The Impact of Intravenous Catheter Insertion Training Modalities on Clinical Intravenous Catheter Insertion Performance in Graduate Nursing Students

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INTRODUCTION

• The use of simulation in health care training has proliferated over the last decade, but definitive evidence demonstrating translation of mechanical or conceptual skills gained in the simulated setting to clinical care remains an area of inquiry.
• The difficulty in demonstrating this ‘connection’ has centered on two primary areas:
  1. reliability within training devices and between instructors
  2. developing valid methods for measuring skill translation from simulation training to actual clinical performance.
• The low fidelity, part-task training devices currently used in many schools of nursing for developing the psychomotor skill of IV insertion are subject to both technologic and process variability.
• Because there is no universally accepted, published and validated ‘correct technique’ for teaching IV insertion, inter- and intra-instructor variability are significant concerns in assisting with the development of this benchmark clinical skill.

PURPOSE

• The overall purpose of this IRB approved (IRB # 0510116) study was to compare the impact of a hybrid screen-based and haptic IV training system with standard tubing based IV insertion arms.
• Specific aims were to evaluate:
  1. The impact of a novel intravenous catheter insertion trainer, the Laerdal, Inc. Virtual IV™ (VirIV), on success rate of IV insertion as reported by subjects
  2. Success rate of actual IV insertion as reported by subjects receiving two-way, interactive video conferencing instruction versus having the instructor physically present
  3. Adherence to and acceptance of a 10-point IV Insertion Protocol derived through hierarchical task analysis methods (HTA)
  4. Use of the 10-point IV Insertion Protocol along with the VirIV as a method to improve compliance with selection and use of Personal Protective Equipment (PPE) during IV insertion

METHODS AND TOOLS

• Hierarchical task analysis (HTA) was used to develop a standardized 10-point IV Insertion Protocol
• All subjects were 1st year Nurse Anesthesia Program students (N=30) who had received baseline IV training using a ‘standard’ tubing based IV insertion arm prior to initiation of the study protocol. Subjects were consented, enrolled and randomly assigned to one of three study arms, each training to the 10-Point IV Insertion Protocol:
  1. The standard treatment group received additional ‘standard’ IV arm training.
  2. Intervention Group-1 received training on the VirIV system with the instructor physically present.
  3. Intervention Group-2 received training on the VirIV system with the instructor interacting via two-way video.
• Prior to and following the IV insertion protocol training, all subjects recorded successful and unsuccessful IV attempts (on actual patients) in an online, password protected, database (Typhon Group™).
• In addition, subjects were randomly observed and evaluated versus the 10-Point IV Insertion Protocol in the clinical setting with scoring done on HP IPAQ™ hand held computers.
• Random observation points were prior to the protocol, three months and six months post-training (data collection is ongoing).

IMPORTANCE AND POTENTIAL IMPACT

• The most common invasive procedure in the hospital setting is an IV start; patients often express this as their number one concern prior to surgical procedures.
• Undergraduate nursing education does not typically offer this experience due to access and fear of iatrogenic injury.
• IV Teams have reduced the number of professional nurses who gain or regularly practice this skill.
• Development of this clinical skill among other healthcare professionals continues to involve ‘trial and error’ with patients.
• We hope to demonstrate these main outcomes:
  • More rapid acquisition of IV insertion skills
  • Increase in success of IV insertion in the intervention groups (VirIV with instructor present and by video link)
  • Ability to effectively train a psychomotor skill through use of a two-way video conferencing system
  • Improved adherence and use of personal protective equipment and procedures
  • Standardized training in conjunction with well defined, observable measurement points could allow for demonstration of skill transference from the simulated to the clinical setting.