

PARAMEDIC PERCEPTIONS OF CHALLENGES IN OUT-OF-HOSPITAL ENDOTRACHEAL INTUBATION

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ABSTRACT

Objective. Paramedics often perform endotracheal intubation (ETI), insertion of a breathing tube, on critically ill out-of-hospital patients. Recent studies highlight important paramedic ETI shortcomings including adverse events, errors, and poor outcomes resulting from this procedure. Little is known about workforce perceptions of these events. We sought to identify paramedic and physician perceptions regarding the challenges and pitfalls of out-of-hospital ETI. **Methods.** We conducted a qualitative study involving paramedic focus groups sessions and individual interviews with Emergency Medical Services (EMS) physician medical directors. We recorded and transcribed all sessions. We used inductive theory construction to examine, organize, and classify thematic patterns. **Results.** Fourteen paramedics and 6 physicians participated. Although paramedics and physicians recognized problems with paramedic ETI, all participants strongly felt that paramedics should continue to perform the procedure. Physicians and paramedics disagreed about the ability of paramedics to perform neuromuscular blockade-assisted intubation. Both groups identified aspects of paramedic education, skills acquisition, and maintenance as core issues. Participants also identified broader factors about the structure of emergency services, the role of the medical director, and workforce culture and professionalism. **Conclusion.** Paramedics and EMS physicians attribute paramedic ETI performance to a myriad of factors involving EMS education, organization, oversight, retention, and professionalism. Efforts to improve ETI must include strategies to address multiple aspects of EMS operations and culture. **Key words:** emergency medicine; allied health personnel; perceptions; focus groups; qualitative research; intubation

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INTRODUCTION

Although physicians usually perform endotracheal intubation (ETI) in the hospital, resuscitation on critically ill patients usually begins in the out-of-hospital (OOH) setting under the care of paramedics. Despite its accepted role as standard OOH clinical practice for the last 25 years, several recent studies question the safety and effectiveness of paramedic ETI.^{1–4} For example, multiple studies have identified that the intervention is not associated with clinical benefit and in selected cases may be associated with increased harm.^{5–8} Other studies highlight important procedural errors, such as tube misplacement or dislodgment, multiple attempts, failed intubation efforts, and iatrogenic oxygen desaturation and bradycardia.^{9–13} These findings have fueled intense debate about the appropriateness of paramedic ETI, even leading to proposals to cease paramedics ETI.^{14–17} Although paramedics appear to oppose this proposition, the reasons for this opposition are not well understood. Changes and improvements in paramedic ETI practice may not be possible without an improved understanding of paramedics' beliefs about ETI and other aspects of OOH care.

In this qualitative study, we sought to identify and characterize paramedics' perceptions of out-of-hospital ETI training and clinical practice. We also sought to compare and contrast these views with those of physician medical directors of paramedic emergency medical services (EMS) agencies.

METHODS

Study Design

We received approval by expedited review from the University of Pittsburgh Institutional Review Board. All paramedics and physicians involved in this study provided written informed consent. We conducted a qualitative study consisting of focus group discussions with paramedics and interviews with EMS physician medical directors.¹⁸ We chose a qualitative approach for this effort because there were no prior studies characterizing the nature of paramedic workplace culture. In addition, qualitative methods are particularly efficacious for examining attitudes, opinions, and beliefs, especially when issues of interest are complex.^{19,20} We also sought to identify factors or themes that may not be recognized through objective survey or measurement.

Qualitative methods have been widely used to characterize dimensions of medical beliefs and culture.^{7,21–23}

Study Setting and Population

We conducted all focus groups and interviews in the Pittsburgh, Pennsylvania, area. The first focus group with the paramedics had six participants, the second had five, and the last one had three. There were an additional six individual interviews with physicians. We included focus group participants of both genders and from both urban and suburban/rural EMS agencies. The paramedic participants worked for both professional and volunteer services and had a range of prior professional experience. The physicians, all male, consisted of professional medical directors of local urban and suburban/rural EMS services. They came from different hospital systems and varied professional backgrounds Table 1.

Study Protocol

We conducted three separate focus group discussions by using a “snowball” sampling of paramedics from the Pittsburgh, Pennsylvania, area. “Snowball” sampling is a form of nonprobability sampling, using key contacts for the sample population.²⁴ To enrich our understanding of the themes and issues raised in the focus groups, we contrasted paramedics’ views with those of physicians by using a series of individual interviews with EMS physician medical directors. We did not conduct focus group sessions with the EMS physicians because of logistical difficulties coordinating a group session with these specialized individuals. All focus group discussions and five individual interviews were taped and transcribed. One interview was recorded with notes. We de-identified all transcripts prior to analysis.

Data Analysis

We followed the methodologies prescribed by Krueger, Miles and Huberman, and Strauss and Corbin, to identify thematic content.^{18,25,26} We used grounded theory to develop the basic codes from the focus group sessions and interviews and then applied these in our

coding.²⁶ Using these codes, which are descriptive or inferential labels assigned to clusters of words, we divided the data into meaningful categories. We then differentiated, combined, and compared the categories and broad themes identified across the different focus groups and interviews. We used these themes to formulate larger observations. To ensure consistency, the coding was independently coded and compared by an external reviewer. Because this was a qualitative data analysis of focus groups and interviews, sample size determinations were not relevant.

RESULTS

We initiated discussions and interviews about general considerations of ETI in the field all participants (14 paramedics and 6 physicians). The themes that emerged encompassed issues about ETI techniques and coworkers and expanded to encompass training, skills maintenance, and the structure of paramedic services. The data from the focus groups and the interview were collected until redundancy was reached. We selected quotations representative of either paramedics or physicians as a group.

Should Paramedics Intubate?

All paramedic participants believed that ETI was a defining characteristic of paramedic care and were adamant that they continue to perform the procedure in OOH settings. One paramedic stated, “Airway management. . . it should not change from the pre-hospital setting to the hospital setting.” There was strong agreement that “You have to select better paramedics or make paramedics better. You don’t take the skills away.” Many noted that not even all doctors are able to easily perform this procedure. Several paramedics proudly spoke of skillfully intubating when a young or inexperienced doctor was unsuccessful.

Physicians generally concurred that paramedics should continue performing ETI, with one physician observing that ETI is a “defining procedure” and “an essential duty” of paramedics. However, the physicians believed the procedure should be limited to specific patient populations where ETI may benefit the patient, specifically cardiac arrest patients. Most but not all physicians also saw advantages for the ETI of pneumonia, congestive heart failure, and chronic obstructive heart disease patients. There was common agreement among the physicians that ETI may not be appropriate for trauma and head-injured patients. As a group, the physicians also agreed that only those with specific pediatric ETI training should attempt ETI of children. Several physicians cautioned that hospital proximity must guide ETI use; for example, in urban settings with short transport times, deferral of ETI may be prudent, but in

TABLE 1. Study Participants

Group	Paramedics	Physicians
Age (mean, range)	35.7 (23–46)	N/A*
Years of experience (mean, range)	13.8 (1–28)	17.3 (9–25)
Primary work setting		
Urban	4	3
Suburban/Rural	8	3
Other (EMS governing body)	2	

*These data were not applicable because the focus of the study was the paramedics.

rural locations with lengthy ambulance transport time, ETI may be desirable.

Access to Neuromuscular Blocking Agents

Because ETI of “awake” patients with intact airway reflexes is difficult, physicians may use neuromuscular blocking (NMB) agents to “paralyze” the patient beforehand in the in-hospital setting.²⁷ In the United States, this technique is considered extremely advanced and is usually restricted to physicians, with only limited paramedic use.^{5,28,29}

The use of NMB agents was the point of strongest disagreement between paramedics and physicians. The physicians, citing recent negative scientific studies, did not believe the paramedics would be capable of handling the complexities and potential adverse outcomes of NMB-assisted intubation, even with supplemental training. One physician described, “It’s become very uncomfortable because of the literature . . . they run into a lot of complications that they’re not very good at handling, and they’ve had bad outcomes . . . So the studies for me have been a disappointment. But I’ve got to respect the scientific validity of those studies.”

However, paramedics believed that this restriction was one of the greatest barriers to ETI performance and strongly resented that they were not permitted to use NMB agents. They also expressed frustration with physicians’ failure to recognize the difficulty of ETI without NMB agents, particularly on patients “who are fighting and flailing” or whose jaws are “clamped down” (clenched in trismus). Paramedics perceived that “it comes down to a trust issue” and that physicians lacked trust in paramedics’ skills, judgment, and intelligence; “Paramedics are just trained monkeys.”

Another source of paramedic frustration was their belief that physicians relied on NMB for difficult intubations. One paramedic expressed, “We all know what it’s like to sit in the back of an ambulance trying to hold someone down because they’re hypoxic [low oxygen level]. And we call the doc and we say, ‘Doc, I need to intubate them. Can I give them just some Valium?’ But they don’t feel we’re intelligent enough sometimes. If [the patient is] not dead, the first thing [the physician does] is anesthetize them [and intubate them]. And the [physician] looks at you like, ‘Why didn’t you do this?’”

Adequacy of Paramedic ETI Training

The paramedics attributed poor ETI performance to the current manner of initial and ongoing training. They believed there were a variety of causes; national paramedic education standards are “bare minimum,” there are no curriculum standards, and no uniformity in educational quality of institutions and teachers, or in mentoring and precepting.

Paramedics also perceived that they did not have adequate opportunity to practice ETI in the operating room (OR) and complained that other medical professionals had priority over them for OR ETI. Describing his training, one paramedic said, “When I went to paramedic school, I was not allowed to intubate when I did my [operating room] intubation. I watched the procedure when the anesthetist [did it and] said, ‘Here’s how you do it. You open the tube. You push this down. There you go. It’s done.’ I’m like, ‘What was that?’ I did not get my first live intubation until I was actually out in the field.”

Because they fail to accurately replicate the complexities of real-world ETIs, paramedics thought that ETI training mannequins and human simulators were inadequate because they did not capture the awkward nature of the field environment (e.g., working under low ambient light, in a stairwell or a cramped restroom).

Paramedics reiterated that practice is necessary to maintain ETI skills, but they noted multiple factors that limited practice, such as the unavailability of mannequins and lack of time due to “moonlighting” because of low salaries. Retention problems were also an issue in part because of the salaries; “Some places got a lot of green people because a lot of the EMTs aren’t paid enough to want to stay there. Working at a restaurant, they could get paid more.” Inadequate feedback from medical directors was cited as another factor: “It is difficult to improve ETI skills if people are not aware of problems with their own performance.”

Numerous paramedics described medical directors who do not terminate paramedics with the poorest skills. There is also the issue of lack of state standards to maintain ETI skills. As a paramedic said, “I would welcome a state mandatory regulation where we have to go into an OR and intubate three or four patients a year. Ten years ago, we used to have to do X amount of hours every year to maintain our standards. Now that has gone by the wayside because of overtime. Who is going to pay it? Who’s going to do liability? And some people said we just don’t have time for it.”

Physicians also agreed that paramedics need more initial ETI training and continuing practice, but they strongly believed (more so than the paramedics) that ETI practice should occur on live patients. They believed that “mannequin simulation doesn’t give them a realistic view of what intubation is like.” Some suggested that live OR ETI training opportunities might be more available at small, nonacademic hospitals rather than at large academic medical centers.

Physicians also cited retention and lack of a career ladder as relevant issues “Paramedics need to be paid. You can’t make more money working at [a convenience store] than being a paramedic. When you look at some of the salaries, you can’t be a paramedic and have a family. There’s also no career ladder. You can’t carry people up and down steps all your life.”

Centralization of EMS Structure and Improvement of Medical Oversight

Currently in southwestern Pennsylvania, municipalities operate their own ambulance service. Both paramedics and physicians believed that consolidation and centralization of EMS personnel and resources would help to unify paramedic standards and protocols and give medical directors more power. One of the physicians said, "I think that the medical directors often are not powerful enough in the companies; there's a lot of politics, and they can be replaced easily."

Several of the physicians emphasized that it was vitally important to begin collecting objective data about intubations and airway management. One physician pointed out, "They had a study four years ago in which they saw that about a quarter of the intubations were not in the right spot... Nobody was counting things, never mind thinking critically about it." One place to begin is with the success rate for all intubation attempts, as one physician suggested, "Every single airway needs to be audited by the medical director. Every service needs to know [that] last year [they] tried to intubate 363 people [and that their] success rate was X. There are [EMS agencies] out there that have no clue even how many intubations [they] attempt."

Others wanted to see clinical studies comparing various methods of airway management and pointed out that these other modalities were not yet proven superior to ETI and also required training and skill. One physician expressed his feelings, "[Comparative studies] are the studies that I need to see before I know to abandon intubation. There's a problem, but I'm not going to immediately go to something else that's not going to improve it."

DISCUSSION

In our study, paramedics and EMS physicians offered insights linking ETI performance to broader aspects of EMS education, organization, oversight, retention, and professionalism. These observations confirm the complex relationships among the procedure (ETI), broader system-level aspects of EMS, and cultural dimensions of the EMS workforce. Efforts to improve ETI cannot focus only on the procedure itself, they must include strategies to address multiple aspects of EMS operations and culture.

Neuromuscular blockade assisted paramedic intubation is presently limited to only selected paramedic systems in the United States.^{5,28,29} Our observations confirm the strong divergent views between paramedics and physicians about the safety and use of this practice. Beyond the issues surrounding NMB ETI technique, this disagreement may also reflect the conflicted relationship between EMS physicians and paramedics. If widespread, this phenomenon may interfere with efforts to improve ETI performance. For example, rather

than seeing medical directors as "partners" helping to improve quality, paramedics may perceive physicians as quality "watchdogs." Conversely, physicians may fail to fully engage paramedics in collective efforts to implement or evaluate clinical interventions. Inclusion of paramedics in efforts to improve ETI performance, clear focus on the goal of improved patient care, and the possible use of a mediator may facilitate these issues.

One observation of interest involved paramedics' pride and confidence in their intubation skills. Individual paramedic participants expressed that their ability to perform this complex skill validated their greater clinical and professional roles in emergency medical care. Although this issue was not thematically prominent, it does highlight paramedics' perceptions of their own intubating skills and the close relationship between the procedure and paramedic job identity. One also wonders if this type of "attachment" to an intervention exists in other areas of medicine. For example, emergency physicians once struggled with anesthesiologists to perform Emergency Department ETI and NMB-assisted ETI.^{30,31} Would emergency physicians express the same feelings if ETI were threatened to be removed from their scope of practice?

From a systems perspective, broader questions merit consideration. For example, under the paramedic education and development system, how easy is it to alter practices? Physicians and nurses regularly update practices to reflect current scientific knowledge; is this type of progression present or possible with paramedic care? Both paramedic and physician participants believed that improvements in ETI performance were possible with adequate education and financial and system support. However, is the general public willing to make these investments? Is the medical community similarly committed to paramedics and their training? These complex questions suggest the need to reexamine not only the clinical dimensions of paramedic care but also its origins, principles of care, methods of education, and systemic design.

LIMITATIONS

This study contains several limitations. We interviewed only a select sample of paramedics and EMS physician medical directors. We might have observed different responses if we used physicians without medical direction experience or paramedics with prior supervisory experience. We were not able to facilitate a focus group discussion among the EMS physicians. Participants from different areas or practice settings might have identified additional topics or areas of concern. We focused primarily on ETI. Because of time and logistical constraints, we did not explore participants' views about other methods of airway management such as bag-valve-mask ventilation, the Combitube, or Laryngeal Mask Airway.³²

Qualitative research is designed to identify themes, not to quantify their prevalence or absolute priority. Additional efforts using survey or other designs are needed to generalize these observations across a broader range of EMS services and geographical areas. However, even with these limitations, the themes identified in this effort have strong face validity; further efforts are unlikely to identify significantly different concepts.

CONCLUSION

Paramedics and EMS physicians attribute paramedic ETI performance to a myriad of factors involving EMS education, organization, oversight, retention, and professionalism. Efforts to improve ETI must include strategies to address multiple aspects of EMS operations and culture.

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