It is difficult to compare simulation training with other learning methods and it is unproven that simulations are worth the large financial and educational investment. Simulation training has become increasingly integrated into graduate medical education and is used in many specialties. Thus it is necessary to ensure that the investment of time and financial resources generates improved learning over traditional didactic lectures.

- OR emergencies are infrequent, yet high risk events, that require communication and teamwork. Consequently, beginning in July 2010, the Penn Medicine Clinical Simulation Center (PMCSC), in cooperation with the Departments of Surgery and Perioperative Services, and Safety Management, developed a series of surgical simulations aimed at improving preparedness and patient outcomes in the event of uncommon OR emergencies.

- Approximately 450 PeriOp nurse, staff and residents from OB/GYN, Anesthesiology, Surgery, ENT, OMF/S, and Orthopedics have participated in an OR Fire scenario with improvements observed in timeliness of response as well as self-reported confidence and role recognition in the event of an OR Fire. Simulation training consisted of a naive simulation followed by a debriefing session with all participants.

- To demonstrate that the effectiveness of this training is due to the simulation and not the didactic component alone; 46 surgical interns undergoing OR fire training were divided into simulation-based and traditional lecture-based trainings.

**BACKGROUND**

Post Simulation

Pre Simulation

Pre Lecture

Lecture Training

Simulation Pre Training

Simulation Post Training

Self Assessment in Lecture

Pre Simulation and Lecture Training Survey Responses

Self Assessment of Simulation Training

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**MATERIALS and METHODS**

- Participants were split into two groups, each containing four teams of residents for a one-hour training on OR Fire Safety. Both groups completed a ten question written test to assess basic OR fire safety knowledge and confidence prior to training.

- Lectures either received training via participation in a simulated OR fire with a post-session debriefing ("simulation group", n=22) or a PowerPoint lecture ("lecture group", n=24). The same content was provided to both groups.

- Both the lecture and simulation groups participated in a post training OR fire simulation. Participants in the simulation were assigned team roles (anesthesiologist, scrub nurse, surgeon, etc.) and entered an OR equipped with a SimMan 3G.

**RESULTS**

- Incoming surgical interns (n=46) participated in OR Fire training during a surgical skills boot camp at the Penn Medicine Clinical Simulation Center. This included all interns in the Department of Surgery and surgical subspecialties.

- The "simulation group" improved in length of time to perform necessary steps in the fire protocol (p < 0.05) from their initial to final simulation, similar to previous data. In their post-session OR fire simulation, the "lecture group" performed all steps but at a significantly slower rate than the "simulation group" (p < 0.05). (TABLE 1)

- Self-reported understanding of response steps, risk factors, and role in the event of an OR Fire increased significantly for both groups following training (FIGURE 2B). However, the "simulation group" improved significantly more (p < 0.05) (FIGURE 2C).

- Prior to training, interns scored similarly on a pre-training test (61% vs. 62% correct responses with no significance determined by a one tailed unpaired t-test, FIGURE 3). Following training, interns in the "simulation group" scored significantly higher than those in the "lecture group" on the same test (93% vs. 82% correct responses, p < 0.05).

**SUMMARY of RESULTS**

- This study demonstrates that OR fire safety training via a simulation followed by structured post-session debriefing, improves:

  1. Response times in a simulated OR fire
  2. Scores on tests relating to OR fires and
  3. Self-perceived educational benefit, than a traditional lecture approach. As shown in previous studies on simulation training (Acero et.al.1)

- This study also suggests simulation training is a more effective training method than traditional didactic training.

- Further studies are required to assess the retention of each of the measured improvements in this study.

**CONCLUSION**

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**TABLE 1**

<table>
<thead>
<tr>
<th>Task Time (sec)</th>
<th>p-Value</th>
<th>Time (sec)</th>
<th>p-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Call Fire</td>
<td>7.16</td>
<td>0.0000</td>
<td>3.00</td>
</tr>
<tr>
<td>Incoming</td>
<td>52.75</td>
<td>0.0260</td>
<td>5.86</td>
</tr>
<tr>
<td>Remove Drapes</td>
<td>32.75</td>
<td>N/A</td>
<td>8.50</td>
</tr>
</tbody>
</table>

**FIGURE 2A**

- Responses to a post training survey containing questions answered on a 5 point Likert type scale. FIGURE 2A displays self reported understanding before the interns received their respective training. An unpaired one tailed t-test demonstrated no significance (p>0.5) between the two groups. Thas three groups are considered homogeneous before any training.

**FIGURE 2B**

- Quiz scores collected pre and post training. Before training there is no significance found between the two groups quiz scores with a one tailed unpaired t-test indicating a homogenous testing group. Post training however, the "simulation group" improved significantly more than the "lecture group".

**FIGURE 2C**

- Responses to a post training survey combining questions answered on a 5 point Likert type scale. FIGURE 2C displays self reported understanding before the interns received their respective training. A paired one tailed t-test revealed significance (p<0.05) between the two groups.