Research in
ISSN : P-2409-0603, E-2409-9325
AGRICULTURE, LIVESTOCK and FISHERIES
An Open Access Peer-Reviewed International Journal

Article Code: 434/2024/RALF
Article Type: Research Article

Res. Agric. Livest. Fish.
Vol. 11, No. 1, April 2024: 19-23.

A COMPARATIVE STUDY OF VENIPUNCTURE SKILLS AMONG INTERN STUDENTS WITH AND WITHOUT SIMULATOR PRACTICE

Saima Rahman Shokhi[1], Alamgir Mahfuj Abir[2], Md. Masud Parvej[3], Md. Khademul Islam[4] and Md. Mahfuzul Haque[5*]

[1]Faculty of Veterinary, Animal and Biomedical Sciences, Sylhet Agricultural University; [2]Department of Dairy Science, Sylhet Agricultural University; [3]Department of Anatomy and Histology, Sylhet Agricultural University; [4]Department of Epidemiology and Public health, Sylhet Agricultural University; [5]Department of Surgery and Theriogenology, Sylhet Agricultural University.

***Corresponding author:** Md. Mahfuzul Haque; E-mail: mahfuzul.dst@sau.ac.bd

ARTICLE INFO

Received
14 March, 2024

Revised
25 April, 2024

Accepted
28 April, 2024

Online
May, 2024

Key words:

Blood collection
Simulator
Venipuncture
Skill training
Confidence
Obstacles

ABSTRACT

Blood collection from small animals is difficult due to the increased risk of problems involved in getting a blood sample. The purpose of this paper was to analyze skill training using a simulator in the venipuncture method and investigate its impact. Twenty Intern Veterinary students were randomly chosen from Sylhet Agricultural University's 23-batch DVM program. They were separated into two groups. One group (n=10) was exposed to a simulator before practicing on a live animal, while another (n=10) was not exposed to the simulator. They worked with a live animal. Students in the experimental group demonstrated a 50% skill efficacy. The control group demonstrated inferior skill, with 25% efficacy. The difference between groups was statistically significant ($p<0.05$). The experiment was carried out using a simple methodology and easily accessible resources to benefit other educational institutions and lessen the negative impact on live animals. Understanding the anatomy, physiology, and behavior of the species from whom the sample is being collected is critical for minimizing the risk of injury associated with venipuncture in these species. A physician must be aware of the benefits and drawbacks of venipuncture, the volume of blood that can be safely obtained, and the patient's preferred manner of getting the sample. Simulated skill training is a teaching strategy that aims to provide students with early education, enhance their confidence and skill development, and maximize process success while minimizing obstacles.

To cite this article: Shokhi S. R., A. Mahfuj Abir, Md. Masud Parvej, Md. Khademul Islam, Md. Mahfuzul Haque, 2024. A comparative study of venipuncture skills among intern students with and without simulator practice. Res. Agric. Livest. Fish. 11(1): 19-23.

DOI: https://doi.org/10.3329/ralf.v11i1.73096

www.agroaid-bd.org/ralf, E-mail: editor.ralf@gmail.com

INTRODUCTION

Hematological and serum chemistry tests are regarded part of the minimum database for small animal diseases and consequences, although getting blood samples from small mammals can be extremely difficult. Understanding the anatomical location of the vessels and their associated markers is required before performing venipuncture on tiny animals. Veterinary health workers should be aware of the potential risks associated with obtaining blood from these small animals, particularly those in advanced sickness states. When collecting blood from tiny animals, both the vacuum tube system and a syringe and needle are used (Barun et al., 2015). Students must be trained in this manner since the veterinarian must efficiently complete each stage of these several treatments (Barun et al., 2015; Weiser et al., 2007). In Brazil, the National Council for Animal Experimentation (CONCEA) recently issued regulatory standard no. 38 on April 17, 2018, declaring that the use of live animals in demonstrative and observational classes is prohibited and should be replaced by other teaching resources of sufficient quality to maintain and improve learning environments (Avila et al., 2019). Innovative technologies in human and animal health are being deployed to simulate clinical practice and patient well-being (Silva et al., 2015). Clinical simulation entails role-playing and skill improvement. These are critical instruments for the advancement of both professionals and trained graduates (Silva et al., 2015; Valliyate et al., 2012). Researchers developed and evaluated a system for teaching clinical procedures using small animals and simulators, demonstrating how this technology provides an easy-to-use and effective way to learn. (Aulmann et al., 2015; Williamson et al., 2019). Simulators foster critical and reflective thinking, as well as cognitive development, increasing students' self-assurance in a range of circumstances and allowing them to develop their abilities in a risk-free environment (Hunt et al., 2020; Valliyate et al., 2012). As a result, the purpose of this study was to assess ability in the venipuncture method using a simulator, as well as to investigate the impact of training on this operation, how to develop and maintain a simulator, and how to perform venipuncture on a live animal.

MATERIALS AND METHODS

The study was conducted from 1st -30th August, 2022 at PMUAC Veterinary Teaching Hospital, Sylhet Agricultural University.

Study Design

The study included ten canines and ten felines. A total of 20 students worked on this task. For a period of time, all students got theoretical and visual information regarding intravenous cannulas (IVCs). Ten students worked as an experimental group, while the remaining ten worked as a control group. A 10-day observation period was used to assess the practical skill. Experimental ten students worked on a simulator model before practicing with a live animal. Following that, the control group worked directly with live animals.

Requirements

Gauze, Saline sets, cork sheet, Needle, Blood collecting tube, Antiseptic solution, Hair trimmer, Skin shaving by blade, Catheter/cannula, Dye.

Blood Collection Procedure

Temperature, respiration, and pulse rate were recorded from small animals (dog and cat). Calculate the dog's body weight for Anaesthetic drug delivery and prepare all instruments. Prepare the operating site by using savlon/povisep wash after shaving the site, and apply a tourniquet slightly above the operating site to ensure that the vein elevates appropriately. The vein was pierced, and blood was drawn into the blood collection tube.

Simulator development

The simulator was built from a 15-inch cork sheet rolled up with cotton, wrapped with gauze, and bandaged to form the shape of a dog's leg. Saline set was sliced into a length that resembled a vein and placed beneath the last two external layers of gauze. Another saline set has one end attached directly to a water storage bag and the other end connected to a cannula. The bag was filled with water that had been tinted red using a vegetable dye to resemble the blood content of a vein. Prospective longitudinal study was conducted with 10 intern students who had no prior experience creating and maintaining an intravenous cannula (IVC).

Figure 1. Practice on simulator

i). In Experimental Group:

Intern students were randomly chosen and instructed on the simulator for 10 days. When the simulated blood flowed freely into the cannula's optical chamber, the trocar guide was removed, and the cannula was securely attached, the simulated intravenous cannulation was deemed successful and a 05 mL sample of the simulated blood was taken.

ii). Control Group:

The control group comprised of ten students who received a live animal rather than a simulator.

Figure 2. Blood collection from live animal

RESULTS AND DISCUSSIONS

The students in the experimental group (n = 10) made 40 attempts over the course of 10 days to create and maintain IVCs in the lab, and they were successful in 20 (50%) of them. Five (50%) of the simulator-trained volunteers were effective on their first attempt at practicing on a live animal, three (30%) on the second effort, and two (20%) on the third attempt. The control group made 40 tries and succeeded in ten (25%) of them. Three students (30%) in this group were successful on the first attempt, four (40%) on the second, and three (30%) on the third attempt. The experimental group performed significantly better than the control group in establishing and maintaining an IVC ($p < 0.05$).

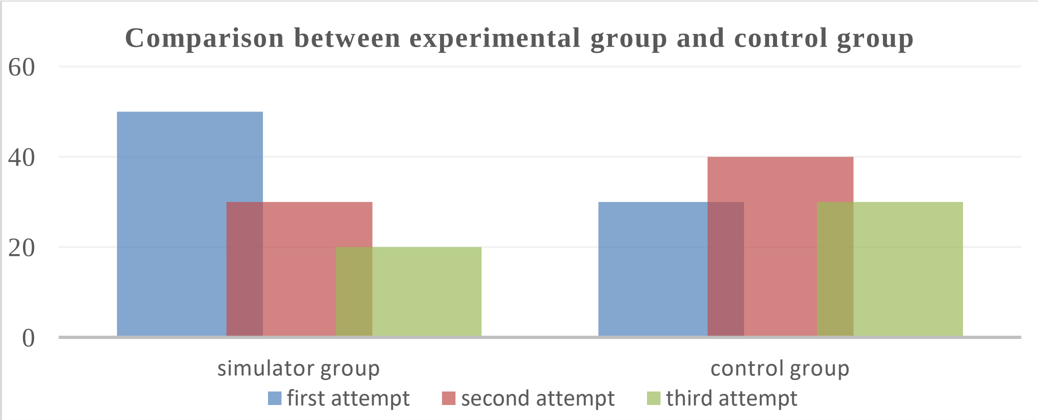

Figure 3. The vertical figure reflects the proportion (%) of attempts for the experiment and control groups

Before performing surgery on live animals in a real-world context, organizers of veterinary science study programs assess if training with simulators can improve technical competence. Several published studies address the use of simulators and their instructional potential, notably in the realm of technical competence. For example (Engum et al., 2003), two IVC placement instruction strategies were investigated. The first was the usual technique, which involves showing a film, followed by a teacher's demonstration, and then giving pupils the opportunity to practice using a mannequin that resembles a human arm. In contrast, a different method including computer simulations was employed. The study discovered that the two strategies yielded similar educational outcomes. However, because it allowed them to develop their practical skills, students favored traditional teaching methods (Engum et al., 2003). Britt et al. (2009) reported on a central cannula placement simulator and compared it to the traditional method, which involves students practicing on actual patients. Adverse consequences, such as infections, are unfortunately common in the latter case. Students who utilized the simulator learned how to correctly place the cannula, with the added benefit of not potentially introducing infection or incurring additional costs for the teaching hospital (Engum et al., 2003). Another example is that first-year cardiothoracic surgery students use simulators to perform coronary anastomoses in pig models (Fann et al., 2010). The students' performance on the procedure improved after four hours of simulation (Fann et al., 2010). The study's result was obvious: using the venous simulator for two hours of training practice helped students develop the skills required to form and sustain IVCs in a real-world environment.

CONFLICT OF INTEREST

There is no conflict of research interest.

REFERENCES

1. Aulmann M, März M, Burgener I A, Alef M, Otto S, and C K Mülling, 2015. Development and evaluation of two canine low-fidelity simulation models. Journal of Veterinary Medical Education, 42(2): 151-160.
2. Ávila R I, and M C Valadares, 2019. Brazil moves toward the replacement of animal experimentation. Alternatives to Laboratory Animals, 47(2): 71–81.
3. Braun J P, Bourgès-Abella N, Geffré A, Concordet D and C Trumel, 2015. The preanalytic phase in veterinary clinical pathology. Veterinary Clinical Pathology, 44(1): 8-25.
4. Britt R C, Novosel T J, Britt L D and M Sullivan, 2009. The impact of central line simulation before the ICU experience. American Journal of Surgery 197: 533–536.
5. Engum S A, Jeffries P and L Fisher, 2003. Intravenous catheter training system: computer-based education versus traditional learning methods. The American journal of surgery, 186(1): 67-74.

6. Fann J I, Calhoon J H, Carpenter A J, Merrill W H, Brown J W, Poston R S and R H Feins, 2010. Simulation in coronary artery anastomosis early in cardiothoracic surgical residency training: The Boot Camp experience. The Journal of Thoracic and Cardiovascular Surgery, 139(5): 1275-1281.
7. Hunt J A, Heydenburg M, Kelly C K, Anderson S L and Dascanio J J, 2020. Development and validation of a canine castration model and rubric. Journal of Veterinary Medical Education, 47(1): 78-90.
8. Scalese R J, Obeso V T and Issenberg S B, 2008. Simulation technology for skills training and competency assessment in medical education. Journal of General Internal Medicine, 23(1): 46-49.
9. Silva A R A D, Campos A L M D, Giraldes J M, Almeida M M D and C M Oka, 2015. Simulation training for prevention of healthcare associated-infections. Revista Brasileira de Educação Médica, 39: 5-11.
10. Valliyate M, Robinson N G and J R Goodman, 2012. Current concepts in simulation and other alternatives for veterinary education: A review. Veterinarni Medicina, 57(7): 325.
11. Weiser M G, Vap L M and M A Thrall, 2007. Perspectives and advances in in-clinic laboratory diagnostic capabilities: hematology and clinical chemistry. Veterinary Clinics of North America: Small Animal Practice, 37(2): 221-236.