

Endotracheal Intubation Proficiency Training-The Need for Continuous Training

Managing Officer Program

La Verne Fire Department Training Division

Kevin Greenway

Abstract

The purpose of this paper is to identify and address a training gap within the La Verne Fire Department. Endotracheal Intubation (ETI) is one of the staple skills of prehospital medicine. Though it has been a controversial subject within the medical community, it remains a necessity and a critical tool in the Paramedics skill set. When a paramedic is confronted with a potentially unstable airway due to altered levels of consciousness and no gag reflex, ETI is the preferred method of controlling and maintaining an open airway. In the hospital setting this is a common occurrence that has a very high success rate. In the prehospital environment ETI is often met with higher failure rates and increased risk. The prehospital environment has more variables such as lighting, room size, bystanders and fewer available personnel. That being said, the proficiency in which it is done has regularly come into question. Currently, intubation training is only required through the initial paramedic school programs. It is commonly up to the individual provider agencies to assess the need for retraining and to add it to their year to year training program. With the overall number of intubations on the decline it is an area that needs to be addressed. This skill as with others may be in jeopardy of being removed from the scope of practice for the prehospital care provider. As with any skill in medicine or firefighting, more repetition is the key to making it second nature. The environment of prehospital medicine alone can offer challenges that need to be accounted for when practicing the skill of ETI. Any successful training program must consider ongoing, regular training to address the issue of proficiency.

Introduction

Endotracheal Intubation is taught regularly as a primary skill during entry level paramedic school and is emphasized as a life saving measure. More and more the skill of intubation has come under fire due to reduced need and proficiency in the pre-hospital setting. The skill of intubation is first taught in paramedic school, with emphasis on not only the indications and contra-indications for use, but the importance of accuracy. The training begins with anatomy and physiology then progresses through the various types of airway adjuncts including nasal pharyngeal, oral pharyngeal, King airway, and the Endotracheal tube. Each having their own specific uses. For ETI the equipment is covered as well, the importance of understanding the differences between how to use a Miller, Mack or Grandview blade when doing the procedure and how each have its own specific function based on anatomy and style. The overall number of intubations attempted during the initial training phase varies by school but can be upward of 50 during the routine training scenarios and practice shifts. Most paramedic schools even go so far as to require a minimum number of “live” intubations prior to graduating the program. This varies based on the program, but the intent is to have a level of proficiency when entering the field. Proficiency is paramount when utilizing ETI in the real world due to the ever evolving “Core Measures” and “Data” driven environment that Emergency Prehospital Care operates in. The challenge after the initial year of paramedic school is to maintain or increase the level of the provider so that performance and proficiency is not lost. Currently, there is no program or sustained training within the La Verne Fire Department to improve or maintain proficiency. The only ongoing intubation training is a component of Advanced Cardiac Life Support which allows for intubation practice, but this is not a required section of the American Heart Association training program. Less than 25% of the practicing paramedics in the La Verne Fire Department

have attempted ETI in the past three years due to reduced opportunities. It is for this reason that training is so important.

Background and Significance

It was commonplace prior to ten years ago to have several intubations per year on cardiac arrest patients which would help maintain proficiency. After several studies were released, AHA changed their procedures for Advanced Cardiac Life Support which eliminated the need for most intubations on cardiac arrest patients. This directly led to a large decline in the overall number of intubations via Endotracheal Tube over the past ten years. In La Verne Fire Department alone, the number of intubations have gone from 23 in 2008 to 2, in 2016.¹

Even though intubation has been a staple of emergency prehospital treatment for over thirty years, there have been significant studies that show ET tubes are frequently inaccurately placed² or dislodged, and multiple unsuccessful attempts are commonplace³. The La Verne Fire Department has had an outstanding history of successful, proficient and timely Endotracheal Intubations. The La Verne Fire Department's intubation success rate has closely mirrored the national average of 85.3%⁴. The LVFD's success rate has been steady with an average of 84% for 2008 through 2014. However the numbers for 2015 and 2016 show a significant decrease in success, with a dismal 50% success rate. The overall number of intubations have gone down

¹ Los Angeles County Emergency Medical Services Agency report 2008-2016

² Katz SH, Falk JL. Misplaced endotracheal tubes by paramedics in an urban emergency medical services system. *Ann Emerg Med.* 2001; 37(1):32-37.

³ Wang HE, Yealy DM. How many attempts are required to accomplish out-of-hospital endotracheal intubation? *Acad Emerg Med.* 2006; 13(4):372-377.

⁴ Diggs LA, Yusuf JE, de Leo G. An update on out-of-hospital airway management practices in the US, *Resuscitation*, 2014 Jul; 85(7): 885-92.

significantly over the same time period. To add to the falling number of intubations, there has been little to no ongoing hands on training. The average number of practice intubations per year over the 10 year span was approximately 2 per year. The question of proficiency becomes paramount when dealing with such disparagingly low numbers of attempts. The latest success percentage for La Verne Fire Department 2017 shows only 62.5%. Those numbers are a divided by a total of 30 duty paramedics. Current evidence shows that increased experience with ETI attempts leads to more successful intubations. A paramedic needs to perform five intubations for independent practice each year in the United States to maintain basic proficiency⁵. While some results have shown that successful ETI in the prehospital setting is not solely dependent on experience, national data from local EMS services reported to state authorities showed prehospital success rates of 77%⁶. A review of paramedic programs found the median number of intubations by students was seven and that 20-25 ETI are needed for a success rate above 90%⁷⁵. That being said, more is better. Paramedics need more ETI initially in training as well as more repetitions to maintain proficiency. The following is an attempt to increase the number of yearly intubations through training and practice to maintain an acceptable level of proficiency.

(Hawnwan Philip Moy, 2014)

⁵ Wang HE, Seitz SR, Hostler D, Yealy DM, Defining the learning curve for paramedic student endotracheal intubation. *Prehosp Emerg Care*, 2005; 9:156-62

⁶ Wang HE, Mann NC, Mears G, Jacobson K, Yearly D. Out-of-hospital airway management in the US, *Resuscitation*, 2011; 82:378-85.

Literature Review

I conducted a literature review of studies on paramedic prehospital intubation proficiency and success rates of field intubations, as well as a review of the La Verne Fire Department's proficiency over the past 10 years. Based on the literature, success rates were directly correlated to training and number of intubations. The chart below shows that intubation success percentage was on a steady increase then over the past three years there has been a massive decrease in number of intubations and a reduction in proficiency. (Table 1) One of the studies conducted in the *Journal of Emergency Medicine* showed that newer paramedics that had recently come out of school had higher success rates than paramedics that had more time on the job, but less frequent intubations.⁸ This in great part to the frequency of intubations during the students' initial training. Subsequent studies have shown that the number of intubations, even in a training environment lead to higher proficiency.⁹ All of the performance studies, both prospective and retrospective showed a strong correlation with the amount and frequency of training. The current initial training standards for paramedics in Los Angeles County follow the National Registry Standards for Paramedics and is accredited by the *Commission on Accreditation of Allied Health Education Programs*. The program is also approved by the *Committee on Accreditation of Education Program for the Emergency medical Services Professions*.

Table 1

Year	2008	2009	2010	2011	2012	2013	2014	2015	2016
Attempt	23	21	17	16	10	4	7	2	2
Success	17	17	14	13	7	4	7	1	1
Percentage	74%	81%	82%	81%	70%	100%	100%	50%	50%

⁸ Garza AG, Gratton MC, Effect of paramedic experience on orotracheal intubation success rates. *Journal Emerg. Med.* 2003; 25:251-56

⁹ Warner KJ, Carlbom D, Copass MK, Paramedic training for proficient prehospital endotracheal intubation. *Prehosp Emerg Care.* 2010; 14: 103-108

Procedure

I contacted the Los Angeles County Emergency Services Agency, which is the regulating agency for 32 Public Safety Advanced Life Support EMS Provider Agencies and 14 Licensed Advanced Life Support Ambulance Operators in the Los Angeles area regarding Endotracheal Intubation statistics for the past 10 years. The Agency was unable to provide the data due to concerns of potentially “corrupt” or “un-vetted” numbers based on inaccurate reporting from the individual Provider Agencies. Though they could confirm that there has been a significant decrease in both overall number of attempted ETI, as well as a decline in proficiency. They were unwilling to provide actual hard data to support those claims. A general survey was conducted within the last year for the La Verne Fire Department EMS Education Section titled *2017 EMS Needs Assessment*, (Appendix A) which revealed a significant number of the current paramedics felt that they needed more Intubation Skills training in the year to come. The survey is sent out annually to provide the basis for subsequent training evolutions and Continuing Education hours for the next year. This survey is conducted via Target Solutions, which is a web based platform used by the La Verne Fire Department for training. The results are shown in Table 2. There were no specific reasons given or requested during the survey for why.

Table 2

Type of Training Requested	Number of Requests
Intubation	15
Arrhythmias	2
Pediatric Emergencies	4
Trauma	6
Assessments	3
Total	30

Discussion

While conducting the needs assessment for training, other areas for improvement were also suggested, but did not have the data or literature to support the need. Current discussions within the medical community continue to question whether the skill of ETI is needed in the future or not¹⁰. Dr. Henry Wang, who is one of the leading researchers on in the area of prehospital ETI sums up the discussion by saying that “the goal is airway management” not just ETI. He suggests that there are plenty of airway tools and adjuncts to use to maintain an airway within the prehospital environment. The skill itself still has a place in the prehospital world, but as the practical use diminishes so does the times it is practiced. Within the fire service the term High Risk, Low Frequency was coined by Gordon Graham referring to things that are done very infrequently, but have dire consequences for failure. This term applies directly to ETI. Within the state of California, pediatric intubation has been removed as a prehospital skill, citing studies conducted in Los Angeles and San Diego counties that showed no significant benefit to it.¹¹ This due to factors including complications and lack of proficiency. It is foreseeable that the skill of adult ETI may too fall to a lack of proficiency and lack of use due to changing guidelines.

Recommendations

In order to improve upon the failing Endotracheal Intubation success rates, I recommend that a training program be developed that requires all La Verne Fire Department paramedics participate in at least 12 ETI hands on training sessions per year. The training will involve establishing an

¹⁰ Eckstein M, Experts debate paramedic intubation; should paramedics continue to intubate? *Journal of Emer. Med. Services* 2010; June 30

¹¹ Gaushe M, Stratton S, Pratt FD, Effect of out-of-hospital pediatric endotracheal intubation on survival and neurological outcome a controlled clinical trial. *Journal of Emerg. Med.* 2012; 6: 783-93

area in the training room that is set up year round with the intubation mannequin and equipment to conduct practice Endotracheal Intubations. Each paramedic will have an assigned date and time throughout the month to demonstrate and explain the proper placement of an ET tube. The goal is to have continuous training throughout the year and improve the overall success percentage of ETI. These would be reflected by conducting a follow up review of patient care reports.

References

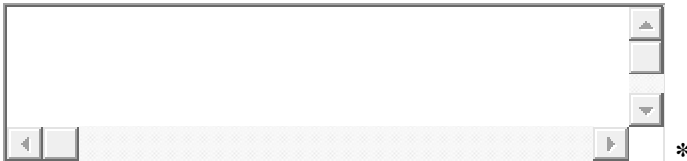
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- H.E. Wang, S. S. (2005, September). Defining the Learning Curve for Paramedic Student Endotracheal Intubation. *Prehospital Emergency Care*, pp. 156-162.
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- L.A. Diggs, J. Y. (2014, July). An Update on Out-of-Hospital Airway Management Practices in the U.S. *Emergency*, pp. 885-892.
- Los Angeles County EMSA. (2008-2016). *Annual EMS Statistics by Provider*. Santa fe Springs: Los Angeles County Emergency Medical Services Authority.
- Marrion Gaushe, S. S. (2012). Effect of Out-of-Hospital Pediatric Endotracheal Intubation on Survival and Neurological Outcome. *Journal of Emergency Medicine*, 783-793.
- S.H. Katz, J. F. (2001). Misplaced Endotracheal tubes by Paramedics in an Urban Emergency Medical Services System. *Emergency Medicine*, 32-37.

Appendix A**EDUCATIONAL NEEDS SURVEY 2016**

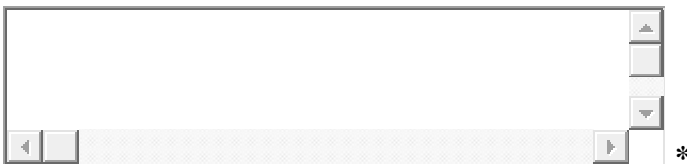
- **In an effort to provide relevant, timely and desired education I am requesting your help. I have developed an educational needs survey for you to complete. Providing you, the staff, education that meets your needs and desires is very important to me. This survey will give me a road map to get there. Thank you, in advance for your cooperation. Dawn Trilles Nurse Educator/Quality Improvement Coordinator**

LVFD

- Is there any material that you feel is regularly overlooked by LVFD? YES/NO

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- Are there any skills that you have not practiced regularly and feel that you may not be able to perform if required to do so in an emergency? YES/NO

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- Select all courses or areas you would like to see education provided in over the next year *

- Arrhythmia recognition and treatment
- Updates in current communicable disease

- Airway Management
 - Upcoming trends (below list specifics)
 - Equipment Review
 - Legal Issues (Below list specifics)
 - Sepsis
 - Trauma (below list specific topics)
 - Specific disease processes
 - Pediatrics (below list specifics)
 - Pacing
- list any specifics from the above question.

A screenshot of a text input field with a scroll bar and a small asterisk to its right. The field is empty and has a standard Windows-style scroll bar on the right side. The asterisk is located to the right of the scroll bar.

- Currently we require ALL Prehospital providers to complete EMT skills verification every 2 years. We have tried various ways of accomplishing this, with varying levels of enthusiasm from the staff. Please identify which technique below will meet your needs better, and feel free to add any of your own suggestions below. (Please note: This has to be LIVE verification, not self-study, must be based in LACO verification criteria. Skills verification is generally accompanied by pre education. This is not a requirement, so indicate if this aids in your ultimate success.) *

Dedicated 8 hour day every 2 years to provide pre-education and verification on the SAME day.

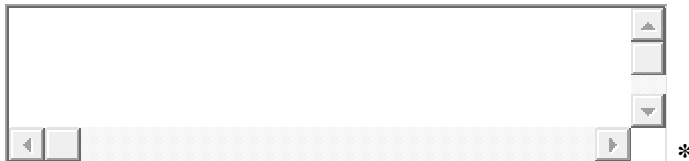
Dedicated 4 hour day every 2 years for skill pre-education, followed by dedicated 4 hour day for skill verification.

Biannual Skill Fair with stations

Quarterly review of 1-2 skills at a time

Monthly review or bimonthly review of 1 skill at a time

- Our goal is to provide an AVERAGE of 2-3 hours of education per month per shift (Total of 24-36 hours per year per shift.) There are certain months that it is impractical and/or logistically challenging to provide CE, therefore I often will give 3-4 hours of CE at one time. Please give me feedback on how CE scheduling and class length and frequency meet yours and the departments needs the best.

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- Indicate to me what areas of our current educational program you like BEST, and which

ones meet your needs the most. 

- Indicate to me what areas of our current educational program you like LEAST and meet

your needs least. 

- As your Nurse Educator/Quality Improvement Coordinator what do you like about my performance and what would you like to see changed?

- **EVALUATION FACTORS FOR NURSE EDUCATOR/QUALITY IMPROVEMENT 1-5. 1 BEING LOW AND 5 BEING HIGH.**

- RATE TEACHING METHODS USED BY NURSE

EDUCATOR. *

- RATE CONTENT OF COURSES OFFERED *

- WORKING KNOWLEDGE OF MATERIAL BEING

PRESENTED. *

- AVAILABILITY TO STAFF *

- FOLLOW THROUGH *

- COLLABORATION WITH STAFF. *

- KEEPING STAFF UPDATED. *

- OVERALL COMMUNICATION *

- TIMELINESS. *

- I would like feedback on my returned survey *

- **Thank you, again, for your participation in this survey. I commit to be open to the findings, evaluate them fairly and consistently, and do my best to make your educational experience the best we can make it. Dawn**