Establishing the content validity of an early extubation protocol: A quality improvement project for improving early extubation of CABG patients

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Abstract

Introduction

Patients undergoing coronary bypass graft will require intubation and the use of mechanical ventilation during and after surgery. It is well accepted that early extubation is associated with not only positive patient outcomes, but organizational outcomes as well. These patients that are not extubated early are at risk for complications associated with prolonged intubation. The literature supports the use of protocol aid with early extubation. The goal and expected outcome of this project is to establish the usability of an early extubation protocol by assessing its appropriateness for use in the post-operative cardiac surgical adult patient.

Method

For the purpose of establishing content validity of an early extubation protocol, two protocols were chosen from the literature. Fifteen cardiac surgery experts were invited to select the protocol they felt was most appropriate for use in this patient population. These reviewers were then asked to further analyze the protocol, based on a five-question survey. Their response was used to calculate a scale-content validity index (S-CVI) and an item-content validity index (I-CVI).

Results

Twelve of fifteen experts participated in the project. The content validity was estimated using 1) inter-rater agreement for relevance for each item (I-CVI) and 2) scale content validity (S-CVI). The means were established for each item. Content validity was estimated using 1) inter-rater agreement for relevance for each item (I-CVI: 0.75 to 1.00); and the scale content validity index (S-CVI/average = 0.92). Cronbach's alpha was estimated to establish reliability (0.972).

Conclusion

Selecting an appropriate protocol to be used in this patient population is the first step in implementing an effective early extubation process. The results highly suggest that the content of this protocol is quite relevant in this patient population. It is hoped that this will set the stage for early extubation in post-operative cardiac surgery patients.

Introduction

Cardiovascular disease affects an estimated 82 million American adults annually (Roger et al., 2011). An estimated 6 million will be treated with cardiovascular operations and other cardiac procedures (Roger et al., 2011). Consequently, an estimated 405,000 coronary artery bypass graft (CABG) surgeries are performed in the United States, each year (Hall, DeFrances, Williams, Golosinskiy, & Schwartzman, 2010). These CABG patients required intubation during surgery, and a majority of them continue to require mechanical ventilation after being transported to the cardiac surgery intensive care unit (ICU). Hence, the burden and method of extubation often lies with the cardiac surgery ICU team (Anderson, Henry, Hunt, & Ad, 2010). Many of these patients remain intubated up to 24 hours or more following surgery. Research has demonstrated that patients who are intubated for more than 24 hours experience increased morbidity and mortality (Anderson, Henry, Hunt, & Ad, 2010; Ji et al., 2010). Contributing factors associated with this are the notable increases in complications, such as pneumonia and airway trauma, that could lead to a cost increase of a patient's hospital stay when compared to patients who are extubated earlier.

Traditionally, the standard of practice for intubated patients is to leave patients intubated overnight and extubate at 24 hours post-op. However, this practice began to change in the 1990s, driven largely by the pressure to improve health-care costs associated with the use of resources utilized by intubated patients. For example, Davis, Worley, Mee, and Harrison (2004) found that early extubation could lead to a $10,000 reduction in total cost following open-heart surgery. Additionally, there were clinical benefits to early extubation in terms of patient outcomes. Thus, results of recent studies have suggested that early extubation can lead to a shortened length of stay, reduced total costs, and positive patient outcomes (Akhtar & Hamid, 2009; Alhan et al., 2003; Georghiou, Stamler, Erez, Raanani, Vidne, & Kogan, 2006; Guller et al., 2004; Hawkes, 2010; Murphy et al., 2002; Warltier, Myles, Daly, Djaiani, Lee, & Cheng, 2003).

The Cochrane Collaboration concluded that early extubation (within 8 hours) is beneficial and safe with regard to morbidity and mortality in the cardiac surgery patient population (Hawkes, 2010). Moreover, some of the benefits associated with early extubation include a decrease in ventilator- associated pneumonia, other nosocomial infections, airway trauma, lung atelectasis, and decreased use of sedation (Blackwood et al., 2010; Davis et al., 2004; Dodek et al., 2004; Ji et al., 2010). Finally, practicing early weaning in the post-operative cardiac surgery patient allows for a shorter ICU and hospital course (Konstantakos & Lee, 2000; Rashid et al., 2008 ;Toraman et al., 2005; van Mastrigt, Maessen, Heijmans, Severens, & Prins, 2006).

For these reasons, early extubation has become an important goal in most quality improvement initiatives. To help achieve this goal, The Society of Thoracic Surgeons (STS) recommends the use of an algorithm or protocol to guide early extubation. There are many studies that support the use of protocol to drive early extubation from mechanical ventilation (Chaiwat, Sarima, Niyompanitpattana, Udomphorn, & Kongsayreepong, 2010; Girard & Ely, 2008). According to Hawkes, Foxcroft, and Yerrel (2010), the use of protocols, algorithms, policies or guidelines is often a part of the early extubation of a cardiac surgery patient's plan of care. Several studies have reported that using a standardized procedure may shorten the overall time on the mechanical ventilator (Tonnelier, et al., 2005; Wall et. al, 2001).

As presented, early extubation is an important consideration in improving patients' outcomes following coronary bypass graft, and the use of protocol can provide an important guide for achieving this. Currently, there was no standard protocol for early weaning and extubation of the postoperative cardiac surgery patient at University of Maryland Medical Center (UMMC). The practice of extubating post-operative cardiac surgery patients is completed based on provider expertise, thus the practice of extubation can vary from practitioner to practitioner. The purpose of this project was to establish the usability of an early extubation protocol and establish its appropriateness for use in this setting. The result of this project will provide a basis for the implementation of the protocol, which in turn, will result in the reduction in the amount of time a post cardiac surgery patient will remain intubated. The long-term goal of the project is that with decreased extubation time, there will be a reduction in the length of stay in the intensive care unit, a decrease of complications related to prolonged intubation, and improved patient satisfaction.

Method

The population of interest for this project was experts within the field of adult cardiac surgery. For the purpose of this project, experts were defined as respiratory therapists, registered nurses, nurse practitioners, intensivists, or/and physicians, who have two or more years of experience and are involved with the management of post-operative cardiac surgery mechanically ventilated patients. Following IRB approval, the researcher identified a panel of 15 experts who work in the Cardiac Surgery Unit at UMMC. The sample consisted of 5 RN, 4 physicians, 4 nurse practitioners, and 2 respiratory therapists. This selection breakdown was based on a deliberate attempt to make sure each group was adequately represented based on their distribution and involvement with the extubation process. A list of these experts and their work email addresses was created from the organization's directory.

Participants' inclusion in the study was based on their expertise within the field of cardiac surgery. The sample size for assessing the usability of the protocol was determined to be ten experts as Polit, Beck, and Owen (2007) suggested that an I-CVI of greater than 0.75, with ten or more experts, yields a probability of agreement between the experts. Therefore, 15 experts were identified and invited to participate in the survey with the hopes of receiving ten or more responses.

The project was divided into two phases. Phase One consisted of the identification and selection of a protocol. Many of the protocols examined for possible consideration were immediately excluded from consideration because they were not applicable to this patient population. Most of these were geared toward patients with underlining respiratory problems that led to the requirement for intubation, which was not the case with most cardiac surgery patients.

A few protocols that warranted examination more closely include the protocol those used in (Branson, 2012 & Schadler et al., 2012).

These studies were based on an automated approach. They considered automated weaning and focused on adoptive weaning modes; these were not appropriate for this project because they differed from this project's objective. Protocols utilized in local hospitals were also considered but not chosen due to lack of study data supporting their use.

Ultimately, the two protocols were chosen because they focused on parameters that encompass all the major component of a weaning/extubation protocol. Using the expertise of the research group, the literature was reviewed and the two protocols were selected for possible implementation. Both protocols had demonstrated significant use in clinical practice. The first protocol (Appendix A) had a 50 percent rate of extubation within 6 hours following surgery (Anderson, Henry, Hunt, & Ad, 2010). The second protocol (Appendix B) was chosen for this project based on early extubation results during its use in a quality improvement program (Champ et al., 2009). It is a detailed protocol that contains more than the average criteria for extubation. For example, it includes not only respiratory function but also other functions such as cardiac function, neurological function, and renal function.

Following the identification of the two protocols, each expert was sent a personal email asking them to participate in the review (Appendix C), a link to an anonymous survey (Appendix D), as well as a PDF copy of each of the protocols. Each participant was asked to review each of the protocols and select one of the two protocols that best fits the needs of the cardiac surgical unit. The experts were given 14 days (two weeks) to complete the survey. After the 14 days, an email was sent out reminding each participant to complete the survey within one week (Appendix E). Following this reminder message, no additional message was sent to the experts.

At the completion of Phase One, Phase Two began. Phase Two of the project was based on the experts' selection of the protocol. The selected protocol was further analyzed for the purpose of establishing its usability. Using the same list of 15 experts (respiratory therapists, registered nurses, nurse practitioners, intensivists, and/or physicians), the participants were sent an email asking them, again, to participate in the second survey (Appendix F). Participants were also sent a link to the electronic, anonymous survey (Appendix G) and a PDF copy of the protocol. The participants were asked to review the protocol and complete the survey within 14 days. After the 14 days, an email was sent out reminding the participants to complete the survey within one week (Appendix H). Following this reminder message, no additional messages were sent to the experts. The completed surveys were then aggregated for statistical analysis and the data were reviewed for its completeness. All completed portions of the survey were included in the analysis. In order to establish the usability of the protocol, the protocol's content validity (S-CVI) and content validity index (CVI) were used as a proxy (Polit, Beck, and Owen, 2007). Polit, Beck, and Owen (2007) suggest that an S-CVI greater than 0.80 and an I-CVI of greater than 0.75 (with ten or more experts) yields the probability of agreement between the experts of the protocol's utility in practice.

The results from this survey were used to calculate a content validity index (CVI). A CVI for each item (I-CVI) was calculated using Excel. The I-CVI was calculated by dividing the number of experts giving a rating of either a "quite relevant" or "highly relevant" by the total number of experts participating in the survey question (Polit, Beck, & Owen, 2007). Following the calculation of I-CVI, the content validity of the protocol, as a whole, was calculated (S-CVI). The S-CVI is the average of the I-CVI for each item on the survey (Polit, Beck, & Owen, 2007).

Results

Phase One: The data collected from the surveys were analyzed using frequency to determine which protocol would be used for continued evaluation. Of the 15 experts selected, 13 responded to the anonymous survey. Twelve (92%), of these participants chose Protocol B. Therefore, Protocol B was selected for additional analysis.

Phase Two: The data was analyzed using Excel spreadsheet to determine the I-CVI and the S-CVI for the identified protocol. Of the 15 experts included in Phase Two, we obtained a total of 12 respondents. Most of the items were rated as "quite relevant" or "highly relevant" by the participants (see Appendix I). The individual item "This protocol contains all of the major components necessary for an early extubation protocol in this setting" had an I-CVI of 100%. The next item "The initial ventilator setting represents the initial ventilator setting appropriate for this population" I-CVI was determined to be 75%. The next item "The procedure for weaning considers all the appropriate indicators" was determined to have an I-CVI of 92%. The fourth item, "The criteria for extubation is adequately represented in the protocol" had an I-CVI of 100%. The final item, "This protocol is easy to use and follow" scored a 92% for its I-CVI. Based on the average of all the individual I-CVI, the S-CVI of the entire protocol was calculated to be 0.92.

In order to assess the reliability of the survey tool, internal consistency was assessed using the Cronbach's alpha calculation. This was calculated using the Statistical Package for the Social Science (SPSS) version 17. This analysis revealed a Cronbach's alpha was of (0.972).

Discussion

The I-CVI ranging from 75% to 100% is considered to be excellent. Polit, Beck, and Owen (2007) suggested that an I-CVI of greater than or equal to 0.78 for three or more experts is considered good evidence for content validity. Accounting for any chance agreement, generalizability can be safely assumed for I-CVI greater than 0.78 (Polit, Beck, & Owen, 2007). The resulted S-CVI of 0.92 suggested that the protocol analyzed in this project is highly appropriate for this unit's patient population. It also suggests that it is a useful tool in assisting with weaning and extubating these post-operative cardiac surgery patients from the mechanical ventilator.

In addition to the I-CVI and the S-CVI, Cronbach's alpha was calculated to determine the internal reliability of the survey (the degree to which each item on the survey is measuring the same thing). Increased correlation of the individual questions leads to increased confidence of the survey's reliability. A Cronchbach alpha of at least 0.80 is considered to be optimal measure of internal consistency (Yang, Shi, Lebrun, Zhou, Liu, & Wang, 2013). A Cronbach"s alpha of 0.972 is considered to be an excellent measure of inter-correlation of items on the survey.

The key recommendation from this project is that a successful implementation process should include all stakeholders. This was a multidisciplinary team approach. The project included representatives from all disciplines that are involved with early extubation of this patient population. This provides accountability for decisions affecting the overall success of the weaning and extubation process. It also allows for ownership of success or failure. Hence, there would be a greater effort on the part of participants to ensure success.

Another key recommendation is the use of protocol. Several studies support the use of a protocol for the purpose of early extubation. According to Hawkes, Foxcroft, and Yerrel (2010), the use of protocols, algorithms, policies or guidelines is often a part of the early extubation of a cardiac surgery patient's plan of care. Tonnelier, et al., (2005) and Wall et. al, (2001) reported that using a standardized procedure may shorten the overall time on the mechanical ventilator. Despite variations in protocols used in assisting with early extubation, the impact on early extubation and associated benefits is improved with the use of protocols.

Future Recommendations

This is an important project that sets up the groundwork for the implementation of an appropriate weaning and extubation protocol, following cardiac surgery. Phase One and Two are important steps in an early extubation protocol implementation process, but they are only a portion of the complete implementation process. The next step is to assess the usability with a small sample group. Depending on the results obtained from a small sample group, the next phase in the process would be to implement the protocol as the standard of practice for the unit or to revise as needed. Future considerations also include revision to the protocol, as needed, based on new evidence provided in the literature or changes in the population. Any future changes should take the same steps in acquiring a multidisciplinary approach.

The generalizability of these findings can also be improved through the implementation of this project in other settings. It cannot be assumed that the same results generated in this population can be extrapolated to a different setting. There are a variety of reasons why this may be the case. These reasons may include variables that may not be consistent from one setting to the next.

Role of the DNP

The DNP prepared nurse uses science-based theories and concepts to deliver the highest level of care. One major role of the DNP prepared nurse is to integrate nursing science into practice (Roberts, 2013). This project exemplifies this role. This project used an evidence-based approach to the implementing care for the individual patient.

Additionally, the DNP prepared nurse develops and evaluates a new practice approach to delivering evidence-based care. This is highly evident in this project. The project incorporates an evidence-based approach to early extubation of the postoperative cardiac surgery patient.

Furthermore, the implementation of these DNP roles is supported and enhanced by the use a multi-disciplinary approach in health-care practice. Effective translation of evidence into practice requires a collaborative approach. Collaboration involves coordination of individual actions, cooperation in planning and working together; it also requires sharing of goals, planning, problem solving, decision-making, and responsibility (Elligson, 2002). The project adopted a multidisciplinary approach to the implementation of an evidence-based early extubation protocol.

Translation into Practice

Translating evidence into practice can be a daunting task for anyone involved. Practice change associated with translation occurs in only about 8 to 15% (Best, A., & Holmes, B., 2010). Studies demonstrate that close to 30-40 percent of patients in the United States do not receive care according to scientific evidence (Graham et al., 2006; Grol & Wensing, 2004; Bhogal, et al., 2011). This failure to translate knowledge into practice is associated with health inequities, wastes, and increase cost (Ward, House, & Hamer, 2009). Despite the need to improve the delivery of care in this increasingly complex health care system, many barriers exist that interfere with the translation of evidence into practice (Grol & Wansing, 2004) identified some of the perceived major barriers to the implementation of evidence-based practice. These included: guidelines will not be read, insufficient evidence base, lack of knowledge of complications, guidelines too rigid, the cost is too excessive, there is an attitude of dislike to the imposed activity, no support and lack of financial compensation (Grol & Wensing, 2004). In order to have a successful transition plan, some of these barriers need to be eliminated or lessened. This translation of evidence into a practice plan aims to accomplish this using a theoretical framework for the dissemination of evidence into practice. The literature supports that the implementation of evidence is related to the critical issue of decreasing health system improvement (Best, A., & Holmes, B., 2010). The translation into practice should be guided with the conceptualization of a translation model or framework.

One major responsibility of the DNP nurse is translating evidence into practice. The use of a translation framework is required to successfully drive that evidence into practice. The framework that was chosen to guide the implementation and translation process is the knowledge-to-action process framework (see Appendix J). This was chosen for its multidimensional, systematic approach to the translation of research into practice that illustrates knowledge transfer as a cyclical process.

The knowledge-to-act consists of two components. These two components include knowledge creation and action (Graham et al., 2006). There are three phases included in the knowledge creation component. These phases include knowledge inquiry, knowledge synthesis, and knowledge tools/ product (Graham et al., 2006). Knowledge inquiry relates to primary knowledge obtained from primary studies. Knowledge synthesis represents secondary knowledge from meta-analysis or systemic reviews. Knowledge tools/products represents tools used to facilitate the application of knowledge (e.g. protocols, pathways, practice guidelines). These phases are represented as a funnel in the center of the model; illustrating the refinement of knowledge as it is filtered through these various levels.

The action cycle represents the process by which knowledge is implemented. The cyclical processes represent dynamic phases in which all phases can be influenced by the other and can also impact the knowledge creation process (Graham et al., 2006). This component consists of seven phases: 1. Identify problem, 2. Adopt knowledge to local context, 3. Assess barriers to knowledge use, 4. Select, tailor, and implement interventions, 5. Monitor knowledge use, 6. Evaluate outcomes, and 7. Sustained knowledge. Identifying knowledge to action gaps requires a needs assessment that can be accomplished from the perspective of the population, the organization, or the health-care provider. For this project the need was identified as gaps in knowledge related to the utilization of an evidence-based protocol in assisting with extubation of post-operative cardiac surgery patients. Adoption of knowledge to local context requires customizing the practice guideline (protocol) to meet the needs of this particular setting. Assessing barriers to knowledge requires analysis of any barriers that hinders the translation process. Select, tailor, implement interventions requires tailoring specific barrios for change. The next stage following this project is the implementation of the protocol in a pilot study. Methods for translation that will be employed include educational interventions regarding the written protocol via workshops. Opinion leaders will also be utilized to facilitate this process. A nurse champion will be assigned to provide support for use on a continuum. The DNP prepared nurse will serve in a leadership role that will coordinate meetings with stakeholders and facilitate buy-in, provide feedback, data collection, and revision of protocol (base on feedback) as needed. Monitoring knowledge is based on the assessment of the type of knowledge utilized. The DNP will measure this by the collection of data on the use of the protocol (the frequency of its use). Evaluation of outcomes is an important feedback criterion of the translation process. Measuring the terms of the impact on patient will assess this. For example, is decreased length of stay in the ICU being achieved? The final phase is sustaining knowledge. Sustainability requires the continued commitment of all the members of the team. The long-term goal is to develop a successful routine that will facilitate longevity.

Limitations

There are some limitations to this project. First, the small sample size of 15 participants (though adequate for the purpose of this project) makes generalizability to all experts difficult. Generalizability to this unit's experts should also be cautioned because the sample size is not inclusive of the entire population of experts. A second limitation is that the project reflects results of only one setting. Therefore, the results cannot be generalized to all settings. Hence, further analysis in each setting would be appropriate. A third limitation is the subjectivity of the survey. The interpretation of survey questions may be interpreted differently from one project participant to another. This was controlled for by the calculation of the CVI.

Another limitation to consider is to take a different approach in eliciting feedback from the participants regarding the protocol. It may be possible to obtain a greater abundance of information through a focus group. This could provide additional information regarding the appropriateness of the protocol in this setting. This is an area for examination with future research.

A final limitation is that the strength of this project would have been heightened with the addition of a pilot study, implementing the protocol on this patient population. Due to time constraints, it was not feasible to implement this project in this setting. This is an area for continued work.

Conclusion

There is a substantial body of evidence to support early extubation and for the use of a protocol to achieve this goal. It is evident from the literature that early extubation is facilitated by employing a protocol or guideline for removing a patient from mechanical ventilation. Early extubation in post-operative cardiac surgery patients may have numerous advantages, including decreased length of stay in the intensive care unit. The major outcomes of early extubation in cardiac surgery patients are shorter intubation time and accelerated activity (early ambulation); therefore, a reduction in overall length of stay. It can be concluded that these positive outcomes can be improved with an effective early extubation strategy that utilizes a multidisciplinary approach and an early extubation protocol.

The mission of this project was initiating the process of an effective early extubation process. The project's objective was to establish the appropriateness and usability of an early extubation protocol in a specific setting. The results obtained supported the use of the protocol in

this setting. There was strong agreement among the experts regarding the protocol's utility in practice. It is concluded that this is a good start to continued improvement in the early extubation of postoperative cardiac surgery patients on this unit.

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Appendix A: First Protocol

A. Procedure to wean patient to FIO2 of 40%:

a). After patient has been on 100% for 15 minutes, obtain an ABG. Record an oxygen saturation (SpO2) reading and ETCO2 one minute before ABG.

b). If ABG is within ordered parameters on 100% FiO2, decrease the FiO2 to 70%. Wait 15 minutes after above change and obtain SpO2 and ETCO2 readings. If SpO2 is greater than or equal to 94% and ETCO2 reading is equal to or less than 50, decrease FiO2 to 40%.

NOTE: If the ETCO2 unit is calibrated properly and the PaCO2/ETCO2 gradient is greater than 8 mmHg (hi or low), discontinue ETCO2 monitor and monitor ventilation with ABGS.

ABGs must be drawn at FIO2 OF 100%, and pre-extubation if the ETCO2 and SpO2 are not being used.

B. Procedure to Reserve Patient: Administer reversal agents Neostigmine and Glycopyrolate if the following criteria are met:

C. Procedure to further wean:

a). Decreases IMV to 8 stimulate respiratory drive b). Elevate head of bed c). As patient becomes more awake, decrease IMV to 6 d). If the following criteria are met, place the patient on CPAP: e). SpO2 greater than or equal to 94% or, FiO2 equal to or less than 50% f). ETCO2 equal to or less than 50 g). RR greater than or equal to 10 and equal to or less than 24 h). May add Pressure Support of 5 cm H20

D. Extubation Criteria

a). Fully awake, able to follow commands, can lift head off the bed b). Hemodynamically stable c). SpO2 greater than or equal to 94% on FiO2 equal to or less than 50% ETO2 equal to or less than 50 on CPAP d). Respiratory rate less than 30

Adopted from: Anderson, J., Henry, L., Hunt, S., & Ad, N. (2010). Bispectral index monitoring to facilitate early extubation following cardiovascular surgery. *Clinical Nurse Specialist: The Journal for Advanced Nursing Practice, 24*(3), 140-148. doi:10.1097/NUR.0b013e3181d82a48

Appendix B: Second Protocol

Weaning Steps
A) Before any weaning occurs, nursing will be in-
formed of the weaning
B) Sedation and narcotic medications will be adjusted
accordingly
C) During weaning, the patient will be continually monitored for signs of fatigue/respiratory distress
D) As weaning continues, patients will be assessed for either continuation of the wean, discontinuation of mechanical ventilation, or extubation

A) Stop weaning at any time if the patient develops significant changes in vital signs or hemodynamic instability:
(a) Cardiac Index < 2.2
(b) Hypotension (SBP □90 mmHg)
(c) Hypertension (SBP □160 mmHg)
(d) Elevated pulmonary artery pressures from baseline
(e) Tachycardia (HR □130 beats per minute), or dysrhythmia

B) Contraindicated without a MD or NP order in the following:
(a) Residual narcosis or neuromuscular paralysis
(b) Central nervous system dysfunction, cerebrovascular accident, delirium, or encephalopathy
(c) Hemodynamic instability
(d) Intra-aortic balloon pump
(e) Fluid overload (great than 8 kg from preoperative weight)
(f) Prolonged ventilatory support > 24 hours
(g) Excessive chest drainage > 100 mL/hour
(h) Urine output < 40 mL/hour

E) Intermittent mechanical ventilation (IMV) / pressure support (PSV) wean
A) Decrease SIMV rate as tolerated , until PSV is reached
B) Wean FIO2 to 30%, as tolerated , or titrate FIO2 while maintaining SpO2 □92% on an FIO2 □50%
C) Decrease PEEP by 2 cm H2O without compromising gas exchange. Once reaching 5-cm H2O PEEP, the weaning of PEEP may be stopped
D) Decrease PSV, as tolerated, until a spontaneous VT of > 4 mL/kg ideal body weight is maintained, or PSV of 8 cm H2O is reached
E) When patient maintains adequate Vt (or minute ventilation) with minimal PSV, assess for continuation of wean to PSV of 8 cm H2O unless
otherwise ordered by MD or NP
F) Obtain ABG after patient has been on PSV for
30 minutes (a) Note: As-tolerated means that the patient
continues to breathe within the weaning inclusion criteria. Additionally, the patient will continue to clinically present without signs of respiratory distress, respiratory fatigue, or a discordant breathing pattern. If the patient does display signs of respiratory dis- tress, respiratory fatigue, or

Appendix C: Email to Participants_Phase One

Dear Colleague,

As an expert in the field of cardiac surgery, I would like to request your participation in Phase One of my DNP capstone project. Please find attached to this email, an example of two early extubation protocols. I am asking that you review each of the protocols and determine which of the protocols is most applicable to the patient population at the University of Maryland School of Nursing. The selected protocol will be further evaluated for its content validity.

Please do not include any identifying information on the survey as the survey is anonymous. Your participation in this survey is completely voluntary. You may withdraw your participation at anytime. Your consent to participate in this project will be implied by your completion of this survey.

Thank you for your participation in this project.

Alicia Williams

http://www.surveymonkey.com/s/Z2VDFHX

Appendix D: Survey_Phase One

Please indicate which protocol (A or B) best fits this unit.
Thank you for your time and participation!

Question	Protocol A	Protocol B
Which protocol best fits this unit?		

Appendix E_Reminder_Phase One

Dear Colleague,

Just a gentle reminder that the Phase One survey is due back to me no later than 00/00/2013. If you have completed the survey, thank you for your participation! If not, here is the link to the survey:

http://www.surveymonkey.com/s/Z2VDFHX

Again, thank you for your participation in this important project.

Sincerely,

Alicia Williams

Appendix F: Email to Participants_Phase Two

Dear Colleague,

As an expert in the field of cardiac surgery, I would like to request your participation in the second phase of my DNP capstone project. Please find attached to this email, an example of an early extubation protocol. I am asking that you review the protocol and complete a brief survey regarding the contents of the protocol. It should only take you about 10 minutes to review the protocol and 5 minutes to complete the survey. The result of this survey will be used to evaluate the appropriateness of this extubation protocol for use here at the University of Maryland Medical Center.

Please do not include any identifying information on the survey as the survey is anonymous. Your participation in this survey is completely voluntary. You may withdraw your participation at anytime. Your consent to participate in this project will be implied by your completion of this survey.

Thank you for your participation in this project.

Alicia Williams

http://www.surveymonkey.com/s/WQDGQ5T

http://www.surveymonkey.com/s/WQDGQ5T

Appendix G: Survey_Phase Two

Please indicate the level of relevant for each item on this survey in relation to the early extubation protocol.
Thank you for your time and participation!

Questions	1 not relevant	2 somewhat relevant	3 quite relevant	4 highly relevant
This protocol contains all of the major components necessary for an early extubation protocol in this setting.				
The initial ventilator setting represents the initial ventilator setting appropriate for this population.				
The procedure for weaning considers all the appropriate indicators.				
The criteria for extubation is adequately represented in the protocol.				
This protocol is easy to use and follow.				

Appendix H_Reminder_Phase Two

Dear Colleague,

Just a gentle reminder that the Phase Two survey is due back to me no later than 00/00/2013. If you have completed the survey, thank you for your participation! If not, here is the link to the survey:

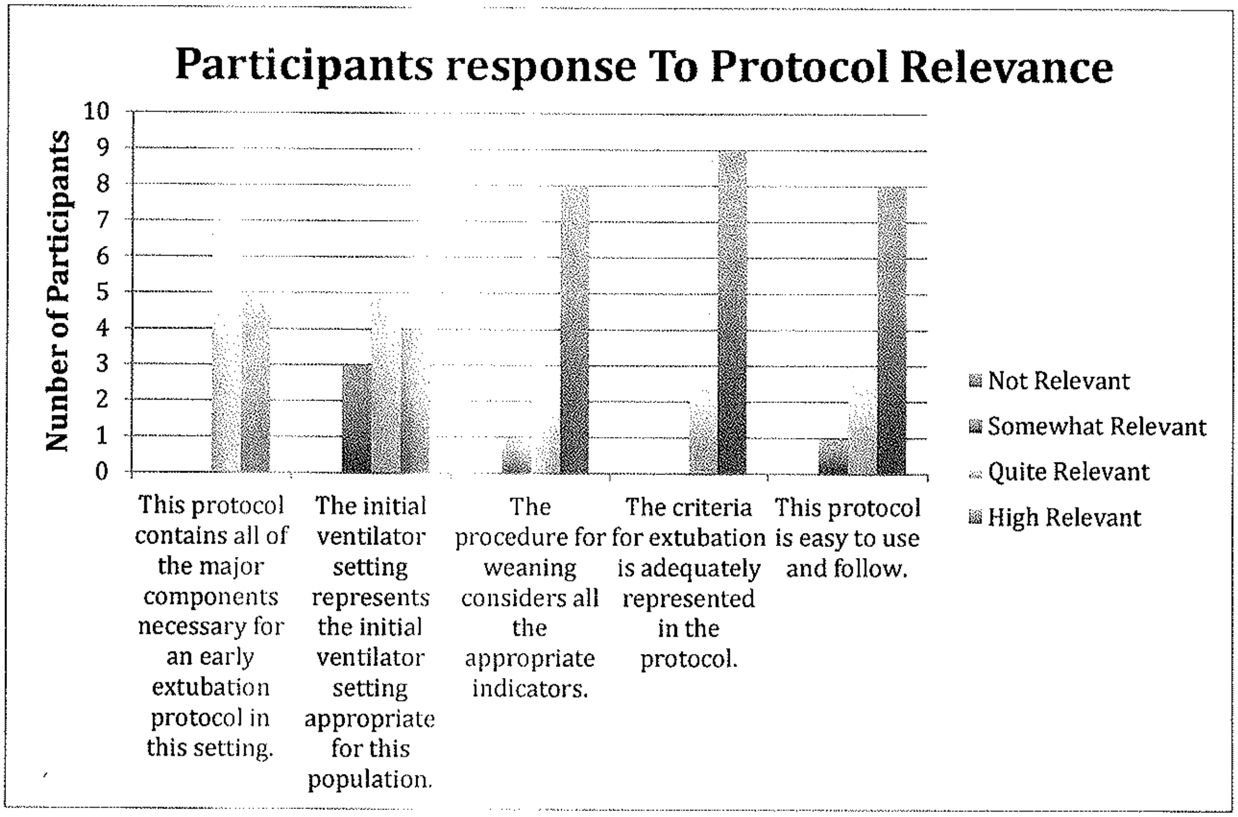
(Add link here)

Again, thank you for your participation in this important project.

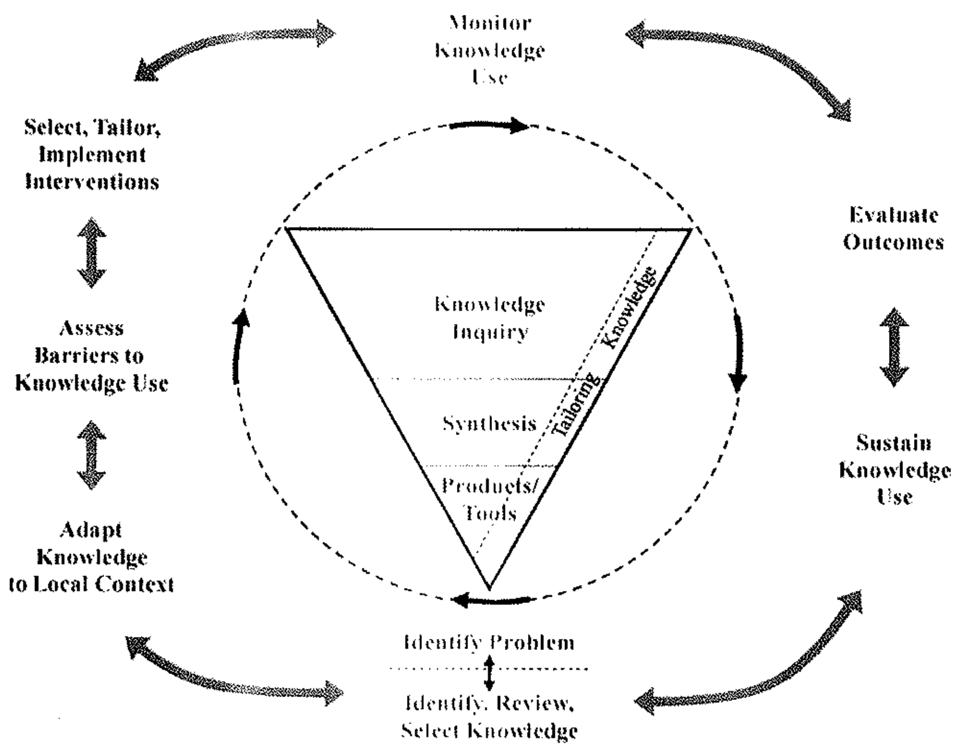
Sincerely,

Alicia Williams

Appendix I_Phase Two Results



Appendix J: Knowledge-to-action process framework



Bhogal, S. K., Murray, M. A., McLeod, K. M., Bergen, A., Bath, B., Menon, A., ... & Stacey, D. (2011). Using problem□based case studies to learn about knowledge translation interventions: An inside perspective. *Journal of Continuing Education in the Health Professions*, *31*(4), 268-275.

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