

May 1, 2019

APSF Scientific Evaluation Committee
Charlton 1-145, Mayo Clinic
200 1st St SW
Rochester MN 55905

Members of the APSF Scientific Evaluation Committee:

The research team at UCLA's David Geffen School of Medicine is excited to propose our idea to be considered for receipt of your IIR Grant program. We have designed this project for what we believe is its significant potential to reduce the rate of intubation errors, which remain the largest contributing factor to anesthesia-related errors and patient deaths.

We are a group of researchers passionate about utilizing and advancing technology to improve patient safety in all aspects of medicine. With access to a 9,000 square foot, world-class simulation center, we are poised to research, analyze, and broadcast desperately needed data. Our study will commence with design of simulation-training and review modules for use intubation skill acquisition, which will be proctored to anesthesiology residents and nursing students from UCLA. In addition to data on the efficacy of simulated intubation skill training, we also hope to identify possible sources of interdisciplinary errors in communication.

This proposal provides an overview of the state of anesthesiology practice and research, which has illuminated the necessity of our project. The goals of our research have been broken down into phases and are explained in detail. An estimated budget is included, followed by an explanation of the expected results of the study, including new data and potential real world impacts.

We enthusiastically await the opportunity to join the the APSF in working toward a future in which no patient is harmed by anesthesia by expanding knowledge, cultivating solutions, and saving lives.

Regards,

Simulation Research and Development Team,
David Geffen School of Medicine

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EXECUTIVE SUMMARY

This proposal presents a research project designed to study the use of virtual reality simulation to train medical professionals for intubation during anesthesia. The study will alleviate the lack of information available about anesthesia procedures which the Anesthesia Patient Safety Foundation has long striven to mitigate. The APSF's vision of a future in which no patient is harmed by anesthesia is shared by our team. As a community of passionate medical researchers and practitioners with access to a world class simulation center, we are ideally positioned to investigate, analyze, and facilitate progress.

Despite the growing popularity of simulation training in medicine, empirical data supporting the method is still lacking. Emerging trends do suggest that simulation training is more effective for certain skills and certain types of students. In addition to intubation errors, recent studies point to interdisciplinary errors of communication as another significant complication of anesthesia procedures. Our study has been designed to explore these concerns by:

- studying psychomotor skill acquisition
- focusing on inexperienced learners
- comparing training efficacy in two disciplines

Our approach is broad intentionally, as we hope that it will be broadly applicable and beneficial. Over the 24-month time frame stipulated by the IIR Grant terms, our project will be completed as follows:

- Phase 1: Curriculum Design
- Phase 2: Programming and Media Synthesis
- Phase 3: Training and Evaluation
- Phase 4: Review and Re-evaluation
- Phase 5: Data analysis and Authoring Report

INTRODUCTION

This proposal is submitted in response to a request for proposals issued by the Anesthesia Patient Safety Foundation. The foundation's mission to promote research, education, and innovation to improve anesthesia patient safety is one already shared by the David Geffen School of medicine.

As the current body of research shows, there are several major challenges to overcome in pursuit of a future in which no patient is harmed by anesthesia. Foremost among them, a simple lack of relevant and trustworthy information is available as a result of rapid technological advances in medicine as well as incongruence across state mandates for reporting data and incidents. Even the growing acceptance of simulation training for medical procedures is under-supported due to insufficient numbers of trials and data.

Our study will produce crucial data about the efficacy of training medical professionals to perform intubation through virtual reality simulation. This skill has been chosen as our focus because there is still a pressing need for improvement in training techniques for that skill. It has long been known that intubation is the largest contributing factor to anesthesia-related patient deaths as well as malpractice litigation. Given our team's access to an outstanding community of medical professionals and educators as well as world-class simulation equipment and facilities, we are ideally poised to conduct this study. The potential impact we predict will be affected through this research can spread across a multitude of medical disciplines. The data that we hope to collect will be published for the benefit of the global medical community, and the

programs which will be produced can be disseminated to medical educators and professionals wherever technological resources allow.

CURRENT SITUATION

Anesthesiology safety has vastly improved in stride with decades of immense technological innovation. Among other road blocks, the rapid-fire cycle of progress does not lend itself to thorough scientific inquiry. What data there is to survey suggests areas of promise or concern:

- **Assumptions:** while centers like our own at UCLA have wholeheartedly embraced simulation training as the golden standard, adequate analysis of the practice is still required. Emerging data has begun to suggest that not all skills are acquired the same. Drexel College of Medicine reports psychomotor skills, like intubation, as standout candidates for the method.
- **Experience:** new data suggests that simulation training is not as effective for medical professionals already in practice. The World Journal of Medicine suggests junior-level learners have significantly more to gain than their senior counterparts. Drexel College of Medicine supports the logic, suggesting anesthesiology residents as ideal candidates for simulation, as the low-risk experience can instill confidence in everyday skills as well as less common—but still crucial—procedures.
- **Communication:** a growing body of evidence suggests the educational incongruities that exist across the members of a patient's care team can lead to fatal errors of communication.
- **Prevalence:** It has long been known that endotracheal intubation most commonly results in complications that lead to patient injury and death.

PROJECT PLAN

We have designed our research study in pursuit of data that will facilitate progress toward endotracheal intubation safety and, at the same time, be applicable across a broad range of medical disciplines to the most benefit possible.

Objectives:

- Asses the efficacy of simulation training for the acquisition of a psychomotor skill.
 - Asses the efficacy of simulation training for junior-level learners.
 - Identify, where they may exist, deficiencies in communication between nurses and anesthesiologists.
1. Curriculum design (3 months).
 2. Program synthesis and video production (7 months).
 3. Initial training and evaluation (6 months).
 4. Review and reevaluation (6 months).
 5. Data analysis and authoring report (6 months).

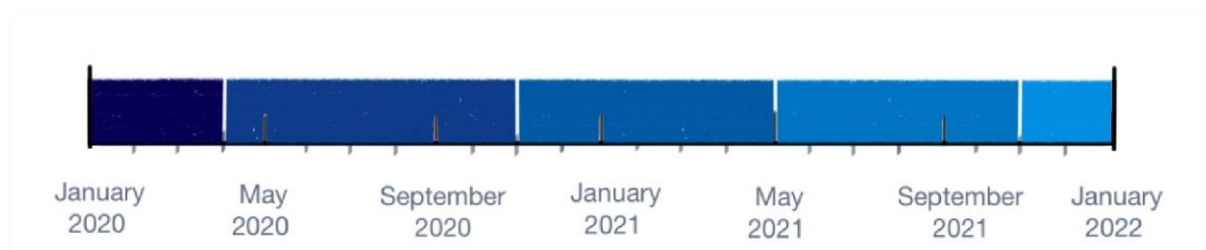


Figure 1 Project Timeline

Phase 1: Scope Assessment and Curriculum Design.

- Assess scope of the skill: What does intubation do? What is the standard procedure?
- Design curriculum based on scope assessment.
- Establish system for assessing performance of the skill.
- Choose most appropriate simulation type.

Phase 2: Simulation Programming and Media Production.

- Program initial and review simulation experiences.
- Film initial and review video components.
- Establish procedures for proctoring training.

Phase 3: Initial Round of Training.

- Complete initial training.
- Evaluate participants.
- Observe participants' performance for (an amount of time).
- Re-evaluate participants at the end of (phase 3).

Phase 4: Second Training, Course Review.

- Complete review materials.
- Evaluate participants.
- Observe participants' performance for (an amount of time).
- Re-evaluate participants at the end of (phase 4).

Phase 5: Data Analysis

- Analyze total data collected.
- Compose full report.

QUALIFICATIONS

The David Geffen School of Medicine at the University of California, Los Angeles was born just after World War II to fill a growing need for medicine in Southern California. The school was established and progress toward their mission has advanced tirelessly in the decades that followed. Just a decade after the school was established, the UCLA Medical Center was opened and just two decades later their student body multiplied from fewer than thirty to more than four hundred. In the 70's the school partnered with Venice Family Clinic, the nation's largest free clinic while also embracing the onset of computerization in medicine. As the school continued striving for advances through research and community outreach and support, its graduates were leaving their mark on the world, more than proving the quality of the school and the virtue of its mission.

The David Geffen School of Medicine tasked itself with a mission to improve health and health care through well-intended, forward-focused discovery and innovation. This has led to the addition of numerous research centers and labs, including its state of the art Simulation Center, which opened in 1996 and was among the first of its kind in medical training facilities.

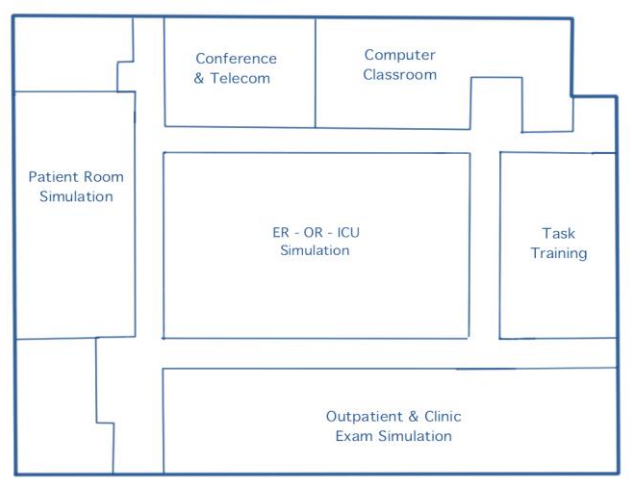


Figure 2 UCLA Simulation Center

UCLA's Simulation Center was built in 1996 and has since become one of the world's forefront sources of training technique advances. Students from all medical disciplines come here to build their confidence acquiring skills in simulated emergency rooms and intensive care units. Combining state of the art technology with the quality instruction of some of medicine's most accomplished physicians molds students into the outstanding innovators the school has become known for.

In recent years, the school has published research findings on learning style impact on simulation skill training, integration of simulation into medical curricula, and simulation-based re-training of established physicians.

Eran Halperin, PhD – Research and Innovation Manager

Dr. Halperin is a Professor of Anesthesiology and Perioperative Medicine and Computer Science. He has researched neurocognitive processes in psychomotor skills acquisition and ethical decision making as it relates to reporting intervention outcomes. He has worked with the Commonwealth Fund to lobby for protection and expansion of a national incident-reporting database of medical errors and malpractice.

Williamina Sugar, PhD – Principal Investigator

Dr. Sugar has investigated the use of simulation training in low income regions and peripheral nations, decision fatigue, and diminished vigilance of doctors during overtime clock hours. She currently advocates for ethical and responsible scheduling of medical professionals in California.

Amanda Hamilton, BS – Student Researcher

Amanda Hamilton is a student of David Geffen School of Medicine pursuing her doctor after having earned her Bachelor of Science in Biology from University of California, Irvine. She has volunteered her skills at Planned Parenthood as well as UCLA's long-time partner, Venice Family Clinic.

COSTS AND BENEFITS

The following budget provides a breakdown of how grant funding will be apportioned. The major costs, programming and media production, will produce innovative new simulation experiences which will benefit medical educators in and beyond UCLA's medical school. Additionally, the supplemental review curriculum will be made available to currently practicing medical professionals in hopes of amending knowledge gaps that cause communication errors in anesthesia patient care.

As a multi-fold return on investments, funds allotted to equipment and facility rentals will ultimately support maintenance of and technological innovation within UCLA's simulation center. By supporting an organization that has proven itself a powerhouse of meaningful research returns, the beneficial influence of APSF's funding will prove impactful beyond this project. Below we have provided a rough breakdown of our vision to utilize IIR Grant funding to facilitate patient safety improvements.

Services and Facilities	
Equipment Rental	\$18,000
Lab Rental	\$30, 000
Insurance	\$12, 000
Programming and Production	
Filming	\$10,500
Video Post-production	\$10,500
Program Development	\$31,500
Stipend Allotment	
Student Researcher	\$15,000
Materials and Equipment	
Medical Mannequins	\$7,800
Intubation Kits	\$5,850
Endoscopic Imaging Equip.	\$5850
Communications & Dissemination	
Printing	\$750
Publishing	\$750
Patient Safety Measures	
Board Evaluation	\$300

Figure 3 – Budget

CONCLUSION

In sum, we hope that your team recognizes in ours the same passion for helping people that the APSF has championed for decades now. Of course we know that we are not the only team chomping at the bit to do our part—there is no shortage of smart and selfless folks in our field. But, we are uniquely advantaged to work among the brilliant medical minds of the David Geffen School of Medicine utilizing facilities and technology that will be the template after which medicine's safer future is modeled.

Our project has been tailored to utilize funding in the most efficient way possible, producing data relevant to various aspects of anesthesia safety while focusing on clearing the most significant danger our work poses to our patients. The funding then essentially doubles its influence, as a significant portion of it has been allotted to use of the Simulation Center, which, by degrees, supports every other project and training that takes place in its well-maintained, ever-modernizing facilities.

Thank you for considering our project. We are eager to hear from you and get to task. If we can answer questions or address concerns, please reach out to us and GeffenSimSquad@ucla.edu.