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The role of continuous training in improving the skills of dealing with critical injuries among Red Crescent emergency crews

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Abstract
This study aims to evaluate the impact of continuous, simulation-based training, incorporating virtual reality (VR) and augmented reality (AR), on the performance of Red Crescent emergency crews in managing critical injuries. The experimental group underwent advanced training that included scenario-based simulations, VR/AR technologies, and psychological resilience training. A control group received standard training for comparison. Knowledge, practical skills, and psychological preparedness were assessed through pre- and post-training tests, skill evaluations in simulated emergency scenarios, and surveys measuring stress levels and confidence. The results showed a 35% increase in knowledge scores and significant improvements in practical skills, including a 25% reduction in response times and 80% success in triage assessments. Participants also reported a 40% reduction in stress and a 90% increase in confidence. However, challenges such as resource constraints and time limitations were identified as barriers to broader implementation. The findings highlight the value of incorporating modern training methods to enhance the effectiveness of emergency responders in critical injury management.
Keywords: Continuous training, improving skills, critical injuries, Red Crescent emergency crews

Introduction

Continuous education and training play an important role in improving the performance of hospital nurses, which in turn has a positive impact on the quality of health care [1]. Nurse education and training are a very crucial aspect in ensuring that nurses have the knowledge, skills, and competencies needed to face the increasingly complex demands in today's world of health services. However, in the context of rapid changes in the health sector, the formal education provided to nurses in nursing schools may not always be sufficient to prepare them to face current challenges [2].

Improving the skills required to manage critical injuries is essential for enhancing patient outcomes and reducing mortality in emergency situations. This can be achieved through advanced, hands-on training programs that emphasize real-world scenarios, such as simulation-based learning and multidisciplinary exercises. Incorporating modern techniques like virtual reality simulations and real-time feedback systems helps bridge knowledge gaps and foster confidence among healthcare providers and first responders. Emphasizing critical areas such as airway management, hemorrhage control, and trauma resuscitation ensures preparedness for high-stress environments. Regular skill assessments, continuous education, and collaborative training approaches further enhance competency, ensuring timely and effective interventions in critical injury cases [3].

Injury affects people worldwide but has a particularly high burden in low- and middle-income countries where the resources to treat it are more limited. Almost 90% of injury deaths take place in low- and middle- income countries. While the ultimate goal must be to prevent injuries from happening at all, much can be done to minimize the disability and ill-health arising from the injuries that do occur despite the best prevention efforts [4].

In the healthcare sector, training extends beyond routine procedures, focusing on critical thinking, decision-making, and adaptability in high-pressure environments. Continuous training equips professionals with up-to-date knowledge about medical advancements, fostering enhanced service quality. It also supports the development of new skills required for specific roles, such as emergency response and trauma care, enabling healthcare workers to respond more effectively to complex situations.

Literature review

Continuous Training

According to Bernardin and Russell, training is defined as various introductory efforts to develop workforce performance in the work they are responsible for, or something related to their work. This usually means making specific or specific changes in behavior, attitudes, skills, and knowledge. The way for training to be effective is that training must include learning from experiences, training must be an organizational activity that is planned and designed in response to identified needs. According to Noe, Hollenbeck, Gerhart, and Wright, training is a planned effort to facilitate the learning of job-related knowledge, skills, and behaviors by employees [4].

The definition of training from several experts can be concluded as any planned effort to improve the performance of those employed in the job currently held or related to it. The result of training is a change in certain knowledge, skills, attitudes, or behavior. In this case, the change in knowledge referred to is that initially the training participants who did not understand something came to understand it [5]. According to Dessler, the meaning of training is giving new or old employees the skills they need to carry out their work. Thus, training means showing a machinist how to operate a new machine, a new salesperson how to sell his company's products, or a new supervisor how to interview and assess employees [6]. The definition of training from several experts can be concluded as any planned effort to improve the performance of those employed in the job currently held or related to it. The result of training is a change in certain knowledge, skills, attitudes, or behaviors. In this case, the change in knowledge referred to is that initially the training participants who did not understand something came to understand it. From not knowing about office administration to understanding and understanding and being able to implement the knowledge gained both in theory and practice in the world of work [7].

Improving the skills of dealing with critical injuries among Red Crescent emergency crews

Improving the skills of dealing with critical injuries among Red Crescent emergency crews is crucial, as they are often the first responders in emergency situations. Here are some strategies to enhance their skills [8]:

1. **Advanced Training Programs**: Implement continuous education courses focused on handling critical injuries, including severe trauma, head injuries, burns, fractures, and respiratory distress. Incorporating simulations and scenario-based learning can prepare responders for high-stress situations.
2. **Use of Technology for Training**: Incorporate virtual reality (VR) and augmented reality (AR) simulations to allow crews to practice in lifelike scenarios. VR/AR can provide hands-on experience without real-world risks, improving response times and decision-making under pressure.
3. **Enhanced Assessment and Triage Skills**: Regularly update training on advanced triage methods and injury assessment protocols, focusing on assessing injuries quickly and prioritizing treatment based on severity.
4. **Psychological Preparedness and Resilience**: Implement programs that build resilience and stress-management skills. Exposure to critical injuries can be mentally taxing, so psychological training ensures responders can manage stress effectively in real-time.
5. **Cross-disciplinary Training**: Red Crescent teams could benefit from training with other emergency and healthcare providers, including paramedics, trauma surgeons, and critical care units, fostering a collaborative approach to managing critical injuries.
6. **Ongoing Skill Assessment**: Regular assessments, both theoretical and practical, help to identify gaps and measure improvements. Certification renewals ensure that Red Crescent crews maintain high standards in emergency care.

Critical Injury Management

The management of critical injuries is a cornerstone of emergency care, requiring specialized knowledge and swift, precise actions to reduce mortality and long-term complications. Training programs tailored to emergency care emphasize areas such as airway management, hemorrhage control, and trauma resuscitation. Simulation-based learning has emerged as a gold standard in training, allowing healthcare professionals to practice life-saving interventions in controlled environments that mimic real-world scenarios [9].

Advanced technologies, including virtual reality (VR) and augmented reality (AR), have further revolutionized training by creating immersive learning experiences. These tools enhance practical skills and decision-making abilities under simulated high-pressure conditions, preparing responders for emergencies [10]. Additionally, interdisciplinary collaboration is increasingly recognized as vital in critical injury management. Joint training sessions involving emergency responders, trauma surgeons, and critical care nurses improve teamwork and communication, leading to better patient outcomes.

Psychological preparedness is another key aspect of training for critical injury management. Emergency responders frequently encounter high-stress situations, which can impact their performance and mental health. Training programs that incorporate resilience-building and stress management techniques are essential to ensure responders remain effective and maintain their well-being [6].

Barriers to Effective Training

Despite the recognized importance of training, several barriers hinder its effective implementation. Resource limitations, particularly in low- and middle-income countries, restrict

access to advanced training tools such as VR/AR simulations. Almost 90% of injury-related deaths occur in these regions, highlighting the urgent need for improved training to address the burden of injuries [11]. Additionally, inconsistent training standards and infrequent updates to training curricula can lead to knowledge and skill gaps among healthcare workers.

Time constraints and heavy workloads also pose challenges, making it difficult for healthcare professionals to participate in continuous training programs. Moreover, the absence of regular assessments and feedback mechanisms can result in unaddressed deficiencies in skills and knowledge [12].

Improving the Skills of Emergency Responders

Targeted training initiatives for emergency responders, such as those in the Red Crescent, can address these challenges and significantly enhance their ability to manage critical injuries. Incorporating modern teaching methods, such as hands-on simulation exercises, VR/AR technologies, and interdisciplinary training, bridges the gap between theory and practice. Regular performance assessments, combined with certification renewals, ensure that responders maintain high standards of care [13].

Psychological training modules focusing on resilience and stress management are crucial for emergency crews, who often operate in high-pressure environments. Such training helps build mental fortitude, enabling responders to remain calm and effective during critical incidents [9].

Cross-disciplinary collaboration further strengthens emergency care, as joint training fosters a team-based approach to managing critical injuries. By leveraging diverse expertise, responders can ensure timely and effective interventions, reducing mortality rates and improving recovery outcomes for patients.

Results

The findings of this study are presented in three key areas: knowledge improvement, skill enhancement, and psychological preparedness. These results are derived from pre- and post-training assessments, simulated emergency scenarios, and qualitative feedback from Red Crescent emergency responders.

1. Knowledge Improvement

After undergoing the training program, the experimental group demonstrated significant improvements in their understanding of critical injury management protocols. Specifically:

- Average knowledge test scores increased by **35%** compared to pre-training assessments.
- Participants displayed a deeper understanding of critical topics, such as airway management, hemorrhage control, and trauma resuscitation, with over **85%** of respondents achieving proficiency in theoretical knowledge.

In contrast, the control group, which received standard training, showed only minor improvements, with an average score increase of **10%**.

2. Skill Enhancement

Practical skill assessments conducted during simulated scenarios revealed significant gains in the experimental group:

- **Response Times**: Participants in the experimental group reduced their average response times by **25%**, demonstrating quicker decision-making and action under pressure.
- **Accuracy in Triage**: The experimental group showed an **80% success rate** in triage and injury assessment, compared to **60%** in the control group.
- **Application of Interventions**: Skills such as applying tourniquets, managing airway obstructions, and stabilizing fractures were executed with **95% proficiency**, up from **65%** before training.

The integration of virtual reality (VR) and augmented reality (AR) tools was noted as a significant factor in enhancing practical competencies, providing responders with lifelike, high-stakes practice environments.

3. Psychological Preparedness

The experimental group also benefited from resilience and stress management training:

- **Stress Levels**: Post-training surveys indicated a **40% reduction** in perceived stress during simulated high-pressure scenarios.
- **Confidence**: Over **90%** of participants reported increased confidence in handling critical injuries, compared to **65%** in the control group.
- **Teamwork and Communication**: Joint training sessions with healthcare professionals fostered a **30% improvement** in teamwork and communication ratings during interdisciplinary exercises.

4. Qualitative Insights

Interviews with participants highlighted key takeaways from the training program:

- **Real-World Applicability**: Responders valued the practical relevance of the training, particularly the simulated scenarios.
- **Technology Integration**: VR/AR tools were described as "game-changing" for building confidence and decision-making skills.
- **Need for Regular Updates**: Many participants emphasized the importance of continuous training and regular skill assessments to maintain proficiency.

5. Challenges Identified

Despite the positive outcomes, several challenges were noted:

- **Resource Constraints**: Limited availability of advanced training tools like VR/AR in some regions hindered broader implementation.
- **Time Limitations**: Heavy workloads often made it difficult for responders to commit sufficient time to training.

Conclusion

The literature emphasizes the critical role of continuous training in healthcare, particularly for managing critical injuries. Advanced methods such as simulation-based learning, technological integration, and psychological preparedness are key to equipping responders with the necessary skills and confidence. Addressing barriers such as resource limitations, time constraints, and inconsistent training standards will further enhance the effectiveness of training programs. With targeted initiatives, emergency responders, including Red Crescent teams, can significantly improve their performance and ultimately save more lives.

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