**Application of Cricoid Pressure during Anesthesia Induction-Critically Appraised Topic (CAT)**

PICOT Question:
Are the majority of perioperative RN’s applying proper cricoid pressure technique during anesthesia induction and if not, does instruction to the perioperative personnel on applying cricoid pressure improve technique?

**Clinical bottom line based on literature appraisal below:**
Although the application of cricoid pressure is a technique that is performed every day in the operating room, the majority of perioperative nurses may not be applying cricoid pressure correctly. These articles all agree that technique can be improved with both written instruction and hand-on practice with mannequins.

Search strategy implemented:

Search outcome:
The search results revealed over 60 articles, but of those articles, only a handful were relevant to this research topic. Of those articles, two which promised to be helpful in review of this topic, *Survey of skills needed to assist tracheal intubation: nurse assistants lack accurate knowledge of BURP and cricoid pressure maneuvers & Krikoiddruck, (Cricoid Pressure)* were only available in Japanese and German respectively. Two additional articles were literature reviews of the topic and are included in this synthesis.

Synthesis of relevant studies:

<table>
<thead>
<tr>
<th>Author, date, country, and industry of funding</th>
<th>Patient Group</th>
<th>Level of Evidence (Oxford) / Strength of Evidence (GRADE)</th>
<th>Research design</th>
<th>Significant results</th>
<th>Limitations</th>
</tr>
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<tbody>
<tr>
<td>Patten. S. (2006). USA, 51 Perioperative nurses</td>
<td>Level 5 Qualitative, correlational study,</td>
<td>The number of participants who could apply the appropriate amount of pressure to the</td>
<td>Some of the proposed goals, specifically, 90% of the participants being able to apply</td>
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Reviewed/Revised: 10/08; 2/09
| Funding not disclosed | collecting data pre and post instruction. | correct location increased from two (3.9%) on the pretest to 35 (68.6%) on the posttest. This QI project resulted in a written testing tool to assess understanding of correct application as well as a tool to be used in training nurses to apply cricoid pressure correctly. | the correct amount of pressure in the correct location during the posttest, were not met, and the authors recommend an increase in the time each participant was allowed to practice on the model and scales. 32 participants had only 2 models and scales for hands-on portion of the program, (only about 2 minutes of practice time). |
| Meek, Gittins & Duggan, 1999, Great Britain, Funding not disclosed. | 135 anesthesia assistants | Level 3 | This study is a qualitative design, utilizing structure interview and the actual application of cricoid pressure with a model designed for measuring force applied. | This research project was implemented to determine the knowledge level and applied technique of appropriate cricoid pressure and whether knowledge of the required force and practical training in the application of a target force would affect performance. Applied force was measured utilizing a simulator, both before and after instruction. The authors found that pre-instruction, only 33% of participants could correctly state the necessary pressure recommended for cricoid application, and the applied pressure was equally as poor. After instruction, the variability in the force applied was much reduced and the aspect of grossly inadequate force (under 20 N) was totally eliminated. 60% of the subjects were experienced providers, while 40% were trainees. The difference between experience might have affected the statistical results, however the authors state that all subjects were equally misguided on correct application. Interestingly, this study believed that the optimal cricoid force was between 20 N and 30 N, while newer studies believe 40N is a more appropriate pressure for occlusion of cricoid cartilage. |
| Herman, Carter & Van Decar, 1996, USA. | 53 anesthesia providers consisting of 9 MD faculty, 20 anesthesiology | Level 5 | This design was a qualitative and correlational study. | There was a statistical difference between the preinstructional and subsequent attempts at the applied cricoid force applied. The study It could be argued that the disparity between levels of practice of the research subjects may affect testing results, although no significant individual |

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| Funding not disclosed | residents, 9 CRNAs, 1 off-service MD rotator, 3 medical students, 9 OB nurses and 2 OR technicians | collecting data for both awake and anesthetized scenarios at 4 separate phases, preinstruction, post verbal instruction, postpractice on laryngotracheal model and 3 month follow-up. | indicated a positive correlation between instruction and practice in the application of appropriate cricoids. The cumulative mean for all groups in the preinstruction phase was almost 20 N less that the recommended force for esophageal occlusion and post instruction the overall mean increased to 30.8+ 2.1N. After practice, this mean value was 39.0±1.4N. At the 3 month follow-up, the mean cumulative pressure was 38.6±2.9N. These results indicated that the application of cricoid pressure can be learned over a short period and the knowledge can be retained after 3 months. |

| Koziol, C.A., Cuddeford, J. D., Moos, D. D. (2000). USA. Funding Not Disclosed | 102 perioperative nurses anonymously participated. | Level 5 | This study was a qualitative analysis of the knowledge of recommended amount of cricoid pressure to prevent aspiration during induction, assessed by written testing, as well as the actual amount applied, assessed on Cognitively, only 5% of participants was able to identify the correct amount of cricoid pressure to apply. During actual applied pressure, only 13% of participants utilized the recommended amount of cricoid cartilage pressure on the model. Statistical analysis showed that the applied cricoid force was significantly less than the recommended amount, P=.0001; a <.05. An association was then assessed utilizing the Pearson’s Product Moment Correlation, analyzing the association between cognitive knowledge and applied pressure. No statistically significant association was found. P=.391. Another |

A larger sample would be advantageous to identify variations between different roles, (perioperative nurses, vs anesthesia or critical care nursing, etc.) Although training and practice on a model is recommended by the authors, no correlation between education and enhancement of technique was identified.

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Parry, A. (2009). UK. Funding not disclosed. This article is a literature review using the key words cricoid pressure, Sellick manoeuvre, rapid sequence intution and acid aspiration syndrome. N/A N/A The authors found a disparity between not only practice but a difference in opinion between the amount of cricoid pressure necessary to achieve optimal results. The key finding of the literature review and the recommendation of the author is that “education plays a role in ensuring best practice.” N/A

Gardiner, E. & Grindrad, E. (2005). England. Funding not disclosed. This article discusses the literature associated with the application of cricoid pressure during anesthesia induction and ways to improve technique. N/A N/A The literature reviewed in this article indicates that “clinical practice and knowledge of cricoid pressure is poor and inconsistent.” The authors recommend the development of clinical guidelines for the practice of applying cricoid pressure, as well as training to address proper location of cricoid cartilage, correct positioning of fingers and the correct amount of force to maintain cricoid pressure. N/A

Commentary:
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These studies indicate that a majority of subjects are unaware of the proper applied technique of cricoid pressure and that the correct application of cricoid pressure can be learned over a short period of time. Preferable instruction would include both verbal instruction as well as hands-on practice. It is also advisable to refresh technique periodically with additional practice on manikins and testing, perhaps annually.

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References: