An Example of Developing Simulation-Based Training Model at National Scale

Ulusal Çapta Simülasyon Temelli Eğitim Modeli Geliştirme Örneği

Olgu Sunumu
Case Report

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Abstract
Scenario-based simulations provide standardization in crisis management for emergency patient approaches by creating awareness of teamwork and ensuring effective communication during a crisis. The Republic of Turkey Ministry of Health General Directorate of Emergency Healthcare Services has developed and implemented a national-scale simulation-based training program for 112 Emergency Healthcare staff. This initiative aimed to improve accessibility, effectiveness, and efficiency in pre-hospital emergency care services while ensuring consistent quality across the nation. By employing the Kern Curriculum Development Model, the program addressed the educational and operational needs of emergency staff, focusing on enhancing decision-making, communication, and teamwork skills through scenario-based simulations. Adult, pediatric and trauma life support trainings have been developed according to the scenario-based simulation model. As a pioneering effort in country-scale program design, this initiative not only elevated staff competencies but also established a framework for future large-scale educational interventions. The challenges encountered and lessons learned provide valuable insights for similar global applications.
Keywords: simulation-based training; pre-hospital emergency care; curriculum development; patient safety; medical education

Özet
Senaryo tabanlı simülasyonlar, kriz anında ekip çalışması farkındalığı oluşturarak ve etkili iletişimi sağlayarak acil hasta yaklaşımlarında kriz yönetiminde standardizasyon sağlar. T.C. Sağlık Bakanlığı Acil Sağlık Hizmetleri Genel Müdürlüğü, 112 acil sağlık personeline yönelik ulusal ölçekli bir simülasyon tabanlı eğitim programı geliştirmiş ve uygulamıştır. Bu girişim, hastane öncesi acil sağlık hizmetlerinde erişilebilirlik, etkinlik ve verimliliği artırmayı, aynı zamanda ulusal çapta tutarlı bir kalite sağlamayı amaçlamıştır. Kern Program Geliştirme Modeli kullanılarak, program acil sağlık personelinin eğitim ve operasyonel ihtiyaçlarını ele almış, senaryo tabanlı simülasyonlar yoluyla karar verme, iletişim ve ekip çalışması becerilerini geliştirmeye odaklanmıştır. Yetişkin, pediatrik ve travma yaşam desteği eğitimleri senaryo tabanlı simülasyon modeline göre geliştirilmiştir. Ülke çapında program tasarımında öncü bir çaba olarak, bu girişim yalnızca personelin yetkinliklerini artırmakla kalmamış, aynı zamanda gelecekteki geniş ölçekli eğitim girişimleri için bir çerçeve oluşturmuştur. Karşılaşılan zorluklar ve edinilen dersler, benzer küresel uygulamalar için değerli içgörüler sunmaktadır.
Anahtar Sözcükler: simülasyon tabanlı eğitim; hastane öncesi acil sağlık hizmetleri; program geliştirme; hasta güvenliği; tıp eğitimi

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Introduction

Pre-hospital emergency healthcare services operate under unique and demanding circumstances. Rapid, accurate, and effective responses to incidents at the scene are critical to patient outcomes, distinguishing these services from other medical specialties. The dynamic and unpredictable nature of pre-hospital care often requires healthcare providers to function efficiently under intense pressure, making continuous training and skill enhancement indispensable (1).

Simulation-based training has emerged as a transformative approach in medical education, offering healthcare providers an opportunity to practice and refine critical clinical and non-clinical skills in a controlled environment. By replicating real-life scenarios, this method prioritizes patient safety while enhancing decision-making, teamwork, and communication skills. It allows participants to re-analyze the learned knowledge and skills, and transfer them to their professional life, as it allows them to make their own assessment of knowing their own states with immediate feedback. Simulation-based training actively involves students in the learning process, promoting a student-centered approach. This methodology allows learners to tailor the process to their individual learning styles, enabling experiential learning. Through repeated practice and engagement, students can achieve mastery and meet desired performance outcomes. Research supports that such active learning environments foster deeper understanding and skill retention (2). Studies have demonstrated the effectiveness of simulation in improving healthcare delivery in high-stakes environments, such as trauma care and emergency services (3,4).

The Republic of Turkey Ministry of Health General Directorate of Emergency Healthcare Services organizes in-service training programs for 112 emergency staff in line with key objectives. These include ensuring the accessibility, effectiveness, and efficiency of emergency healthcare services at a national level, increasing the satisfaction and educational levels of both service providers and recipients, and maintaining consistent standards across all segments of society by leveraging technological innovations. A primary goal of these programs is to enhance staff experience in emergency case management by creating realistic training environments using simulation-based methodologies. These initiatives also aim to meet healthcare quality criteria by minimizing staff-related error rates and improving overall service delivery (5).

Considering these objectives, the General Directorate has undertaken studies to develop simulation-based in-service training programs according to the Kern Curriculum Development Model. This structured approach ensures that training is tailored to the specific needs of emergency personnel while aligning with international best practices. The focus of this case report is to detail the development, implementation, and evaluation of these programs, highlighting their impact on staff competencies, service quality, and patient safety. The lessons learned provide valuable insights into scaling simulation-based education for healthcare systems worldwide.

Method

The simulation-based program development studies were conducted following the Kern model, encompassing the identification of the problem, determination of requirements, needs assessment of target learners, setting goals and measurable objectives, formulating educational strategies, implementation, and subsequent evaluation and feedback. Initially, data was collected from emergency healthcare staff and managers through document reviews, group interviews, executive meetings, on-site observations, face-to-face interviews, and written feedback. These efforts aimed to determine the field characteristics and staff readiness within the system while assessing their training needs. Based on these findings, the General Directorate, informed by updated international resuscitation guidelines, identified changes in the literature and adopted current approaches for field interventions.

In 2016, a workshop was organized involving physicians, paramedics, emergency medical technicians, Ministry of Health representatives, and experts from emergency medicine, pediatric emergency, anesthesiology, and reanimation. This workshop identified the learning requirements of 112 emergency personnel, addressing issues

critical to meeting operational criteria and standards. A roadmap was established to ensure alignment between training and identified field needs, supported by evaluating case types encountered and relevant legislation defining core competencies.

Specific, measurable objectives were crafted based on the identified training requirements. Qualifications and sub-competencies expected of participants in adult advanced life support, pediatric advanced life support, and advanced trauma life support trainings were defined through group consensus. Task forces composed of academicians, field experts, and Ministry representatives were formed to address objectives and learning outcomes for each training module.

During the training strategies and content design phase, strategies were aligned with desired outcomes, emphasizing simulation as the primary methodology. Realistic scenarios were developed for each program, complemented by prepared scenario areas and models for practical application. Coordinators were assigned to oversee each module. Additional methods, such as small group projects, case discussions, role-playing, and guided skill practices, were incorporated to support the most effective transfer of knowledge to professional settings.

Each training module included 6-9 simulation scenarios, scenario implementation guides, debriefing guides, and evaluation materials tailored to learning objectives. Participant guidebooks, presentation materials, pre-tests, post-tests, and skill-specific learning guides were prepared for each program. Simulation models required for training were identified, with medium-fidelity advanced life support models prioritized for cost-effectiveness. The 112 training and simulation centers utilized task trainers and manikins of varying fidelity levels.

Four-day training courses were conducted in groups of up to 18 participants. Sessions were held in simulation rooms equipped with advanced audiovisual technology, enabling scenario recording for instructor feedback. Participants were observed during scenarios through one-way glass in debriefing rooms or, where unavailable, within divided training halls. Instructors used checklists to guide debriefing sessions, an integral component of the program, fostering analysis, reflection, and synthesis of participants' actions and thought processes.

For advanced trauma life support, external field simulations were preferred, incorporating simulated patients and accident scenarios with vehicles or motorcycles. The implementation phase focused on resource standardization, covering costs, time, space, instructors, equipment, and training fields. Pilot studies were conducted for each scenario, first with instructors, followed by experienced staff, and lastly with untrained personnel. Feedback collected during these studies informed adjustments to the scenarios and content.

Following pilot studies, the finalized simulation-based national programs were implemented at targeted standards. This phased rollout began with instructor training, incorporating simulation methods, debriefing techniques, and interactive strategies. Subsequently, 21 central provincial education centers observed and adopted the training model from designated reference simulation centers in Antalya, Bursa, Konya, and İzmir. Observer instructors delivered modules under task force supervision, with feedback provided to the Ministry using structured reports and scenario analyses.

Between 2018 and 2019, observation and post-observation trainings were conducted nationwide using the standardized implementation model. Feedback mechanisms were established as part of the evaluation phase, culminating in the design of an emergency healthcare automation system training portal. This portal, currently under pilot evaluation, is intended to gather comprehensive feedback from participants and instructors. Additionally, nationwide audits are conducted by coordinators and module development teams to evaluate and refine the training processes. Simulation-based training programs has continued to be implemented from that day to the present.

Discussion

The Role of Simulation in Advancing Pre-Hospital Emergency Care

The national simulation-based training program for 112 Emergency Healthcare Services represents

a significant advancement in pre-hospital medical education in Turkey. Pre-hospital settings pose unique challenges, requiring rapid decision-making, effective communication, and seamless teamwork to ensure optimal patient outcomes. Simulation-based training is particularly well-suited for pre-hospital environments as it allows healthcare professionals to practice scenarios that closely mimic real-life emergencies, including time-critical conditions such as cardiac arrest, severe trauma, and mass casualty incidents. These trainings provide a safe environment to build technical skills, refine protocols, and strengthen non-technical competencies like leadership and situational awareness (2,3)

By employing the Kern Curriculum Development Model, the program systematically addressed critical gaps in emergency care delivery while aligning training objectives with international standards (5,6). The inclusion of high-fidelity simulations in pre-hospital scenarios equipped 112 emergency personnel with the tools to manage complex and unpredictable situations. These exercises foster a hands-on approach, encouraging active participation and real-time problem-solving. Studies have shown that pre-hospital simulation enhances decision-making under pressure, improves adherence to protocols, and reduces errors, ultimately leading to better patient outcomes (7,8).

Moreover, pre-hospital simulation-based training provides opportunities to address rare but critical events that emergency personnel may encounter only a few times in their careers. These include neonatal resuscitation, hazardous material incidents, and complex airway management. Training in such scenarios helps to ensure that staff remain prepared for the full spectrum of emergencies. Furthermore, the integration of pre-hospital simulation with feedback and debriefing has been shown to enhance knowledge retention and skill transfer, reinforcing a culture of continuous improvement and patient safety (4)

Addressing Challenges

Implementing a nationwide training program presented several challenges. Resource allocation, particularly the high costs associated with simulation technology, was a primary concern. The use of medium-fidelity manikins provided a cost-effective solution without compromising training quality. However, disparities in infrastructure across provinces highlighted the need for ongoing investment in training facilities and equipment

Another challenge was ensuring consistency in training delivery across diverse geographic regions. To address this, the program included standardized scenarios, instructor training workshops, and continuous monitoring through feedback mechanisms. These measures helped maintain uniformity in training outcomes while allowing for regional adaptations based on specific needs

Lessons for Global Applications

The success of this initiative underscores the potential of simulation-based training to transform emergency medical education on a national scale. Key lessons include the importance of adopting a structured curriculum development model, integrating feedback mechanisms, and balancing cost with training effectiveness. These insights can guide other countries seeking to enhance pre-hospital care through standardized, simulation-driven education (6).

Moreover, the program's emphasis on reflective practice and experiential learning highlights the need for ongoing professional development. As clinical guidelines and medical technologies evolve, maintaining the relevance and effectiveness of simulation-based programs will require continuous updates and evaluations (3)

Conclusion

The simulation-based training model developed for 112 Emergency Healthcare Services in Turkey demonstrates the feasibility and impact of implementing standardized educational initiatives in pre-hospital settings. By addressing identified training gaps and leveraging innovative educational strategies, this program significantly will enhance the competencies of emergency personnel.

This initiative serves as a model for scaling simulation-based education in other healthcare systems. Its structured approach, emphasis on reflective learning, and adaptability to diverse resource settings provide a roadmap for countries aiming to strengthen their emergency care infrastructure. Ongoing evaluation, resource investment, and alignment with global best

practices will be critical to sustaining the program's success and maximizing its long-term impact on patient safety and healthcare outcomes.

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