# Mobile Simulation Lab With Acute Care Telemedicine Support

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## INTRODUCTION

Whether operating a helicopter or working in the operating room, individuals continually engage in skilful performance – a necessary element of safety to self and others. Well-organized, deliberate practice with instructions and feedback leads to truly skilled performance. Today, the rapid introduction of supportive technology in challenging work conditions changes how we learn to perform. Consequently, training programs should be developed in tandem with the development of supportive technologies.

Our research investigates how novel technologies and communication systems can aid in the development and maintenance of complex clinical skills in remote environments, such as Newfoundland and Labrador.

NL is faced with significant challenges pertaining to the maintenance of procedural proficiency and the delivery of acute care medical services – largely a result of its geography. Our research centers on the investigation of tele- and mobile simulation as a solution to the challenges presented by the geographic divide within the province and as a mechanism for connecting medical providers with continuing medical education opportunities.

## IMPORTANT ELEMENTS

**Simulation**
The replication of an event or a task for the purpose of training and/or assessment. The Royal College of Physicians and Surgeons of Canada requires every medical school to offer simulation as part of the medical student curriculum. Accordingly, MUN has created the CLSC and the Faculty of medicine developed a living lab – the HELPS lab.

**Telemedicine**
The remote diagnosis and treatment of patients using a variety of communications equipment. Telemedicine enabled services facilitate timely access to acute care and potential for improved patient outcomes [1]. It presents an opportunity to address the challenges associated with rural and remote healthcare provision [2].

**Mobile Simulation**
Enables access to simulation training by bringing the training environment and equipment directly to the remote teaching site. For rural areas, or those without a simulation center, mobile simulation is a valuable resource [3, 4].

## OBJECTIVES

1. **Build** a mobile simulation unit assessed for human factors that uses acute-care telemedicine/mentoring techniques to meet rural doctors’ needs.
2. **Assess** communications and privacy requirements and existing infrastructure with associated limitations for operating in this environment.
3. **Evaluate** various software and hardware technologies that have the potential to enhance remote medical care in rural and remote locations.
4. **Assess** learner satisfaction with the teaching methods utilized in the mobile unit and assess user satisfaction of the product design.

## METHODS

Our design process will consist of a **prototype development series** whereby results from research on the previous prototype will inform the development and enhancement of the subsequent prototype.

### Location:
1. HELPS lab (Human Experimental Learning, Performance and Safety Lab) at MUN
2. Mobile Simulation Unit (MSU)

The **Prototype Development Series** will proceed as follows:

1. **Prototype-A development**: structural mock-up developed and assessed for human factors to inform optimal design of mobile unit.
2. **Prototype-B development**: design and development of mobile unit based on results of step one. Assessment of human factors and connectivity for tele-simulation instruction and feedback.
3. **Prototype-C development**: development of improved design based on results of step 2. Mobilization of the unit to the rural/remote site including on-site assessment of human factors and connectivity with local learners.
4. **Enhancement of Prototype-C**: evaluation of prototype for educational effectiveness using an equivalency trial.

The methodology of this study is both quantitative and qualitative. The pseudo-randomized experimental design of this equivalency trial represents the quantitative methodology, with details shown in the PICO format.

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## PROTOTYPE C DEVELOPMENT

**Population, Intervention, Comparison, Outcomes (PICO):**
- **P**: Senior medical students and junior residents.
- **I**: Instruction of intubation skills using a simulation mannequin located in the MSU.
- **C**: MSU tele vs. MSU control group.
- **O**: Participants will complete a retention intubation test 1 week after the intervention. This test will be video-recorded and scored off-line by two independent experts in the field.

### Objectives

- Simulation-based education addresses many ethical, economic, and medico-legal concerns associated with medical education, however it can be expensive, time consuming, and subject to scheduling/space limitations.
- As modern simulation labs are outfitted with video-recording equipment, observational practice is a readily-available and under-used method.
- Individuals practicing in rural and remote areas of the country will have limited access to high-fidelity simulation labs that are often limited to larger, academic centers. In many cases, high fidelity simulation is not required to provide high yield instruction and practice to those in need. The use of mobile simulation in combination with efficient telecommunications technology could play an important role in overcoming the barriers of geography, cost and access to expert instruction.

### IMPULSATIONS

Simulation-based education addresses many ethical, economic, and medico-legal concerns associated with medical education, however it can be expensive, time consuming, and subject to scheduling/space limitations.

### REFERENCES


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