

## Effectiveness of Education Demonstration Practice (EDoP) Model on Fracture First Aid Knowledge in Adolescents

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### Abstract

Adolescents have high activity, so they are at risk of injury, especially fractures. Appropriate first aid skills are needed in conditions of injury to avoid the impact of disability or death for the victim. However, conditions in the field show that not everyone can perform first aid. Therefore, improving first aid skills through the Education-Demonstration-Practice (EDoP) method is a solution to overcome this problem. This study contributed to identifying the effectiveness of EDoP on adolescents' knowledge in providing first aid for fractures. This study is a quasi-experimental study with one group pre-posttest without a control. The sampling method was probability sampling with the proportionate stratified random sampling technique on 110 adolescents in Aceh Besar Regency. Data analysis was carried out using the Wilcoxon test. The results showed a significant difference in first aid skills for fracture conditions before and after the Education Demonstration Practice (EDoP) intervention was carried out on adolescents, with a p-value of 0.000. It is hoped that adolescents can apply the knowledge they have gained if they experience or find fracture victims around them. In addition, it is expected that this model can be applied by researchers to distribute knowledge that requires skills.

**Keywords:** Education; Demonstration; First Aid; Fracture; Practice

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### 1. Introduction

Fractures due to physical injuries in adolescents are a significant and common health problem. Injuries cause around 2,300 deaths in children under 18 years of age every day worldwide (WHO, 2014), and the school injury rate is 419.1 per 1,000 children per year. Elementary school children have the highest injury rate, but the rate remains high through high school (Al-hajj, Nehme, Hatoum, Zheng, & Pike, 2020).

One of the important skills in dealing with fracture emergencies is the ability to provide first aid correctly and quickly. This skill not only helps in temporarily relieving the condition before receiving medical care, but can also minimize further negative impacts from the injury (Collins & McMahon, 2026; Tavakkal, 2023).

However, several previous studies have found that adolescents do not have a sufficient level of understanding regarding the handling of fracture injuries, especially in emergencies (Garcia-blaya, Abraldes, & Cristobal, 2025). The study was conducted to explore the level of knowledge and attitudes of adolescents towards first aid and found that many adolescents lack understanding of how to handle fracture injuries and other emergencies. The study also highlighted the need for innovation in first

aid education to improve adolescents' understanding and skills (Leon-Guereno *et al.*, 2023).

Furthermore, adolescents receive very little first aid education. Therefore, immediate efforts are needed to improve adolescents' first aid skills to improve public safety and prevent further injuries if injuries occur in the community (Sharif, Hasan, Jamaluddin, & Firdaus, 2018).

Furthermore, adolescents rarely receive first aid training, so efforts are needed to improve their skills. Given that adolescents are a growing segment of society and play a crucial role as agents of change and first responders in pre-hospital situations in the event of an injury, further impacts from the injury can be minimized (Amni, Fikriyanti, & Aklima, 2024; Garcia-blaya *et al.*, 2025).

In other studies, it is stated that formal education is only able to increase knowledge and skills in the short term, but rarely lasts in the long term (Amni, Jufrizal, Tarigan, & Halimuddin, 2025; Rossetto, Morgan, Hart, Kelly, & Jorm, 2020). In addition, longitudinal research shows that first aid training is effective in increasing knowledge at the beginning, but the majority of participants experience a decline in ability in the long term if they do not reinforce or repeat the material (Li *et al.*, 2020). Therefore, learning methods that combine multiple

methods are urgently needed to improve first aid skills in adolescents.

The Education Demonstration Practice (EDoP) learning model is an approach that combines direct learning and demonstration activities with practice, allowing students to learn through direct observation and experience. EDoP can provide great benefits in learning practical skills such as first aid. In the context of first aid for fractures, this model has the potential to improve adolescents' understanding of the correct procedures, as well as improve their ability to carry out first aid actions correctly if a fracture occurs. Other research also shows that experiential learning, including demonstration and practice, is effective in improving skills, relevant for the EDoP model (Chernikova et al., 2020).

The development of demonstration-based and practice-based learning has been proven to bridge the gap between theory and clinical practice, a frequent challenge in nursing education. Demonstrations and hands-on practice can provide a more realistic learning experience, improve psychomotor skills, and strengthen long-term skill retention for participants. Therefore, the development of this training method is an important step in improving the quality of nursing education and supporting evidence-based nursing (Montoro-pérez, Montejano-lozoya, & Rocamora-rodríguez, 2025).

Furthermore, this training, which combines various learning methods, can enhance the role of adolescents as first responders in the community, specifically as first aiders in schools and neighborhoods. This innovative, interactive, and practice-based training can also improve community preparedness in the face of injuries (Reveruzzi, Bianca; Buckley, Lisa; Sheehan, 2020). This is also part of the role of nursing science in promotive and preventive efforts, namely in increasing adolescent knowledge and preventing the worsening of the victim's condition.

Therefore, the study was conducted to test the effectiveness of the EDoP learning model on first aid knowledge for adolescents with fractures. By developing and implementing interactive methods, it is expected that adolescents can be more prepared and responsive in dealing with emergency conditions and are able to provide effective first aid to victims with fractures, both in the school environment and the community.

## 2. Method

This study is a quasi-experimental study with a single pre-posttest group without a control group. The study will be conducted on one group, where the group's abilities will be measured before (pre-test) the intervention is given, and after (post-test) the intervention is given. The study will be conducted in October 2024. The flow of the intervention implementation using the EDoP method is as follows:

In the first session, the researcher provides education using lecture and discussion methods about fracture first aid. In the second session, the researcher demonstrates first aid actions when a fracture occurs, specifically splinting and bleeding control. In the third session, the researcher provides an opportunity for each respondent to practice first aid in fracture conditions.

The study was conducted on students of Madrasah Tsanawiyah and Madrasah Aliyah in Aceh Besar Regency. Sampling used the probability sampling method with the proportionate stratified random sampling technique. The number of respondents in this study was 110 students.

The instrument in this study was a questionnaire on adolescent knowledge about first aid in fracture conditions, which was used to measure the ability of adolescents to provide first aid in fracture conditions. The questionnaire has been tested for content validity by experts in the field of emergency nursing. The questionnaire has also been tested for Cronbach's Alpha reliability and obtained a value of 0.6333.

Data analysis used univariate and bivariate tests to describe or explain the characteristics of each research variable. Bivariate analysis used the Wilcoxon test to analyze differences in the abilities (knowledge) of respondents before and after being given the EDoP intervention in the same group.

This research was conducted after passing the ethical test from the Research Ethics Committee of the Faculty of Nursing, Syiah Kuala University, number 113022110624 on July 23, 2024.

## 3. Results and Discussion

Table 1 shows that, based on gender, there were 62 (56.4%) male respondents and 48 (43.6%) female respondents. In addition, respondents were spread across the teenage age range, namely 12 to 18 years, with the majority of respondents aged 16 years, amounting to 38 respondents (34.5%), and a minority of respondents aged 12 years, amounting to 1 respondent (0.9%). The results of the Wilcoxon analysis in Table 2 show that there is a significant difference in first aid skills for fracture conditions before and after the Education Demonstration Practice (EDoP) intervention was carried out on adolescents, with a p-value of 0.000 ( $p < \alpha$ ,  $\alpha = 0.05$ ).

Based on the results shown in Table 1, the majority of respondents in this study were male (56.4%), with the highest age in the 16-year-old age group (34.5%). This finding indicates that the age group of adolescents participating in this study was dominated by males in the 16-year-old age range, reflecting the characteristics of a fairly representative sample for this study. The distribution of respondents dominated by males in this study can provide insight into the behavior and needs of first aid education in the male adolescent group. It also illustrates the fact

that in some social contexts, males may be more often involved in physical activities or sports that increase the risk of injury, including fractures. Thus, this study is relevant to understanding how male adolescents can be better assisted in acquiring appropriate first-aid skills to deal with potential accidents or injuries in the future.

**Table 1.** Distribution of Respondents' Demographic Characteristics (n=110)

Characteristics	F	%
<b>Age</b>		
12	1	0.9
13	15	13.6
14	23	20.9
15	10	9.1
16	38	34.5
17	21	19.1
18	2	1.8
<b>Gender</b>		
Male	62	56.4
Female	48	43.6

However, this is different from other research, explaining that women are generally more resistant to monotonous actions and activities, and have a more caring attitude and sensitivity than men (Benenson, Gauthier, & Markovits, 2021; Löffler & Greitemeyer, 2023; Pang, Li, Zhou, Gao, & Han, 2023). They are more knowledgeable than men (Paasche-Orlow, Parker, & Gazmararian, 2022; Qiu, Chen, Zhang, &

Li, 2023). However, other studies show that gender does not have a significant effect on knowledge of basic life support training because male and female students have the same average desire and motivation to learn (Garcia-blaya et al., 2025; Rossetto et al., 2020). But the effectiveness of training is influenced by the learning method, not gender (Reveruzzi, Bianca; Buckley, Lisa; Sheehan, 2020). Another view related to gender analysis in the book *Psychology of Learning Perspectives* explains that boys and girls are equal creatures. Therefore, access and participation in learning must be fair and equal (Kizi, 2025; Suardi et al., 2025).

The respondents in the study were schoolchildren; the majority of respondents were 16 years old (34.5%). This indicates that the adolescent age group is an important transition period in physical and mental development. Adolescents often begin to engage in more intense social and physical activities, which can increase exposure to injury. This study can be a strong foundation for designing more effective and relevant first-aid education programs for adolescents in this age range. The respondents in this study were the same as in previous studies on increasing knowledge through first aid training for injuries, namely, adolescents. Adolescents can think logically about various abstract ideas and are no longer limited to real or concrete experiences as a starting point for their thinking (Dumontheil, 2020; Fitrianna, Prabawanto, & Rosjanuardi, 2025; WHO, 2023).

**Table 2.** Difference in Pretest and Posttest Knowledge Levels in the Intervention Groups with the Wilcoxon Test

Variable	Pre test (n=110)			Post test (n=110)			Wilcoxon p-value
	Min-Max	Mean	SD	Min-Max	Mean	SD	
Fracture First Aid Skills	1-9	6.33	1.521	5-11	8.64	1.187	0.000

This condition causes teenagers to frequently engage in more intense physical and social activities, thus increasing the risk of accidental injury (Garcia-blaya et al., 2025). Injuries in adolescents, such as accidents, trauma, and fractures, are one of the leading causes of morbidity in this age group globally (WHO, 2023).

Age is one of the factors that influences knowledge (Puiu, Udriștioiu, & Zăvăleanu, 2025). As age increases, the level of knowledge increases, and the way of obtaining information becomes better. If someone is old enough, then he also has a mature mindset and experience. The knowledge gained is better because a person's age has a significant influence on grip strength (Febryani, Rosalina S, & Susilo, 2021; Hanushek, Kinne, Witthöft, & Woessmann, 2025). Considering the number of respondents who were mostly male and aged 16 years, this finding highlights the need for a more specific approach that is tailored to the characteristics

of the target group, both in terms of gender and age. The right approach can increase the participation and effectiveness of first aid education in the adolescent community.

Table 2 shows a significant difference in the level of knowledge and skills of first aid for fractures before and after students received the Education Demonstration Practice (EDoP) intervention. Before the intervention, the average value of first aid skills was 6.33 with a standard deviation of 1.521, while after the intervention, the average value increased to 8.64 with a standard deviation of 1.187. The p-value obtained from the Wilcoxon test was 0.000, which is smaller than the significance level of  $\alpha = 0.05$ . This shows that there was a significant increase in the ability of first aid for fractures in the adolescent group after receiving the EDoP intervention.

This improvement in first aid skills shows that the EDoP method applied in this study is effective in improving participants' understanding and skills

related to first aid for fractures. Interventions that combine education and direct demonstration through practice have helped participants understand the correct steps in providing first aid in emergencies (Ygiyeva et al., 2024). These results reinforce the importance of practical education in first aid skills for adolescents as an effort to prevent greater injuries and provide a quick response when facing minor or serious injuries (León-Guereño et al., 2023; Parada-Espinosa, J. M., Ortega-Gómez, S., Ruiz-Muñoz, & González-Silva, 2025; Rossetto, A., Morgan, Hart, Kelly, & Jorm, 2020).

In addition, the results of this study are also supported by previous studies, which provide an overview that demonstration-based training and direct practice can have a significant positive impact on participants' understanding and skills (Amni, Jufriзал, & Akbar, 2025; Murakami et al., 2023; Peng, Su, Hou, & Geng, 2022). EDOP training can improve preparedness in dealing with emergencies such as fracture management. This study is also similar to previous studies in that there is an effect of emergency first-aid simulation on fracture management knowledge (Yang et al., 2025). After participating in the training, students' abilities can be concluded to have an effect on fracture first aid skills (Peng et al., 2022).

The effectiveness of first aid training in adolescents has been studied extensively before, with a focus on increasing knowledge and practical skills in ordinary people as well as in school children (Atmojo, Quyumi, & Kristanto, 2022). Several studies have shown that first aid training programs, especially those provided to students in schools, show significant improvements in adolescent knowledge and skills (Reveruzzi, Bianca; Buckley, Lisa; Sheehan, 2020). Other studies have shown that first-aid education conducted in schools not only improves students' understanding of first-aid procedures but also increases their confidence in providing first aid in emergencies. Based on previous research shows that there is a positive influence of training activities on the level of knowledge and confidence of participants in handling emergencies such as bleeding wounds and fractures (Sumantri, Putra, Ertanto, & Lismana, 2024).

In another study conducted, school-age children who received first aid education showed a significant increase in their knowledge and skills in first aid, such as performing simple wound care (León-Guereño et al., 2023; Tse, Plakitsi, Voulgaris, & Alexiou, 2023). This training program was delivered through age-appropriate content, using visual materials and practical demonstrations to ensure effective learning. Similar findings were also described in another study that the combination of education and direct training through demonstrations and videos significantly contributed to long-term first-aid retention and skills (Rohmani, Tukayo, Felle,

& Sahiddin, 2022). Direct training provided through demonstrations or videos is more interesting for participants and creates a sense of enjoyment in learning (Alkahtani, Alnufaiy, Albaijan, Alnafaiy, & Elfakhri, 2025; Miller & Newnam, 2024; Moe-byrne, Knapp, & Lidster, 2026).

The results of this study demonstrate the importance of incorporating first aid training into educational curricula, not only to equip adolescents with lifesaving skills but also to enhance their ability to respond effectively to real-world situations. Therefore, first aid training programs are crucial in reducing injuries and deaths among adolescents and the wider community.

Furthermore, in nursing science, learning first aid is a form of primary prevention, specifically health promotion. While first aid administered at the scene to prevent disability, prevent further deterioration, and death for victims is part of tertiary prevention. Furthermore, in emergency response, there are three types of first aid: pre-hospital, intra-hospital, and post-hospital. Learning first aid measures is part of pre-hospital measures that significantly impact the victim's prognosis.

#### 4. Conclusions and Suggestions

The conclusion of this study is that there is a difference in the ability (knowledge) scores of adolescents regarding first aid for fractures before and after the EDOP learning model is implemented. It is hoped that adolescents can apply the knowledge they have gained if they experience or encounter fracture victims around them. Furthermore, it is hoped that this model can be implemented by researchers or community service providers in channeling knowledge that requires skills. It is also recommended that future researchers examine the effectiveness of this method in other emergency interventions.

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