

# Practice and preferences of endotracheal intubation by emergency and critical care physicians in Riyadh, Kingdom of Saudi Arabia

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## Abstract

**Purpose:** This survey aimed to identify the practice and preferences of endotracheal intubation amongst Emergency and Critical Care physicians in Riyadh, Kingdom of Saudi Arabia (KSA).

**Methods:** An electronic questionnaire was created and distributed using SurveyMonkey®. This was sent to emergency and critical care physicians working at various hospitals in Riyadh, KSA. Data was collected regarding their airway skills, experience in performing the procedure, drugs of choice for rapid sequence intubation, the availability of difficult airway equipment and participant demographics.

**Results:** Out of the 210 physicians contacted we received 100 completed responses. Of these two thirds were Emergency Medicine physicians or residents. Pre-oxygenation is performed 74% of the time and direct laryngoscopy is preferred over video laryngoscopy. Doctors with less than 5 years of clinical experience are more likely to perform airway assessments prior to the procedure compared to the more experienced clinicians; 32% of the respondents are always performing airways assessment. 84% of respondents are working in clinical areas which have a difficult airway cart available. Etomidate and succinylcholine are the most commonly used induction and paralytic agents.

**Conclusion:** While pre-oxygenation is performed prior to the majority of the intubations, airway assessment is not routinely performed. Junior doctors are more inclined to perform airway assessment. Direct laryngoscopy is the preferred method of endotracheal intubation by the majority. The use of induction and paralytic agents vary widely. Difficult airway carts are not universally available.

## Introduction

Critically ill patients that present to the Emergency Department (ED) or Intensive Care Unit (ICU) are physiologically unstable and may have poor reserves to sustain life. These patients may require Endotracheal Intubation (ETI) to secure their airways and provide ventilator support [1-3]. Outside the operating rooms, ETI is most commonly performed by the Emergency Physicians (EPs) in the ED and the Critical Care Physicians (CCPs) in the ICU [4].

Clinicians at the forefront of managing these acutely decompensating patients need to be proficient with airway management skills, have a complete knowledge of the equipment, and have formal training to perform the procedure [5]. The intubating physician has to have access to airway equipment, be able to recognize and intervene in a timely and effective way to manage any complications [6]. The intubating physician should also be knowledgeable in the use of the rescue devices which should be available universally [7].

ETI protocols are established by various airway management societies to guide the clinical practice. This survey was conducted to understand, the current practice of ETI among the emergency and critical care physicians working at various hospitals in Riyadh, Kingdom of Saudi Arabia (KSA).

## Methods

An electronic survey questionnaire was designed to study the practice of intubation preferences and techniques of Emergency and Critical Care Physicians. The questionnaire was distributed to the physicians using SurveyMonkey®. Data collected were participant demographics, intubation procedure preference, induction and paralytic agent of choice, and the availability of rescue and emergency intubation equipment. The questionnaire was distributed amongst attending and resident physicians, working in ED and ICU setting in various hospitals in Riyadh, KSA.

The data collected was analyzed using IBM- SPSS V27 program. Descriptive statistics, cross-tabs, and Chi-square were performed to correlate between categorical variables to check for associations.

## Results

The questionnaire was sent to 210 Physicians. A hundred questionnaires (48%) were completed and returned. Out of the total

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respondents, 91% were residents, and 9% were attending physicians. EPs and emergency medicine residents constituted 67% (67/100) of the total respondents. Two respondents had no prior experience in ETI, and one respondent was unsure of how to intubate. 81% of respondents have less than five years' in clinical practice (Table 1).

Airway assessment is performed always by 32% of the responders and sometimes by 35% (Figure 1). Pre-oxygenation is always performed by 74 % of the respondents, while 26% reported pre-oxygenating most of the time or sometimes (Figure 2). Direct laryngoscopy is the preferred method of intubation for 74 % of the respondents, while only 26 % preferred video-laryngoscopy. All the respondents used endotracheal tube introducers or stylets as adjuncts. The stylet was the adjunct of choice for 86 % of the respondents, 23% used a stylet or bougie, 13% used a bougie only.

Etomidate is the most commonly used (62%) induction drug choice by the responders. Of these, 24% used Etomidate exclusively. Propofol is used by 54%, followed by Ketamine 46% and Midazolam 27% of the total responders (Figure 3). Suxamethonium was the preferred paralyzing agent for 47% of respondents, while 53% preferred rocuronium on its own or in combination. Of these 37 percent used rocuronium exclusively; 15% used either suxamethonium or vecuronium.

Out of the total 100 responses, 89% of respondents have access to video laryngoscope. However, only 26% use this and the rest 74% use direct laryngoscope. Out of the remaining respondents, 5% were unsure of the availability of video laryngoscope, and 6% do not have video laryngoscope available at all. 84% of the respondents have difficult airway carts available. Four percent of respondents did not have a difficult airway cart while 12% have never checked for the availability of a difficult airway cart (Table 2).

### Discussion

Our data show significant variance in the practice of ETI among EM and CCP in the city of Riyadh and consequently a potential impact on standardization of the clinical practice. Airway management training is mandatory for all EM and CCPs during residency. In most countries, including the KSA, trainees in the above specialties are expected to

Table 1. Years of experience vs number of respondents

Level of training and/ or Years of Experience	Number of respondents N (%)
R1	21 (21%)
R2	23 (23%)
R3	23 (23%)
R4	14 (14%)
5 years' experience	10 (10%)
7 years' experience	1 (1%)
10 or more years' experience	8 (8%)

Table 2. Availability of video laryngoscope and difficult airway cart

Availability of Difficult Airway Cart in your Department	Availability of Video Laryngoscope				Total
	Never Checked	No	Yes		
Never Checked	1	2	9		12
No	0	1	3		4
Yes	4	3	77		84
Total	5	6	89		100

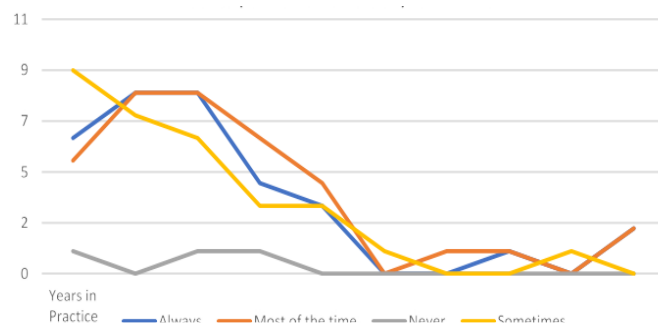


Figure 1. Years of Experience vs Airway assessment

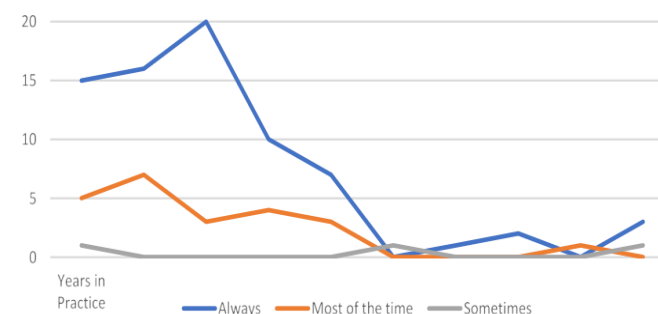


Figure 2. Years in practice vs performing pre-oxygenation

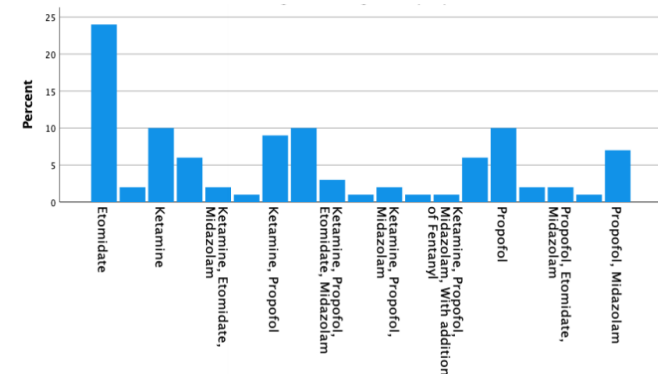


Figure 3. Use of induction agent

learn and perform unsupervised ETI to complete their structured training programs.

ETI is a high-risk, lifesaving advanced airway skill, performed in the hospitals and prehospital setting by physicians and or allied health staff [2,4,8]. Admitted patients in need of advanced airway and ventilation, are usually managed by the CCPs. Correspondingly, the teaching of this skill and receptiveness of a trainee becomes challenging when there is a lack of adherence to the standard protocols [7,9,10]. Teaching and skills development also depends on the locally available resources. However, the practice of intubation varies widely across different countries [11]. Maintaining post training competency is also a challenge [9,10].

Pre-oxygenation and airway assessment are critical steps before intubation to mitigate potential difficulties and complications [8]. Adequate pre-oxygenation during a Rapid Sequence Intubation (RSI) can be achieved within 3-5 minutes through a non rebreather mask. This would increase the safe apnea time by nitrogen washout, improved

oxygen delivery and increased uptake of alveolar oxygen into the blood. It is a standard of care that may increase desaturation time up to 8 minutes [8,12]. Our survey showed that not all intubators pre-oxygenate their patients; only 74% always pre-oxygenated. Airway assessment is also not performed by all participants. Generally, junior doctors have a higher propensity to perform airway evaluation. However, the more senior the respondent was the more likely they did not perform an airway assessment. This may show a lack of standardization or operator overconfidence.

The choice of induction and paralyzing agents during RSI may vary widely [13,14]. This can be due to a local protocol, situational needs, experience, and confidence in the use of a particular drug, etc. Midazolam may induce hypotension during ETI. However, 27% of our surveyed physicians use it in their practice. Recently, Ketamine is becoming a more favorable induction agent, recommended due to its stable hemodynamic properties [15,16]. However, Etomidate and Propofol are other commonly used induction agents.

Video Laryngoscopy (VL) is being advocated as the standard for difficult airway intubation but its superiority for first-pass intubation is not conclusive [17-20]. ETI risk awareness, availability of equipment and teaching during training programs continues. However, standardization of difficult airway carts is still lacking [21]. Our survey findings were similar to Cook and Kelly that difficult airway or rescue equipment is not available all the time [22,23].

Health Care Workers (HCW) at the frontline are at the highest risk of occupational exposure to COVID-19 infection. Since, the advent of the COVID-19 outbreak, VL is being supported as a safer procedure compared to DL [21,20]. This has resulted globally in HCW changing their approach to “self-safety” and health promotion. Among our respondents despite having the facility, majority preferred direct laryngoscopy. It is not clear whether this is a lack of experience, equipment knowhow or a personal choice. The use of VL is now promoted as the method of choice to perform ETI [24,25].

At our institution, we have standardize the difficult airway adjuncts utilized during ETI. A difficult airway algorithm is proposed for patients with difficult or anticipated difficult airways (Figure 4). This poster is displayed in the resuscitation room as a visual clue for the intubating team. The bidirectional bottom arrow is to allow flexibility to the operator. As at times, switching between VL and DL may improve success rate. Each resuscitation room in our institution is equipped with a difficult airway cart. This cart is always stocked with different airway adjuncts including various types and sizes of DL and VL blades, bougies, stylets, supraglottic airway devices including LMA® (laryngeal mask airway) I-gel®, fiber-optic or video bronchoscope, No.10 blade

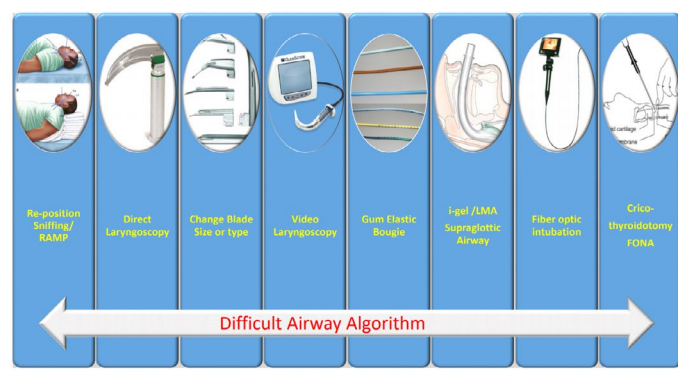


Figure 4. Difficult airway algorithm

and a formal front of neck access (FONA) kit. This practice facilitates the best possible outcome.

## Conclusion

Our survey shows that there is a significant disparity among the physicians in managing ETI procedure. DL remains the preferred method of ETI by the majority. While pre-oxygenation is performed prior to the majority but not before all the ETIs. Junior doctors are more likely to perform airway assessment prior to intubation. Etomidate and succinylcholine are the most commonly used induction and paralytic agents. However, there is a need for standardization, universal availability of VL, and difficult airway carts.

## Recommendations

The authors recommend that practitioners at all levels should follow a standardized approach to intubating a patient. There should be a rigorously structured training program for trainees to develop competencies in all available airway adjuncts including VL. To improve patient safety, all patients must be adequately pre-oxygenated before the RSI attempts. To improve HCW safety, healthcare facility must provide staff access to VL and implement protocols for intubating patients with COVID-19 infections.

## Limitations

Our study was limited to physicians in Riyadh, thus the results may not be generalizable. The majority of the respondents had 5 years or less experience, this has potentially skewed the results. The survey did not explore the clinical scenarios that may dictate the choices made. There is a need for a larger prospective study.

## Disclosure

None.

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