

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:

Utilizing the keywords anesthesia, Perioperative, and cricoid as well as various combinations: A search of all the Ovid databases, (CMH&C Books@Ovid, **Ovid MEDLINE(R) In-Process & Other Non-Indexed Citations and Ovid MEDLINE(R)** 1950 to Present, **Ovid OLDMEDLINE(R)** 1947 to 1965, **PsycINFO** 1806 to November Week 3 2010, **EBM Reviews - ACP Journal Club** 1991 to October 2010, **EBM Reviews - Cochrane Central Register of Controlled Trials** 4th Quarter 2010, **EBM Reviews - Cochrane Database of Systematic Reviews** 2005 to November 2010, **EBM Reviews - Cochrane Methodology Register** 4th Quarter 2010, **EBM Reviews - Database of Abstracts of Reviews of Effects** 4th Quarter 2010, **EBM Reviews - Health Technology Assessment** 4th Quarter 2010, **EBM Reviews - NHS Economic Evaluation Database** 4th Quarter 2010, CMH&C Full Text Journals@Ovid).

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:

Author, date, country, and industry of funding	Patient Group	Level of Evidence (Oxford) / Strength of Evidence (GRADE)	Research design	Significant results	Limitations
Patten. S. (2006). USA,	51 Perioperative nurses	Level 5	Qualitative, correlational study,	The number of participants who could apply the appropriate amount of pressure to the	Some of the proposed goals, specifically, 90% of the participants being able to apply

Upon completion of the CAT please forward to Jackie Bartlett, EBPC Program Manager, at jbartlett@cmh.edu
EBP@EBPC@EBP Core/Toolkit/LiteratureSynthesis

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

Upon completion of the CAT please forward to Jackie Bartlett, EBPC Program Manager, at jbartlett@cmh.edu
EBP/@EBPC@/EBP Core/Toolkit/LiteratureSynthesis

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 than 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.	group differences were found using the Bonferroni multiple comparison method. It is interesting to note that pressures applied by the MD faculty across the board pre-instruction were considerably less than optimal. Also, only 81% of the participants were retested at the 3 month interval.
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; $\alpha < .05$. 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.

Upon completion of the CAT please forward to Jackie Bartlett, EBPC Program Manager, at jbartlett@cmh.edu
EBP/@EBPC@/EBP Core/Toolkit/LiteratureSynthesis

			provided model, as well as a comparative analysis, repeating measurements after instruction given.	concerning finding was that many of the participants applied pressure to the thyroid cartilage rather than the cricoid cartilage. (No data was collected regarding this observation).	
Parry, A. (2009). UK. Funding not disclosed.	This article is a literature review using the key words cricoid pressure, Sellick manoeuvre, rapid sequence intubation 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:

Upon completion of the CAT please forward to Jackie Bartlett, EBPC Program Manager, at jbartlett@cmh.edu
EBP/@EBPC@/EBP Core/Toolkit/LiteratureSynthesis

Reviewed/Revised: 10/08; 2/09

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.

Authored by:

Julie Thorne, RN, CNOR, MSN, CPNP

Date created:

12/28/10

References:

Patten, S. (2006). Educating Nurses about Correct Application of Cricoid Pressure. *AORN Journal*, 84 (3), 449-461.

MEEK, T., GITTINS, N. & DUGGAN, J. E. (1999) Cricoid pressure: knowledge and performance amongst anaesthetic assistants.

Journal of the Association of Anaesthetists of Great Britain and Ireland. 54, (1), 59–62, January 1999

KOZIOL, C.A., CUDDEFORD, J. D., MOOS, D. D. (2000). Assessing the Force Generated With Application of Cricoid Pressure. *AORN Journal*, 72(6), 1018-1030.

Parry, A. (2009). Teaching anaesthetic nurses optimal force for effective cricoid pressure: a literature review. *Nursing in Critical Care*, 14 (3), 139-144.

Herman, N. L., Carter, B. & Van Decar, T. K. (1996). Cricoid Pressure: Teaching the Recommended Level. *Anesthesia & Analgesia*, 83, 859-863.

Gardiner, E. & Grindrad, E. (2005). Applying cricoid pressure. *British Association of Critical Care Journal of Perioperative Nursing*, 14 (4), 164-168.

Upon completion of the CAT please forward to Jackie Bartlett, EBPC Program Manager, at jbartlett@cmh.edu
EBP/@EBPC@/EBP Core/Toolkit/LiteratureSynthesis

Reviewed/Revised: 10/08; 2/09