

IMPROVEMENT OF *ABILITY TO APPLY* FOR PMR MEMBERS AT SMAN 1 BANGSAL THROUGH THE APPLICATION OF SIMULATION *BASIC AIRWAY MANAGEMENT*

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ABSTRACT

Airway obstruction is an emergency condition due to airway obstruction that can cause ventilation disorders to death. The purpose of this study is to determine the effect of *basic airway management simulation* on the *ability to apply* to PMR members at SMAN 1 Bangsal. This study uses a *pre-experimental* design with a *one-group pretest-posttest approach* with a population of 50 PMR members and a sample of 45 respondents using *total sampling*. The research variables include *simulation of basic airway management* and *ability to apply*. Data was collected using SOPs and observation sheets, then analyzed using the *Wilcoxon Rank Test*. The results showed that 43 respondents (95.56%) experienced an increase in ability to apply. The *Wilcoxon Rank Test* shows an *Asymp. Sig. (2-tailed)* value = 0.000 (<0.05), so H_0 is subtracted. *Basic airway management simulation* has a significant effect on increasing the *ability to apply* PMR members in handling choking cases according to procedures.

Keywords: *Degree of Dyspnea, Degree of Obstruction of the Respiratory Tract, COPD*

INTRODUCTION

Airway obstruction is an emergency condition characterized by partial or total obstruction of the airway so that it inhibits the ventilation process and can cause hypoxia, permanent brain damage, and death if not treated immediately. In the principle of emergency handling ABCDE (*Airway, Breathing, Circulation, Disability, Exposure*), *airway* is the top priority before other interventions are carried out. *Basic airway management*, such as *head tilt–chin lift, jaw thrust, back blow*, and *Heimlich maneuver*, is an important first aid measure to maintain airway patency in victims with airway obstruction (Khan et al., 2025; Khalilati et al., 2025).

Airway disorders are still a global health problem. The World Health Organization (WHO) reports that choking is one of the leading causes of accidental death due to airway obstruction, especially in children and adolescents. In Indonesia, although national data on choking incidents is still limited, Riskesdas 2018 shows that choking still contributes to child deaths. A delay in treatment of 4–6 minutes can cause permanent brain damage, while the provision of proper first aid through *basic airway management* can significantly increase the victim's chances of survival (Ministry of Health of the Republic of Indonesia, 2018; Khalilati et al., 2025).

One of the factors that affects the success of handling airway obstruction is the *ability to apply* in performing *basic airway management* techniques. These abilities are not only influenced by knowledge, but also by psychomotor skills acquired through repetitive exercise, demonstration, and feedback. In the school environment, members of the Youth Red Cross (PMR) have a role as first responders in emergencies. However, learning that is still dominated by theory causes the practical ability of PMR members to perform *back blow* techniques and Heimlich maneuvers is not optimal (Basnet et al., 2022).

Previous research has shown that *simulation-based education* (SBE) is effective in improving knowledge, skills, and preparedness of practice in handling emergencies compared to conventional learning methods (Hye et al., 2021; Basnet et al., 2022). The results of a preliminary study on five PMR members at SMAN 1 Bangsal showed that all respondents had *the ability to apply basic airway management* in the low category because they had never received training. Therefore, this study was conducted to analyze the effect of *basic airway management simulation on the ability to apply* to PMR members at SMAN 1 Bangsal as an effort to improve adolescent preparedness in providing first aid in cases of airway obstruction.

METHOD

This study uses a quantitative research with a *pre-experimental design* with a *one-group pretest-posttest* design approach, which aims to determine the effect of basic airway management simulation on the ability to apply to PMR members at SMAN 1 Bangsal.

The research population is all PMR members at SMAN 1 Bangsal totaling 45 members. The research sample amounted to 45 respondents who were selected using *the total sampling technique*.

Data collection will be carried out in June 2026 at SMAN 1 Bangsal after obtaining approval for a research permit. Data collection uses SOPs and observation sheets on *the ability to apply basic airway management*. All respondents were first given an explanation of the purpose of the research, then signed an approval sheet to become a respondent before pre-test measurements and *basic airway management* simulation education was carried out. The data obtained is then through *editing, coding, scoring, and tabulating* stages before being analyzed using SPSS. Univariate analysis was used to describe the characteristics of respondents and the distribution of each variable, while bivariate analysis was carried out using *the Wilcoxon Rank Test* with a significance level (α) of 0.05 to determine the effect of *basic airway management* simulation on *the ability to apply* to PMR members at SMAN 1 Bangsal.

FINDING AND DISCUSSION

RESEARCH RESULTS

GENERAL DATA

Table 1: Frequency Distribution of PMR Respondent Characteristics at SMAN 1 Bangsal

	N	Minimum	Maximum	Red	Std. Deviation
Age	45	15	18	16,67	,769
Valid N (listwise)	45				

Yes	Characteristics Respondent Demographics	F	%
1	Gender		
	Male	10	22,2
	Women	35	77,8
2	Classes		
	10	24	53,3
	11	14	31,1
	12	7	15,6
4	Have Been Exposed to <i>Basic Airway Management</i> Information Before		
	Ever	2	4,4
	Never	43	95,6
	Total	45	100

Source : Primary Data 2026

Table 1 shows that the average age of respondents is 16 years old with a mean of 16.67. When viewed from gender, it is known that almost all of the respondents are female as many as 35 respondents (77.8%). Based on class, most of the respondents came from grade 10 as many as 24 respondents (53.3%). Based on having been exposed to basic airway management information before, almost all of the respondents (95.6%) never had as many as 43 respondents (95.6%). There were 2 respondents (4.4%) who had been exposed to basic airway management information previously because the respondents participated in volunteer activities and became members of PMI in Mojokerto district.

SPECIAL DATA

1. *Ability to Apply Heimlich Manual Pre-Test*

Table 2: *Ability to Apply Heimlich Maneuver Before Being Given Basic Airway Management Simulation*

Yes	<i>Ability To Apply Heimlich ManueverPre Test</i>	F	%
1	Able	2	4,4
2	Unable to Afford	43	95,6
	Total	45	100,0

Source : Primary Data 2026

From table 2, it shows that almost all of the ability to apply heimlich maneuver to PMR members at SMAN 1 Bangsal before being given basic airway management simulation was in the category of incapable as many as 43 respondents (95.6%).

2. *Ability to Apply Heimlich Manuever Post-Test*

Table 3: *Ability to Apply Heimlich Maneuver After Being Given Basic Airway Management Simulation*

Yes	<i>Ability To Apply Heimlich Manuever Post Test</i>	F	%
1	Able	45	100,0
2	Unable to Afford	0	0
	Total	45	100,0

Source : Primary Data 2026

Table 3 shows that the entire ability to apply heimlich maneuver in PMR members at SMAN 1 Bangsal after being given a basic airway management simulation was in the able category of 45 respondents (100.0%).

3. *Ability to Apply Back Blow Pre-Test*

Table 4: *Ability to Apply Back Blow Before Being Given Basic Airway Management Simulation*

Yes	<i>Ability To Apply Back Blow Pre Test</i>	F	%
1	Able	2	4,4
2	Unable to Afford	43	95,6
	Total	45	100,0

Source : Primary Data 2026

Table 4 shows that almost all of the ability to back blow in PMR members at SMAN 1 Bangsal before being given the basic airway management simulation was in the inability category of 43 respondents (95.6%).

4. *Ability to Apply Back Blow Post-Test*

Table 5: *Ability to Apply Back Blow After Basic Airway Management Simulation*

Yes	<i>Ability To Apply Back Blow Post Test</i>	F	%
1	Able	45	100,0
2	Unable to Afford	0	0
	Total	45	100,0

Source : Primary Data 2026

Table 5 shows that the entire ability to apply back blow to PMR members at SMAN 1 Bangsal after being given a basic airway management simulation was in the category of 45 respondents (100.0%).

5. *The Effect of Basic Airway Management Simulation on the Ability to Apply to PMR Members at SMAN 1 Bangsal*

Table 6: Statistical Test of *Basic Airway Management Simulation on Ability to Apply to PMR Members at SMAN 1 Bangsal*

				<i>Ranks</i>
<i>post_test</i> <i>pre_test</i>		N	Mean Rank	Sum of Ranks
	Negative Ranks	43	22,00	946,00
	Positive Ranks	0	,00	,00
	Ties	2		2.00
	Total	45		
Test Statistics				
		post_test-pre_test		
Z		-6,557b		
Asymp. Sig. (2-tailed)		.000		
a. Wilcoxon Signed Ranks Test				

Table 6 shows that the Wilcoxon Signed Ranks Test was conducted to determine whether there was a significant influence between the ability to apply heimlich maneuver and back blow before (pre-test) and after (post-test) basic airway management simulation was given to PMR members at SMAN 1 Bangsal.

The results of the analysis showed that 43 respondents (95.56%) experienced an increase in the ability to apply heimlich maneuver and back blow (included in the category of negative ranks), no respondents experienced a decrease in the ability to apply heimlich maneuver (positive ranks = 0) and there were 2 respondents who did not experience changes (ties = 2). The statistical value of $Z = -6.557$ and the value of Asymp. Sig. (2-tailed) = 0.000, which means $p < 0.05$. This shows that the difference in ability to apply heimlich and back blow between before and after being given basic airway management simulations is statistically significant.

DISCUSSION

1. *Ability to Apply Heimlich Manual Pre-Test*

The results showed that almost all PMR members at SMAN 1 Bangsal had the ability to apply Heimlich Maneuver in the inability category before being given a basic airway management simulation (43 respondents; 95.6%). These findings show that the initial ability of respondents to perform first aid in cases of airway obstruction is still low. The low ability is suspected to be influenced by the lack of training or direct practical experience, so that respondents have not mastered the psychomotor skills needed to perform the Heimlich Maneuver correctly. This condition confirms that mastery of emergency action is not enough to be obtained through theoretical knowledge, but requires structured and repetitive practice practice.

The results of this study are in line with the research of Girianto et al. (2023) which showed that the ability of PMR members to perform Heimlich Maneuvers was still low before being given training, then increased significantly after the intervention. Similar findings were also reported by Amalia et al. (2025), who stated that education accompanied by demonstrations and hands-on practice was able to improve first aid skills in choking cases. The similarity of these results strengthens that simulation is an effective learning method to improve psychomotor skills in basic airway management.

This study has limitations because it uses a pre-experimental design without a control group so that the change in ability cannot be fully attributed to the intervention. In addition, the study was only conducted in one school with a limited number of respondents, so the results could not be generalized widely.

The implications of this study show that basic airway management simulation can be used as a routine training method for PMR members to improve preparedness in handling airway obstruction cases. Further research is recommended using experimental designs with control groups, larger sample sizes, and involving multiple schools so that the effectiveness of simulations can be evaluated more comprehensively.

2. *Ability to Apply Heimlich Manuever Post-Test*

The results of the study showed that all PMR members at SMAN 1 Bangsal had the ability to apply Heimlich Maneuver in the able category after being given a basic airway management simulation (45 respondents; 100%). These findings show that the simulation is able to improve the psychomotor skills of respondents in performing first aid in cases

of airway obstruction. This ability indicates that respondents have been able to understand the sequence of actions, apply the Heimlich Maneuver technique correctly, and have better readiness to deal with emergency conditions. This improvement in ability is thought to be influenced by the learning process through demonstrations, hands-on practice, and repetitive exercises that facilitate optimal skill mastery.

The results of this study are in line with the theory of Anderson and Krathwohl (2021) which states that psychomotor skills develop through the process of learning and repetitive practice. This finding is also supported by Green and Kreuter (2021) who explain that a person's abilities are influenced by predisposition, supportive, and reinforcing factors, including training and the learning environment. In addition, the American Heart Association guidelines (2020) affirm that first aid training plays an important role in improving the skills and readiness of first responders in dealing with airway blockages. Thus, the results of this study reinforce that simulation is an effective learning method to improve the ability to apply Heimlich Maneuver in PMR members.

This study has limitations because it uses a pre-experimental design without a control group and was conducted in one school with a limited number of respondents, so the results cannot be generalized widely. The implications of this study show that the simulation of basic airway management can be applied as a routine training method for PMR members to improve first aid competence in choking cases. Further research is recommended to use an experimental design with a control group and involve a wider sample count and study location so that the effectiveness of the simulation can be evaluated more comprehensively.

3. *Ability to Apply Back Blow Pre-Test*

The results showed that almost all PMR members at SMAN 1 Bangsal had the ability to apply the back blow technique in the inability category before being given a basic airway management simulation (43 respondents; 95.6%). These findings show that the initial ability of respondents to carry out back blow actions is still low. The low ability is suspected to be influenced by the lack of practical experience, lack of training, and limited opportunities to conduct simulations so that respondents have not mastered the back blow technique properly. This condition confirms that first aid skills are psychomotor skills that require repeated exercises so that they can be applied correctly in emergency situations.

The results of this study are in line with the guidelines of Advanced Trauma Life Support (ATLS, 2018) which states that clinical skills develop through a continuous process of learning and practice. This finding is also supported by Apriyanti et al. (2025) who explain that the ability to perform first aid is influenced by knowledge, training, and environmental support. In addition, the American Heart Association (2020) affirms that the success of back blow action depends on mastery of techniques acquired through training and hands-on practice. The similarity of these results strengthens that the lack of simulation exposure is one of the causes of the low ability of respondents to do a back blow before the intervention.

This study has limitations because it uses a pre-experimental design without a control group and was conducted in one school with a limited number of respondents so that the results of the study cannot be generalized widely. The implications of this study show that simulation-based training needs to be applied regularly in PMR activities to

improve back blow skills as one of the basic competencies for handling airway obstructions. Further research is recommended using an experimental design with a control group and involving a larger sample so that the effectiveness of the simulation can be evaluated more comprehensively.

4. *Ability to Apply Back Blow Post-Test*

The results of the study showed that all PMR members at SMAN 1 Bangsal had the ability to apply the back blow technique in the able category after being given a basic airway management simulation (45 respondents; 100%). These findings show that the simulation is able to improve the psychomotor skills of respondents in performing back blow techniques according to the procedure. This ability indicates that respondents have been able to understand the stages of action, apply techniques correctly, and have better readiness in providing first aid in cases of airway obstruction. This improvement in ability is thought to be influenced by the learning process through demonstrations, hands-on practice, and repetitive exercises that facilitate optimal skill mastery.

The results of this study are in line with the theory of Anderson and Krathwohl (2021) which states that psychomotor skills develop through the process of learning, practice, and practice experience on a repetitive basis. This finding is also supported by Marta and Purnomo (2025) who explain that first aid skills are influenced by knowledge, training, and environmental support. In addition, the American Heart Association (2020) affirms that the success of back blow actions is highly dependent on mastery of techniques obtained through education and training. The similarity of these results strengthens that simulation is an effective learning method in improving back blow skills in PMR members.

This study has limitations because it uses a pre-experimental design without a control group and is only conducted in one school with a limited number of respondents, so the results of the study cannot be generalized widely. The implications of this study show that the simulation of basic airway management can be applied as a routine training method for PMR members to improve competence in handling airway obstructions. Further research is recommended using experimental designs with control groups, larger sample sizes, and involving multiple schools so that the effectiveness of simulations can be evaluated more comprehensively.

5. *The Effect of Basic Airway Management Simulation on the Ability to Apply to PMR Members at SMAN 1 Bangsal*

The results of the study showed that the basic airway management simulation had a significant effect on the improvement of the ability to apply Heimlich Maneuver and back blow in PMR members at SMAN 1 Bangsal. A total of 43 respondents (95.56%) experienced an increase in ability, while 2 respondents (4.44%) did not experience changes because they were in the able category before the intervention. The results of the Wilcoxon test showed a value of $Z = -6.557$ with $p = 0.000 (<0.05)$, so there was a significant difference between the ability before and after the simulation. These findings show that simulation-based learning is effective in improving participants' ability to apply airway obstruction handling techniques. However, there is still a variation in ability upgrades, shown by the difference in Heimlich Maneuver score of 0–6 points and back blow of 0–8 points. These variations indicate that skill improvement is influenced by the

initial ability, learning experience, motivation, and psychomotor ability of each respondent.

The findings of this study are in line with the experiential learning theory which states that simulation provides a learning experience through hands-on practice and repetitive practice thereby improving participants' technical skills, decision-making, and confidence (Maurya et al., 2024). These results are also consistent with the research of Basnet et al. (2024) which reported that simulation-based emergency airway management significantly improves knowledge, practical skills, and confidence through practice accompanied by feedback from instructors. The existence of two respondents who did not increase can also be explained as the ceiling effect, which is a condition when participants have reached a high level of competence before the intervention so that the post-intervention score remains stable without showing a significant improvement.

This research has several limitations. Pre-experimental design without a control group limits the ability of research to ensure cause-and-effect relationships. In addition, the study was only conducted in one school with a relatively limited number of respondents, so the results could not be generalized to the wider population of PMR members. Factors such as previous training experience, learning motivation, and individual psychomotor abilities have also not been analyzed in depth.

The implications of this study show that the simulation of basic airway management is feasible as a routine training method for PMR members to improve Heimlich Maneuver and back blow skills in handling airway obstructions. Further research is suggested using experimental designs with control groups, larger sample sizes, and involving multiple schools so that the effectiveness of simulations can be evaluated more comprehensively and consider factors that affect skill improvement.

CONCLUSION

The results of the study showed that there was a significant influence of the basic airway management simulation on the ability to apply to PMR members at SMAN 1 Bangsal, as evidenced by the results of the wilcoxon test, namely 43 respondents (95.56%) experienced an increase in the ability to apply heimlich menuever and back blow (included in the category of negative ranks), no respondents experienced a decrease in the ability to apply heimlich menuever and back blow (positive ranks = 0) and there were 2 respondents who did not experience changes (ties = 2). The statistical value of $Z = -6.557$ and the value of Asymp. Sig. (2-tailed) = 0.000, which means $p < 0.05$. This shows that the difference in ability to apply heimlich and back blow between before and after being given basic airway management simulations is statistically significant.

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