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Studying the effect of the Single-Module Educational System of the Comprehensive University of Applied Sciences on the Knowledge and Skills of First Aid in IRCS Rapid Response Teams in Northwestern Provinces, Iran

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Original Article

Abstract

INTRODUCTION: The modular curriculum system is a powerful tool for empowerment in the labor market, due to the strengthening of certain specific skills for employed individuals or individuals who intend to work in jobs with special skills. this study was conducted to investigate the effect of single-module educational system on the knowledge and skills of first aid in the IRCS rapid response teams in northwestern provinces, Iran.

METHODS: In this descriptive-analytical study, data collection was done through pre and post-test scores as a measure of first aid knowledge in the study group. All aid workers of rapid response teams in the mentioned provinces (63 people) were examined and selected. The knowledge and skills of the participants before and after training were assessed using questions designed by expert trainers.

FINDINGS: The findings showed that the total information of the selected aid workers from four northwestern provinces of the country including Ardabil (16 people), West Azerbaijan (17 people), East Azerbaijan (15 people) and Zanjan (15 people) was analyzed after the first aid modular curriculum training. The participants were all male with a mean age of 31.6±5.3 years. The mean theoretical scores of aid workers in all provinces increased significantly after the training ($p<0.001$).

CONCLUSION: According to the results, the comparison of theoretical scores before training among the four provinces indicates a significant difference between the average knowledge of aid workers before training; so that East Azerbaijan and West Azerbaijan provinces have the lowest and highest average theoretical scores, respectively, which is a significant difference. The difference in the average skill scores in the four provinces after training is significant, so that Ardabil and East Azerbaijan provinces have the highest and lowest average skill scores, respectively.

Keywords: Single-module; First aid; Rapid response team; Red Crescent Society (RCS); knowledge; Skills.

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Introduction

Skills training is directly linked to improved response times in emergencies, and several studies have documented the importance of skills training in reducing fatalities in emergencies. (1) Studies have also shown that simulation-based training can improve the confidence and practical skills of first responders. (2)

These studies have highlighted the importance of learners participating in practical and group activities, which leads to increased team cooperation and coordination. In addition, another study has also examined the positive impact of

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these trainings on reducing anxiety in critical situations. (3)

Modular training is defined as a systematic and modular approach to skills learning that focuses on dividing educational content into smaller, targeted units, especially in the field of first aid and rescue, allowing learners to learn in a gradual and step-by-step manner.

Carter et al. (2020) showed in their study that this method significantly improved the ability to solve complex problems and apply concepts in critical situations. (4) Also, Nguyen & Tran (2021) in their research examined the effectiveness of modular training in resource-poor communities and showed that designing modules to key skills such as revitalizing the combination of theoretical and practical training is recognized as a comprehensive approach to improving skills training. (5)

Wang et al. (2023) showed in their research that this training can effectively increase people's self-confidence and practical ability. They also recommended the use of simulation techniques alongside theoretical training as one of the best ways to prepare learners for real-world situations. (6)

Brown et al. (2021) believe that combining both practical and theoretical approaches not only increases the depth of learning, but also allows for the correction of errors in a controlled environment. In addition, blended learning is also cost-effective, as it can train a larger number of learners in a shorter period of time. (7)

Machine learning algorithms can also analyze learners' learning patterns and deliver educational content tailored to individual needs. This type of personalization has been very effective in improving skills such as crisis management and quick decision-making. (8) A study also highlighted the development of lifelong learning programs in improving the quality of skills training. (9)

O'Connor and Evans (2023) noted that implementing skills training in rescue and relief faces several challenges, including financial constraints, lack of expert trainers, and cultural barriers. (10)

Nguyen & Tran (2021) examined the impact of these challenges in low-income areas and showed that the lack of educational infrastructure is one of the biggest obstacles to providing quality education, and the lack of standardization of content and the process of assessing learners are also among the other problems identified in this regard. (5)

A review of previous studies shows that skills training in first aid and rescue will be more effective when it is provided in a combined (theoretical and practical), structured and using modern technologies. Research also emphasizes the need for continuous training and periodic retraining. Furthermore, cultural and social factors can also significantly affect the effectiveness of these trainings. However, there are also significant research gaps, including the need to standardize training content, examine the cultural impact on the learning process, and the role of psychological factors in increasing the effectiveness of trainings. Future research can examine these issues and provide solutions to improve the quality of these trainings. However, this study was conducted to investigate the effect of modular curriculum first aid training on the knowledge and skills of the Iranian Red Crescent Society (IRCS) rapid response teams.

Methods

In this descriptive-analytical study, data were collected through pre-test and final test scores as a measure of first aid knowledge in the study group. The statistical sample included all aid workers of rapid response teams in the four provinces mentioned, which met the specific criteria set by the Deputy for Planning and Specialized Training of the Rescue and Relief Organization.

The special single-module course for rapid response teams was designed in such a way that the content is based on the standards of the University of Applied Sciences & Technology and the Skill Center of the Ministry of Health, Treatment and Medical Education, and with an appropriate combination of scientific and academic education that is fully related to the topic, and then the expected skill practice is transferred to the learners.

In this regard, theoretical content based on up-to-date sources in the field of anatomy was prepared and created for further study in the group simultaneously with the teacher's teaching, which will be available to learners on the social network. In this way, learners will have the opportunity to learn and practice related training in a practical and skilled manner using professional models and other equipment in an appropriate environment. The selected instructors are often graduates of nursing and emergency medicine with desirable

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previous experiences with national or international certificates in teaching first aid.

The most basic feature of the designed course is a standard and integrated training package in all provinces of the country. In addition, in the final week of the course (the fifth week), it is possible for the rapid response team learner to attend small teams of 8 or 9 people in the hospitals of the intended parties to the agreement and experience all the technical knowledge learned in the course in a practical and professional way as an observer.

The pre-test design was carried out by the course instructors taking into account the knowledge expected of rapid response paramedics.

The post-test design is also carried out in two parts: a theoretical test (with questions similar to the pre-test) and a scenario-based skill test to assess the skills desired by the learners, including the skills of the paramedic in a simulated accident environment. Given that the present study only deals with a descriptive analytical study of the knowledge of the learners of this course in four provinces of the northwest of the country, the scores obtained from the skill test have not been taken into account in this study.

Findings

Statistical analysis

The collected data were analyzed using SPSS-27 software. The assumption of normality of quantitative variables was checked using the Kolmogorov-Smirnov test. Comparisons before and after training were made according to the normality or not of the variables using paired t-tests or Wilcoxon signed rank test. Also, ANOVA or Kruskal-Wallis test was used to compare the results between provinces. The significance of the tests was declared at the 0.05 level.

A total of 63 rescuers from four northwestern provinces of the country including Ardabil (16 people), West Azerbaijan (17 people), East Azerbaijan (15 people) and Zanjan (15 people) were analyzed after training in single-module of first aid. The participants were all male and had a mean age of 31.6±5.3 years. The mean age of the rescuers between the four provinces did not differ significantly (P=0.351) (Table 1)

Table1. Age comparison results between provinces

Province	N	Mean±SD	Minimum	Maximum	P-value
Ardabil	16	32.7±4.7	27.00	44.00	
West Azerbaijan	17	30.2±4.2	25.00	41.00	0.351
East Azerbaijan	15	33.0±6.5	26.00	49.00	
Zanjan	15	30.5±5.5	22.00	42.00	
Total	63	31.6±5.3	22.00	49.00	

Table 2. Final theory score comparison results before and after training

Province	Before	After	P-value_a
Ardabil	11.8±1.9	17.4±0.4	<0.001*
West Azerbaijan	14.6±1.1	17.1±0.9	<0.001*
East Azerbaijan	10.3±2.7	14.8±1.4	0.001*
Zanjan	14.5±0.8	18.1±1.1	<0.001*
Total	13.9±1.9	17.0±1.5	
P-value_b	<0.001*	<0.001*	

**: Significant at 0.05 level*
P-value_a: Results of the before and after comparison in each province.
P-value_b: Comparison results between provinces.

Table 3. Final skill score comparison results before and after training

Province	Mean	Minimum	Maximum	P-value_a
Ardabil	19.1±0.2	18.8	19.6	<0.001*
West Azerbaijan	16.9±0.7	16.0	18.0	
East Azerbaijan	15.2±1.4	14.0	18.0	
Zanjan	19.0±0.4	18.4	19.6	
Total	17.6±1.8	14.0	19.6	

**Significant at 0.05 level*

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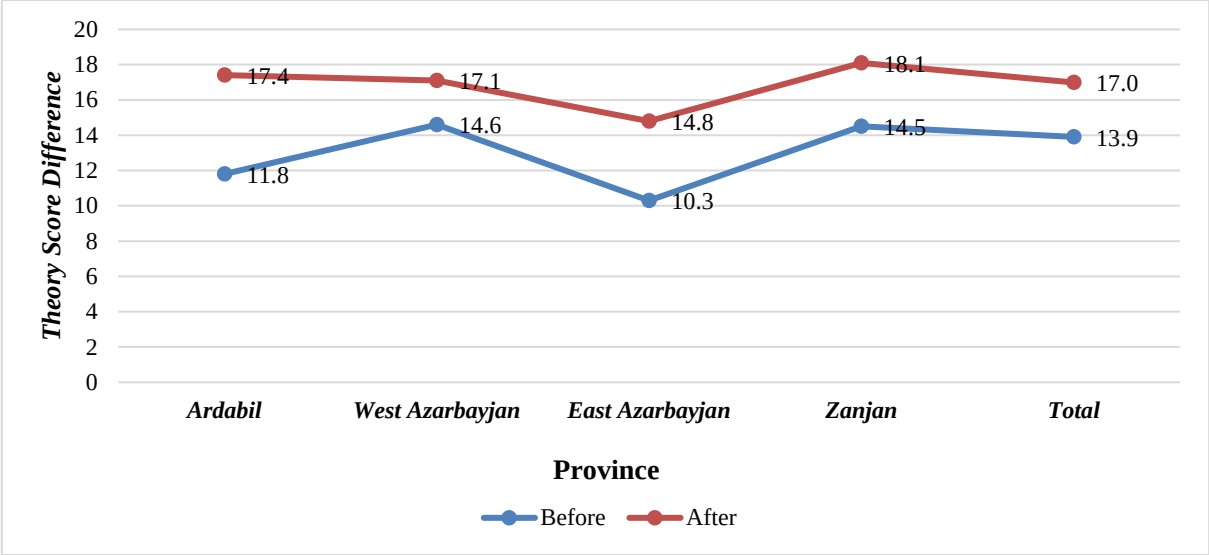

Fig 1. Comparison of average theory scores before and after training

Table 2 includes a comparison of the average theory scores before and after the first aid training in each province separately and also between the provinces. According to Table 2, the average theory scores of rescuers in all provinces increased significantly after the training compared to before. For example, the average theory scores of rescuers in Ardabil province increased by 5.6 points after the training ($p<0.001$). Also, the comparison of the theory scores before the training between the 4 provinces indicates a significant difference between the average knowledge of rescuers before the training; so that the provinces of East Azerbaijan and West Azerbaijan have the lowest and highest average theory scores, respectively, with averages of 10.3 and 14.6, and this difference is significant ($p<0.001$) Figure 1.

As mentioned earlier, after training, a significant increase was observed in the average theory scores of the provinces, and there was also a significant difference between the provinces, such that the average after training in East Azerbaijan and Zanjan provinces had the lowest and highest values, with values of 14.8 and 18.1, respectively ($p<0.001$).

Table 3 shows the results of comparing the average practical or skill scores between the four provinces. The difference in the average skill scores in the four provinces after training is significant; Ardabil and East Azerbaijan provinces have the highest and lowest average skill scores with averages of 19.1 and 15.2, respectively ($p<0.001$).

Discussion & Conclusion

The single-module course system is a powerful tool for empowering individuals in the labor market, due to the strengthening of certain specific skills for employed individuals or individuals who intend to work in a job with special skills. Studying and examining the impact of this training system can be very informative in terms of expanding the application of these trainings. Therefore, the present study seeks to examine the impact of the single-module course implemented in terms of theory and skills by the Iran Helal Applied Science Higher Education Institute. The single-module first aid course is the focus of this study. After selecting eligible individuals to participate in the aforementioned training, changes in the knowledge and skills of the trainees before and after training were examined using pre- and post-test questions. The results show that in all four provinces studied (Ardebil, Zanjan, East and West Azerbaijan), the average theoretical score has increased significantly. Also, the comparison of the average skill score after training was significant between the provinces. The results indicate that the trainings continue in the form of periodic retraining on the one hand and special skill trainings for provinces with lower skill scores.

Given the practical and operational importance of specific training for rapid response teams, and considering that this study analyzed and examined the differences in knowledge of first aid course

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learners in 4 northwestern provinces of the country, it is recommended that a more comprehensive study be conducted to study the knowledge, attitude, and capabilities of learners. Also, if data from other provinces of the country are available, similar analyses can be conducted in the form of a comparison of the country's regions.

Considering other variables from learners (in addition to the variables currently used) can also yield more practical results in making the necessary changes in some parts of the course.

This study shows that first aid training can significantly improve individuals' skills, but there is a need for continuous review and modification of training methods and content. Improving coordination in training programs, strengthening group participation, and using multi-stage evaluation methods can contribute to the greater success of these courses. Generalizing the successful models of this research to other regions and more accurately assessing regional differences can be effective in formulating macro-educational and relief policies. These courses not only help to strengthen individual preparedness, but also to increase social capacity to deal with crises, indicating that relief training is essential not only in improving individual preparedness, but also in strengthening collective abilities to deal with critical situations. Generalizing this educational model to other regions can lead to increased relief capabilities at the national level. Also, the results of this course can be used to formulate macro-educational policies in the field of crisis management.

The following can also have a positive impact on improving the organization's performance:

- *Developing supplementary programs*: Holding more practical courses can help strengthen the practical skills of participants.
- *Phased evaluation*: Using multiple assessments throughout the course can better show the progress of participants and identify potential weaknesses in real time.
- *Generalization of the educational model*: The success of this course can be used as a model for designing and implementing similar courses in other regions.

Ethical Considerations

All ethical principles have been considered in this article. Participants were informed about the purpose of the research and the steps of its implementation.

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No financial support was received for this research.

Author's Contributions

The author alone was responsible for all stages of the research.

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Conflict of Interests

None.

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