

The use of a high fidelity simulator for veterinary medicine training

Raul Caraballo, MVZ, M en C*; José Luis Payro Dueñas MVZ*; Edgar Ivann Tellez EITT+; Juan-Manuel Fraga-Sastrias DHLthSc*

Abstract: In this paper we present a new proposal for High Fidelity simulation for Veterinary Medicine education by introducing a High fidelity Simulator, we also focus on the advantages of using simulation for veterinary medicine student formation and the positive impact on the animal welfare.

Author's address: Universidad del Valle de México Campus Coyoacan. Calzada de Tlalpan No. 3058 Mexico City 04850 (Caraballo, Payro); e-mail: raul.caraballo@uvmnet.edu

* Universidad del Valle de México.

+ Laerdal. Mexico.

Introduction:

As we know human error is present at all stages of the medical profession. According to the 2000 Report "To Err is Human" (1) up to 70% of the errors relay on human aspects (communication, leadership, teamwork) rather than technical deficiencies, the lack of knowledge of technical skills from the Health Care professionals treating those patients. We think this experience can be extrapolated to veterinary medicine and considering that, we are proposing the use of High Fidelity simulation to enhance Veterinary Medicine training and include these Human Aspects through high fidelity simulation. Knowing all this we encourage the use of simulation for veterinary medicine student training to minimise human error by optimising human and humane training. As Reason James said we cannot change the human condition, but we can change the conditions under which humans work.(2)

Traditional Veterinary Medicine learning has encountered difficulties to offer adequate number of opportunities to veterinary students to practice their skills, this problematic is the result of a high number of students, a low number of real life clinical cases and the importance of animal welfare.(3) Learners must integrate a complex set of skills and behaviours in order to become competent veterinarians. Among these: technical skills, effective communication with the client and team members, decision making, clinical judgment and professionalism (4). Traditional learning methods are based mainly on observation, where the student learns by watching the teacher doing certain procedure at the vet clinic, or operating room, limiting student practice.

Simulation is based on the continuous practice of different skills and procedures within a safe environment for both the animal and the veterinarian (practitioner), without placing our patients in any jeopardy. Simulators range from low fidelity (eg. task trainers) to high fidelity simulators. They can be reliable most of the time, treat them many times, they do not get tired, they provide a standardised experience, among other benefits.(5) Veterinary

students need to practice over and over every procedure under a controlled scenario, to be able to gain the necessary skills, knowledge, aptitudes and attitudes and be able to meet the expectations and defined competences. We encourage active student participation using simulation. We considered it as an important factor that increases competence acquisition.

To be able to achieve this, we created a high fidelity simulator by modifying a medium fidelity simulator and using its mechanics and software to develop a high fidelity dog simulator. We used are beginning to use it in high fidelity simulations using the dog simulator and "standardized owners".

This effort has been motivated because we haven't been able to find high fidelity simulators for veterinary medicine, it might be strongly related to a lack of interest by manufacturer's at this moment to develop simulators for veterinary medicine (4).

Material and Methods:

We design the SimDog. This simulator consists of a full sized dog mannequin enhanced by the use of the ALS advance simulator components.

The SimDog is controlled via laptop PC based ALS software and a VitalSim Unit is still needed for operation. A Graphical User Interface to write and run a wider range of simulations. Integrated video recording and debriefing is available at the end of the simulation with event log synchronised with the patient monitor.

It has an interactive touch screen that simulates the Patient Monitor which displays all the physiological parameters like blood pressure, electrocardiogram, pulse oximeter, respiratory rate, heart rate and tidal volume. The Patient Monitor is also capable of displaying digital X rays, ultrasounds videos, lab results and other media on demand of the user, increasing the fidelity of the simulation experience for our students. The instructor controls the parameters through the use of the ALS software and he is in charge of developing and running the scenarios. This simulator is able to respond physiologically in real time to medication and any treatment that is given.

With these features we think there will be a major clinical competency acquisition such as patient diagnosis, treatment planning, anaesthesia, basic surgery skills, basic medicine skills, emergency and intensive care management and client communication. The versatility of this high fidelity simulator allows us to build scenarios where we can teach physiology, pharmacology, anesthesia, clinical, surgical and emergency procedures.

The SimDog is able to reproduce realistic normal and abnormal respiratory, heart, bowel sounds and gut sounds and the following characteristics:

- Airway: Ventilation, Intubation

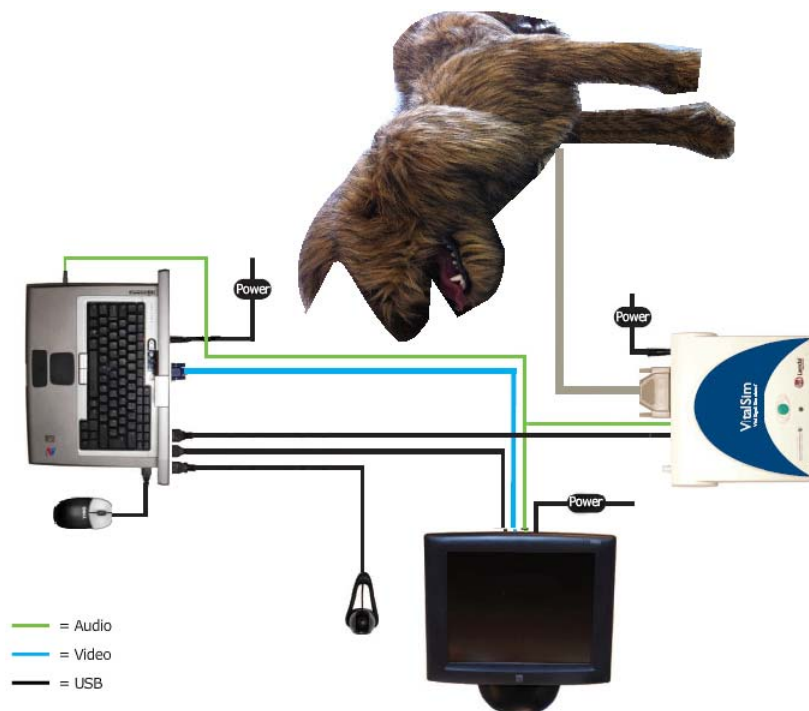
- Cardiac: 1400 + Cardiac Rhythm (when running with VitalSim remote control) with synchronised pulses allows students to interpret and intervention overusing clinical monitors, defibrillators, and external pacers and drug administration
- Bilateral pulses on the femoral artery -- in the groin area between the thigh and abdomen.
- Manual chest compressions – The thorax allows the compressions for CPR practice.
- 3- or 4- lead ECG, pacing and defibrillation using standard clinical equipment, Pacing with programmable threshold for capture
- IV Canulation infusible vein on the forearm allows peripheral/intravenous therapy and site care.
- Osseous Palpation (Ribs, legs)

The SimDog interface is the ALS Simulator software that is use in the human simulator.





Diagram



We are using this equipment in scenarios where apart from the high fidelity simulation we use "standardised owners" which are actors playing the role of the dog owner providing with the information needed for the learning objectives established.

Discussion:

Now a day's simulation is playing a fundamental part of veterinary medicine education. It's considered a humane teaching method that allows the learner to practice until they acquire and develop the desirable level of skills that will enhance their learning and performance providing the same quality of learning opportunities and practical and clinical skills to every student, avoiding the use of animals as an educational resource. Students are able to

make their own decisions with more freedom, allowing them to make mistakes without jeopardising the integrity of the patient. The students are able to practice over and over until they master the desired concept or skills. (6) It's important to know that we don't consider simulation as an alternative to reality, it's a powerful tool that enables the students to make their own decisions and help us approach an important goal such as veterinary student learning. We are using simulation as a model of reality used for learning purposes and in such a way, the higher the fidelity, the broader aspects we can simulate in order to provide a significant learning process.

Simulation might be an interesting solution to the limited practice opportunities that veterinary students encountered during their formation. For example in Mexico more than 50% of graduate veterinarians do not go to an internship or residency as part of their training. They are not exposed to such environments, where they can master their clinical skills under supervision. Instead of that, they go directly into clinical practice.

During first year lesson we started with task trainer simulation, based on the philosophy of do one, see one and teach one, if we compare it to second year we start with advance simulation where we teach them to think about it, then do it and finally assimilate it.(7)

In our experience paper based cases do not breathe, bleed or die, therefore students do not get as engaged into solving these cases and the diminished realism, do not allow them to experience the impact of their clinical decisions and the consequences of their lack of knowledge or technical and non-technical skills. This is the real importance of simulation, we can enhance student learning without real consequences, because models worsen just to get better again to provide a new learning experience. (8)

The SimDog fulfill the Veterinary Medicine clinical competency requirements such as (patient diagnosis, treatment planning, anesthesia, basic surgery skills, basic medicine skills, emergency and intensive care management and client communication).

Next Steps:

We are beginning to use the SimDog with different level Veterinary Medicine Students. During the next years we will design scenarios and scripts considering standardised owners. Although we think this strategy will have a high impact on student behaviour is something we still need to measure, and in such a way we are beginning to do it.

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