Exploring Veterinary Simulators: From Task Trainers to Virtual Reality

The veterinary profession utilizes various simulators to assist trainees in honing their skills and achieving proficiency in performing diagnostics and procedures on animal patients. Over time, these simulation tools have evolved not only in their technical capabilities but also in their realism and user interface. Today, the most advanced simulators immerse trainees in lifelike scenarios, providing a controlled environment closely resembling actual clinical settings.

In essence, simulation offers all the advantages of top-tier veterinary training without risking the well-being of animal patients. Veterinary simulators can be broadly categorized into three main types:

Task trainers are physical models or simulators designed to mimic specific procedures or tasks that veterinarians may encounter in their practice. These trainers often replicate anatomical structures or physiological conditions to provide hands-on practice for veterinary students or professionals. For example, task trainers may simulate procedures such as suturing wounds, administering injections, or performing surgical techniques on animal models.

Anatomical models and manikins in veterinary training are tools that provide physical representations of animal anatomy to educate veterinary students or professionals. These models encompass a spectrum, ranging from basic diagrams to detailed, life-sized replicas of animal organs or skeletons. By offering tangible visuals, they assist students in comprehending the intricacies of animal anatomy, preparing them for practical application on live animals.

Virtual Reality VR simulators in veterinary medicine utilize computer technology to create immersive virtual environments, providing trainees with hands-on experience in simulated clinical scenarios. It also provides data of training outcomes and can be used for standardized assessment.

This white paper aims to delve into each simulation type, offering insights into their benefits, considerations, and examples. We believe that each simulator type holds a valuable place within veterinary training programs, tailored to the specific goals and objectives of the training curriculum.

TASK TRAINERS

Task trainers are specialized simulators or lifelike models of human anatomy designed to help learners practice a specific skill.

They aid trainees in dissecting common and repeatable tasks into manageable steps, fostering proficiency and confidence for real-life scenarios.

Task trainers are particularly valuable for refining competency-based and procedural skills such as suturing, airway management, lumbar and venous punctures, catheterization, and more. Additionally, they can be incorporated into 'hybrid simulation,' allowing trainees to practice tasks while honing their interpersonal skills with animal patients simultaneously.

The benefits of task trainers in veterinary training include providing learners with ample opportunities for repetition, leading to the development of confidence and proficiency in specific tasks. Trainees can practice invasive procedures without risking injury to animal patients.

However, there are considerations to bear in mind when utilizing task trainers:

- Their utility is limited to the specific task they are designed for, offering less versatility for general training purposes.

- Procuring multiple task trainers for various procedures may entail significant costs.

- Task trainers typically lack the functionality and adaptability of high-fidelity models and VR simulators, as they do not present a range of anatomies, pathologies, and patient scenarios.

- Performance feedback often necessitates the presence of an instructor or professor.

Types of task trainer simulators:

In veterinary training, task trainers come in a wide range of options. Some examples of task trainer simulators include:

- First Aid

- Airway Management and Intubation

- IV Access and cannulation

- Suturing
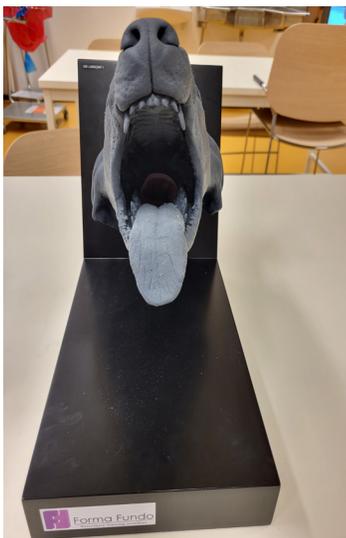
ANATOMICAL MODELS AND MANIKINS

> The earliest veterinary simulation tools primarily consisted of static representations of animal anatomy, providing trainees with a risk-free environment to practice their skills.

The benefits of modern veterinary models and manikins include their lifelike resemblance to animal anatomy, with high-end models for CPR, injections, birthing, and venipuncture. These simulators offer learners the opportunity to develop their skills under close supervision in a low-pressure setting and can be utilized repeatedly by multiple trainees. Additionally, they facilitate the development of specific behaviors relevant to veterinary roles, such as veterinarian/animal relationships, and are valuable for team training scenarios.

- High-end manikins can be costly, with ongoing expenses related to maintenance, supplies, and cleaning.
- Basic models are static and typically do not provide trainers with feedback or data insights regarding each trainee's performance.
- Despite advancements, even the most sophisticated manikins cannot perfectly replicate the complexity of animal anatomy.
- Models may not be suitable for learning all veterinary scenarios due to their limitations in specifications.

Types of anatomical models and manikins:

Some examples of anatomical models and manikins' simulators include:

- Skeletal, organ, muscular, neuroanatomical, and reproductive models provide detailed representations of animal anatomy.
- Canine, equine, bovine, feline, and exotic animal manikins designed for hands-on practice of veterinary procedures such as physical examinations, surgeries, and diagnostic techniques.

VIRTUAL REALITY (VR) SIMULATORS

Virtual Reality (VR) technology is shaping the future of veterinary simulation. Unlike simpler manikins and task trainers, VR tools offer immersive experiences that transport trainees into hyper-realistic scenarios. By integrating optics, haptics, and graphics, top-tier VR simulators provide a sensation of being in the operating room or clinical setting, working with an animal patient.

While many envision VR as goggles or headsets that immerse users in computer-generated environments, some simulators go beyond by combining various simulation tools like manikins, models, surgical instruments, and computer-generated displays. This results in a multi-sensory, mixed-reality environment.

Benefits of VR simulators in veterinary training include:

- **Immersive experience:** VR simulators offer a realistic experience that closely resembles real-life scenarios.
- **Safe practice:** Trainees can practice procedures unlimitedly without risking harm to animal patients.
- **Long-term cost savings:** Despite initial expenses, incorporating VR simulators can save costs over time due to their versatility and no need for single-use accessories. Trainees can explore various patient types and scenarios on the same simulator, with task complexity adjustable for different educational stages.
- **Detailed performance insights:** Advanced technology enables comprehensive data collection, providing trainers with detailed feedback on trainees' performance.
- **Sensory engagement:** VR simulators not only visually demonstrate procedures but also provide tactile feedback, aiding in muscle memory development through repeated use.
- **From basic skills to professional veterinarians:** A customized learning experience for both inexperienced trainees and seasoned professionals, offering detailed performance insights and opportunities for skill refinement and exploration of new techniques. The immersive nature of VR adds excitement to learning, motivating trainees and serving as a recruitment tool.

Things to consider:
The cost for higher-end VR simulators may be prohibitive for some training facilities.

Types of VR simulators:
- VR headsets or goggles - Some medical simulators use VR headsets or goggles to place the trainee in a virtual reality world. As with other non-medical applications, these devices typically include a stereoscopic display (providing separate images for each eye), stereo sound, and sensors. The main issue with these simulators is that they are mainly visual and are less reflective of real surgical environments.

- Fully immersive VR simulators - The most effective VR simulators combine computer technology with a realistic set-up that prepares trainees for the real world. This might include the use of controllers designed to look and feel like real instruments, as well as tactile materials that provide haptic feedback, and displays that react in real-time to a trainee's actions.

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Surgical Science is a leading provider of medical simulation training and software solutions. Together with healthcare partners and customers worldwide, we enhance patient safety and healthcare outcomes using evidence-based customized simulation to improve clinical proficiency and performance.

Surgical Science offers a realistic learning experience for simulation centers, hospitals, universities, veterinary schools, and medical device partners across the world, helping medical professionals become more skilled and confident.

Surgical Science has over 20 years of experience in creating the most realistic simulators with advanced graphics and haptic and the ability to train teams. It is one of the only simulator companies that develops simulators in a wide range of medical specialties, currently there are 8,000 simulators being used around the globe. MentorLearn is a unique cloud-based simulator management system that provides performance reports and proficiency-based training. The Surgical Science simulators are supported by over 400 validation studies.

Surgical Science have joined forces with both the Greater Stockholm Veterinary Care Foundation and additional veterinary professors aimed at developing and implementing VR training for veterinarians.

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