

A Comparison of Endotracheal Intubation Success Using Video Laryngoscopy and Reconstructed Laryngoscopes Among Health Workers in Nusa Penida

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ABSTRACT

Background: Endotracheal intubation is a critical procedure in the management of patients with respiratory distress. The two main methods used are video laryngoscopy and reconstructive laryngoscopy. This study aims to compare the duration and number of intubation attempts using video laryngoscopy and reconstructed laryngoscopy in health workers in Nusa Penida.

Objective: This study aimed to compare the time and number of endotracheal intubations performed by healthcare workers in Nusa Penida using two strategies, video laryngoscopy and repeat laryngoscopy. The study involved healthcare specialists who performed intubations in the model, with two groups of 31 people each.

Methods: This study used a quasi-experimental design involving health workers in Nusa Penida who performed endotracheal intubation using a video laryngoscope and a reconstructed laryngoscope on mannequins. Two groups of 31 samples were created for the study, and both were given intubation training using a laryngoscope video and direct laryngoscopy.

Results: The outcomes of this study were the duration of intubation and the number of attempts required by each respondent to intubate successfully after training. The study used statistical analysis to compare outcomes, employing a paired t-test. The results indicated that the average duration of intubation using laryngoscopy was 31.7 seconds (range: 13 - 93 seconds), while video laryngoscopy took 22.9 seconds (range: 11-49 seconds), with a significance level of $P < 0.014$. Additionally, the average number of intubation trials was 1.29 (range: 1 - 3) for direct laryngoscopy and 1.03 (range: 1 - 2) for video laryngoscopy, with a significance level of $P < 0.018$.

Conclusion: There is a difference in the use of the video laryngoscope better in terms of duration and intubation attempts.

Keywords: endotracheal intubation; intubation time; number of intubation attempts; reconstructed laryngoscopy; video laryngoscopy

INTRODUCTION

Nowadays, visualization techniques are becoming increasingly popular as they can reduce the risk of severe intubation reactions and intubation failure. However, airway difficulties, whether expected or unexpected, can still lead to intubation failure, which not only puts the anesthesiologist in an embarrassing situation but also threatens the patient's life and safety.¹ The use of laryngoscopy-assisted intubation has become standard in modern medical practice. But as the technology advances, video laryngoscopy is becoming more and more popular and is thought to have some advantages over direct laryngoscopy in some cases.^{2,3} In performing tracheal intubation, two types of laryngoscopes are commonly used: the direct laryngoscope and the video laryngoscope.⁴ These procedures can pose a significant risk when performed outside the operating room. They are often carried out by inexperienced individuals on physiologically unstable patients, as demonstrated.^{3,4,7} The direct laryngoscope is widely available in Indonesia for endotracheal intubation, but recent anesthesia journal studies recommend the use of the Video laryngoscope. It has been observed that using a video laryngoscope leads to better first-attempt success compared to a direct laryngoscope.^{5,6,8} Additionally, the application of a video laryngoscope provides good visualization of the larynx, as mentioned.⁹

The Nusa Penida Islands in Klungkung Regency are included in the strategic tourism areas of Bali. The area consists of three islands that are rich in natural wealth and beauty and diverse tourism potential, namely Nusa Penida, Nusa Lembongan, and Nusa Treasure Island. Based on statistics, the number of

tourists traveling to Nusa Penida in 2018 was 133,848 people, an increase of 10.23% compared to the previous year.¹⁰ The increase in the number of visitors must accommodate the availability of tourist facilities in the Nusa Penida area, including accommodation and health facilities. Therefore, researchers conducted a comparative study of the duration and trial of tracheal intubation using video laryngoscopy versus direct laryngoscopy in health workers in Nusa Penida.

METHOD

This research is a quasi-experimental study using the Counterbalanced Design approach. Respondents in the study were split into two groups and assessed for intubation time and duration of intubation attempts. The first group used direct laryngoscopy for intubation, while the second group used video laryngoscopy. The study evaluated the duration (in seconds) and the number of trials performed for each method. The study was carried out on May 8, 2024, at Gema Santi Nusa Penida Hospital in Batununggul Village, Nusa Penida District, with a total sample size of 31 people.

RESULTS

The quasi-experimental method in analyzing the relationship between variables is expressed numerically. Where can I find a comparison of the duration of endotracheal intubation using video laryngoscopy versus direct laryngoscopy among health workers in Nusa Penida? This study was analyzed with the help of Statistical Package for the Social Sciences 22 using a paired sample t-test. In this study, the sample was 31 health workers who participated in the training. In the intubation duration group, samples were collected using video laryngoscopy and direct

laryngoscopy based on the duration of intubation. The number of intubation attempts using video laryngoscopy and direct laryngoscopy was also documented and analyzed using Statistical Package for the Social Sciences 22. The characteristics of the research subjects are described in terms of their occupation and age (Table 1). The data in the table indicates that there were 8 doctors and 23 nurses among the respondents. In addition, "the number of males was higher" in the training group based on gender characteristics.

Table 1 describes the characteristics of respondents based on the type of work, where the occupational groups consist of nurses (23 respondents) and general practitioners (8 respondents). The variables of this study were intubation duration and intubation attempts. Each of which was treated with intubation using a video laryngoscope and a reconstructed laryngoscope. The following is the frequency distribution of intubation trial research variables.

In the first trial using video laryngoscopic intubation, there were 3 respondents who failed the first trial. Whereas in intubation using direct laryngoscopy, there were 8 respondents who needed endotracheal intubation more than once (Table 2).

Illustrates the intubation time required by the training group using video laryngoscopy and direct laryngoscopy. The intubation group using video laryngoscopy has a shorter time than intubation using a reconstructed laryngoscope, with the results of the t-test illustrating Sig. (2-tailed) of ($P < 0.014$) (Table 3).

The number of intubation attempts using video laryngoscopy compared with direct laryngoscopy was significantly different, with a higher success rate of intubation attempts using video, with a P value (Table 4).

Table 1. Distribution of patient characteristics

No	Characteristics	Type of work	Amount
1	Doctor		
	General Practitioner of the Health Center	Nusa Penida Health Center 1,2, and 3	3
	Hospital General Practitioner	General Practitioner Gemma Santi Hospital	5
2	Nurse		
	Hospital Nurse	Emergency Department Nurse	3
		ICU Nurse	3
		Room Nurse	5
	Health center nurse	Nusa Penida Health Center Nurse 1	4
		Nusa Penida Health Center Nurse 2	4
		Nusa Penida Health Center Nurse 3	4
3	Type of Gender		
	Male		18
	Female		13

Table 2. Distribution of dependent variable characteristics by intubation trial

No	Intubation attempt	Variabel dependen			
		Laryngoscopic video experiment (n=31)		Laryngoscope experiment direct (n=31)	
		Frequency	%	Frequency	%
1	First attempt at intubation	28	90.32 %	23	74.19 %
2	Intubation attempts more than 1 time	3	9.68 %	8	25.81 %

Table 3. Comparison of the intubation time required by training groups

Treatment	Duration of intubation (seconds)	Sig. (2-tailed)
Direct laryngoscopy	31.7 (13 – 93)	P < 0.014
Video laryngoscopy	22.9 (11-49)	

Table 4. Comparison of intubation trials using video laryngoscopy and direct laryngoscopy

Treatment	Intubation attempt (times)	Sig. (2-tailed)
Laryngoscope experiment direct	1.29 (1 – 3)	P < 0.018
Laryngoscopic video experiment	1.03 (1 - 2)	

DISCUSSION

The results of this study indicate that in intubation trials using a reconstructed laryngoscope, the duration of intubation is faster with a video laryngoscope. This is shown by the results of the study with a Sig value of 0.014. indicates that the success rate of intubation using a video laryngoscope is higher than with a reconstructed laryngoscope. The advantage of the video laryngoscope is better visualization of airway anatomy, which can reduce intubation difficulties, especially in patients with airway anatomical difficulties.^{11,12,13,16}

The use of video laryngoscopy also reduced mean intubation time and improved airway visibility, although differences in intubation duration were not always statistically significant.^{8,14} The success rate of intubation has several factors, one of which is influenced by the experience of intubation officers.¹⁴

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The use of video laryngoscopy also reduced mean intubation time and improved airway visibility, although differences in intubation duration were.¹⁷

CONCLUSION

There is a difference in duration and intubation attempts using a video laryngoscope compared to a direct laryngoscope. Where the use of video laryngoscopy has a better duration and intubation attempts.

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