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A Malignant Hyperthermia Competency Training for Nurse Anesthesia Trainees: Development, Implementation, and Evaluation

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Introduction

- Video simulation is an alternative method of teaching that can play an important role in nurse anesthesia education.
- MH can be triggered by frequently used anesthetic gases such as sevoflurane, desflurane, and isoflurane and also a frequently used short acting muscle relaxant called succinylcholine.
- Symptoms of MH crisis include increased blood carbon dioxide level, muscle spasms or rigidity, increased respiration, increased heart rate, and increased temperature. It also causes severe electrolyte shifts causing blood potassium levels to be extremely high and the blood to become acidic.
- This crisis can be difficult to recognize and manage without proper training. It is a time sensitive and critical situation that must be recognized and managed properly to ensure patient survival.

Methods

- A single group pretest-posttest design was used to determine the effectiveness of video simulation on improving knowledge of junior and senior NATs at NorthShore University HealthSystem School of Nurse Anesthesia.
- Three phases: (1) development of the simulation video, (2) development of the pre-test and post-test, and (3) evaluation of the video simulation on NAT knowledge via the pre-test and post-test.
- Sample – convenience sample of Junior and Senior NATs at NorthShore University Healthsystem School of Nurse Anesthesia.

MH Learning Session

- Pretest - The first page of the pretest was a face sheet that identified whether the participant is a junior or senior NAT. This was completed, followed by the pretest to determine baseline knowledge regarding MH recognition and management. The pretest and posttest were the same for consistency in comparing data.
- MH Simulation Video – 10 minute educational simulation video demonstrating the proper management of MH.
- Posttest - After the video was completed, the post-test was given to the NATs to complete.

Results

NAT Sample Distribution

<table>
<thead>
<tr>
<th>Pretest - Challenging Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Question 1</td>
</tr>
<tr>
<td>-----------</td>
</tr>
<tr>
<td>10 Junior NATs</td>
</tr>
<tr>
<td>Average score: 13.9</td>
</tr>
</tbody>
</table>

Paired Samples Statistics

<table>
<thead>
<tr>
<th>Pair</th>
<th>Mean Scores Pre Test</th>
<th>Mean Scores Post Test</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>10.750</td>
<td>13.900</td>
<td>1.48235</td>
<td>0.6682</td>
</tr>
</tbody>
</table>

N = 20 Nurse Anesthesia Trainees
- 10 Junior NATs
- 10 Senior NATs
• Average pretest score including both junior and senior NATs was M=10.75 (SD=1.48235).
• The average score on the posttest was M=13.9 (SD=.30779).
• The overall NAT pretest score on average improved by 3.15 points (95% confidence interval, 3.799, 2.501) after viewing the video simulation.

Conclusion

• The use of technology is useful in enhancing traditional learning methods.
• The findings of this study show that viewing a video simulation on the proper management of malignant hyperthermia increased knowledge in both second and third year nurse anesthesia trainees.
• The results of this anesthesia crisis study were consistent with previous literature that demonstrated the positive effects of video simulation in medical and nursing education.
• The strong results of this pilot study conclude that there is a significant role for video simulation in the curriculum of nurse anesthesia programs.
• Further research is needed to explore this new and exciting educational strategy.

Discussion

• The results show NATs that participated in the study gained knowledge regarding the management and treatment of MH.
• NATs improved their scores after viewing the video simulation. The seniors scored slightly higher on the pretest (11.5), than the juniors (10), suggesting that some advanced clinical experience provided them with a slight advantage going into the study.
• Levene’s Test for Equality of Variances showed statistically significant variances for questions 7, 12, and 13. This could help educators in the future identify knowledge gaps for the junior NATs.

Clinical Question

• Does viewing an instructional video on management of a MH crisis improve knowledge of 2nd and 3rd year nurse anesthesia trainees (NATs)?

Future Research

• Larger studies involving recognition and treatment of various crisis using video simulation as a learning tool for NATs.

Pretest - Challenging Questions

1. What are the symptoms of malignant hyperthermia? (MCQ)
2. What is the proper management of malignant hyperthermia? (MCQ)
3. What is the most common anesthetic gas associated with malignant hyperthermia? (MCQ)
4. What is the role of succinylcholine in the management of malignant hyperthermia? (MCQ)

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