General Anesthetic Induction Sequence High Fidelity Simulation: Determining Efficacy Among Novice Student Registered Nurse Anesthetists

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High Fidelity Simulation (HFS) is used across multiple health professions. Despite the wide variety of clinical experiences that Student Registered Nurse Anesthetists (SRNA) possess prior to training, the induction sequence to a General Anesthetic (GA) is a daunting task. Although the efficacy of HFS has been widely studied within undergraduate nursing programs, there are no studies published determining the efficacy of HFS on SRNA training.

The purpose of this study was to determine the efficacy of simulation training among entry-level SRNAs and examine any individual participant factors that may influence clinical performance within HFS.

### Methods

- **Human subjects were protected (~Spokane IRB ID: STUDY18000465)**
- **Pilot study participants recruited from 1st semester SRNAs in the Doctorate of Nurse Anesthesia Practice (DNAP)**
- **Full study participants recruited from prospective DNAP students**
- **Primary endpoints: efficacy of GA induction sequence HFS**
- **Secondary endpoints: individual participant factors that may influence clinical performance within HFS**
- **Scoring tool developed to measure primary outcome (Figure 2)**
- **Powerpoint and didactic lecture provided to all participants**
- **Pretest assessment following didactic training, using scoring tool, prior to HFS**
- **Participants guided through HFS and subsequently debriefed**
- **Posttest assessment completed following HFS using scoring tool**
- **Each participant allotted 60 minutes for individual HFS session**
- **Analysis of variance utilizing a waitlisted study design**
- **A priori confidence level (α = 0.05)**

### Results

- **Table 1. Demographic and Clinical Characteristics (N=37)**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Gender Male (%)</th>
<th>Gender Female (%)</th>
<th>Type of Critical Care Experience</th>
<th>Critical Care Experience (%)</th>
<th>First semester SRNA (%)</th>
<th>Prospective SRNA (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CVICU</td>
<td>13 (34.2)</td>
<td>24 (65.8)</td>
<td>1 up to 3</td>
<td>18 (49%)</td>
<td>11 (30%)</td>
<td>26 (70%)</td>
</tr>
<tr>
<td>MICU</td>
<td>9 (24.3)</td>
<td>28 (75.7)</td>
<td>3 up to 5</td>
<td>23 (62%)</td>
<td>12 (32%)</td>
<td>25 (68%)</td>
</tr>
<tr>
<td>SICU</td>
<td>3 (8%)</td>
<td>34 (92%)</td>
<td>&gt; 5</td>
<td>6 (16%)</td>
<td>7 (19%)</td>
<td>29 (71%)</td>
</tr>
</tbody>
</table>

- **Table 2. Efficacy of High-Fidelity Simulations (N=37)**

<table>
<thead>
<tr>
<th>Type of Critical Care Experience</th>
<th>Mean Pre HFS Score</th>
<th>Mean Post HFS Score</th>
<th>Mean Δ HFS Score</th>
<th>95%CI p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>CVICU</td>
<td>23.7</td>
<td>33.4</td>
<td>9.7</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>MICU</td>
<td>23.3</td>
<td>33.2</td>
<td>9.9</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>SICU</td>
<td>23.8</td>
<td>33.2</td>
<td>9.4</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

### Discussion

Our sufficiently powered study detected a 28.0% (mean pre-test 23.7, mean post-test 33.4) improvement in Simulation Assessment Tool scores following HFS (p < 0.001). Despite variations in pre HFS scores, both HFS scores remain homogeneous across all participants confirming the effectiveness of our training. Our study also indicated that there were no statistically significant group differences in HFS pre-test scores amongst the participants for the demographic factors we assessed; type of ICU (p=0.76), years of ICU experience (p=0.36), and age (p=0.91).

GA induction sequence training using HFS was proven to be effective among novice SRNAs. In alignment with the current research evidence, the use of HFS among SRNAs may help to improve learning, self-efficacy, and subsequently patient safety. Doctoral nurse anesthesia programs should consider the integration of HFS throughout program curriculum.

### References


### Figure 1: Power Analysis Based on Pre Study

### Figure 2: Simulation Scoring Tool

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