

2006-2007 Learning Technologies Grants Proposal

(COVER PAGE)

Project Information

Model canine limb for teaching chemotherapy administration to veterinary students.

Project Title

Nicole Northrup, DVM, DACVIM (oncology), Associate Professor

Project Director

Small Animal Medicine and Surgery

Requesting Department

\$8400 (if not possible, then \$5000 first year and \$3400 second year)

Amount Requested Year 1

Amount Requested Year 2

Project Director's Signature

Proposal Endorsement Signatures

Department Head

Dean

Proposal Abstract (100-word maximum)

We will develop and implement a model canine forelimb with a realistic cephalic vein. This model will provide a safe, humane, practical, and engaging method for teaching veterinary students and veterinary technician students venipuncture, intravenous catheter placement, chemotherapy administration, and chemotherapy safety. Chemotherapy drugs present a serious occupational risk to veterinarians. It is our responsibility to teach students how deliver this therapy in a manner that is safe, but this is difficult to accomplish in the teaching hospital because of the risk of student exposure to chemotherapy and the risk of injury to client-owned patients. Our project is the solution.

Section I. Project Description

Cancer is the most common natural cause of death in companion animals. Veterinary clients expect the same types of treatment for their pets that are available to human patients. Chemotherapy is more and more routinely being offered to veterinary cancer patients, not only by specialists, but by general practice veterinarians as well. Chemotherapy drugs present a serious occupational risk to veterinarians and their staff. Exposure can cause mutation, development of cancer, and injury to an unborn fetus. Also, for the patient, a mistake in dose or administration technique can result in life threatening toxicity (for example, some chemotherapy drugs cause such severe tissue injury if they leak from a vein that a patient could require amputation or euthanasia). As teachers of oncology at the College of Veterinary Medicine, it is our responsibility to teach students and veterinarians how deliver this therapy in a manner that is safe for themselves, their staff, their patients, and owners of pets with cancer. To truly learn these skills, students need to practice them. Unfortunately, this is difficult to accomplish in the setting of the veterinary teaching hospital. We do not want to risk student exposure to chemotherapy or injury to client-owned patients. Consequently, students are generally not allowed to administer these drugs. This leaves graduating veterinarians uncomfortable and unskilled at handling and administering chemotherapy.

This project involves the development and purchase of a model canine limb with a realistic and functioning cephalic vein. This equipment will provide a safe, humane, practical, and engaging method for teaching veterinary students, veterinary technician students, and veterinary practitioners (at continuing education conferences) venipuncture, placement of an intravenous catheter, chemotherapy administration, and safe handling of chemotherapy. Similar models exist for teaching phlebotomy in human patients and a model of a dog neck for teaching jugular venipuncture and transtracheal aspiration is also currently available.

Working with an established company that specializes in creating this type of teaching device, we will develop a realistic and reusable model of a canine forelimb with a functioning cephalic vein. The model would be used in clinical skills laboratory type settings for teaching venipuncture and IV catheterization techniques. These laboratories would allow veterinary students and veterinary technician students to practice and become proficient in these skills. As an oncologist, my ultimate goal would be to implement the model for practicing proper techniques for handling and administering chemotherapy once the students have mastered IV catheter placement. This would also be beneficial for practicing veterinarians who wish to give chemotherapy. Mock chemotherapy agents would be used to give students and veterinarians the actual feel of administering chemotherapy. The use of the model and mock chemotherapy would allow students to develop proficiency with no risk to them. In addition, live animals would be spared the discomfort of multiple unsuccessful needle or catheter sticks and there would be no risk of students damaging veins needed for future chemotherapy treatments or causing life-threatening toxicity to live animals.

The model would consist of a sturdy base that is very similar in feel to bone. The base would be covered with a silicone/foam latex skin, which closely simulates the feel of the canine subcutaneous tissue. A reservoir in the subcutaneous tissue would hold artificial “blood” (water with red food coloring) and would be in the shape of and have the feel of a vein. This reservoir would produce a flashback of “blood” whenever the vein was punctured and accept infusion of mock chemotherapy. This would give the students an accurate idea of what venipuncture, intravenous catheter placement and infusion of chemotherapy feel like. The bone-like base would be a permanent fixture of the model, while the skin/subcutaneous layer would need to be replaced after several venipunctures. **The goal of the model is to create competency and confidence among veterinary students in administration of chemotherapy drugs without risking injury to students or patients. All veterinary students and veterinary technician students could benefit from this technology.**

We have been in contact with an engineer (Mr. John Cook) at Simulation (Prior Lake, MN) regarding the model limb. This company produces several similar products, is interested in helping us, and has provided a protocol for development of the model as well as an estimate of the cost for development and purchase of the model limbs.

Section II. Budget

Item	Quantity	Total Cost	Requested from LTG	Other Sources
Model development (includes the molds used to create the limbs)	one-time fee for development of our model	\$5000	\$5000	\$0
Overlying skins/pads	48 (one per lab team; \$50 each; will be used multiple years)	\$2400	\$2400	\$0
Bases	24 (one per 4 students; \$125 each; completely reusable, will not require replacement)	\$3000	\$3000	\$0
Lilly Fellow project money*				\$2000
Total			\$10400	\$8400

*I am a Lilly Fellow and, if funded, this would be my innovation in instruction project so \$2000 would be from my Lilly Fellow project money.

Project timeline

Date (mm/yy)	Objective	Person(s) Responsible
10/06-4/07	Develop model limb	Nicole Northrup and Simulation (Prior Lake, MN)
10/06-4/07	Plan laboratory exercise and prepare associated notes/images for WebCT	Nicole Northrup and Karen Cornell
4/07-6/07	Produce and deliver model limbs	Simulation (Prior Lake, MN)
6/07-7/07	Practice use and teaching use of model with senior students on clinic rotation; adjust plan for laboratory exercise as needed	Nicole Northrup, Corey Saba, Carrie Kosarek
Fall 2007	Implement teaching with model	Nicole Northrup, Corey Saba, Carrie Kosarek

Section III. Learning Outcomes

The desired outcome from implementing use of the model canine limb in the second year veterinary oncology class and the 4th year clinical oncology rotation is for veterinary students to fully understand chemotherapy safety procedures and to be able to safely administer chemotherapy to a canine cancer patient (the model). Following the laboratory exercise in the 2nd year, students will demonstrate these clinical skills to the instructor and receive a score based on evaluation of their performance (standardized criteria will be developed to be as objective as possible, for example, checking for successful placement of intravenous catheter, placement of gauze sponge under catheter cap before administering chemotherapy, flushes catheter appropriately, etc.). If sufficient competency is not demonstrated, students will receive feedback on areas for improvement and be asked to practice further and be reevaluated. Students will be coached, allowed to practice, and reevaluated until they have demonstrated mastery of these skills.

The same skills will be practiced in the fourth year, when students rotate on the oncology service in the Veterinary Teaching Hospital, also using the model limb. The students will be scored on their performance using the same standardized criteria used in the second year class. To determine the effect on clinical proficiency, we will compare the scores of students who are naïve to practical instruction using the model limb (current 4th year students) to students who have practiced these skills in their 2nd year (when they reach the 4th year). We hope to observe and to document greater confidence and competency in the pre-trained group. Also, at the end of the clinical rotation, we hope to see that all students are proficient at safely administering chemotherapy.

All students will be asked to complete an evaluation of their experience with the model limb, whether they feel it has improved their clinical skills, and suggestions for improving their experience.

All resources for evaluating the project will be developed by Nicole Northrup with the support of her Lilly Fellow mentor, oncologic surgeon and Norden Teaching Award winner, Karen Cornell. Support for compiling results of the evaluations will be provided by the department secretaries and the College of Veterinary Medicine statistician (currently, Deborah Keyes) will help with statistical analysis of the difference between pre-trained and not pre-trained students.

Potential applications to other academic areas

As discussed above, the model canine limb would be effective for teaching venipuncture and IV catheterization (not just for chemotherapy administration). This instruction and practice would benefit veterinary technician students and new technicians in the veterinary teaching hospital. The limb could also be used for continuing education purposes for practicing veterinarians and technicians, for instance at a conference on managing veterinary cancer patients.

Section IV. Support Plan

As described above, the development work will be done by Nicole Northrup working with Simulation, a company that already produces similar products. Simulation will produce and deliver the product. Implementation of the product in the second year course and on the 4th year oncology rotation in the Small Animal Clinic will be done by Drs. Northrup, Saba, and Kosarek (the oncologists at University of Georgia College of Veterinary Medicine). Nicole Northrup will organize the laboratory exercises and materials associated with these exercises with the assistance of Lilly Fellow mentor Karen Cornell (an oncologic surgeon and Norden Teaching award winner). Dr. Northrup has the necessary time and interest to ensure that this project is completed according to the time table above. The industry support (Simulation) will expedite completion of this project.