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# Current Airway Management Training Guidlines for Air Medical Personnel: A Critique

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# CURRENT AIRWAY MANAGEMENT TRAINING GUIDELINES FOR AIR MEDICAL PERSONNEL: A CRITIQUE

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## Abstract

Advanced airway management techniques are implemented by air medical personnel in a variety of settings. These techniques require special training and repetition before one becomes a proficient and skilled practitioner. Air medical personnel are also expected to bring a high level of care to the prehospital setting, have frequent contact with critically ill patients, and work in a demanding patient care environment. Because of these challenges, it is imperative flight personnel be highly proficient in the techniques of airway management. This independent study examines the current guidelines for airway management training in prehospital air medical personnel and makes recommendations for the establishment of, and / or improvement upon universal airway management standards of practice. This independent study also includes recommendation of methods that may be implemented to fulfill these standards.

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# CURRENT AIRWAY MANAGEMENT TRAINING GUIDELINES FOR AIR MEDICAL PERSONNEL: A CRITIQUE

## *Introduction*

"Airway management defines the specialty of emergency medicine. This statement also applies to air medical transport" (Swanson & Fosnocht, 2002). Airway management (AWM) is an essential element of the transport of critically ill or injured patients in the air medical transport setting. The maintenance of the airway is one of the fundamental skills air medical personnel (AMP) must consistently perform with expertise and confidence (Swanson & Fosnocht, 2002). Air medical services also bring a high level of care to the patient, often requiring the use of advanced airway management techniques such as laryngeal tracheal intubation (LTI) and rapid sequence intubation (RSI). These techniques are a mainstay to the purpose of air medical services.

Werman, Schwegman and Gerard, (2004, p. 185) state, "Airway management is the first priority in patient stabilization for air medical transport. Because of the critical nature of patients transported, air medical transport crews are often called on to establish a definitive airway." Because advanced airway management is one of the foundational pillars of care for air medical services, it is imperative AMP become highly proficient in LTI, rapid sequence intubation protocol, as well as other airway management techniques. Therefore, it stands to reason, that there should be specific guidelines or standards of practice to follow. Numerous published articles state the need of and make training recommendations in airway management techniques for prehospital personnel. However, there is scant evidence of universal guidelines or standards of practice to carrying out this process.

It is the goal of this independent study to demonstrate the need for intensive airway management education and discuss the benefits of following universal training standards to ensure flight personnel have the necessary training to be highly proficient in airway management skills.

### *Problem Statement*

Competent airway management skills are imperative for air medical critical care. Unfortunately, there is a lack of established guidelines or in-depth universal standards for airway management training that would promote a best-practice environment for air medical personnel. There is also complacency in the enforcement of continuing education. Enforcement and commitment to specific education is needed to establish the high level of competence necessary in the air medical setting.

### *Purpose Statement*

The purpose of this independent study to critique the current guidelines for prehospital airway management training, demonstrate the need for intensive airway management education, and discuss the benefits of following universal training standards to ensure flight personnel have the necessary training to be highly proficient in airway management skills. In addition, training methods to meet the proposed standards of practice in the most effective manner will be recommended. The target audience is a rural upper Midwest air medical service.

The specific goals of this project are the following:

1. Determine the training needed for flight personnel to be competent in airway management skills, specifically those of laryngeal tracheal intubation, rapid sequence intubation protocol and bag-valve mask technique.
2. Determine if existing standards of practice in airway management training for air

medical personnel are established or are as in-depth as the literature implies they should be.

3. Determine if changes need to be made to the current training practices of air medical services.

*Theoretical Framework*

The conceptual framework utilized for this paper originates from the concepts set forth by Faye Abdellah's 21 nursing problems, the first deputy surgeon general of the U.S. Public Health Service. She developed a list of 21 unique nursing problems related to human needs in the 1960s. Her early writings contributed to the idea that nurses use a problem-solving approach to practice rather than merely following physician orders.

Abdellah's model has several utilities or relevance for nursing. Like all nursing philosophies, it sets forth foundational principles to be guides to nursing practice, while also providing a broad understanding to further our discipline. Her theory defines problems unique to nursing and then describes how to skillfully resolve them from a nursing point of view; offering an organized, systematic way to practice (Tomey & Alligood, 2002, p. 18-21).

Abdellah's theory states nursing is the use of the problem-solving approach with key nursing problems related to the health needs of people. "Such a theoretical statement maintains problem solving as the vehicle for the nursing problem as the client's moved toward health-the outcome. It is also a relatively simple statement and can be used as a basis for nursing practice, education, and research" (George, 1995, p. 144). George (1995) goes on to say: "It is anticipated that by solving the nursing problems, the client would be moved toward health" (p. 157).

Nursing as a metaparadigm can be broadly grouped in the 21 nursing problem areas to guide care and promote the use of nursing judgment within the nursing process. Because of the

strong nurse-centered orientation in the 21 nursing problems, their use in the nursing process can primarily direct the nurse, and indirectly, the patient benefits (George, 1995). Furthermore, "The 21 problems can have a great impact on the planning phase of the nursing process. The statements of the nursing problems most closely resemble goal statements. Therefore, once the problem has been diagnosed, the goals have been established" (George, 1995, p. 152). Using the goals as a framework, a plan is then developed and the appropriate nursing interventions are determined and implemented. Following the implementation phase, evaluation takes place. In this instance, Abdellah's 21 nursing problem encounters difficulty / limitations because of its nurse-problem orientation. In order to stay true to the theory, evaluation would have to look at the nurse's progress and not the client's progress toward specified goals. This limitation can be remedied by a slight modification: a promotion of a more client-centered orientation rather than a nurse-orientation. This modification can be better understood via a statement by The American Nurses Association's standards of nursing practice which states, "The nursing plan is evaluated in terms of the client's progress or lack of progress toward the achievement of the stated goals" (George, 1995, p. 151).

The development of, or improvement upon, universal AWM standards of care is a nursing related problem that needs to be addressed by persons who have experience in the particular problem at hand. This could be a medical doctor, an accreditation commission or an individual with personal experience in air medical programs and airway management techniques. In addition, the basic premise of this independent study incorporates Faye Abdellah's problem solving approach. While previously employed as a flight nurse, the author of this paper noted a deficit in educational standards in practice and enforcement of training. The author also noted lack of practice standards while doing a literature review. In this way, Abdellah's theory is

guiding practice through the nursing process by a nurse noting and assessing a problem, followed by identifying goals and a developing a plan to implement and remedy the problem. Evaluation of this plan will occur by evaluation of personnel experienced in the field of air medical practices. In addition, the efficacy of the proposed universal standards will be further evaluated some time after implementation by the air medical program. In accordance to Abdellah's theory, in this scenario, the client is the flight personnel or air medical program who will implement the standards of practice for AWM into their practice.

Beneficiaries from establishment of airway management standards are the flight personnel who will have literature based guidelines as a tool for intense training in order to provide the expertise and proficiency necessary for their work environment. Indirectly, the patient also benefits by receiving a high level of care and expertise in AWM techniques from the flight personnel. In accordance to Faye Abdellah's theory, the patient is then moved toward health by the expert level of care given by AMP.

*Definitions*

The following terms were encountered in the exploration of this independent study topic:

1. Standard: "Something considered by an authority or by general consent as a basis of comparison; an approved model" (Stein, 1982, p. 1280); the way a procedure or practice should be performed to ensure uniformity of practice among all practitioners.
2. Airway management: the establishment and maintenance of a patient's airway sufficient to sustain life and prevent hypoxia by utilizing airway management techniques.
3. Competence: attainment of a certain level of proficiency in airway management skills or airway critical thinking / judgment based on a universal standard of practice.

4. Complacent: an attitude of being pleased with oneself, merits or situation, often without an awareness of some potential deficit; content with the status quo; self-satisfied (Stein, 1982).

*Significance*

This problem is significant because airway management is of utmost importance for air medical services. This is reiterated by Thierbach (2002) who made reference to the fact that airway management is one of the key components in the treatment of any critically ill patient while in the air medical setting.

A second reason of significance is because of the lack of documented, universally accepted, in-depth airway management training guidelines for air medical personnel. The American Nurses Association (2004) states that professional organizations and the standards they establish are to create consistency among practitioners; accountability from nurses; provide expertise; and protect the public. This theme is continued by The Congress for Nursing Practice who state: "A profession's concern for quality of its service constitutes the heart of its responsibility to the public. The more expertise required to perform the service, the greater is society's dependence upon those who carry it out" (ANA, 2004, p. 62). This last statement by the ANA is especially true of AMP. This highly visible job, with its vast accountability, is a resource the public greatly depends on because of the level of expertise in advanced airway management. The ANA's comments have strong implications that a lack of universal guidelines could lead to a potential grave consequences for the patient. An article by Stringer, Bajenov, and Yentis (2002) confirms this sentiment by stating the failure to maintain adequate gas exchange can have catastrophic effects on the patient. The implication is that a practitioner needs to have excellent AWM skills.

A third reason this problem is significant is because AMP need to be able to manage a patient's airway with expertise. To become a proficient and skilled practitioner, special training, repetition and experience is required. This is particularly true with laryngeal tracheal intubation (LTI). Several studies have shown that it takes a minimum of 47-57 successful, live, human intubations before you gain a 90% proficiency rating (Konrad, 1998; Mulcaster et al., 2003; Nolan, 2001). Therefore, it would behoove an air medical service to have in-depth universal guidelines to follow. Unfortunately, studies have indicated that non-anesthesia personnel, such as respiratory therapists and flight crew members, are not getting the adequate live, human training necessary to gain a 90% efficiency rating in LTI during their orientations (Bishop, Michalowski, Hussey, Massey, & Lakshminarayan, 2001). Mulcaster et al., (2003) assert this is related to the lack of universal standards. In addition, the American Heart Association Guidelines 2000 for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care has made a consensus recommendation that "Those who perform tracheal intubation require either frequent experience or frequent retraining" (p. 195). Furthermore, if personnel are not getting adequate training in LTI, the gold standard of AWM, it is guaranteed they are not getting sufficient training in other AWM techniques either.

A fourth reason for critiquing the current guidelines is due to the vast diversity amongst AWM training regimens and a gap in the literature of commonly accepted guidelines for AWM education. In addition, when looking at recommendations by the Commission on Accreditation of Medical Transport Systems (CAMTS), the one organization that has attempted to provide standards, there is an apparent lack of depth in skills necessary for initial AWM training and in maintenance training as compared to the literature. Furthermore, CAMTS does not mention how the practitioner should demonstrate competence in order to ensure a high level of proficiency.

Lastly, universally accepted guidelines or standards of practice are invaluable because they provide a system to measure practitioner skill levels and provide a measuring stick for compliance in training and level of competence. In addition, practice standards provide direction and clarity as to what methods could be utilized for the attainment of the standards, such as an airway education program (AEP). Swanson and Fosnocht (2002) asserted that in order for air medical personnel to have competence necessary to perform at the high level of proficiency needed in their line of work, skills training in airway management and RSI protocol are a must. This can be accomplished by an AEP that provides the education necessary to meet the requirements of airway standards of practice.

*Assumptions*

The assumption will be made that the presentation of data and recommendations for more in-depth airway management training will be accepted by the target audience: an upper Midwest air medical service. It is also assumed that a more in-depth standard of practice would ensure a high level of proficiency in each individual of the air medical service. In addition, it is assumed that if standards of practice are in place, medical personal will be required to maintain the level of skill as set forth by the standards. Another assumption is that any organizations that influence air medical services, such as CAMTS, would be interested in considering recommendations for more in-depth airway management training requirements for AMP.

*Limitations*

Universal guidelines in AWM for prehospital personnel need to be developed, which may impose an undesirable accountability and scrutiny on the individual recommending the specific changes. Such a situation may occur at the local, regional, or national level of the air medical community. Another limitation is that research is needed to: a) develop science-based standards,

b) determine what the best practice standards are, and c) determine what affect in-depth standards of practice have on patient outcomes or performance level of the practioner in the field. Another limitation is the potential difficulty in getting guidelines approved and universally accepted. Another limitation is the lack of available literature to review about AWM training and AEP.

*Summary*

The air medical setting demands excellent patient care, judgment, and technical skills. This is particularly true in airway management for the critically ill patient. The means to become an excellent practitioner in AWM strikes at the foundational ideologies of this independent study. The literature has suggested that air medical personnel have a high level of proficiency in AWM skills. This not only provides an increased level of care and safety for the patient, but also increases the confidence and abilities of the practitioner. Unfortunately, as will be demonstrated in chapter two, there is a lack of universally established training guidelines to ensure that this high level of expertise is obtained or maintained. Consequently, there is a need for improvement in airway management training and recommendations for the implementation of universal standards to ensure air medical personnel are competent and highly skilled, thereby promoting a best-practice environment.

# Chapter II

## *Review and Critique of Related Literature*

### *Introduction*

A review of literature was done on airway management training guidelines for prehospital and air medical personnel. The purpose of the search was to determine if there were any universal guidelines or standards of practice for AWM education and to see what the current literature said about what kind of training air medical personnel should have in order to be highly proficient in airway management skills.

The literature search was accomplished by using an electronic data base at a North Dakota university. Several topics related to this independent study were entered into the data base and articles were then obtained from the lists provided. The following is a sample of several topics entered into the data base: a) standards of practice, b) airway management, c) airway management training, d) prehospital airway management techniques, e) competencies and skill demonstration, f) airway education programs, g) scope of practice standards, h) the role and benefits of standards of practice in nursing care, and i) air medical practice standards.

Upon review of literature related to airway management training for prehospital and air medical personnel, several themes emerged. First, superior AWM skills are of paramount importance for the flight crew member. Second, a lack of consensus about the amount of training necessary to ensure proficiency and competence in AWM was readily apparent. Third, there was a distinct gap in the literature regarding universally accepted guidelines or standards for AWM training to ensure a best-practice environment and consistency amongst practitioners of an air medical service(s). Further explanation of these themes can be found in below.

*Superior airway management skills are of paramount importance to the flight crew member*

Dorges, Wenzel, Knacke, and Gerlach (2003) state: "Endotracheal intubation is the gold standard for providing emergency ventilation, but acquiring and maintaining intubation skills may be difficult" (p. 63). The reason for this is because of the amount of time that can elapse between opportunities to perform LTI. Interestingly, they also stated that even EMS services with frequent LTI opportunities, esophageal intubations were observed (Dorges et al., 2003). This indicates how difficult it is to master the complex skill of LTI in the uncontrolled, prehospital setting. This study originated from departments of anesthesiology in Germany and Austria. Since it is difficult for all paramedics to acquire and maintain intubation skills due to lack of available training or lack of opportunity in the field, and because of the unacceptable high rate of esophageal intubation, it was determined that greater intubation skills were needed. In addition, it was determined that the use of alternate AWM techniques needed to be explored (Dorges et al., 2003). This study used 12 experienced paramedics to test four different airway devices by in simulations of emergency ventilation of an apneic patient. When LTI failed, alternatives for emergency ventilation were utilized and completed with success. The bag-valve-mask was found to be the most simple, successful strategy.

This same scenario can play out in the air medical setting. It is not uncommon for several weeks, or even months may go by without the opportunity for LTI, making it difficult to maintain proficiency. The implication is that in order to keep LTI success rates high, consistent training is needed. In addition, if opportunities in the field are not presenting themselves, the AMP must obtain skills maintenance elsewhere. Dorges et al., (2003) stated that the success rate of airway management interventions depends on several issues, "Initial training, continuous quality assurance and actual frequency of performance regarding the airway performance" (p. 6).

This study indicates the importance of good AWM training and the need for proficiency in order to provide airway control, but it does not state what the training should be. It is also valuable because it stressed the importance of having a back-up plan if LTI fails and the need to know how to use alternative airway techniques.

A study by Duchynski, Brauer, Hutton, Jones, and Rosen (1998) accentuate the importance of AWM skills to air medical personnel because of the complexity of the environment that AMP must work in day in and day out. The setting of this study was a flight service whose members were stated to be highly trained in AWM skills. Their training consisted of quarterly cadaver lab training, intubations on anesthetized patients in the operating room (O.R.), and mannequin practice. Their AWM protocol encouraged RSI, especially on head injured patients. There was no protocol for a back-up plan if LTI failed. The purpose of the study was to investigate the benefits of the quick look airway classification tool as a means of predicting a difficult intubation.

In order to show the complexities of the air medical environment, the authors state, "The out-of-hospital environment poses additional intubation challenges, such as bleeding, emesis, a need for cervical spine immobilization, the presence of cervical or facial trauma, inadequate lighting, and patient position" (Duchynski et al., 1998, p. 46). The authors also stated another challenge encountered in the prehospital setting is that of time. With each repeated attempt at LTI, valuable time is wasted in transferring to a tertiary facility (Duchynski et al., 1998).

It is evident from the above challenges that there is a requirement for superior AWM skills in the air medical environment, specifically LTI. Furthermore, it is clear that AMP should get the best training possible in order to have the skills to promote the best-practice environment considering the difficult situations they will face outside a tertiary facility. They should also use

all available adjuncts or tools to make the first intubation successful. One such tool is the quick look airway classification. This allowed the practitioner to predict a difficult intubation by assessing a patient's oral pharynx by having them open their mouths. The airway was then classified or given a visualization ranking of grade I to grade IV (grade I being easy to intubate, grade IV being very difficult). This study indicated that, "A statistically significant correlation (Spearman's rho) was found between increasing grades and both the number of intubation attempts (0.52) and the number of complications (0.45)" (Duchynski et al., 1998, p 46).

The reason to use such a tool in the air medical setting is because the patients cared for by AMP will not always have grade I airways. It is only a matter of time before they will also encounter difficult airways in the prehospital setting, such as grade III and grade IV (Duchynski et al., 1998). If AMP utilize this tool, they can be better prepared both technically and psychologically for the difficult airway scenario; thereby providing better care to the patient (Duchynski et al., 1998).

Despite the authors' stating encountering grade IV airways would be rare, the implication was that AMP must be highly proficient in LTI to have any chance at a successful intubation (Duchynski et al., 1998). In addition, If LTI fails, AMP must decide which alternative AWM technique to use as back-up. Therefore, it is of utmost importance that significant training via diadactic and skills lab opportunities, opportunities that an airway education program would provide. Since AMP in a majority of flight programs deal with critically ill patients outside of a tertiary care facility, they all stand in need of similar education and standards.

A study done by Doerges, Sauer, Ocker, Wenzel, and Schmucker (1999) assessed the adequacy of lung ventilation and gastric inflation when ventilating with a bag-valve-mask (BVM), laryngeal mask airway (LMA), and esophageal-tracheal combitube (ETC). The purpose

was to determine which alternate airway device would be the simplest and most effective to use during a cardiac arrest for healthcare workers with infrequent experience in their use. Twenty one non-experienced nursing students used the three different methods to ventilate bench models. Tracheal intubation, the gold standard, was not assessed. The reason for this was that performing LTI requires excellent skills and experience (Doerges et al., 1999). In addition, "Intubation skills require an extensive period of training and continuous practice" (Doerges et al., 1999, p. 63). Therefore, alternative AWM techniques were tested in this study.

Prior to the study, it was determined that the bag-valve-mask was the method preferred amongst practicing healthcare workers (Doerges et al., 1999). This is most likely because they are exposed to this technique in advanced cardiac life support (ACLS). However, Doerges et al., (1999) go on to state that performing BVM ventilation may be difficult, especially in those who have limited training and infrequently use it.

In a study to determine the best way to train personnel in the use of the LMA, Roberts, Allsop, Dickinson, Curry, Field, and Eyre (1996) stated, "The use of bag-valve-mask ventilation is widely taught and recommended to nursing staff even though it is known to be poorly performed as a single-handed technique, even by individuals practicing the method on a regular basis" (p. 211). The major cause of poor performance was a poor seal on the patients face and inadequate ventilations (Roberts et al., 1996). It was also stated that many people who use a BVM put too much air into the stomach which increases the risk of aspiration. In light of this, the researchers wanted to determine if another alternate AWM device would be more effective during the cardiac arrest scenario (Roberts et al., 1996).

The findings of this study showed higher tidal lung volumes with the LMA & ETC than BVM ($p < .01$). The inability to use the devices were zero for the LMA, two for the ETC, and

four for the BVM. Gastric inflation was greatest with BVM, much less with the LMA, and none with ETC ($p < .01$). The subjects ranked the LMA and ETC better that BVM in terms of quality of seal on the face and adequacy of ventilation ($p < .01$) (Doerges et al., 1999). Performance using a BVM with limited training proved to be significantly less effective in 80% of the cases which could lead to possible deleterious outcomes such as hypoxemia and hypercarbia (Doerges et al., 1999). Use of a BVM also increases the risk of gastric insufflation leading to regurgitation and possible aspiration. This possibility is significantly increased if the performer is inexperienced. A limitation of the study was the difficulty encountered when trying to get a good seal around the mouth of a mannequin. Another limitation was the relatively small sample size of 21. No power analysis was documented.

The research done by Roberts et al., (1996) is important because it stresses the difficulty of using the BVM-a critical AWM technique air medical personnel are expected to perform with effectiveness. However, there is a large gap in the literature as to how much training AMP should get with the BVM. The BVM is often used to preoxygenate before LTI and is the number one rescue device when LTI fails. Therefore, it is imperative that AMP have excellent BVM skills, perhaps even better than their LTI skills (Morgan & Mikhail, 2002). Unfortunately, the training mandates for AMP do not include extensive use of BVM. In addition, no standards have been observed in my literature review.

*Recommendations for training to ensure competence in airway management*

A study by Mulcaster et al., (2003) was done to determine the number of successful LTI were required during initial training to ensure competent performance, as well as a determination to define competence. The researchers observed 20 non-anesthesia personnel while they intubated 438 patients. A generalized linear, mixed-modeling approach was used to identify key

aspects of effective training and performance. The results of this study revealed that a "90% probability of a good intubation required 47 attempts" (Mullcaster et al., 2003). The authors also stated, "Proper insertion and lifting of the laryngoscope were crucial to good or competent performance" (Mullcaster et al, 2003, p. 2). Competency was determined to be essential component of personnel who performed LTI. Although it was not formally defined, it was implied that the intubator was competent when they reached the 90% or above level of success. Mulcaster et al., (2003) stated:

> Unfortunately, there is little information to indicate the extent of the training required for competence in LTI, or even what signifies true competence. In general, airway training programs for healthcare personnel, such as paramedics and respiratory therapists, are not standardized and may be inadequate. This inadequacy if a grave concern, given the seriousness of failed airway management. (p. 2)

In a position paper by Wang, OConnor, and Domeier (2001), physician members on the National Association of EMS Physicians Standards and Clinical Practice Committee (NAEMSP), it was stated that all programs that use prehospital RSI programs should include specific elements to ensure competence. Wang, OConnor, and Domeier (2001) further stated:

> Personnel who perform RSI should be advanced life support providers with substantial clinical experience above the minimum requirements for their field of specialty. Personnel performing RSI must have a demonstrated an exceptional ability to perform endotracheal intubation under clinical conditions. (p.44)

Limitations with the above statements are that they do no state how much training is needed to perform on the exceptional level. In addition, neither can we determine how much clinical experience is needed to be above minimum requirements because there are no standards.

The implication is AMP need to place high standards on themselves, and the programs that employ them need to provide opportunities for necessary training.

The training curriculum recommended by Wang et al., (2001) contained six main points: a) instruction of the technique and application of RSI, b) RSI pharmacology, c) instruction on indications and contraindication of RSI, d) instruction on recognition of potentially difficult airway, e) training in the use of neuromuscular blockers and AWM of chemically paralyzed patients in the operating room, and f) instruction on alternate AWM techniques if LTI fails. It was stated that all providers of RSI should be proficient in BVM ventilations. In addition, continuous assessment of the AWM skills must be done and quality assurance programs need to be in place to ensure success (Wang et al., 2001).

Konrad, Schupfer, Wietlisbach, and Gerber (1998) did a study that looked at how many anesthetic cases were needed anesthesia students learn the manual skills of LTI. They suggested that in order to develop rational training programs, determination of how many anesthetic cases are needed to reach an optimal proficiency level is needed. They also stated, "Training programs with minimal requirements have been propagated without a clear scientific understanding" (Konrad et al., 1998, p. 2). This concept applies to the air medical setting as well, and implies the need for research based standards for AMP. However, the data from this study can also be applied to AMP since new orientees start out with no intubation experience. Throughout this study, success was not only considered completion of the task, but it was also defined as adequate technical performance and given a numerical rating. Complete success excluded any help from a physician and was done with good technique. This study found that learning manual skills differ greatly, depending on the procedure. For LTI, 57 intubations was the mean number for students to reach a 90% success rate and a 95% confidence interval. This confidence

interval percentage is significant as it is well know how important confidence is when performing a procedure. Roberts et al., (1996) stated, "Felt confidence rests with the individual, and individual differences govern the willingness to practice" (p. 213). In the air medical setting, confidence is tantamount due to the criticalness of the situation and the difficult environment in which they must perform. With high proficiency provided by a commitment to intense training, AMP will have confidence and be able to provide a best-practice environment to the patient. Konrad et al., (1998) also expressed that manual skills, such as LTI, must be acquired in the O.R. under supervision or with simulators. In addition, the authors also stated that there was a need for more information about the number of procedures required to maintain manual skills.

*Guidelines / Standards for airway management training*

There was only one source that actually used the term "standards" in their recommendations for AWM training. That source was found in the Commision on Accreditation of Medical Transport Services (CAMTS) 2004 manual. Even though they used the word "standards" when describing initial training and maintenance requirements for newly hired flight personnel, what they describe for training are only recommendations, not official governing standards of practice. The reason for this is because the CAMTS organization, comprised of professionals involved in the air medical transport community, is a non-profit organization dedicated to improving the quality and safety of medical transport services. It is considered an organization of organizations, with 16 current member organizations each of which sends one representative to the CAMTS Board of Directors. CAMTS is not a governing board for the nation's air medical services per se, rather, it offers air medical services the opportunity of compliance with the CAMTS accreditation standards as a marker of excellence for federal, state,

and local governmental agencies, private agencies and to the general public (Commission on Accreditation of Medical Transport Systems, 2005).

One of the goals of CAMTS is to maintain recognition of the accreditation standards as a measure of quality for air medical and ground interfacility transport services. Another goal is maintain currency in the accreditation standards according to medical research in order to meet the dynamic needs of air medical and ground facility transport services (Commission on Accreditation of Medical Transport Systems, 2005). In light of this, CAMTS recommendations are not considered governing standards of practice within the air medical community, but rather as sound recommendations to follow.

The fact that there are no universal standards to follow is reiterated in a study done by Wydro, Yeh, Walters, and Hamel (2002) which states, "There are no universal standards in airway management for air medical programs" (p. 169). They also did not make reference to CAMTS. As alluded to above, the reason for this is most likely because air medical services are not mandated for accreditation by CAMTS, and therefore, their standards are not considered to be universal. This concept is reinforced by many other pieces of literature that give recommendations for AWM training, but do not mention any universal standards as instituted by CAMTS.

It should be noted that despite the goal of CAMTS to maintain currency in standards according to medical research, when comparing the CAMTS recommendations to other sources, there appears to be a significant deficit in recommended AWM training to ensure high proficiency among flight trainees. Therefore, it appears their standards need to be revised to better reflect the sentiments found in related literature.

A the study done by Wydro et al., (2002) revealed there was a lack of universal standards in AWM for air medical programs, allowing for a large amount of variations of practice amongst practitioners. The authors attempted to examine the practice patterns of AWM of air medical programs across the country by sending out one page surveys to the medical directors of the flight program. They found that the majority of air medical programs (46%) completed annual training on their RSI protocol and failed airway algorithm. In addition, a majority of programs utilized a RSI protocol which included use of succinylcholine, midazolam or etomidate, fentanyl, and lidocaine if head injury; had a failed airway algorithm; and had a flight team that consisted of a flight nurse and flight paramedic. It was concluded that RSI was a common procedure utilized by air medical services across the country, but there was little consensus on which induction agent to use, and there was tremendous variation on how programs practice rescue techniques and training intervals to maintain AWM skills. There was no mention of AWM standards, initial training requirements, nor specific guidelines used by air medical services to ensure AWM competence.

Lack of adequate AWM training is echoed by Bishop, Michalowski, Husey, Massey, and Lakshminarayan (2001) when they asserted that no evidence exists that recommends retraining for this highly skilled procedure. The Bishop et al., (2001) study assessed retention of skills of respiratory therapists (RT's) one year after initial treatment and identified specific areas of knowledge critical to successful performance of intubation, as well as assessing the need for retraining. It was determined that retraining was necessary because daily or frequent exposure to intubations was not available to reinforce training for non-anesthesia personnel (Bishop et al., 2001).

To accomplish their research, the authors used eleven RT's who had initial LTI training in LTI in the operating room. Throughout the following year, each RT had opportunities to intubate during cardiac arrests. The number of intubations each RT performed varied. Upon returning to the operating room for retraining, they first took a 21 question exam that addressed pre-intubation assessment of the airway, airway anatomy, use of intubation blades, appropriate head position, and other factors related to airway management. When in the O.R., the RT's were assessed whether or not they carried out several discrete steps related to preparation and techniques used in intubation. Recertification was approved only after all skills were routinely performed, with a minimum of 5 successful first-pass intubations in five different patients.

The results of this study by Bishop et al., (2001) showed that the RTs who had performed the most intubations on the floors during the previous years required the least number of intubations for recertification, whereas, one who had none in the past year required the most. The results also showed a negative correlation ($p < .05$) between scores on a 21 question written LTI exam and the number of intubations attempts needed to achieve recertification. The RT's that scored higher on the exam needed fewer attempts to successfully intubate 5 patients. Bishop et al., (2001) also observed that first-pass success occurred much more frequently if all discrete steps were performed correctly. In addition, the results showed that occasional performance of LTI did not ensure the maintenance of skill and that factual knowledge of airway anatomy and LTI procedural steps are useful for LTI success.

The results provided by the Bishop et al., study are useful as they imply the need for continual training. However, there is a gap in the literature as to how much retraining is needed to keep proficient in this essential skill. The authors reiterate this by stating, "Few data are available on skill retention and retraining" (Bishop et al., 2001, p. 235). In addition, the results

are helpful in showing that an algorithmic approach, with correct use of the blade and correct tube placement, improved the first-pass success rate. Furthermore, it is clear that no universal standards for initial training or retraining were identified in this study, but the need for such was implied in the statement, "There is extensive information regarding initial training, but no other information on retraining in airway management" (Bishop et al., 2001).

*Airway management training via AEP*

For the most part, the literature that discusses airway management training regimens are found in research that has been conducted on the effectiveness of airway management programs. In a study done by Swanson and Fosnocht (2002), the impact of an airway education program on the success rate of prehospital intubations for a university-based air medical program was examined. It consisted of a retrospective review of 372 consecutive intubations spanning a 6 year period: 3 years before implementing an AEP and 3 years after. The flight crews included a nurse and a paramedic, both of whom performed intubations. The AEP that was implemented consisted of an initial orientation, continuing education, and quality assurance methodologies. The program was further described by stating orientation included reviewing the flight programs RSI protocol, performing 10 supervised intubations in the operating room, as well as instruction using the laryngeal mask airway (LMA) and the intubating laryngeal mask airway (ILMA). The continuing education requirements were monthly manikin training and at least four intubations per month during flight duty, either on live patients, manikins, or animal models. A back-up plan for failed intubations was also implanted and consisted of using the intubating LMA, cricothyrotomy, translaryngeal jet ventilation, and digital intubation. The results of the study showed the pre-AEP group had a 94% intubation proficiency compared to 97% in the post-AEP group ($p > 0.05$). This statistically insignificant result was attributed to the high intubation

success rate that was already present before implementing an AEP. The study also showed a marked increase in the use of the full RSI theory and methodologies for intubation, a decrease in the use of crycothyrotomies, increased use of non-invasive failed intubation options (ILMA), and a significant drop in the number of patients receiving a neuromuscular blocker without the use of sedation ($p< 0.001$). These are important findings for air medical services as they demonstrate that an AEP can improve efficiency and safety in airway management techniques. The limitation of this study was there was not universal standard that provided a foundation for a best practice environment.

Another study conducted by Swanson and Fosnocht (2005) reiterated the importance of airway management (AWM) of the transport of the critically ill patients and the use of RSI to establish an airway. Although the focus of the article was the use of RSI in the pre-hospital environment they again had no universal standard on which to establish their training program. These authors utilized the National Association of EMS Physicians (NAEMSP) program goals in their work. The authors indicated that the same high standards for success required by hospitals should also be demanded of flight personnel who use RSI techniques in pre-hospital settings. Accomplishing this goal requires commitment to training and quality improvement by the flight personnel (Swanson & Fosnocht, 2004).

In a position paper from the NAEMSP, Wang, OConnor, and Domeier (2001) suggested that any RSI program use these six goals: increase prehospital RSI success rates; limit multiple intubation attempts; avoid misplaced endotracheal tubes, and monitors must be provided to avoid hypoxia. Several elements to improve prehospital RSI success were established by NAEMSP which included: a) medical direction and supervision, b) training and continuing education, c) resources for patient monitoring & confirmation of endotracheal tube (ETT) placement, d)

standardization of RSI protocols, e) backup rescue airway methods, f) continuing quality assurance and performance review.

In the development of a universal standard of practice certain components need to be addressed. To improve prehospital RSI success rates, air medical programs must first improve intubation techniques by making certain a foundation of basic airway management and intubation skills has been established and flight personnel who perform RSI have substantial experience. In addition, training and quality improvement opportunities should be provided. Although there are no established RSI training regimens, training often includes time in the operating room for initial and ongoing training. Other factors to improve prehospital intubation success are to have a planned, stepwise approach to RSI, and utilizing techniques to improve glottic visualization. These techniques include crycoid pressure; the backward, upward, rightward pressure (BURP) or the external laryngeal manipulation (ELM) techniques (Swanson & Fosnocht, 2004). A successful air medical RSI program should also include and means to confirm and monitor placement of the endotracheal tube, as well as have backup methods in place for failed RSI attempts. Backup methods may include use of an ILMA, LMA, or esophageal-tracheal combitube.

*Summary*

As stated earlier, the air medical setting demands excellent patient care, judgment, and technical skills. This is particularly true in airway management for the critically ill patient. The means to become an excellent practitioner in AWM strikes at the foundational ideologies of this independent study. The literature has suggested that air medical personnel have a high level of proficiency in AWM skills. This not only provides an increased level of care and safety for the patient, but also increases the confidence and abilities of the practitioner. Unfortunately, there is

a lack of universally established training guidelines to ensure that this high level of expertise is obtained or maintained. Consequently, there is a need for improvement in airway management training and recommendations for the implementation of universal standards to ensure air medical personnel are competent and highly skilled, thereby promoting a best-practice environment.

The information presented in the position paper by Wang et al., (2001) fits in well into the purpose of this independent study. It shows the definite need of AMP to be committed to training and to have high expectations of their AWM abilities and that definitive goals need to be in place for each air medical program to ensure their flight personnel are getting the training needed to perform with competence. Even though the article did not define what competence was, it did state AMP should have clinical experience above minimal requirements and that their skills should be exceptional. This article provided good recommendations for AWM training, but did not state the need for universal standards. However, the benefit of standards was implied by the authors making these recommendations to all AMP who perform RSI. In addition, standards would improve on the suggestions by Wang et al., (2001) by determining the amount of training to best provide competent air medical personnel.

# Chapter III

## *Introduction*

The purpose of this independent study was to critique the current literature for guidelines in airway management training, determine if any universal standards exist, and provide recommendations for improvements in training guidelines to ensure that air medical personnel are competent, highly skilled practitioners for the promotion of a best-practice environment. The main goals were to communicate the need and benefits of improved airway management training guidelines as observed from the literature, make recommendations of how to improve the guidelines, encourage the establishment of universal guidelines / standards, and provide recommendations of training that would satisfy the guidelines / standards. Recommendations were to be made to the target audience of a rural, upper Midwest air medical service.

## *Setting*

The setting in which this independent study will take place was in a rural area in the upper Midwest with a population size of approximately 80,000 people. The area contains industry such as tourism, paper plants and a major port for Great Lakes shipping. The community has a diverse racial populace in the following rank order: Caucasian, Native American, African American, Asian, and Hispanic. The community also has several higher educational opportunities and offers a choice between two colleges and one community college. In addition, available health care opportunities consist of a level two regional trauma center of 200-300 beds, a regional burn center and specialty hospital of 200-250 beds, and a level two trauma and regional heart center of 300-350 beds. The regional heart center performs a variety of surgeries ranging from low to high patient acuity. This medical center also owns and operates an air medical service that flies in excess of 600 patient oriented missions per year, providing

*Data Collection*

Primary data collection was from an extensive search of the current literature via electronic data bases. Topics searched were:

1. standards of practice
2. airway management
3. airway management training
4. prehospital airway management techniques
5. prehospital practice guidelines
6. competencies and skill demonstration
7. scope of practice standards
8. airway education programs
9. air medical standards
10. the role and benefits of standards of practice in nursing care

The CAMTS handbook and anesthesia textbooks were also used as resources.

Secondary data collection was from policy and procedures of 6 air medical programs in the upper Midwest area. The policies and procedures obtained consisted of initial airway management training for orientees, airway maintenance training, RSI protocol, and any airway management program they had in place. The data was then compiled to determine if any universal guidelines / standards of practice existed and what current practice guidelines for airway management were being followed by air medical services.

These recommendations would be made to the air medical community for the establishment of universal guidelines / standards of practice. These recommendations first focused on the local level, then the national level. On the local level, the nurse manager of a

rural, Midwest air medical service (also a certified air medical site surveyor) was given the recommendations for airway standards for implementation into their program. On the national level, if the implementation of recommendations proved to be of benefit to the above flight service, the governing board of CAMTS would be contacted and given the recommendations for review. In addition, if airway management training standards were accepted and implemented on the local level, literature based recommendations of what training methods would best ensure proficiency and confidence in airway management skills would be provided.

One such method would be the use of an airway education program. This program would be based on the current literature and consist of didactic education on airway management techniques & rapid sequence intubation theory and pharmacology; manual skills training with extensive time in the operating room learning intubation, bag-valve-mask, rapid sequence intubation (RSI) sequence, use of drugs used in the RSI protocol and management of the chemically paralyzed patient. Competency would be determined by the preceptor of the flight personnel and by predetermined standards set forth in the current literature (i.e. 47-57 intubations must be done successfully in order to acquire a 90% proficiency rating). The preceptor would be an anesthesiologist or a CRNA. Didactic learning could be evaluated by a post-test requiring an 80% passing score.

### *Evaluation of the Project*

Evaluation of this independent study would be done by contacting the nurse manager and medical director of the target audience for their expert opinions on the recommendations. Evaluation would also be done by another manager of a flight service in a neighboring state with many years of experience. A third party to evaluate this independent project could be a member

of the governing board of CAMTS. All parties involved in the evaluation process would determine the following:

1. if there is a need for a standard of practice based on the current literature
2. is what the author recommends necessary to be included in a standard of practice to ensure high proficiency in airway management (AWM) techniques in the air medical setting
3. what is the best way to meet the proposed standards

If the standards of practice recommendations were implemented, their effectiveness could be evaluated by contacting the nurse manager of the target audience to determine if the flight personnel had increased confidence with their AWM skills and if AWM technique success rates increased.

## *Expected Outcomes*

A projected outcome of this project would be that the target audience would see the benefit of standards of practice in AWM for their flight service and implement the standards to increase their confidence and skills in AWM, thereby providing a best-practice environment for the patient and themselves. Another projected outcome would be that CAMTS would see the need for the recommendations of this study and seek to improve upon their current recommendations for AWM, as well as push for universal standards of practice.

## *Implications for Nursing*

### *Nursing Practice*

Universal guidelines / standards of practice promote consistency amongst practitioners which leads to increased safety for the patient. They also promote accountability and excellence

within a profession. Keeping up with standards is the key to safe practice and the best way to ensure a best-practice environment for the nurse and the patient.

In the air medical environment there are many critical decisions and complex skills the flight personnel must perform each time they are involved in patient care. Due to the critical condition of most patients, it is imperative that complex skills be mastered, especially airway management techniques. In this setting, high proficiency and confidence is imperative and no deviation from this expectation should be tolerated. Development or improvement upon current guidelines / standards in AWM, if implemented, will provide the means to the high level of expertise in practice that is vital in the air medical setting.

It is easy to see how Faye Abdellah's theoretical framework is a good fit for this master's project. Abdellah's theory states nursing is the use of the problem-solving approach with key nursing problems related to the health needs of people. By seeing the lack of initial AWM training for air medical personnel (the problem), we can correct it by presenting what the current literature states on the matter, and then encourage increased training in AWM skills during the orientation process (the solution). This will then lead to an increased ability to skillfully care to the patient. In this way, the foundational principles that Abdellah's theory sets forth truly are guiding nurse practice and furthering nurse practice.

*Nursing Research*

Research specific to the topic of this independent project is lacking. Therefore, recommended research about the benefits of universal standards of practice in relation to promotion of a best-practice environment in the air medical setting would be helpful. In addition, continued research regarding the amount of training needed before a practitioner is proficient and safe in airway management techniques is needed. It is recommended that research

which further investigates LTI proficiency, BVM & LMA proficiency be done. Research regarding practitioner confidence and proficiency would also be helpful. Furthermore, research is needed to determine which specific components of AWM techniques are critical and should be incorporated into a standard of practice. These recommendations for research are to increase awareness of the need for a significant increase in training in order for flight personnel to become, and remain, highly proficient, skilled practitioners.

*Nursing Education*

An airway education program (AEP) that is developed at the local or national level, would be an excellent means to provide the education necessary to meet any guidelines or universal standards of practice. The standards would be the determining force behind what the AEP should include. Air medical services would incorporate the AEP into their policies as necessary training for new orientees, as well as, maintenance training for veteran flight personnel. Training & education could be guided by a certified registered nurse anesthetist (CRNA) and overseen by the flight personnel's nurse manager, medical director, and / or hospital education department. Having guidelines / standards will help deter complacency in education and increase its enforcement.

*Nursing Policy*

Developing departmental policy based on universal guidelines / standards of practice would increase awareness of the depth of training necessary in order to promote a best-practice environment. Establishing policies that require rigorous standards of practice would lead to increased confidence and skill proficiency of the practitioner and increase the level of safety and patient satisfaction. Currently, no universal guidelines / standards of practice exist for AWM techniques in the air medical setting. This could be resolved by communicating to air medical

services about the rigorous training necessary to reach a high level of proficiency for new orientees and the encouragement of establishing universal guidelines / standards for AWM at the local and national levels.

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*Appendix*

*Proposed Airway Education Program*

The National Association of EMS Physicians states prehospital airway education programs should have, at a minimum, the following elements:

1. medical direction and supervision
2. training and continuing education
3. resources for patient monitoring
4. drug storage and delivery
5. confirmation and continuous monitoring of endotracheal tube placement
6. standardized protocols
7. availability of backup rescue airway methods in case endotracheal intubation fails
8. continuing quality assurance
9. quality control
10. performance review

Airway Education Program (AEP)

The proposed AEP would consist of an initial orientation, continuing education, and quality assurance. A specific AEP would be tailored to the needs of the individual flight program which would be determined by anesthesia and the programs medical crew manager. An example of what would be included is as follows:

1. Orientation: this would include a review of the program's rapid sequence intubation (RSI) protocol and failed intubation protocols; performance of at least 50 live endotracheal intubations in the OR; 50 mask-ventilation airway management on live human patients in the

OR; 10 insertions of the combitube either on manikins or live patients; animal model skills training for intubation, cricothyrotomy and translaryngeal jet ventilation, and 10-20 ride-along shifts with an experienced crewmember. The above orientation would have to be completed before the new flight crew employee could practice independently.

Initial training would be done by a nurse anesthetist or anesthesiologist who would determine the adequacy of intubation and bag-mask ventilation technique. Optimally, one or two anesthesia personnel who have a desire and ability to teach, would be assigned to the flight crew members for continuity of teaching methods, establish rapport with the student, and to decrease the stress level of the student. A computerized log of all flight crew personnel would be kept of all initial and continuing education training.

2. Continuing education: this would include yearly lectures on RSI and difficult airway management by an anesthesia provider, and animal model skills teaching by the medical director of the flight program. In addition, 6 live human intubations and 3 mask-ventilation airway management per quarter would be required. These can be fulfilled either in the field of practice or in the OR.

3. Quality assurance: intubations done in the field and difficult airway cases would be discussed by medical control and crewmembers monthly.

4. Protocols: the flight program airway management training protocols would be established by the medical crew manager in collaboration with anesthesia personnel and would be based upon the current available literature on airway management. All protocol and AEP methodologies would be overseen by the medical director of the flight program.