Experience of the Use of Table-top Simulators as Alternatives in the Primary Surgical Training of Veterinary Undergraduate Students

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Table-top simulators are valuable alternatives to animal models in health sciences training, by virtue of their low cost, ease of construction and ability to successfully fulfil teaching objectives.

Currently, simulators are being used more and more in the training of health sciences students, including veterinarians. These simulators range from the simplest and cheapest ones (so called ‘table-top simulators’) to the most sophisticated, such as computerised models, to which access is limited, due to their cost.

A table-top simulator is usually constructed by using readily-available materials in common use, is generally used on the table (hence its name), and is useful for the training of isolated procedures that require, as part of their learning process, the coordination of movements, such as the formation of sutures and surgical knots, the creation and maintenance of intravenous cannulae, and the use of surgical instruments.

Due to their origin, table-top simulators have the advantage of being economical and portable. This means that each student can have his or her own simulator, can transport it easily, practise with it, and replace it, whenever necessary.

At the Universidad Autónoma Metropolitana Unidad Xochimilco (UAM-X), third-year veterinary students who attend classes within the monogastrics module, are taught basic surgical skills. As part of this process, it is important to train their hands and coordinate their movements. To facilitate this, the students are trained by using simulators, the table-top simulator being the most accessible version. The use of these simulators contributes to the reinforcement of the Three Rs principles with regard to the reduction and replacement of the use of animals for training. The importance of using simulators lies in the fact that students acquire skills, prior to their contact with real animals.

Training takes place in groups of no more than 20 students. Before starting the training, an introductory session must be performed, supported by a multimedia presentation, to explain in detail the surgical procedure which is going to be learned. When using the simulator, the training is usually supervised by an instructor, who will help make the necessary corrections until the student performs the procedure without any flaws. This provides the students with better skills than if they were only to perform the training without assessment.

The average training time in the surgery classroom is three hours for each type of simulator (suture or venipuncture). As the final part of the training, it is necessary to evaluate whether the students have acquired the expected skills, and the only way of doing this with this type of simulator is by direct observation of the student while actually working with the simulator.

The members of the Surgical Teaching Unit of the UAM-X have created and used a range of different table-top simulators, among which the venipuncture simulator, basic suture simulator, and the advanced simulators for suturing tubular and parenchymal organs, stand out (Figure 1). In our experience, the use of these simulators helps the undergraduate veterinary students to improve their skills in managing the materials used in venipuncture, as well as improving their knowledge and handling of suture instruments. Moreover, the skills of the students performing venipunctures, and the placement of peripheral venous catheters and their correct fixation, are improved. Suture simulators also enhance the correct use of different suturing patterns and surgical knots, as are required in the anaesthesia room or in the operating theatre.

For surgical training, it is necessary to move forward in the development of simulators that can satisfy different scenarios, e.g. from the viewpoints of physiology, anaesthesia, bleeding control, and the handling of delicate tissues, which are currently only learned in real surgery. If this were to be achieved, then it would become possible to replace the use of animal models in this phase of the training of veterinarians.

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References


Figure 1: A range of table-top simulators

a) A table-top simulator for venipuncture — note the catheters on the sinuous venous path; b) a foam sheet used for practising basic sutures; c) and d) a latex-glove finger filled with gelatine to practice suturing on parenchymatous organs; e) a latex tube used to practise suturing in tubular organs.