical tape enables students to practice the procedure with the correct instruments. The model is reusable. The silicone part can easily be replaced after approximately 15 uses. The model has been implemented for use within the skills laboratory's production animal circuit which consists of a variety of bovine and ovine models. Final year clinic students are exposed to it during their production animal clinic rotation. The model is commercially available from Anatomoulds (Pty) Ltd.

## **Development and Construction of a Multi-use Bovine Tail Model Poster**

Authors: Megan Preston

Julie Williamson DVM, MSc, AFAMEE

Stacy Anderson DVM, MVSc, PhD, DACVS-LA

Institution: Lincoln Memorial University

### **Abstract:**

Veterinary educators use models to simulate clinical skills common in practice to build student competence and confidence, to facilitate assessment of students and provision of feedback, and to protect animal welfare. Coccygeal venipunctures and caudal epidurals are skills expected of entry-level veterinarians in bovine practice (Morin, 2002). We sought to create a multi-use bovine tail model to simulate coccygeal venipuncture and caudal epidural anesthesia of cattle.

Vertebral structures were constructed of 3.8 cm wooden railing, with key-hole routed ventral groove, 1.3 cm drilled central hole, and cut into 2.5 cm sections. Sections were assembled on 1.3 cm latex tubing representing epidural space with alternating 1.3 cm silicone rings representing intervertebral discs. 0.5 cm latex tubing representing coccygeal vein was threaded through the ventral routed groove. This was covered in silicone rubber (Dragon Skin®) and secured on a wooded platform representing the sacrum. A vacuum was created in the epidural space by applying negative pressure to a 20 ml syringe. The model's versions were tested during its development by several LMU-CVM large animal clinical faculty and an anesthesiologist until an acceptable design was reached.

The final design was approved by the faculty. The model was designed to allow 0.5 cm latex tubing replacement for repeated use without disassembly. Wooden infrastructure and thick silicone covering allows durability and reuse. Total cost is estimated to be \$25.00 per model. Yearly maintenance cost of replacing latex tubing is estimated to be \$11.00 per model.

The model facilitates a safe, standardized learning alternative that students can use to become familiar with two common bovine practices encountered in the field. Future studies could develop rubrics for scoring these tasks and collect validation data for its use with veterinary students.

## **Performance, comfort level, and confidence in novice veterinary students after training on a bovine paravertebral nerve block model**

### **Poster**

Authors: Jennifer N. Roberts DVM, DACT

Paulo A.M. Carneiro DVM, MSc

Andrew G. Huff PhD, MS

Institution: Michigan State University

### **Abstract:**

The proximal paravertebral block (PPB) provides anesthesia of the paralumbar fossa during standing surgery in cattle and is considered a core skill of bovine veterinary practice. However, opportunities to perform this procedure in veterinary curricula are limited, potentially increasing stress and anxiety for novice veterinary students and impairing their ability to competently perform this skill on a live animal. This study evaluated the impact of a model developed for teaching PPB on performance, knowledge acquisition, confidence, and anxiety in novice veterinary students. Two experiments were conducted to evaluate the student learning experience. Students were assigned to didactic training method (DTM) or didactic training with model (MOD) groups. Surveys were used to assess the student learning experience using 3 indices: Comfort, Confidence, and Recall. After training, students were assessed by a trained evaluator while performing PPB (Exp 1) or identifying anatomic landmarks (Exp 2) on a cow. Both methods of training improved students' knowledge recall over the study period. Model training resulted in increased confidence and comfort levels in novice veterinary students compared to didactic instruction. Previous experience had no effect on student performance during assessment. Students indicated that instructor feedback during live animal procedures and identification of anatomy on a live animal would enhance their educational experience. While didactic teaching methods are suitable for basic knowledge acquisition, integration of models to teach the paravertebral nerve block resulted in increased confidence and comfort levels in novice veterinary students.

## Development of an interactive iBook for Canine Musculoskeletal Anatomy Dissection

### Poster

Authors: Molly Addison

Shayla Saulsbury

Leigha Wright

Sarah Kovarik

Loni Albrecht

Andrea Wicks

Joshua Rowe DVM, PhD

Jamie Perkins DVM

Institution: Lincoln Memorial University

### Abstract:

In recent years, many veterinary anatomy students have demonstrated difficulty when translating written dissection instructions into action when utilizing traditional dissection resources. That said, contemporary learners are often particularly familiar and adept at utilizing technology to learn new skills. In an effort to meet these needs, Lincoln Memorial University - College of Veterinary Medicine (LMU-CVM) hopes to capitalize on the preferences and skill sets of modern students to address student concerns and observed deficiencies with traditional resources. Accordingly, interactive educational resources, specifically downloadable, non-web-based modules, have been created to reinforce students' training. These modules are being created as EBooks, developed for the Apple iBooks platform (iBooks). The iBooks can be downloaded onto various Apple products such as tablets, phones, and laptops, allowing users to select a device of their choosing and further increase their access to instructional materials. The iBooks have been developed to include videos and interactive components, in addition to text. They will function like an application, or app, providing easy-to-use features and include tools for veterinary instructors who require grading and screen-sharing features in the classroom and laboratory. Users will be able to customize their interface in order to suit their study preferences and facilitate multiple avenues for learning. As an initial step toward our ultimate goal, we are developing an iBook for canine musculoskeletal dissection, and we hypothesize that students will benefit from the use of this iBook and will demonstrate a preference for electronic media to supplement and guide their learning.

## **Augmented reality canine heart**

### **Poster**

Authors: Taimur Alavi<sup>1</sup> DVM

Paul Pion<sup>2</sup> DVM, DACVIM

Institutions: 1 IVALA<sup>®</sup>

2 Veterinary Information Network

#### **Abstract:**

IVALA<sup>®</sup>, a VIN partner company, creates interactive 3D learning content for the veterinary community. IVALA<sup>®</sup> content is made available via a learners web browser using the WebGL/html5 technology stack. A recent study on the impact of this content at Ross University demonstrated that first semester RUSVM students who supplemented their anatomic learning with the IVALA<sup>®</sup> content (n=56) performed significantly ( $p = 0.003$ ) higher on examination questions where the information could be derived from the 3D content compared to students that did not (n = 123).

IVALA<sup>®</sup> is currently exploring other media such as augmented reality (AR). Our first project on the canine heart is being built using the Vuforia SDK & the Unity game engine for use on mobile and tablet devices that support ARkit/ARcore. It will allow learners to position and manipulate the heart in 3D space, interact with surface topology and interact with interior structures. We believe this technology will improve anatomical understanding and translate to improved confidence in clinical procedures involving the heart, such as echocardiography. We also believe AR has unique benefits over browser-based learning:

1. viewing objects at real-world scale
2. viewing virtual objects together with real-world objects (such as overlaying the heart on a real patient)
3. being more collaborative than the current WebGL/html5 content (multiple users can view and interact with the same virtual object via different devices)

## **Game Based Simulation Development of K9 Tactical Emergency Responder Program (Canine Tactical Combat Casualty Care and Canine Tactical Emergency Casualty Care Initiatives)**

### **Poster**

Authors: Jo-Anne Brenner<sup>1</sup>

Patrick Welch<sup>2</sup> DVM, MBA, DACVO

Sid Banerjee<sup>3</sup>

Jeff Johnson<sup>2</sup> M.Ed.

Institutions: 1 K9 Medic

2 Ethos Veterinary Health and VetBloom

3 Indusgeeks

### **Abstract:**

As Working K9s continue to Lead the Way serving and protecting others in austere environments, the need for medical training to support these K9s continues to intensify.

The goal of this presentation will be to share the background, development and implementation of a fully immersive, game-based simulation that is used as a training tool in the instruction of K9 Tactical Emergency Responder Programs (including Canine Tactical Combat Casualty Care and K9 Tactical Emergency Casualty Care). This training addresses the needs of both military teams that support MWDs/MPCs (Military Working Dogs / Multipurpose Canines), as well as federal, state and local law enforcement teams supporting a broad range of Working K9s. The simulation tool provides K9 handlers, medics, tactical medics and other support personnel with the skills needed to prioritize assessments and emergency intervention, focusing on preventable causes of death within the tactical context. The goal of this simulation is to provide real world environments and situations where human medical practitioners can learn to transfer their existing medical skills to the canine patient, K9 handlers can expand their medical awareness and skills, and veterinary professionals can learn how to apply their skills in a pre-hospital austere environment.

We'll provide an overview of how the underlying problem and training need was defined for multiple user groups, the iterative technical development process, the facilitated interactions between the instructional designers, developers and medical subject matter experts and the plans to capture and analyze data from the simulation to drive future development.



## **Computer Assisted Learning: Assessment of the veterinary virtual anatomy education software IVALA™**

### **Poster**

Authors: W. Brady Little<sup>1</sup> DVM, MSc

Elpida Artemiou<sup>1</sup> BSc, MSc, PhD

Anne Conan<sup>1</sup> DVM, PhD

Cathryn Sparks<sup>2</sup> PhD, MSc

Institutions: 1 Ross University School of Veterinary Medicine

2 Kansas State University

### **Abstract:**

Although cadaveric dissection has historically been the cornerstone of anatomical education, it comes at the cost of some emotional, moral, safety, and environmental concerns. Computer assisted learning [CAL] programs are an increasingly common solution to these issues; however, research regarding the efficacy of high fidelity simulation is limited. The traditional first semester veterinary gross anatomy course curriculum at Ross University School of Veterinary Medicine [RUSVM] was supplemented with a web based virtual anatomy program, IVALA™. The purpose of this study was to assess the relationship between supplementary use of the IVALA™ program and student examination scores, as well as to measure student perception surrounding IVALA™. IVALA™ uses an interactive virtual canine specimen that enables students to identify, move, rotate, magnify, and remove individual anatomic structures and provides a text description of each selected anatomic point. The forty-six first semester RUSVM students who supplemented their anatomic learning with the IVALA™ program performed significantly higher on examinations compared to students (n=47) that did not (p=0.003). A well-defined study technique in which students systematically appreciated the anatomic size, shape, origin, insertion, and action of each structure in coordination with the IVALA™ program was significantly advantageous (p= 0.03). Students' overall perception toward IVALA™ was enjoyable (mean=3.8 out of a 5 point Likert scale) and beneficial to their knowledge of anatomy (mean=3.7); however, students did not support replacing cadaveric dissection with CAL (mean=2.1). CAL can effectively supplement learning outcomes for veterinary anatomy.

## **Second Life Virtual Learning Environment Enhances Nursing and Veterinary Student Inter-Professional Development**

### **Poster**

Authors: Mary Mauldin Pereira<sup>1</sup> DVM

Elpida Artemiou<sup>1</sup> BSc, MSc, PhD, AFAMEE

Debra Duncan<sup>2</sup> MA

Paul Woodcock<sup>2</sup>

Dee McGonigle<sup>2</sup> PhD, RN, FAAN, CNE

Institutions: 1 Ross University School of Veterinary Medicine

2 Chamberlain University

### **Abstract:**

A species spanning approach to healthcare that represents knowledge from veterinary and human medicine is termed zoobiquity. For example, non- insulin dependent diabetes mellitus is an acknowledged endocrine disorder in both cats and humans. Exposing students to an educational virtual interaction involving a diabetic human and pet can offer a bridge of knowledge, which connects species similarities and differences. Second Life is a fully interactive virtual learning environment that offers three-dimensional applications where users are able to obtain a simulated experience in an immersive social environment. Here, we describe an inter-professional collaboration between Chamberlain College of Nursing (CCN) and Ross University School of Veterinary Medicine (RUSVM) to develop a Second Life simulation offering essential information surrounding non-insulin dependent diabetes mellitus in cats and humans. The simulation would allow Second Life users to observe a diabetic pet owner and her diabetic cat within their household. An educational script reviewed by healthcare and veterinary experts would be delivered within the simulation all while capturing the environment, diet, activity, and daily routine. The simulation would last approximately 10 minutes and engage nursing and veterinary students in working through a clinical case. The virtual experience can enrich classroom learning and discussions. Many different diseases are shared between human and pet populations. Outcomes will provide literature as well as future experiential opportunities surrounding zoobiquity and virtual approaches to educate pet owners.

## Assessing the impact of VIN's Computer Assisted Learning Tools on student performance

### Poster

Authors: Paul D. Pion<sup>1</sup> DVM, DACVIM,  
Taimur Alavi<sup>2</sup> DVM  
Márton Balogh<sup>1</sup> DVM

Institutions 1 Veterinary Information Network

2 IVALA®

#### Abstract:

The Veterinary Information Network (VIN) has created Computer Assisted Learning tools (CAL) with the aim of helping students in their studies and easing their transition into veterinary practice. Two of those interactive tools are the 3D Anatomy (created by IVALA®) and the VIN Virtual Clinic (VVC). Access to VIN and these tools is free to all veterinary students and faculty.

Several studies have been conducted to evaluate the impact of these tools on student performance. One published study<sup>1</sup> documented statistically significant improvement in student performance on anatomy exam questions for which the information could be learned from the 3D Anatomy learning modules. A second study (in press) evaluated the response to VVC oncology cases. Student feedback drove improvements in subsequent years. In response to the question "The virtual clinic environment seemed realistic and familiar to me," 59% of respondents agreed in 2014, versus 74% in 2015 ( $p = 0.04$ ). A trend also existed towards more students feeling successful at diagnosing and treating their patients in 2015 (95%) compared to 85% in 2014.

Two, unpublished studies related to the VVC were conducted at the University of Veterinary Medicine, Budapest, and University of Veterinary Medicine, Hannover. Participating student dropoff, and low sample sizes were study limitations. A third study is being planned with larger sample sizes. The aim of this poster is to increase awareness of these studies, and to call for participants in further evaluation of the impact of these teaching tools.

## Healthy Animals/Safe Food: A Comprehensive Web-based Educational Tool to Enhance Food Safety Training of Veterinary Medical Students

### Poster

Authors: Ann M. Rashmir<sup>1</sup> DVM, MS, DACVS

Robert Malinowski<sup>1</sup> DVM, PhD

Jill Brester<sup>1</sup> DVM

Jennifer N. Roberts<sup>1</sup> DVM, DACT

Matt R. Raven<sup>1</sup> PhD

Robert L. Linford<sup>2</sup> DVM, PhD, ACVS

Heath King<sup>2</sup> DVM

Hart Bailey<sup>2</sup> MS, PhD

Alex Ramirez<sup>3</sup> DVM, MPH, PhD, DACVPM

Terry Engelken<sup>3</sup> DVM, MS

Institutions 1 Michigan State University

2 Mississippi State University

3 Iowa State University

### Abstract:

Current challenges in training food systems veterinarians include diminishing caseloads at veterinary colleges, the increasing complexity of our food supply and the need for Spanish communication skills. Therefore, a comprehensive, web-based food safety platform called “Farm to Fork” was developed to improve veterinary students’: 1) pre- and post- harvest food safety knowledge 2) Spanish language usage 3) mental motivation and self-efficacy regarding food safety in hopes of improving educational resources.

Educators teaching food safety, food animal medicine and Spanish language skills that pertain to large animal medicine developed content for “Farm to Fork”. Computer applications were developed for these materials which allowed learners to receive immediate feedback. The resulting product was incorporated into clinical instruction at three Colleges of Veterinary Medicine in the USA. The students that used “Farm to Fork” (n= 262) were compared to a cohort of students from the previous year (n=283) that did not have access to the program. Pre- and post- testing was used to evaluate the impact of “Farm to Fork” on students’ food safety knowledge and motivation as well as self-efficacy regarding food safety and the use of the Spanish language.

A quasi-experimental non-equivalent control group design was used to evaluate the data. When compared to the control group, the students using “Farm to Fork” scored higher on the food animal knowledge based test and use of Spanish language (p<0.001). Self efficacy scores were improved (P<0.05) at one of the universities using “Farm to Fork”.

# Effect of a high intensity one-week training program on the bovine trans-rectal palpation skills of veterinary students

## Poster

Authors: Annett Annandale DrMedVet, MSc, DACT

Catherine E May BVSc, DACT

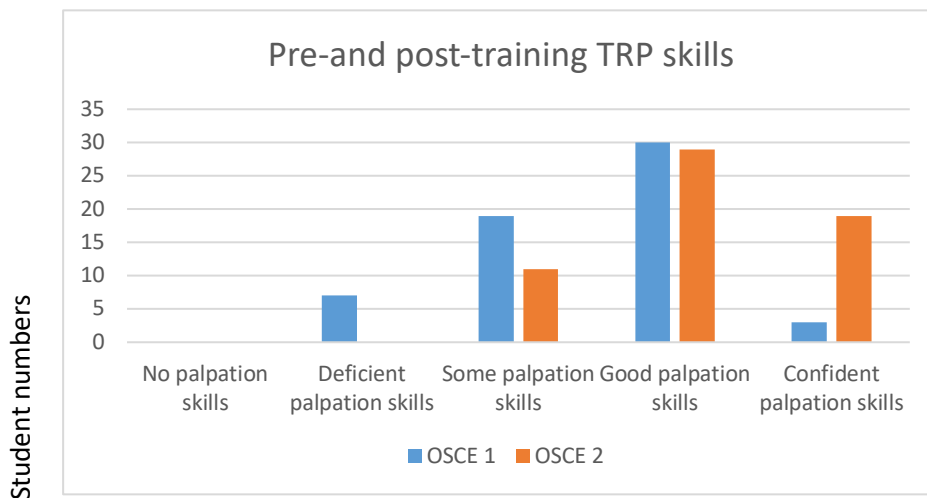
Martin L van der Leek BVSc, MS

Dietmar E Holm MSc

Institution: University of Pretoria

Pregnancy diagnosis (PD) using trans-rectal palpation (TRP) is a frequently performed procedure in bovine practice,<sup>1</sup> and an important competency for veterinary graduates.<sup>2</sup> Despite the known importance of live cow training, opportunities are limited by welfare issues and costs.<sup>3-5</sup> We evaluated a high intensity one-week training program for final year (of a six year program) veterinary students (n=59) consisting of skills laboratory training on Breed'nBetsy and Haptic cowb simulators, abattoir organs (uteri and fetuses at different pregnancy stages), various theory materials and live cow PDs supervised by experienced large animal practitioners (mean 159; SD 134 PDs per student). Palpation skills were assessed before and after training using a validated TRP OSCE in non-pregnant cows and were rated as none, deficient, some, good and confident palpation skills (based on a score of 0-1, 2-3, 4-6, 7-9 or 10-11 from a maximum of 11, respectively).<sup>6</sup> Students' scores improved from the first to the second OSCE (mean; SD 6.5; 2.0 and 8.4; 1.9 respectively,  $P < 0.01$ ), mostly as a result of improved abilities to indicate the symmetry (or asymmetry) of the uterine horns and the presence (or absence) of a corpus luteum on the right ovary ( $P < 0.01$  and  $P = 0.01$ , respectively). OSCE scores improved for 7/7, 16/19 and 19/30 students with deficient, some and good initial TRP skills respectively (Figure 1). It is concluded that a high intensity TRP training program can significantly improve TRP skills of final year veterinary students.

Figure 1



## References:

- 1 Morin DE, Constable PD, Troutt HF, Johnson AL. Individual animal medicine and animal production skills expected of entry-level veterinarians in bovine practice. *Journal of the American Veterinary Medical Association* 221(7):959-68, 2002.
- 2 Luby CD, McIntyre K, Jelinski MD. Skills required of dairy veterinarians in western Canada: A survey of practicing veterinarians. *The Canadian Veterinary Journal* 54(3):267-70, 2013.
- 3 Bossaert P, Leterme L, Caluwaerts T, Cools S, Hostens M, Kolkman I, de Kruif A. Teaching transrectal palpation of the internal genital organs in cattle. *Journal of Veterinary Medical Education* 36:451-60, 2009.
- 4 French HM, Dascanio JJ, Gilbert GE, Robinson JQ. Bovine reproductive palpation training: does the cow make a difference? *Journal of Veterinary Medical Education* 45(2):219-23, 2018.
- 5 Annandale A, Annandale CH, Fosgate GT, Holm DE. Training method and other factors affecting student accuracy in bovine pregnancy diagnosis. *Journal of Veterinary Medical Education* 45(2):224-31, 2018.
- 6 Annandale A, Fosgate GT, Bok HGJ, Holm DE. Ability of a bovine trans-rectal palpation OSCE to predict veterinary students' pregnancy diagnosis accuracy. Currently under review in a *Scientific Veterinary Journal*.

**A teaching tip: implementation of “species circuits” in the veterinary skills laboratory**  
**Poster**

Authors: Annett Annandale DrMedVet, MSc, DACT  
Liani Kitshoff, DipVet Nurse  
Elrien Scheepers BVSc, MSc

Institution: University of Pretoria

**Abstract:**

The appointment of a full-time teaching assistant enabled the veterinary skills laboratory to offer additional practical sessions. One of the training additions are “species circuits” for small animals (SA), equines (EQ) and production animals (PA) which consist of a variety of models/stations to expose final year students to a range of species related procedures. The aim is to enhance the students’ clinic learning experience through supervised practice opportunities for specific skills. The advantages are that all students can practice certain procedures independent of patient availability and that the procedures practiced relate to the clinic rotation the students are on at that time.

The circuits consist of the following stations/models:

SA medicine circuit: endotracheal intubation, IV catheter placement, blood sampling, blood tube identification, clinical pathology station, heart-and lungsound simulator, cystocentesis (blind and U/S guided), urethral catheter placement in the female dog, prostate palpation, nasogastric tube placement, thoracocentesis and skin biopsy.

SA surgery circuit: canine ovariohysterectomy model, gowning and gloving, suturing, scrubbing, draping, surgical dexterity and instrument identification.

EQ circuit: IV blood sampling, IV catheter placement, IM injection, abdominocentesis, using a twitch, tail bandaging, teeth models for ageing and haptic horse.

PA circuit: bovine IV and IM injection, bovine and ovine blood sampling, stomach tube placement and fluid administration into the rumen, bovine skin and hollow organ suturing, some aspects of bull breeding soundness examination (sheath scrape, scrotal palpation, scrotal circumference measurement, rectal examination), ovine body condition scoring, ovine handling, insemination and intravaginal sponge placement, and haptic cow.

## **Uptake and feedback on a series of clinical skills instruction booklets made freely available under a Creative Commons License**

### **Poster**

Authors: Sarah Baillie BSc, BVSc, RCVS Cert

Rachel Christopher RVT

Alison Catterall RVT

Sam Brown RVT

Institution: University of Bristol

### **Abstract:**

Clinical skills instruction booklets have been developed by the Clinical Skills Lab team (staff and recent graduates) at Bristol Veterinary School. A standard PowerPoint template was designed with sections: title page, equipment list, considerations for the station, step-by-step guide to perform the skill (each step has a photo and a written description), resetting the station (text instructions and a 'what tidy looks like' photo), and 'I wish I'd known...' (tips from recent graduates). Over a five-year period nearly 150 booklets have been produced and cover a wide range of skills and techniques from animal handling to clinical skills and procedures. The booklets are used in every year of the veterinary curriculum at Bristol in taught practicals and during open-access self-directed learning.

In October 2017 booklets were made freely available online<sup>(1)</sup> under a Creative Commons License and grouped under headings e.g. Dog & Cat, Bandaging, Surgical Skills, Laboratory Techniques. Webpage statistics indicate that the site is now in the 'Top 10' of the School's pages with visits having risen to over 150/week, just over half are new visitors and average visit time is about 2 minutes. Follow up discussions with three individuals involved in clinical skills teaching who have used the booklets were positive and comments included 'they have saved us so much time and stopped us re-inventing the wheel!'; 'I really like the booklet layout'; 'great idea to include tidying up!'. The CSL team will continue to add further booklets as and when they become available.

1.<http://www.bristol.ac.uk/vetscience/research/comparative-clinical/veterinary-education/clinical-skills-booklets/>



## **The effect of instructional format (video versus handout) on student outcome during a competency-based assessment of canine endotracheal intubation in the simulation laboratory**

### **Poster**

Authors: Kevin Cosford BSc, DVM, MVetSc, DACVIM-SAIM

Barbara Ambros DrMedVet, MVetSc, DECVAA

Shannon Beazley-Burns BSc, DVM, DACVAA

Carolyn Cartwright RVT

Institution: Western College of Veterinary Medicine, University of Saskatchewan

### **Abstract:**

**Background:** Incorporating simulation-based student assessment in the veterinary curriculum should be guided by evidence-based research.

**Hypothesis:** Providing instructions in either a video or handout format prior to competency-based assessments may influence learner outcome.

**Materials and Methods:** The IRB at the University of Saskatchewan granted exemption of formal approval for the following study (BEH #17-270). Forty-five (57%) third-year veterinary students voluntarily participated in a prospective, randomized, double-blinded (student and raters) competency-based assessment of canine endotracheal intubation in the simulation laboratory comparing video (n=23) to handout (n=22). Three raters evaluated each student using a 20-item 5-point global rating scale (GRS) assessment tool anchored with descriptors at 1,3 and 5. Statistical analysis (Shapiro-Wilk Normality Test, Mann-Whitney U test, and Kruskal-Wallis with Dunn's multiple comparisons test) was performed with GraphPadPrism7. Statistical significance was set at  $P < 0.05^*$ .

**Results:** The composite scores were significantly ( $p < 0.05^*$ ) higher in the video (median, 94; 25% -75% percentile, 90-98; min-max, 79-100) compared to the handout group (median, 88; 25% -75% percentile, 83-95; min-max, 73-100). Of the 20 individual skills assessed, 3 had significantly higher scores in the video compared to handout groups: placement of tie to the adaptor-endotracheal tube complex ( $p < 0.05^*$ ); using the anesthetic machine ( $p < 0.01^{**}$ ); and pop-off valve management ( $p < 0.001^{***}$ ).

**Conclusions:** Video instructions prior to a competency-based assessment of canine endotracheal intubation in the simulation laboratory may be associated with better student outcomes in comparison to a written handout. Further research is required to confirm these findings and to determine the underlying factors responsible.

## Teaching and Practicing Clinical Skills: Evidence-Based Recommendations

### Poster

Authors: Erin Malone DVM, PhD

Sue Spence DVM

Institution: University of Minnesota

#### Abstract:

The research in motor skills learning is expanding rapidly across disciplines, particularly as we discover more about the related physical and functional changes in brain structure. Many of the current findings are likely to be directly applicable to veterinary medicine:

- Practicing one skill/day for about an hour is ideal. The brain consolidates (and improves on) what is emphasized at the end. If more than one skill is practiced in a 4-6 hour window, the brain consolidates the last skill and essentially erases the first skill(s). Similarly, if practice goes too long and the performance gets sloppy, the brain reinforces sloppy instead of good.
- Videos are more memorable than lectures and, if detailed and accurate, can be used for mental rehearsal between training sessions as well as for pre-laboratory instruction.
- The maximum time between practice sessions is likely two weeks, due to the turnover in hippocampal cells. After proficiency is reached, practice can be extended to six months or longer, depending on the skill.
- The best instructors are those that have most recently learned the skill.
- Practicing in pairs is ideal.
- Supervision is essential for both training and practice sessions. The brain consolidates incorrect actions just as well as correct actions. Motor skills are retained very well, whether correct or incorrect. Learners are poor at self-evaluation. Ensure they know what they are doing right and what they are doing wrong.
- Twenty minutes of moderate aerobic exercise or thirty minutes of deep nostril breathing within two hours of practice improves brain consolidation.

## **The impact of curriculum revision on the critical thinking dispositions and skills of veterinary students entering into clinical rotations**

### **Poster**

Authors: Harold C. McKenzie III<sup>1</sup> DVM, MS, PGDip VetEd, FHEA, DACVIM

Claire Vinten<sup>2</sup> BVMedSci BVM BVS PhD FHEA MRCVS

Institutions 1 Virginia Maryland College of Veterinary Medicine

2 Royal Veterinary College

### **Abstract:**

Critical thinking is central to decision-making in the clinical setting, however a curricular review at the Virginia Maryland College of Veterinary Medicine revealed limited efforts to facilitate development of critical thinking in the didactic curriculum. Several approaches to address this concern, including case-based small-group integrative sessions, were implemented in a curriculum revision enacted in 2016. This curricular revision also included early clinical rotations, starting immediately after the second year of didactic instruction, rather than after the third. This study was designed to assess the critical thinking skills and dispositions of students from the two curricula prior to their simultaneous entry into clinical rotations. Participating students completed the California Critical Thinking Skills Test with Numeracy (CCTST-N) and the California Critical Thinking Dispositions Inventory (CCTDI). Participants included 28 of 125 students in the Class of 2019, and 37 of 126 students in the Class of 2020. There was no significant difference between classes in the overall or sub-category CCTST-N scores, or in the overall or sub-category CCTDI scores. The influences of student gender and age were examined in the pooled data. Male students had significantly higher scores in the analysis ( $p=0.04$ ) and numeracy ( $p=0.01$ ) CCTST-N subcategories and the truth-seeking ( $p=0.01$ ) CCTDI subcategory. Older students ( $\geq 30$  vs 20-29) had significantly higher scores in the explanation ( $p=0.04$ ) CCTST-N subcategory and the truth-seeking ( $p=0.0006$ ) CCTDI subcategory. These results indicate that students from both curricula were at an equivalent stage of critical thinking at the time of first clinical entry.

## Implementing Veterinary Telehealth Services

### Poster

Matthew Rumbaugh, BA

Institution: VetNOW

#### Abstract:

Veterinary telehealth is an emerging field, and veterinarians should be prepared to adopt this technology either out of necessity or to raise their quality of patient care. The expansion of telehealth into the veterinary field is being driven by consumer demand for convenient services and by the shortage of veterinary specialists and large animal veterinarians in rural areas. Commercial vendors are rapidly filling the telehealth space, but true innovation must come from veterinarians themselves to effectively build gold standards and ensure we deliver better care and access to more patients.

VetNOW has partnered with University Veterinary Specialists in Pittsburgh, PA to build staff and supporting infrastructure capable of designing and implementing telehealth solutions that are designed by veterinarians, for veterinarians. In our multi-phase project to fully integrate an emergency and specialty referral institution through telehealth, teams have joined forces to achieve continuity of care for patients and clients through video functionality and virtual platforms. From lessons learned in human telehealth, platforms and implementation must incorporate the '7 Levels' of telehealth to create a robust exchange of information and to meet and exceed previous standards of care while improving customer satisfaction and compliance.

In Phase 1, critical care support along with real-time doctor-to-doctor consults via video were implemented successfully. In Phase 2, on-site veterinarians and clients held appointments with specialists off-site through real-time video and medical records exchange. Phase 3 will begin to implement direct-to-consumer virtual visits for surgical and behavior follow-up care along with virtual real-time triage in emergency situations.



## **Simulated Otoscopy that promotes self-regulated learning**

### **Poster**

Authors: Abi Taylor<sup>1</sup> BSc, VetMB, MRCVS  
Jennifer T. Johnson<sup>2</sup> DVM

Institutions: 1 North Carolina State University

2 Lincoln Memorial University

### **Abstract:**

A canine simulated otoscopy clinical skills laboratory was developed by North Carolina State University and Lincoln Memorial University based on a self-regulated learning cycle with the goal of teaching a clinical skill in a way that helps guide students to become self-regulated learners. The student goal is performing an otoscopic examination that visualizes the tympanum. An article, videos, instructional booklet and an adventure scenario address differences in learning preferences. Peers provide feedback and the student is guided to self-reflect.

Students are given a clearly stated goal of performing a 3 step otoscopic exam with visualization of the tympanum and identification of a symbol. Prior to laboratory students are required to read an article describing an otoscopic examination. In preparation for this laboratory instructional videos that demonstrate the task, then demonstrate the task with verbal step by step instructions are viewed. Students then progress to a 45 minute small group laboratory where students self-select into groups of 3-4 to work through otoscopy on a canine model with a simulated ear canal. Students will rotate through three roles: performing otoscopy based on a 'choose your own adventure' scenario, performing low stress handling and providing professional peer feedback. At the end of the exercise the student performing otoscopy is prompted to reflect on the exercise by answering what went well and what could be better. Peer feedback is provided last guided by a list of yes/no questions.

## **Development of a Blockchain Based Digital Credential Framework for Competency Based Learning in Veterinary Medicine**

### **Poster**

Authors: Patrick Welch<sup>1</sup> DVM, MBA, DACVO

Jason Johnson<sup>2</sup> DVM, DACT

Julie Noyes<sup>1</sup> DVM, MS, MA

Jeff Johnson<sup>1</sup> M.Ed.

Ken Hubbell<sup>1</sup> MS, I.T.E.

Institutions: 1 Ethos Veterinary Health and VetBloom

2 Lincoln Memorial University

### **Abstract:**

Competency-based medical education is a learner-centered model that de-emphasizes equating competency with grades and focuses on abilities and achievement as salient learning outcomes. A challenge to this model is providing verification of skill acquisition in an appropriate format. Digital badges represent an innovative strategy for credentialing competencies. They establish achievement criteria and communicate concrete evidence of skills, attributes, and accomplishments veraciously versus traditional grades.

While many platforms exist in the area of digital badges, we are proposing a new-generation framework based on blockchain technology. Blockchain is a secure, digitized, decentralized ledger that serves as an ideal technology for this application, creating a method for multiple distributed entities to issue and accept credentials that are portable, verifiable, shareable and discoverable.

Our initiative has been focused on a systematic review of the literature to comprehensively identify, critically appraise, and meticulously synthesize the relevant studies on the use of digital badges in medical education, as well as working with leading technology partners to create a prototype for this concept. This unique development strategy integrates theoretically supported models of learning with the practical application of an educational platform by stakeholders, resulting in empirically-based and feasibly operational instructional technology.

The findings from this study provide an evidence-based foundation for our future work developing an open digital credentialing system accessible to all veterinary professionals and students for the demonstration and standardization of competency-based learning, as well as early stage results for the use of blockchain technology in this application.

# LMU | In VeST<sup>2018</sup>

