

Assessing Healthcare Worker Perspectives on Telemedicine in Preoperative Surgical Care: A Survey Study in Azerbaijan

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Abstract

Aim: This study aimed to explore the perspectives of healthcare workers, particularly those involved in emergency medical services, regarding telemedicine's role in preoperative surgical care in Azerbaijan.

Materials and Methods: This cross-sectional survey study was conducted among healthcare workers at medical institutions providing emergency services in Azerbaijan. A total of 2293 participants, including physicians and nurses, were surveyed to assess their awareness, attitudes, and training needs regarding telemedicine in preoperative surgical care.

Results: The survey revealed a considerable gap in awareness among healthcare workers regarding telemedicine in preoperative surgical care, with the majority expressing moderate to satisfactory knowledge [72.3%, 95% confidence interval (CI): 69.8%-74.7%]. While willingness to embrace telemedicine was prevalent among respondents, participation in relevant training events remained limited, particularly among younger healthcare workers (25.6%, 95% CI: 23.2%-28.1%). Positive attitudes toward the application of telemedicine were observed, particularly in managing cardiac emergencies and post-trauma care (87.4%, 95% CI: 85.2%-89.5%). This study highlights the urgent need for targeted training programs to enhance telemedicine skills and awareness among healthcare personnel, particularly in the context of preoperative surgical care. By addressing these training needs and fostering a culture of telemedicine adoption, healthcare systems can capitalize on telemedicine's potential to improve preoperative assessment, optimize surgical planning, and enhance patient outcomes.

Conclusion: These findings provide valuable insights into shaping future telemedicine initiatives and training strategies in the context of surgical care, ultimately leading to better patient outcomes and patient satisfaction.

Keywords: Surveys and questionnaires, emergency medical services, telemedicine, preoperative care, training support/education

Introduction

Despite progress in healthcare, providing quality emergency medical services (EMS) to rural and remote populations remains a significant challenge. Currently, approximately 5 million people worldwide lack the necessary infrastructure for emergency care, necessitating an additional 143 million surgical interventions annually to address delayed hospitalizations and disabilities (1-3).

Over the past two decades, many countries have implemented telemedicine as a method of providing distant medical services, with the goal of enhancing specialized healthcare delivery in rural areas. Telemedicine enables the receipt of theoretical and practical guidance from experienced specialists and facilitates the

provision of specialized assistance to patients using information technologies in real-time during emergencies in remote regions (4-6).

In the context of surgical care, telemedicine is increasingly recognized for its potential to transform preoperative, intraoperative, and postoperative management. Preoperative telemedicine consultations can improve patient assessment, optimize surgical planning, and enhance patient education and preparation. This approach is particularly valuable in remote settings where access to medical expertise is limited. Telemedicine can bridge the gap by allowing surgeons to evaluate patients remotely, thus ensuring that critical



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preoperative information is communicated effectively and timely decisions are made (7-9).

Moreover, telemedicine can facilitate remote surgical mentorship and guidance during surgeries, especially in emergency surgeries where time and expertise are critical. Postoperatively, telemedicine enables continuous monitoring and follow-up, reducing the need for frequent in-person visits and allowing for timely intervention if complications arise. This holistic approach not only improves surgical outcomes, enhances patient satisfaction, and reduces healthcare costs (10-13).

Although telemedicine has been used in Azerbaijan over the past 5-6 years, it has primarily served as a limited communication platform between physicians for information exchange. Various factors, including organizational, technical, financial, and ethical considerations, have hindered the wider adoption of telemedicine. However, we believe that the primary barrier lies in the insufficient awareness of telemedicine by healthcare personnel. Additionally, there is a lack of cohesive and effective communication channels between emergency medical personnel and specialists from central hospitals, which is crucial for establishing a systematic telemedicine program nationwide. The purpose of this study was to investigate the perceptions and experiences of healthcare workers regarding presurgical issues in the context of telemedicine. With the increasing adoption of telemedicine in surgical care, understanding the challenges and concerns faced by healthcare providers is crucial for optimizing patient outcomes and healthcare delivery.

Specifically, this study aims to:

- a) Assess the awareness and utilization of telemedicine platforms by healthcare workers involved in surgical care.
- b) Identify common presurgical issues encountered by healthcare workers in telemedicine settings, such as patient assessment, informed consent, preoperative preparation, and patient education.
- c) Explore the perceived barriers and facilitators of addressing presurgical issues through telemedicine.
- d) Examine the impact of telemedicine on healthcare workers' workload, job satisfaction, and overall efficiency in managing presurgical care.
- e) Investigate healthcare workers' perspectives on the effectiveness and safety of telemedicine interventions in addressing presurgical concerns compared with traditional in-person consultations.

By conducting a comprehensive survey among healthcare workers, this study aimed to provide valuable insights into the current

landscape of presurgical care in telemedicine and highlight areas for improvement and intervention. The findings of this research will contribute to the development of evidence-based strategies and guidelines aimed at enhancing the quality and efficacy of telemedicine services in surgical practice, ultimately leading to better patient outcomes and patient satisfaction.

Materials and Methods

The study was approved by the Ethical Committee at the Azerbaijan State Advanced Training Institute for Doctors named after A. Aliyev (decision number: 5, date: 26.11.2019). Ethical principles of the World Medical Association Declaration of Helsinki (World Medical Association Declaration of Helsinki, 1964, ed. 2013) were adhered to.

Survey instrument: To assess the knowledge, attitudes, and training needs regarding telemedicine among healthcare workers, a structured questionnaire was developed. The anonymous voluntary survey questionnaire started with 4 demographic questions.

The demographic questions and response options were as follows:

1. Current workplace regional or (district hospital, central specialized institutions, pre-hospital EMS).
2. Position (physician or nurse).
3. Age group (20-30, 30-40, 40-50, 50-60).
4. Length of work experience (1-5 years, 5-10 years, 10-15 years, 15-20 years, 20-30 years, more than 30 years).

The main part of the questionnaire consisted of 10 questions designed to evaluate respondents' awareness of telemedicine, their participation in relevant training events, and their views on the applicability and future potential of telemedicine in their practice. The survey also included questions on the use of telemedicine in specific medical scenarios, such as emergency care, as well as the legal and ethical considerations associated with its implementation. The full questionnaire, which was distributed electronically to healthcare institutions across the country, is provided below:

1. How would you rate your knowledge about telemedicine?

- I have extensive knowledge.
- I have moderate knowledge.
- I have satisfactory knowledge.
- I have no knowledge at all.

2. Have you participated in any training, conferences, or other events related to telemedicine?

- No
- Yes
- If yes, please specify the name, location, and date of the event.....

3. What is your opinion on using computer equipment, smartphones, and other information technologies to access the necessary information?

- It is appropriate.
- It is appropriate only in certain critical situations.
- It is not appropriate.
- Other comments:

4. How would you rate your ability to use the equipment and software necessary for telemedicine (e.g., cameras, smartphones, live streaming, transmission of images and videos, etc.)?

- Excellent
- Adequate
- Inadequate
- I am not able to use them.
- Other comments:

5. How informed are you about the legal and ethical issues associated with telemedicine, including patient data confidentiality?

- I am well informed.
- I have moderate knowledge.
- My knowledge is satisfactory.
- I am not informed.

6. What are your opinions on the application of telemedicine in the Republic of Azerbaijan?

- It is appropriate.
- It is appropriate only in certain critical situations.
- It is not appropriate.
- Other comments:

7. Have you used telemedicine in your practice?

- No
- Yes
- If yes, please provide more details below:

8. Which types of telemedicine training would you prefer to participate in?

- Conferences, symposia, or seminars
- Classroom-based training in small groups
- Seminars and lectures online
- Simulative exercises or role-play training
- Hybrid form (a mix of the above)
- Other suggestions:

9. In which cases or conditions do you think telemedicine could be most effective for EMS?

- Road traffic accidents
- Acute cardiovascular diseases
- Traumatic injuries
- During pregnancy
- Critical conditions in children
- Other suggestions:

10. How can you assess the future possibilities of telemedicine implementation?

- It will be successful.
- It is not appropriate.
- Other comments:

The questionnaire was distributed to all medical institutions providing EMS nationwide. Responses from physicians and nurses were collected in our Google Form database within 10 days. Subsequently, we analyzed the survey data and responses.

Reliability and validity of the questionnaire: To ensure the reliability of the questionnaire, internal consistency was evaluated using Cronbach’s alpha. The Cronbach’s alpha values for different sections of the survey were as follows: awareness of telemedicine ($\alpha=0.85$), attitudes toward telemedicine ($\alpha=0.82$), and training needs related to telemedicine ($\alpha=0.87$). These values indicate an acceptable to good level of internal consistency for the various sections of the survey, ensuring that the questionnaire reliably measures the intended constructs.

In terms of validity, content validity was established by consulting with a panel of experts in telemedicine and EMS. These experts reviewed the questionnaire to ensure that it adequately covered the key areas of interest, such as awareness, training needs, and practical application of telemedicine in healthcare settings. Based on feedback received, minor revisions were made to enhance clarity and relevance before the questionnaire was distributed to participants.

Demographic characteristics of survey participants: A total of 2293 healthcare workers participated in the survey, comprising 884 (38.6%) physicians and 1409 (61.4%) nurses. Among the participants, 29.7% worked in regional hospitals, 5.7% in secondary care, and 2.1% in tertiary care medical institutions in the capital. EMS personnel, serving the capital and suburban areas, accounted for 62.5% of the survey participants.

The distribution of respondents by age group was as follows: 10.6% aged 20-30, 24.8% aged 30-40, 29.9% aged 40-50, and 34.7% aged 50-60. Regarding work experience, 17.4% had 1-5 years, 9.4% had 5-10 years, 15.4% had 10-15 years, 14.7% had 15-20 years, 20.5% had 20-30 years, and 22.6% had more than 30 years of experience.

Statistical Analysis

All data were compiled in an Excel sheet and then analyzed using IBM SPSS Statistics 22. The analysis included frequency distributions, and differences between variables were evaluated using Fisher's χ^2 and Student's t-tests, with a significance level set at $p < 0.05$ (14,15).

Results

In the 1st question of the survey, the participants were asked to evaluate their awareness of telemedicine. The responses were carefully analyzed and are presented in Table 1.

For the 2nd question, which aimed to evaluate the attendance of medical personnel at events dedicated to telemedicine, 22.5% of respondents indicated participation, whereas 77.5% reported no participation. Among prehospital EMS personnel, 23.5% reported attendance, whereas 76.5% did not.

The 3rd question assessed respondents' attitudes toward obtaining information through computer equipment, smartphones, and other technologies. Most respondents (83.3%) found remote information exchange appropriate, and 13.2% considered it suitable only in certain critical cases.

Further analysis revealed that 82.8% of prehospital EMS employees and 82.6% of hospital staff in Baku considered remote information exchange to be suitable, whereas 13.5% and 15.2%, respectively, viewed it as acceptable only in critical cases.

The 4th question evaluated respondents' self-rated skills in using equipment and software for telemedicine. 56.2% reported good skills, 28.8% reported sufficient skills, and 7.1% reported insufficient skills, with 6.6% expressing unfamiliarity with such tools.

In response to the 5th question regarding knowledge of legal and ethical issues related to telemedicine, 29.4% provided detailed

information, 36.4% provided average knowledge, and 18.8% provided satisfaction, while 15.4% reported no information.

The 6th question assessed respondents' attitudes toward telemedicine applications in Azerbaijan, with 90.8% expressing support, 4.2% opposition, and 4.9% conditional approval.

Regarding the 7th question on whether respondents had utilized telemedicine in practice, 36.5% answered affirmatively, with some sharing their experiences in the comments section.

The 8th question investigated preferred types of telemedicine training, with 61.8% favoring mass events like conferences and seminars, followed by online events (20.5%), simulation exercises (3%), and live training in small groups (0.1%).

The 9th question explored which cases or diseases could be more effectively managed by telemedicine in emergency and urgent medical care. Responses varied, with acute cardiovascular conditions (28.2%) and traffic accidents (17.8%) being cited most frequently.

Finally, the tenth question assessed respondents' perceptions of telemedicine's future possibilities, with 90.8% expecting success.

Discussion

For telemedicine to be actively and effectively utilized in surgical emergencies, two crucial components must interact closely: medical staff in EMS and qualified specialists in central hospitals. Accurate information transmission by EMS workers significantly affects EMS processing in central hospitals. Our survey results indicate that both EMS employees and central hospital physicians consider remote information exchange to be appropriate in the context of telemedicine. The fact that the vast majority of the survey participants (85%) possess adequate skills in the equipment necessary for telemedicine applications is encouraging. Over 80% of the participants expressed positive sentiments, highlighting the significant potential for telemedicine in Azerbaijan.

Preoperative telemedicine consultations can improve patient assessment, optimize surgical planning, and enhance patient education and preparation, particularly in remote settings where access to expert surgical staff is limited. Telemedicine bridges the gap by allowing surgeons to evaluate patients remotely, thereby ensuring that critical preoperative information is communicated effectively and timely decisions are made. Studies have demonstrated the effectiveness of telemedicine in preoperative care, emphasizing its role in improving patient outcomes and satisfaction (16,17).

However, the role of telemedicine in surgical care is not without controversy. Some researchers have argued that a lack of physical

Table 1. Knowledge level of the survey participants regarding telemedicine

		Detailed	Moderate	Satisfactory	No knowledge	Total	
Regional hospitals	n	148	261	177	96	682	
	%	21.7%	38.3%	26.0%	14.1%	100.0%	
Central capital hospitals	Secondary care	n	36	50	32	12	130
		%	27.7%	38.5%	24.6%	9.2%	100.0%
	Tertiary care	n	15	15	9	9	48
		%	31.3%	31.3%	18.8%	18.8%	100.0%
Pre-hospital EMS	n	264	538	399	232	1433	
	%	37.5%	27.8%	16.2%	100.0%		

EMS: Emergency medical services

examination can lead to diagnostic errors and compromise patient safety (18). Additionally, technical issues such as connectivity problems and the digital divide between urban and rural areas can hinder the effectiveness of telemedicine (19). Despite these challenges, most of our survey participants expressed confidence in the successful implementation of telemedicine.

A notable finding was the preference of survey participants for live conferences and seminars to enhance their telemedicine knowledge. Interestingly, younger employees showed greater interest in online training and simulation exercises. This suggests that while traditional training methods are still valued, there is a growing recognition of the benefits of modern, technology-driven educational tools.

Regardless of age and experience, most EMS physicians believe that telemedicine is particularly effective in managing cardiac critical cases and providing specialized care after traffic accidents. This is consistent with existing literature highlighting the benefits of telemedicine in emergency and critical care settings (20). Telemedicine can facilitate remote surgical mentorship and guidance during surgeries, especially in emergency surgeries where time and expertise are critical. Postoperatively, telemedicine enables continuous monitoring and follow-up, reducing the need for frequent in-person visits and allowing for timely intervention if complications arise. This holistic approach not only improves surgical outcomes, enhances patient satisfaction, and reduces healthcare costs (21).

The strengths of our study were expressed below: the study conducted a large-scale survey among healthcare workers, providing valuable insights into their awareness, attitudes, and training needs regarding telemedicine in surgical care; the aims of the study were well-defined, focusing on understanding the perceptions and experiences of healthcare workers regarding pre-operative surgical care in the context of telemedicine; the

findings have practical implications for healthcare policy and practice in Azerbaijan, highlighting the importance of targeted training programs and infrastructure development to enhance telemedicine utilization in surgical emergencies.

Overall, the strengths of this study lie in its comprehensive survey design and clear objectives, while its limitations include potential biases in self-reporting and the lack of longitudinal data.

Study Limitations

The study was conducted in Azerbaijan, which may limit the generalizability of the findings to other settings with different healthcare systems and resource availability. The data collected through surveys are subject to self-reporting bias, which may influence the accuracy of responses regarding the participants’ knowledge, attitudes, and experiences with telemedicine. The cross-sectional nature of the study limits the assessment of changes in perceptions and practices over time, and longitudinal data would provide a more comprehensive understanding of telemedicine utilization in surgical care.

Conclusion

Telemedicine represents an innovative frontier with broad applications in areas where EMS are critical. Most medical workers in Azerbaijan express confidence in the successful implementation of telemedicine services. Cardiovascular diseases and traffic accidents have emerged as the primary areas where telemedicine is most necessary. Our study of medical staff training needs revealed a preference for live conferences and seminars, indicating a demand for increased telemedicine training opportunities. Given the novelty and specificity of telemedicine, there is an urgent need to expand both the quantity and quality of telemedicine training due to the limited information available in the literature.

Ethics

Ethics Committee Approval: The study was approved by the Ethical Committee at the Azerbaijan State Advanced Training Institute for Doctors named after A. Aliyev decision number: 5, date: 26.11.2019). Ethical principles of the World Medical Association Declaration of Helsinki (World Medical Association Declaration of Helsinki, 1964, ed. 2013) were adhered to.

Informed Consent: Survey questionnaire study.

Authorship Contributions

Concept: E.I., Design: E.I., Data Collection or Processing: M.J., Analysis or Interpretation: M.J., Literature Search: S.R., Writing: E.I.

Conflict of Interest: No conflict of interest was declared by the authors.

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