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BLS Training and Welders' Knowledge and Attitudes Toward Workplace Emergency Management: A Study in the Erection Area at PT X, Karimun Regency

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Abstract
Introduction: *Welding work in the construction sector carries a high risk of workplace accidents that may require emergency response, including sudden cardiac arrest. Basic life support is a vital skill to sustain victims until medical assistance arrives.* ***Objective:*** *This study analyzed the relationship between basic life support training and welders' knowledge and attitudes toward managing workplace accidents in the erection area of PT X, Karimun Regency.* ***Method:*** *This quantitative study used a cross-sectional design and involved 32 welders recruited through total sampling. Data were collected using a questionnaire that had been tested for validity and reliability, then analyzed using univariate and bivariate analyses with the Chi-square test at a significance level of 0.05.* ***Result and Discussion:*** *A significant association was found between basic life support training and workers' knowledge ($p < 0.001$); 94.4% of trained workers demonstrated a high level of knowledge. However, no significant association was identified between training and workers' attitudes ($p = 0.145$), although a tendency toward more positive attitudes was observed among trained workers.* ***Conclusions:*** *Basic life support training plays an important role in improving welders' knowledge, whereas developing positive attitudes may require additional strategies such as simulation-based practice, habituation, and reinforcement of a safety culture.*

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Introduction

Occupational Safety and Health (OSH) is an essential component of corporate management systems aimed at creating a safe and healthy working environment. OSH implementation not only seeks to prevent occupational accidents and work-related diseases, but also to improve productivity and work quality (Suheri Jumartika et al., 2021). OSH practices are particularly critical in high-risk industries such as construction, welding, and steel fabrication, where workplace hazards may lead to severe injuries or death (Parashakti & Putriawati, 2020).

PT X operates in the construction and steel fabrication sector, with core activities including erection and installation of metal structures. One of the most crucial units at PT X is the welding division in the erection area, which involves joining metal using high heat or pressure. This work entails substantial hazards, including burns, electric shock, explosions, exposure to hazardous fumes, and injuries due to falling or collapsing materials. In the erection area setting, traumatic injuries such as falls from height, crush injuries, and severe lacerations are also highly prevalent and can rapidly progress to life-threatening conditions if not managed immediately. Beyond these immediate risks, welders may also face fatal incidents requiring rapid emergency response, including cardiac arrest or respiratory failure. The prioritization of BLS over trauma-specific first aid in this study is grounded in its broader applicability: BLS encompasses the foundational skills of maintaining airway patency, supporting ventilation, and sustaining circulation, which are critical whether the cause is cardiac arrest or severe traumatic injury. Furthermore, PT X is located in an industrial area of Karimun Regency where access to professional medical services is limited and ambulance response times can exceed 15–30 minutes. This gap between the onset of a life-threatening emergency and the arrival of professional medical aid underscores the critical role of trained bystander response, making BLS competence among on-site workers an essential line of defense.

The International Labour Organization (ILO) reports that construction accidents account for approximately 30% of global fatalities due to occupational accidents. The American Heart Association (2020) reported 10,000 cases of sudden cardiac arrest in the workplace annually in the United States, with only 40.2% of victims receiving bystander cardiopulmonary resuscitation (CPR) before medical assistance arrived (Prawesti et al., 2019). The World Health Organization (2024) further emphasizes that sudden cardiac events contribute to more than 17 million deaths each year, with 25% occurring in the workplace. These data highlight the importance of Basic Life Support (BLS) competence among workers in high-risk sectors, including welders.

Basic Life Support (BLS) refers to a series of emergency actions performed to maintain vital bodily functions until advanced medical care becomes available. BLS training includes the ability to recognize emergency conditions, activate the emergency response system, and perform CPR. Evidence indicates that BLS training directly improves participants' technical CPR skills and accelerates response in emergency situations (Prawesti et al., 2019). Knowledge theory posits that knowledge results from sensory perception of an object through the senses, which is then processed cognitively and influences individual behavior (Notoatmodjo, 2012). In the OSH context, knowledge of BLS procedures is a key determinant of the speed and accuracy of workers' responses during emergencies.

Attitude theory defines attitude as a latent response toward a stimulus or object, which may be positive or negative (Martland, 2017). Work attitudes are shaped by knowledge, experience, values, and norms held by the individual. Although knowledge often underpins attitude formation, several studies indicate that attitude change requires behavioral reinforcement through habituation, repeated simulations, and the integration of safety values into workplace culture (Wijayanti et al., 2024). The association between BLS training and both knowledge and attitudes can be explained through cognitive and affective learning theories. BLS training enhances workers' cognitive capacity regarding rescue procedures, which is expected to foster positive attitudes toward OSH practice. However, successful attitude formation is strongly influenced by training methods, frequency of practice, and organizational culture support. Based on these considerations, BLS training is presumed to be significantly associated with improved knowledge among welders in the erection area of PT X, Karimun Regency, and may also influence positive attitudes toward managing workplace accidents. Improved knowledge gained through training is expected to strengthen workers' mental readiness and practical competence in responding to workplace emergencies.

The novelty of this study lies in its focus on examining the relationship between BLS training and welders' knowledge and attitudes within a high-risk construction setting, specifically welding work in the erection area. This study provides empirical evidence among workers with substantial exposure to fatal risks and evaluates the effectiveness of BLS training in an industrial setting in Karimun Regency, a context that remains underexplored. This study aims to analyze the relationship between Basic Life Support training and improvements in knowledge as well as the formation of attitudes among welders in the erection area of PT X, Karimun Regency, and to provide recommendations for developing more effective and sustainable OSH training methods to enhance workforce preparedness in emergency situations.

Method

This study employed a quantitative approach using a cross-sectional design to analyze the relationship between Basic Life Support (BLS) training and the knowledge and attitudes of welders in the erection area of PT X, Karimun Regency. The study population comprised all welders working in the area (n = 32). All eligible workers were included as study participants through total sampling. Data were collected using a structured questionnaire that had been tested for validity and reliability. The instrument consisted of two sections: a knowledge component containing multiple-choice questions related to BLS procedures, and an attitude component measured using a Likert scale to assess respondents' tendencies toward implementing BLS in the workplace.

The study was conducted in the erection area of PT X, Karimun Regency, from May to June 2024. Primary data were obtained through questionnaire distribution, while secondary data were collected from company documents, including training records and workplace accident reports. Operational definitions were as follows: BLS training referred to formal training activities covering cardiopulmonary resuscitation techniques and emergency management; knowledge referred to workers' level of understanding of BLS procedures, measured by the number of correct responses; and attitude referred to a positive or negative tendency toward BLS implementation, measured by Likert-scale scores. Data were analyzed using univariate analysis to describe variable distributions and bivariate analysis using the Chi-square test with a significance level of $\alpha = 0.05$.

Result and Discussion

Univariate Analysis

Table 1
Frequency Distribution of BLS Training

BLS Training	Frequency	Percentage (%)
Completed	18	56.25
Not Completed	14	43.75
Total	**32**	**100**

Based on the research findings, among 32 respondents who were welders working in the erection area at PT. X in Karimun Regency, 18 individuals (56.25%) had completed Basic Life Support (BLS) training, while 14 individuals (43.75%) had never participated in such training. The proportion of workers who have completed the training demonstrates that the company has made efforts to enhance workers' capacity regarding emergency response in the workplace. However, the percentage of workers who have not received training remains considerably high, representing a potential weakness in field team preparedness. This finding is particularly significant given that the characteristics of welding work at PT. X involve high risks of emergency incidents such as burns, accidents from sparks, and sudden cardiac arrest due to electrical shock. According to (Prawesti et al. (2019), BLS training provided to high-risk workers can significantly improve emergency response capabilities, particularly in performing timely Cardiopulmonary Resuscitation (CPR). This training not only provides technical skills but also builds workers' confidence in handling critical situations.

The fact that 43.75% of workers have never participated in training indicates a gap in training distribution that should be addressed immediately. This gap may be influenced by several factors, including company priorities in selecting training participants or insufficient awareness regarding the importance of BLS training for all workers. The success of occupational health and safety (OHS) training is greatly influenced by equal access for all workers, not just for certain groups (Tadesse et al., 2022). The implication of this finding is that the company needs to establish a mandatory and periodic BLS training policy for all welders without exception. Consequently, workforce preparedness will increase collectively, and the risk of delayed emergency response can be minimized. Training should also be supplemented with simulations of real situations relevant to welding work, ensuring that acquired skills are more applicable in the field (Indawati et al., 2023).

Table 2
Frequency Distribution of Workers' Knowledge Level

Knowledge Level	Frequency	Percentage (%)
High	20	62.5
Moderate	7	21.9
Low	5	15.6
Total	**32**	**100**

The analysis results indicate that among 32 respondents, 20 individuals (62.5%) had a high level of knowledge, 7 individuals (21.9%) were in the moderate category, and 5 individuals (15.6%) were in the low category. This distribution suggests that the majority of welders have a good understanding of BLS procedures and techniques, including CPR steps and initial victim assessment. However, there remains a portion of

workers with limited knowledge, which could potentially hinder the speed and accuracy of emergency victim management in the workplace. The high level of knowledge among the majority of workers is likely influenced by work experience, exposure to OHS information, and participation in training programs. According to Notoatmodjo (2012), knowledge is an important domain that influences an individual's actions. Good knowledge facilitates workers in making appropriate decisions when facing emergency situations. For workers with low knowledge, the causes can be diverse, ranging from never having participated in BLS training, insufficient awareness materials, to low interest in seeking additional information independently.

Furthermore, these differences in knowledge levels may be related to age and length of service factors. Workers with longer service periods tend to have greater exposure to training and relevant field experience, resulting in higher knowledge levels. Conversely, new workers who have not been extensively involved in simulations or formal training may not yet have a complete understanding of BLS procedures (Yakut et al., 2021). The implication is that companies need to provide comprehensive and periodic BLS training and develop materials that are easily understood by all age groups and educational backgrounds. Periodic simulations are also important for maintaining existing knowledge, considering that BLS skills are highly dependent on procedural memory that can diminish over time without direct practice (Wijayanti et al., 2024).

Table 3
Frequency Distribution of Workers' Attitude Level

Attitude Level	Frequency	Percentage (%)
Positive	18	56.25
Neutral	11	34.38
Negative	3	9.37
Total	**32**	**100**

Based on the research findings, 18 individuals (56.25%) had a positive attitude toward BLS implementation, 11 individuals (34.38%) had a neutral attitude, and 3 individuals (9.37%) displayed a negative attitude. The majority of respondents with positive attitudes tended to perceive BLS implementation as important and necessary to be performed immediately when emergency situations occur. However, the percentage of respondents with neutral attitudes remains quite high, indicating that there is a group of workers who have not fully believed in or committed to implementing BLS in the field.

The positive attitude held by most respondents demonstrates acceptance of the BLS concept as part of workplace safety. According to Woreta et al. (2025), positive attitudes are formed through a combination of knowledge, experience, and values acquired from the work environment. For workers with neutral or negative attitudes, possible causes include minimal direct experience in emergency situations or never having witnessed the tangible benefits of BLS implementation.

Neutral attitudes in this context can also be influenced by psychological factors such as fear of making mistakes, doubt in one's own abilities, or concerns about legal consequences if the actions taken are unsuccessful. Confidence in providing emergency assistance will increase with growing practical experience and support from the work environment (Woreta et al., 2025). The implication is that BLS training should not only focus on technical skills but also on building conviction and motivation to act. This approach can be implemented through realistic simulations, provision of positive feedback, and case studies demonstrating successful BLS implementation in saving lives.

Bivariate Analysis

Table 4
Chi-Square Results of the Relationship between BLS Training and Workers' Knowledge

BLS Training	Knowledge Level						P-Value
	High		Moderate		Low		
	n	%	n	%	n	%	
Completed (18)	17	94.4	1	5.6	0	0	<0.001
Not Completed (14)	3	17.6	5	29.4	9	53.0	

The Chi-Square test revealed a significant relationship between BLS training and workers' knowledge level (p = 0.000). Among 18 workers who had completed training, 17 individuals (94.4%) had high knowledge and 1 individual (5.6%) was in the moderate category, while none were in the low category. Conversely, among 14 workers who had not completed training, only 3 individuals (21.4%) had high knowledge, 6 individuals (42.9%) were in the moderate category, and 5 individuals (35.7%) were in the low category. These results confirm that BLS training has a significant impact on improving workers' knowledge. According to Prawesti et al. (2019), direct training with practical field methods can effectively improve knowledge retention compared to theoretical learning alone. The striking difference between groups that have and have not participated in training demonstrates that formal learning processes play a central role in internalizing BLS procedures.

The high percentage of knowledge in the group that completed training can be attributed to direct practical experience, interaction with experienced instructors, and opportunities to ask questions and correct mistakes directly. Conversely, the low knowledge level in the group that never participated in training indicates that informal information sources or experience are insufficient to replace structured training (Olasveengen et al., 2021). The implication is that companies need to make BLS training a mandatory program for all workers, especially those with high work risks such as welders. Additionally, periodic evaluation is necessary to ensure that acquired knowledge is maintained and can be applied in emergency situations.

Table 5
Chi-Square Results of the Relationship between BLS Training and Workers' Attitude

BLS Training	Attitude Level						P-Value
	Positive		Neutral		Negative		
	n	%	n	%	n	%	
Completed (18)	7	38.9	11	61.1	0	0	0.145
Not Completed (14)	7	41.1	7	41.1	3	17.6	

The Chi-Square test results indicate no significant relationship between BLS training and workers' attitudes (p = 0.145). Among 18 workers who had completed training, 13 individuals (72.2%) had positive attitudes, 4 individuals (22.2%) had neutral attitudes, and 1 individual (5.6%) had a negative attitude. Meanwhile, among 14 workers who had not completed training, only 5 individuals (35.7%) had positive attitudes, 7 individuals (50%) had neutral attitudes, and 2 individuals (14.3%) had negative attitudes.

Although statistically not significant, this distribution shows a tendency that workers who have completed training tend to have more positive attitudes compared to those who have not. According to Marín et al. (2024), attitude formation requires time and does not always change immediately after training; other factors such as work culture, management support, and direct field experience also play a role.

The non-significance of the statistical test results can be explained by differences in the level of internalization of training materials among individuals. Some workers may have acquired knowledge but have not yet had the opportunity or courage to apply it. Attitude change requires a habituation process and reinforcement through social interaction and real experience (Nasution et al., 2024).

The implication is that BLS training programs need to be integrated with attitude formation strategies, such as providing practice opportunities in simulated conditions that closely resemble real situations, building a culture of mutual support in first aid actions, and providing recognition to workers who take initiative in emergency response. Thus, the training effect can be more optimal not only on knowledge but also on workers' attitudes.

Conclusion

This study demonstrates that Basic Life Support (BLS) training has a significant relationship with the improvement of knowledge among welders in the erection area at PT. X, Karimun Regency. Workers who have completed BLS training tend to have a high level of knowledge regarding emergency response procedures, including Cardiopulmonary Resuscitation (CPR). However, BLS training did not show a statistically significant relationship with workers' attitudes, although there was a tendency for workers who participated in training to have more positive attitudes compared to those who had not. These findings emphasize the importance of BLS training as an effort to enhance preparedness and cognitive capacity of workers in high-risk sectors. To optimize the formation of positive attitudes, training needs to be combined with habituation strategies, realistic simulations, and reinforcement of workplace safety culture.

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