



The effect of leaflet-based education and simulation of first-aid in accidents (P3K) on the knowledge and skills of tourism workers in Indonesia

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ABSTRACT

Background: Law Number 1 of 1970 concerning Occupational Safety requires all sectors, including tourism, to implement Occupational Safety and Health (K3). Taman Dolan Batu City, as a tourist destination, has a risk of work accidents, so it needs mitigation efforts through First Aid for Accidents (P3K).

Objectives: This study aims to analyze the effect of leaflet-based education and simulation on workers' knowledge and first aid skills.

Methods: The research design used a quasi-experiment conducted with a sample of 16 people divided into two different intervention groups. This study uses questionnaire instruments and observation sheets that have been proven valid and reliable through statistical tests (Pearson, Aiken's V, and Cronbach Alpha) and experts' validation of leaflet educational media. Data analysis used Wilcoxon Signed Rank, and Mann-Whitney U tests with a significance level of 0.05.

Results: The results of hypothesis testing showed that both educational methods significantly improved workers' knowledge and skills ($p < 0.05$). The combined intervention of leaflet and simulation proved more effective than the single method.

Conclusions: Leaflet-based education and simulation together are more effective in improving the knowledge and skills of first aid workers at Dolan Park. Researchers recommend that managers routinely hold K3-related training to reduce the risk of workplace accidents. Future research is recommended to involve a larger sample and evaluate the long-term effectiveness of the intervention provided.

Keywords: first aid for accidents, leaflet-based education, simulation, tourist attractions.

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INTRODUCTION

Occupational Safety and Health (OSH) is important in protecting workers, assets, communities, and the work environment (Maharani, 2022). The obligation to implement OHS is regulated in Law Number 1 Year 1970 and Law Number 17 Year 2023. However, implementing OSH in the tourism sector is still not optimal, even though this sector is included in the high-risk category (Kementerian Ketenagakerjaan, 2022). First Aid for Accidents (P3K) is critical in tourism, given the high potential for accidents and often limited access to medical facilities.

The increase in tourist visits in 2024 by 16.19%, including in East Java, which accounts for 21.42% of the total national visits, also increases the potential risk of accidents and safety threats (Pusat Data dan Sistem Informasi, 2024; Biro Data dan Sistem Informasi Kemenpar, 2025). High-risk tourism activities such as hiking and water sports require workers to have first-aid skills (Agustin & Marta, 2019; Jong & Goossen, 2024; Sudharmono et al., 2024).

The national number of occupational accidents (OSH) in 2023 reached 370,747 cases, up 39.72% from the previous year (Kementerian Ketenagakerjaan, 2024), including fatal accidents at tourist attractions such as Kenjeran Waterpark and Ayuterra Resort (Prastiwi, 2022; Kurniati, 2023). This shows OHS implementation's importance in preventing HHs.

As East Java's leading tourist destination, Batu City recorded several serious accidents, such as the fire at Jatim Park 3 and the incident at Jatim Park 1 (Ibrahim, 2024; Mutmainah, 2025). Taman Dolan, one of the popular destinations in the city, has various rides with moderate to high risks, such as drowning, fire, and physical accidents (Taman Dolan Group, 2024; BPS Kota Batu, 2022). The results of risk identification with HIRADC show various significant hazards that require worker readiness in providing first aid.

Taman Dolan has never held first aid training, even though this action is important according to Article 3 Paragraph 1 of Law No. 1 of 1970 and PER.15/MEN/VIII/2008 concerning the obligation to provide first aid officers and facilities (Maharani, 2022). However, workers' understanding of first aid is still low regarding knowledge and skills (Aulia & Usiono, 2023; Muoneke, 2024).

Based on these conditions, this study was conducted to provide leaflet-based educational interventions and first-aid simulations to improve workers' knowledge and skills. This study has novelty in the use of leaflet media that focuses on Basic Life Support (BHD) and handling of soft tissue injuries, which has rarely been used before compared to pocketbooks, videos, or applications (Imardiani, Septiany, & Perdana, 2020; Saputra, Hidayat et al., 2022; Ekaprasetia & Kristanto, 2022). In addition, the approach of the two experimental groups is still not widely applied in the tourism sector. The results of this study are expected to contribute to developing a more effective first-aid training strategy in the tourism sector and the basis for occupational risk management policies in high-risk tourist destinations.

METHODS

Study Design and Participants

This research is a quasi-experiment conducted at Taman Dolan Batu City on February 8-16, 2025, involving 16 workers as samples using a total sampling technique. The sample was randomly divided into two experimental groups, eight

people each. Experimental group 1 received leaflet-based first aid education, while experimental group 2 received leaflet education and first aid simulation.

On the first day (February 8), both groups participated in the flowchart explanation, informed consent, knowledge and skills pre-test, and leaflet education related to Basic Life Support (BHD) and soft tissue injury management, with a duration of 135 minutes. Group 2 also carried out simulations and case study-based first aid practice. On days 2 to 8 (February 9-15), both groups received follow-up education via WhatsApp via materials and daily quizzes for 90 minutes.

Both groups took the knowledge and skills post-test on the ninth day (February 16). Group 2 continued to simulate and practice first aid, while Group 1 was allowed to simulate after the post-test to avoid knowledge gaps between groups. All interventions followed the ethical principles of the Declaration of Helsinki and received written informed consent from participants.

The scores of the pre-test and post-test answers of each respondent were then transformed into a percentage (%) so that they could be categorized into a scale of knowledge and skill levels with the following classification.

Table 1. Knowledge Level Scale

Percentage/Score	Category of Knowledge Level
$\geq 75\%$	Good
56 – 74%	Fair
$\leq 55\%$	Poor

Source: [Arikunto \(2014\)](#)

Table 2. Skill Level Scale

Percentage/Score	Category of Knowledge Level
$\geq 75\%$	Good
56 – 74%	Fair
$\leq 55\%$	Poor

Source: [Dewi \(2019\)](#)

Ethical approval statement

This study obtained ethical approval from the Health Research Ethics Commission of the Faculty of Dentistry, Universitas Airlangga Ethical Clearance number 0048/HRECC.FODM/I/2025 on January 20, 2025.

Research Instruments

This study used two main instruments, questionnaires, and observation sheets, each comprising 20 items. The True-False, multiple-choice questionnaire was used to measure first aid knowledge. In contrast, the Do-No-Do observation sheet measured first aid skills related to Basic Life Support (BHD) and soft tissue injury management.

The questionnaire was tested for validity using Pearson correlation with results between 0.626-0.987 (r table = 0.5529) and reliability using Cronbach Alpha of 0.924, indicating that the questionnaire was valid and reliable. The observation sheet was tested through expert judgment, validity using Aiken's V of 0.944, and reliability using Percentage Agreement of 95% (0.9473), showing very high reliability.

The leaflet educational media has also been validated by experts with Aiken's V of 0.848 and a Percentage Agreement reliability of 91% (0.906), so it is declared valid and reliable.

Data Analysis

Data analysis of the results of this study was processed with the help of the SPSS application using the Wilcoxon Signed Rank Test non-parametric statistical test with a p-value <0.05 to see the difference in results before and after the intervention in each experimental group, as well as the Mann-Whitney U non-parametric statistical test with a p-value <0.05 to see which intervention is more effective on first aid knowledge and skills. The Wilcoxon Signed Rank Test and Mann-Whitney U test were used by researchers because the data obtained were not normally distributed, the data were arranged on an ordinal scale, and the number of research samples was small.

RESULTS

1. Respondent Characteristics

Referring to [Table 3](#), the distribution of respondent characteristics data shows that workers at Taman Dolan Batu City are dominated by men with a percentage of 81% or as many as 13 out of 16 workers. Most workers at Taman Dolan Batu City are aged 19 - 44 years, which is classified as an adult age according to Permenkes Number 25 of 2016, with the majority having a high school/equivalent education level (94%). As many as 75% of workers at Taman Dolan are classified as workers with a new working period, which is less than 3 years. All permanent workers owned by Taman Dolan are spread to various work sections with their respective duties and functions, with the highest percentage, 19%, being in the public area and housekeeping sections.

Table 3. Frequency Distribution of Respondent Characteristics

Respondent Characteristics	Frequency (n = 16)	Percentage (%)
Gender		
Male	13	81%
Female	3	19%
Age		
10 - 18 years	0	0%
19 - 44 years	14	87%
45 - 59 years	2	13%
>60 years	0	0%
Education Level		
High School / Equivalent	15	94%
Bachelor's Degree	1	6%
Tenure		
< 3 Years	12	75%
≥ 3 Years	4	25%
Work Section		
Public Area	3	19%
Marketing	2	12,5%
Food and Beverage Cooking	2	12,5%
Food and Beverage Service	2	12,5%
Front Office	2	12,5%
Human Resource Development	1	6%
Security	1	6%
Housekeeping	3	19%

2. Experiment Group 1

a. Overview and Analysis of First Aid Knowledge of Experimental Group 1

Referring to the data presented in [Table 4](#), it can be identified that before the implementation of the intervention, the majority of respondents in experimental group 1 (n = 8) had a level of first aid knowledge that was classified as insufficient,

with a percentage of 75%, the rest (25%) showed a level of first aid knowledge in the sufficient category. The measurement results after the leaflet-based educational intervention showed an increasing dynamic, with one respondent (13%) experiencing an increase in knowledge from the insufficient category to the sufficient category and two respondents (25%) showing an increase from the sufficient category to the good category. Five other respondents (62%) experienced a significant transformation with a direct increase from insufficient to good. The results of post-intervention knowledge in experimental group 1 showed that 13% of respondents had sufficient first-aid knowledge, and most respondents (87%) already had good first-aid knowledge.

Table 4. Overview and Analysis of First Aid Knowledge of Experimental Group 1

Category	Before Intervention		After Intervention		<i>p-value</i>
	N (8)	%	N (8)	%	
Good	0	0%	7	87%	0,011
Fair	2	25%	1	13%	
Poor	6	75%	0	0%	

The Wilcoxon Signed Rank Test statistical test was used to compare pre-intervention and post-intervention values with a significance value of 0.05. Based on Table 4, the p-value of the knowledge variable is 0.011, which is smaller than the specified significance limit (<0.05). This indicates a significant difference between knowledge before and after the intervention. Leaflet-based education influences the increase of first aid knowledge among Taman Dolan workers.

b. Overview and Analysis of First Aid Skills of Experimental Group 1

Analysis of Table 5 shows that all experimental group 1 respondents (100%) were in the less skilled category before the intervention. After the leaflet-based educational intervention, there was an increase in skills: 25% of respondents became moderately skilled, and 75% became skilled. The Wilcoxon Signed Rank Test yielded a p-value of 0.012 (<0.05), indicating a significant difference before and after the intervention. These results indicate that leaflet-based education effectively improves the first aid skills of Taman Dolan Batu City workers.

Table 5. Overview and Analysis of First Aid Skills of Experimental Group 1

Category	Before Intervention		After Intervention		<i>p-value</i>
	N (8)	%	N (8)	%	
Good	0	0%	6	75%	0,012
Fair	0	0%	2	25%	
Poor	8	100%	0	0%	

3. Experiment Group 2

a. Overview and Analysis of First Aid Knowledge of Experimental Group 2

Table 6. Overview and Analysis of First Aid Knowledge of Experimental Group 2

Category	Before Intervention		After Intervention		<i>p-value</i>
	N (8)	%	N (8)	%	
Good	0	0%	8	100%	0,012
Fair	2	25%	0	0%	
Poor	6	75%	0	0%	

Based on Table 6, before the intervention, the majority of experimental group 2 respondents (75%) had poor first aid knowledge; 25% were in the moderate category, and none were in the good category. After the intervention in leaflet-based education and first aid simulation, all respondents (100%) experienced an increase in the good category. The Wilcoxon Signed Rank Test showed a p-value of 0.012 (<0.05), indicating a significant difference between before and after the intervention. These

results confirm that the combination of leaflets and simulations significantly increases workers' first aid knowledge at Dolan Park.

b. Overview and Analysis of First Aid Skills of Experiment Group 2

The data in Table 7 shows that all experimental group 2 respondents (100%) were in the less skilled category in first aid skills before the intervention. After receiving the intervention through leaflet-based education and first aid simulation, all respondents (100%) experienced a significant increase in the skilled category, without stagnation or decrease. The Wilcoxon Signed Rank Test yielded a p-value of 0.011 (<0.05), indicating a significant difference between pre- and post-intervention skills. This finding confirms that the combination of leaflet education and simulation significantly improves the first aid skills of workers at Taman Dolan Batu City.

Table 7. Overview and Analysis of First Aid Skills of Experiment Group 2

Category	Before Intervention		After Intervention		p-value
	N (8)	%	N (8)	%	
Good	0	0%	8	100%	0,011
Fair	0	0%	0	0%	
Poor	8	100%	0	0%	

4. Comparative Analysis of the Effect of Leaflet-Based Education Intervention (Experimental Group 1) with Leaflet-Based Education and First Aid Simulation (Experimental Group 2) on Workers' Knowledge and First Aid Skills

Table 8 compares the effectiveness of two interventions, namely leaflet-based education (Group 1) and leaflet education + first aid simulation (Group 2), on Taman Dolan workers' knowledge and skills.

Table 8. Comparative Analysis of the Two Groups' Interventions on First Aid Knowledge and Skills

Variable	Experimental Group 1		Experimental Group 2		p-value
	Delta (Δ)	Mean Rank	Delta (Δ)	Mean Rank	
Knowledge	30%	5,94	55%	11,06	0,03
	35%		30%		
	30%		45%		
	40%		55%		
	50%		40%		
	20%		35%		
	20%		45%		
	35%		60%		
Skill	60%	4,63	80%	12,38	0,00
	65%		70%		
	70%		75%		
	45%		80%		
	60%		80%		
	50%		75%		
	55%		75%		
	70%		90%		

The Mann-Whitney U test showed that for the knowledge variable, the p-value = 0.03 (<0.05), indicating a significant difference between groups. The mean rank of Group 2's knowledge (11.63) was higher than Group 1 (5.94), with all Group 2 participants reaching the "Good" category (100%) compared to 87% in Group 1. For skills, the p-value = 0.00 also indicated a significant difference, with Group 2's mean rank of 12.38, well above Group 1 (4.63). All Group 2 participants fell into the "Skilled" category (100%), while Group 1 had only 75%. In conclusion, leaflet

education accompanied by simulation improves first aid knowledge and skills more than leaflet education alone.

DISCUSSION

Overview of First Aid Knowledge and Skills of Taman Dolan Workers

Workers in the tourism sector, such as at Taman Dolan Batu City, face various operational challenges, mainly because the concept of this tourist spot includes homestays and various rides, increasing the risk of accidents. Therefore, first aid knowledge and skills are essential for every worker to ensure their safety and that of visitors (Asih et al., 2021).

The results showed that workers' knowledge and first aid skills were low before the intervention. However, after providing two types of interventions to the two experimental groups, there was a significant increase, in line with previous research, which states that education and/or simulation affect increasing knowledge and skills (Waladani et al., 2021).

The majority of respondents were at the productive age of 19-44 years (87%) and dominated by men (81%), an age group that has a high learning capacity (Sitepu et al., 2024). There were no respondents over 60 years old, which, according to Ulfah & Wismaningsih (2018), means that advanced age can affect cognitive abilities.

Most workers have <3 Years of service (75%) reflect limited work experience, which impacts skills and potential work risks (Jayanti & Dewi, 2021). The majority also have a high school education, which improves knowledge and skills (Sari, Sari, & Apriyan, 2019). Based on HIRADC, several areas in Taman Dolan have moderate to high risks, with the most placements in public areas and housekeeping (19% each), with a high risk of occupational accidents (Gunawan & Sena, 2024).

Effect of Leaflet-Based Educational Intervention on Knowledge and First Aid Skills of Dolan Park Workers in Batu City (Experiment Group 1)

Before the intervention, experimental group 1, which only received leaflet-based education, showed low knowledge and first aid skills. After the intervention, there was an increase in both aspects, indicating that although leaflets are passive, this media can convey technical information effectively if arranged systematically and according to the work context (Hidayat et al., 2022). This finding also indicates that although workers are of productive age, they are not ready to handle emergencies. The significant improvement is in line with previous research that confirms the effectiveness of leaflets in improving knowledge and skills (Budiyanto, 2016). Leaflets as visual media have been proven to support learning, improving nurses' knowledge (Panwar, 2024) and first aid skills (Hatmalyakin et al., 2024).

The Effect of Leaflet-Based Educational Interventions and First Aid Simulations on Knowledge and First Aid Skills of Taman Dolan Workers in Batu City (Experimental Group 2)

Experimental group 2, who received interventions in the form of leaflet-based education and first aid simulations, showed a significant increase from the majority in the category of less to all respondents in the category of good and skilled. This intervention is effective because it involves active participation through demonstrations, hands-on practice, and case studies. This finding aligns with research by Devi & Khagta (2019) and Alamsyah et al. (2020), which showed that education and simulation positively affected first aid knowledge and skills. The

combination of print media and simulation is proven to thoroughly shape conceptual understanding and practical skills. In addition, the simulation method through case demonstrations also supports this change, as stated by [Supriyadi et al. \(2021\)](#). The effectiveness of the intervention is also influenced by the characteristics of workers who are at a productive age, have a new working period, and are assigned to high-risk areas, which increases awareness of work safety ([Wati et al., 2025](#)).

Effectiveness of Leaflet-Based Education with Leaflet-Based Education and First Aid Simulation on Knowledge and First Aid Skills of Workers at Taman Dolan Batu City

The analysis results show that the combination of leaflet-based education and first aid simulation is more effective than leaflet education alone in increasing the knowledge and skills of workers at Taman Dolan Batu City. This effectiveness is relevant to the characteristics of respondents of productive age and relatively new working period, which requires strengthening work safety capacity ([Wati et al., 2025](#); [Setiawan & Fauzan, 2020](#)). The Mann-Whitney U test showed a p-value of 0.03 ($p < 0.05$), showing a significant difference between the two groups, with a higher mean rank in the group that received the simulation.

This difference is due to the form of intervention: Experimental group 1 only received leaflet education (directly 2 times and online 7 times) without direct practice, while experimental group 2 received additional first aid simulations, which included demonstrations and practice with phantoms. Leaflet media alone does increase knowledge, but not enough to form applicative skills optimally. Simulation provides a direct experience that transforms conceptual understanding into practical skills ([Munawaroh & Fitriana, 2023](#)).

Thus, combining leaflets and simulations is a comprehensive approach to improving work safety in the tourism sector. First aid knowledge and skills are important for effective work safety behavior ([Sulistiyorini et al., 2019](#); [Evan et al., 2025](#)).

Limitations of the study

This study has limitations, such as the short duration of the intervention, limited monitoring during online education via WhatsApp, and impaired concentration because respondents continue to work. The study only measured first aid knowledge and skills, so it is recommended that future studies examine variables that have a direct impact on reducing workplace accidents. Researchers recommend that Dolan Park implement the Hierarchy of Control, mainly administrative control, by drafting OHS regulations and conducting regular training to improve work safety and productivity.

CONCLUSIONS

The study showed low knowledge and skills of first aid workers at Dolan Park before the intervention. Leaflet-based education can improve conceptual understanding but is less optimal in improving practical skills. The combination of leaflets and simulations proved more effective because they provided a hands-on experience reinforcing theory and practice, especially relevant in the risky tourism sector. Both methods had a positive impact, but the integrated approach was superior.

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DATA AVAILABILITY

The data underlying the findings in this article were obtained through direct observation in the field and have been documented by the researcher. The data is not publicly available but can be provided by the author of the correspondence upon reasonable request and based on a justifiable request.

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CONFLICT OF INTEREST

The authors declare that there is no potential conflict of interest related to the implementation, analysis, and publication of the results of this study.

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