

The Effect Of Mobile Applications On First Aid Training For Red Crescent Volunteers

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Abstract

The study examines the impact of mobile applications on the effectiveness of first aid training among Red Crescent volunteers. With the advancement of healthcare training becoming increasingly digital, m-learning websites have become the new face of knowledge retention and the aptness of skills. In comparing the traditional method of training and mobile app training, the article is based on comparisons of training outcomes, knowledge retention levels, and learning of practical skills. Results indicate that mobile applications greatly improve emergency response knowledge recall ($p < 0.05$), access to training, and volunteer self-efficacy.

Keywords: Mobile apps, first aid training, Red Crescent, m-learning, emergency response, humanitarian training.

1. Introduction

Red Crescent societies' core activity worldwide is first aid training, which equips volunteers with lifesaving emergency skills (Pek et al., 2020). Traditional first aid training methods, despite their effectiveness, are plagued by access, time, and recall levels (Plant & Taylor, 2013). The ubiquity of smart phones has presented unparalleled opportunities for mobile interventions in health education (Kyaw et al., 2019).

Mobile apps have various advantages over traditional training, including on-demand usage, interactive multimedia, and even practice of competence via simulation (Hannola et al., 2021). Red Crescent volunteers, who might engage in humanitarian activity alongside other ventures, can take

advantage of mobile apps' flexible learning that can complement initial training and skill updating (Güler & Gülöksüz, 2020).

This study investigates whether the use of mobile applications in first aid training increases learning outcomes among Red Crescent volunteers compared to traditional class-based methods. The potential of mobile applications in such an environment can be utilized to inform training drills of humanitarian organizations globally

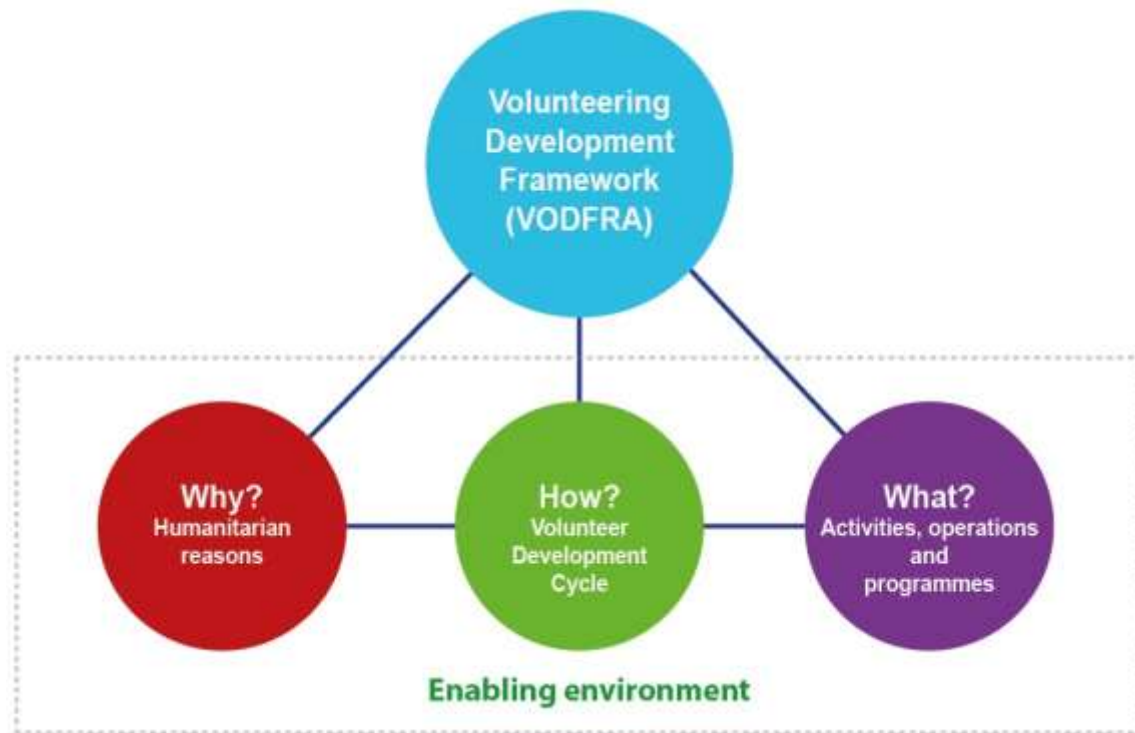


Fig.1: Volunteering Development Framework.

2. Literature Review

2.1 Mobile Learning in Medical Education

Mobile learning has demonstrated significant potential for medical and health professions education. Systematic review of Kyaw et al. (2019) revealed that mobile learning interventions were more robust regarding knowledge and skill than no intervention, and there was moderate evidence to support equivalence or superiority to conventional learning. The portability and ease of use of mobile devices enable the learner to view learning content at more than one location, supporting the "anytime, anywhere" model of learning (Vaona et al., 2018).

2.2 First Aid Training Challenges

Conventional first aid training is faced with numerous challenges. The recall of first aid knowledge and skills erodes very rapidly following initial training, with research showing high attrition rates by 3-6 months (Beskind et al., 2019). In addition, geographical distance and time, especially in rural or remote rural areas covered by Red Crescent volunteers (Nord et al., 2020), limit training participation. These challenges need innovative solutions in training delivery and refresher.

2.3 Emergency Response Training through Mobile Applications

Mobile training response applications have been targeted by recent studies with positive results. Siebert et al. (2021) carried out that subjects who trained on mobile apps performed significantly higher at CPR than the control group with the control only. Zink et al. (2018) also established that medical students trained on a mobile app for trauma examination reported enhanced diagnostic capacity. These findings suggest that mobile applications can reinforce or supplement the traditional training methods.

2.4 Red Crescent Training Needs

Red Crescent societies work in multilateral societies, often where training infrastructure may be inadequate (Al-Shaqsi, 2020). Volunteers do not just require initial competence but also maintenance mechanisms and skill renewal. Mobile applications can fit them by exposing them repeatedly to course content and timely updates when crisis arises (Mohammadi et al., 2019).

3. Methodology

3.1 Study Design

This quasi-experiment was a pre-test/post-test control group design lasting for six months (January-June 2023). The Red Crescent volunteers from five regional chapters were randomly assigned to either the control group (traditional training) or intervention group (mobile application + traditional training).

3.2 Participants

240 Red Crescent volunteers participated in the study (intervention group: n=120; control group: n=120). The inclusion criteria were that the volunteers: (1) were an active member for at least 6 months, (2) owned a smartphone, (3) did not have formal first aid training before this, and (4) had provided informed consent. The demographic profile is shown in Table 1.

Table 1: Demographic Characteristics of Study Participants

Characteristic	Intervention Group (n=120)	Control Group (n=120)	p-value
Age (years), Mean ± SD	28.4 ± 6.2	27.9 ± 5.8	0.512
Gender, n (%)	0.682		
Male	68 (56.7%)	71 (59.2%)	
Female	52 (43.3%)	49 (40.8%)	
Education Level, n (%)	0.741		
High School	35 (29.2%)	38 (31.7%)	
Bachelor's Degree	72 (60.0%)	68 (56.7%)	
Graduate Degree	13 (10.8%)	14 (11.7%)	
Prior Healthcare Experience	22 (18.3%)	25 (20.8%)	0.625
Volunteer Experience (months), Mean ± SD	14.2 ± 4.6	13.8 ± 4.9	0.543

3.3 Intervention

Every subject received a 16-hour standardized first aid training on: basic life support, wound management, immobilizing fractures, shock management, and environmental hazard. The intervention group was also given a mobile app with:

- Interactive video lessons

- Step-by-step instructional procedure guidebooks
- Knowledge assessment quizzes
- Virtual reality simulations
- Skill reminders through push notifications
- Offline availability

The mobile app was specifically developed for this trial by emergency medicine professionals and instructional designers following evidence-based mobile learning best practice (Crompton & Burke, 2018).

3.4 Outcome Measures

Primary Outcomes:

- 1.Retention of knowledge as assessed by a validated 50-item first aid knowledge questionnaire at baseline, immediately post-training, 3 months, and 6 months
- 2.Practical skill performance as assessed by standardized Objective Structured Clinical Examination (OSCE) scenarios

Secondary Outcomes:

- 1.Training satisfaction on a 5-point Likert scale questionnaire
2. First aid skill confidence as self-assessed
3. Rates of use application (intervention group only)

3.5 Analysis

SPSS version 27.0 was used to conduct statistical testing. Independent samples t-tests were used to analyze between-group continuous data. Repeated measures ANOVA analyzed differences between scores over time. Chi-square tests analyzed categorical data. Statistical significance was at $p < 0.05$.

4. Results

4.1 Knowledge Retention Outcomes

Knowledge test scores indicated differences between large groups over time. While both groups had identical scores at immediate post-training, the intervention group had significantly higher scores for 3-month and 6-month follow-ups (Figure 1, Table 2).

Table 2: Mean Knowledge Test Scores Over

Time Point	Intervention Group (n=120) Mean ± SD	Control Group (n=120) Mean ± SD	Mean Difference	p-value
Baseline	42.3 ± 8.6	41.8 ± 8.9	0.5	0.652
Immediately Post-Training	86.4 ± 6.2	85.7 ± 6.8	0.7	0.412
3 Months Post-Training	79.2 ± 7.4	71.3 ± 8.9	7.9	<0.001*
6 Months Post-Training	75.8 ± 8.1	65.4 ± 9.7	10.4	<0.001*

*Statistically significant at $p < 0.05$

Legend: ● = Intervention Group, ○ = Control Group

Repeated measures ANOVA revealed a significant group × time interaction ($F(3,714) = 18.42, p < 0.001$), indicating that the intervention group's knowledge retention pattern differed significantly from the control group.

4.2 Practical Skills Competency

OSCE assessments at 6 months showed superior performance in the intervention group across all evaluated domains (Table 3).

Table 3: OSCE Performance Scores at 6 Months (Maximum Score: 100)

Skill Domain	Intervention Group Mean ± SD	Control Group Mean ± SD	p-value
CPR Performance	84.6 ± 7.3	76.2 ± 9.1	<0.001*
Wound Management	81.3 ± 8.4	74.8 ± 8.9	<0.001*
Fracture Stabilization	78.9 ± 9.2	72.1 ± 10.3	<0.001*
Shock Assessment	82.4 ± 7.8	75.6 ± 9.4	<0.001*
Overall Competency	81.8 ± 6.9	74.7 ± 8.2	<0.001*

*Statistically significant at $p < 0.05$

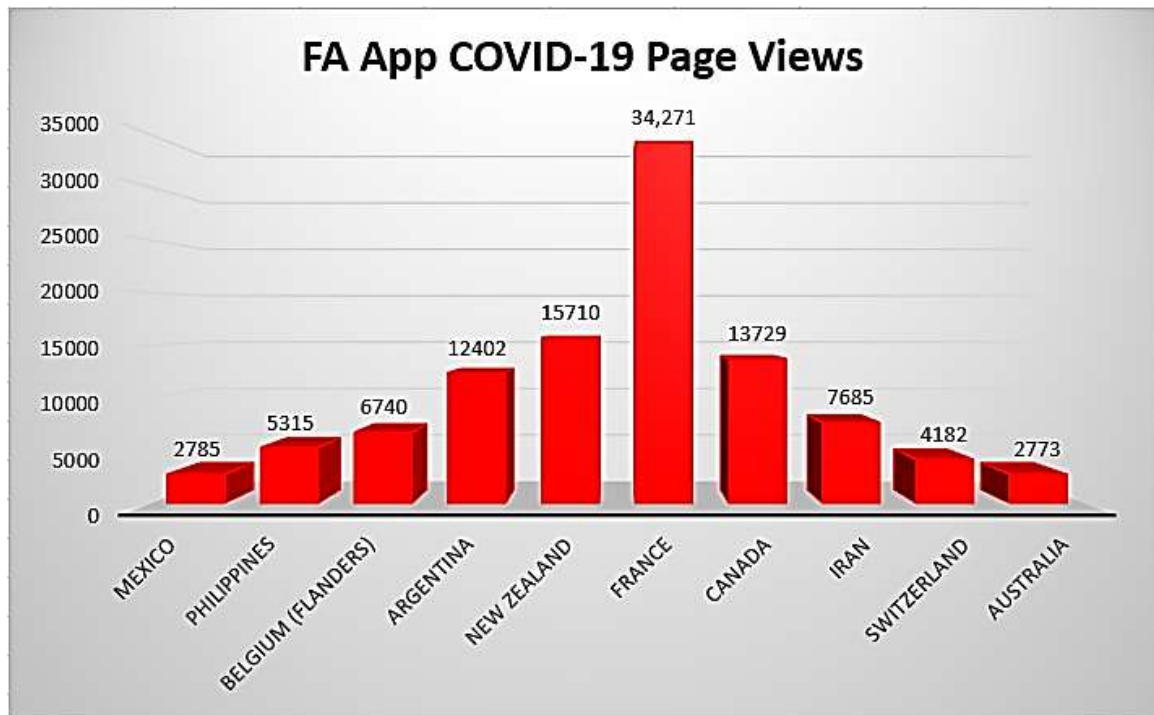


Fig.2: COVID-19 Page Views in Red Cross First Aid App

4.3 Training Satisfaction and Confidence

Participants in the intervention group reported greater training satisfaction (4.6 ± 0.5 vs. 4.1 ± 0.7 , $p < 0.001$) and greater confidence in doing first aid maneuvers (4.5 ± 0.6 vs. 3.9 ± 0.8 , $p < 0.001$).

4.4 Trends in Mobile Application Utilization

For intervention participants, application utilization metrics indicated extensive usage (Table 4).

Table 4: Mobile Application Usage Metrics (6-Month Period)

Metric	Mean \pm SD	Range
Total App Sessions	47.3 ± 18.6	18-92
Average Session Duration (minutes)	12.4 ± 4.2	6-24
Video Views	32.8 ± 12.4	12-68
Quiz Completions	18.6 ± 7.9	6-41
VR Scenario Completions	8.4 ± 3.6	3-18
Weekly Active Users (%)	78.3 ± 12.1	45-95

Correlation analysis showed significant positive relationships between application usage frequency and both knowledge retention ($r = 0.64$, $p < 0.001$) and OSCE performance ($r = 0.58$, $p < 0.001$).



Fig.3:Red Cross First Aid App

5. Discussion

5.1 Principal Findings

This study confirms mobile application integration to significantly enhance first aid training performance by Red Crescent volunteers. The intervention group retained knowledge and skills competency better six months post-training compared to using conventional training alone. This result validates broader evidence for mobile learning in healthcare training (Kyaw et al., 2019; Vaona et al., 2018).

The most significant differences were for the 3-month and 6-month follow-ups, showing mobile apps function particularly well for retention of information over the long term relative to initial learning. This addresses one of the largest issues of first aid training, wherein skill loss typically occurs a few months subsequent to original certification (Beskind et al., 2019).

5.2 Mechanisms of Effectiveness

There are some potential explanations as to why the intervention was successful:

Spaced Repetition: Mobile app push notifications facilitated spaced repetition learning, a research-backed method of long-term retention (Kang, 2016). Volunteers were repeatedly reminded to memorize content, bypassing the forgetting curve.

Multimodal Learning: Interactive videos, textual instructions, and VR simulations engaged more than one modality, catering to different learning styles and enhancing understanding (Mayer, 2021).

Just-in-Time Access: The app provided immediate access to knowledge in real emergencies or simulation training, allowing situated learning and knowledge application (Bujnowska-Fedak & Węgierek, 2020).

Continuous Engagement: High rates of application use indicate ongoing volunteer exposure to training material post-first course completion, providing ongoing learning channels absent in traditional formats.

5.3 Red Crescent Training Program Implications

Implications of the above findings are relevant for humanitarian organizations:

1. **Blended Learning Models:** Combining classroom instruction and mobile applications optimizes learning outcome with the retention of hands-on and social learning aspects essential for first aid training.
2. **Resource Efficiency:** Mobile apps reduce the number of in-class refresher courses, allowing organizations to optimize resource use while ensuring volunteer proficiency.
3. **Scalability:** Phones enable the distribution of training to geographically isolated volunteers, particularly crucial for Red Crescent societies that have operations in distant or rural areas (Al-Shaqsi, 2020).
4. **Continuous Professional Development:** Apps enable continuous learning upon initial certification, enabling volunteer development along the course of their career as a volunteer.

5.4 Comparison with Previous Research

These results contribute to prior mobile app-based evidence for emergency training. Mobile app improvement in CPR skills was also demonstrated by Siebert et al. (2021), and enhanced trauma assessment skills were verified by Zink et al. (2018). This research contributes to this evidence base for humanitarian volunteer organizations specifically, in favor of mobile learning success across a range of settings.

The knowledge retention achievements reported (10.4% improved scores at 6 months) are larger than in some previous studies (Hannola et al., 2021) and could be due to the sharedness of our app layout and volunteer participants' high intrinsic motivation.

5.5 Limitations

Some limitations must be pointed out:

1. **Selection Bias:** Smartphone-owning technically capable volunteers can be unrepresentative for all Red Crescent volunteers and therefore reduce generalizability.

2. Hawthorne Effect: Members in the intervention group could have been conscious of being randomized to an experimental technology and therefore been affected in their activity and performance.
3. Short-Term Follow-Up: Six-month follow-up is possibly too early to know long-term retention; longer studies are needed.
4. Single Application: Results are for app developed specifically for this study; other apps with varying functionality can have varying outcomes.
5. Resource Context: It was conducted in settings with stable internet connectivity; success under resource-limited environments is to be investigated further.

5.6 Future Directions for Research

Future studies must investigate:

- Retention beyond 6 months
- Cost-effectiveness of comparison between mobile apps and conventional training
- Best app features and modes of delivery
- Success in low-resource, unstable connectivity environments
- Integration with augmented reality and sophisticated simulation machinery
- Impact on emergency response performance under realistic conditions simulating real life
- Cross-cultural adjustment to fit various Red Crescent societies across the globe

6. Conclusion

Mobile apps are a key element of Red Crescent volunteer first aid training and are especially valuable for enhancing knowledge retention and skill retention in the practical procedures. The blending of mobile learning with traditional training provides an integrated approach that takes the best aspects of each. As humanitarian adoption of digital innovation increases, mobile apps must be a key component of comprehensive volunteer training courses.

The arguments presented here favor investment in mobile learning technology by Red Crescent societies and other human organizations worldwide. Through enabling continuous learning, better access, and better volunteer skill maintenance over the long term, mobile applications lead directly to the accomplishment of organizational missions and ultimately to better outcomes for crisis-affected populations.

These must be guaranteed to involve alignment of application design with evidence-based teaching practices, sufficient technical support for the volunteers, and inclusion of mobile learning in existing training curricula without interruption. Periodic testing and upgrading of mobile training solutions in line with emerging technologies will allow them to cope with emerging humanitarian volunteer needs and their beneficiaries.

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