Healthcare in transition in the Republic of Armenia: A longitudinal mixed-method study of emergency medical systems

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Original Research

Abstract

Background Acute life-threatening illness such as trauma, myocardial infarction, and stroke depend on timely recognition and treatment. There is a shift in interest by international agencies and funders in recent years towards the development of emergency care systems (EMS) in low and middle-income countries. Armenia, ex-Soviet Republic in transition since independence in 1991, has made remarkable progress but the healthcare sector, emergency systems development and education have lagged behind the overall development of the nation.

Methods This manuscript describes a mixed method study used to derive a comprehensive picture of the state of EMS in Armenia. The quantitative component consists of a survey administered at three intervals over a 5-year period in 2005, 2009 and 2010 to gauge issues with the emergency medical system (EMS). A qualitative assessment of EMS was also performed using focus groups discussion and in-depth interviews.

Results The quantitative questionnaire showed a positive trend in trust placed in EMS via the results of two questions "the ambulance team will respond in a timely manner", and "the ambulance dispatcher will not request payment for services before deciding to respond to the call" (p = 0.04). These positive changes led to a statistically significant systematic increase in the percent of people who will decide to wait for the ambulance rather than to take the patient directly to the hospital in a medical emergency (p = 0.01). In-depth interviews and focus group discussions identified issues with training, timeliness of care and shortages of medications and equipment.

Conclusion Nations and communities rely on emergency medical systems to care for conditions that require timely and skilled interventions. There are vital problems with emergency medical systems in Armenia related to both confidence in emergency systems from the public and physicians especially related to timeliness of care provided, training, equipment and medications. Emergency care systems development provides a comprehensive way to efficiently address multiple critical conditions. Armenia benefits from an organized emergency system as well as from the Franco-German model of care with physicians deployed in the field. An investment in training as well as critical medications and updated equipment will be key to improvement in services.

Background

Emergency systems as efficient system for treatment of acute conditions

Acute life-threatening illness such as trauma, myocardial infarction, and stroke depend on timely recognition and treatment. (1) There has been a shift in interest by international agencies and funders in recent years towards the development of emergency care systems (EMS) and research to address the swelling numbers of those with cardiovascular and non-communicable diseases in low and middle-income countries. (2-4)

Around the world emergency medicine (EM) is in various stages of development ranging from rudimentary care to hospital-based stabilization. (5, 6) The development of EMS is an efficient way to provide care for many acute conditions such as trauma, myocardial infarction and arrest, and stroke which very time-dependent.(7) Many of the links in this chain of survival need strengthening and have been neglected in the current schema of priorities and funding.(8, 9) Efforts to strengthen EM focus on the chain of survival especially the first links in the chain, public education and EMS activation and treatment. (10)

Emergency Medical Systems in Armenia

Armenia is a former Soviet Republic, located in the Caucuses, which gained independence in 1991.

Figure 1: Republic of Armenia (11)

Armenia is classified by the World Bank as has a middle-income country(12) and has a high burden of cardiovascular and non-communicable disease. Armenia has an existing Franco-German model (stay and stabilize) of EMS where physicians treat patients on scene or in their homes. Because they are physicians and not paramedics, they are not protocol driven and can make complex clinical diagnoses and decisions. (13)

In the capital city of Yerevan, EMS is provided by the Yerevan Municipal Ambulance Service (YMAS). (14) The YMAS receives approximately 600 calls per day. About twenty five percent of the calls are transferred to a hospital for definitive care. (15) There is a nation-wide emergency number 1-03 to call for ambulance services. With the exception of two private hospitals, there is little hospital-based emergency care in the country. There is no post-graduate emergency medicine training program or specialty of emergency medicine. (16-18) This has resulted in a mismatch between training and the physicians staffing the ambulance system.

Current Data on Emergency Systems in the Republic of Armenia

The YMAS and the regional ambulance services, police and hospitals collect data on patients seen, fatalities and injuries but there is no overarching organization or examination of this data. This data is important to direct quality assurance and improvement efforts. (19-22)

Although there is a paucity of official data and analysis, we would like to share data collected in three time frames from the years 2005-2010. This data was collected as part of a larger survey but is relevant to share and discuss in the framework of this manuscript. All data was collected in the capital city of Yerevan. Emergency care outside the capital is further fragmented.

Methods

Telephone Survey of the General Population

A comprehensive survey of 380 participants with cross-sectional analytical study design was administered to evaluate awareness and practice of the general population about cardiopulmonary resuscitation (CPR) in (2005) and traffic safety (2009 and 2010) in Yerevan, the capital city of Armenia. A subset of questions was asked concerning provision of emergency medical services. Those questions are the subject of this discussion and are amenable to separate examination in this context. The same set of questions was asked in all three surveys.

Sampling Strategy

In order to obtain a representative sample for one million inhabitants of Yerevan with a confidence interval of 95%, we calculated a sample size of 384 for the study survey. A random digit telephone survey was used to collect the data from the general population. The six-digit telephone numbers were generated randomly using a computerized program that used valid interchanges for fixed lines in the city of Yerevan.

Survey Instrument

We developed an interviewer administered questionnaire that included questions regarding knowledge, and attitude of the general population towards behavior during emergency situations, availability and adequacy of Emergency Medical Services in Yerevan, as well as socio-demographic characteristics of the study participants. The questions were part of larger studiesd examining knowledge of CPR and traffic safety. The questionnaire was developed in English and then translated into Armenian. It was pilot tested and revised accordingly.

Ethical Considerations

The study was granted an exemption by the Yale School of Medicine HIC and was approved by the IRB at the American University of Armenia. Administration of the survey was contingent on initial oral consent. A verbal script was developed to provide participants with information including the project description, and assurance of confidentiality. They were also informed regarding the risks and benefits of participation.

Data Collection and Analyses

We administered a random digit dial fixed-line telephone survey of households in Yerevan in 2005, 2009 and 2010. Any responder over the age of 18 who answered the telephone call was eligible to participate in the survey. If the initial telephone responder was under 18, the interviewer asked to speak with the next available person over 18 in the house at that time. All 11 districts of Yerevan were sampled. The calls were placed at varying times of the day, seven days a week. This strategy allowed us to reach a representative sample and aimed to avoid a selection bias. In this way we hoped to include those who work at home and those who work outside the home as well as between male and female responders, assuming that males spend more of their time outside the home.

In the 2005 (October/November 2005) cohort we had 390 respondents that were consented and participated. In the 2009 survey (April 2009) of 2137 numbers dialed, 436 persons were reached and 390 agreed to participate and in the third follow-up survey (May/June 2010) out of 1972 numbers dialed, 407 persons were reached and 390 agreed to participate. The response rates were 99%, 90% and 96%, respectively.

Data was entered and analyzed using SPSS 16 and Stata/IC 10 statistical software packages. Basic descriptive analysis were carried out for the data. We also performed a trend analysis for a group of questions related to attitude of the general population toward emergency medical services in Yerevan to check if there were any trends observed over time between 2005, 2009, and 2010.

Quantitative Questionnaire Ambulance Staff Physicians

A comprehensive written survey of all 181 ambulance staff physicians was administered to evaluate perceptions of regarding emergency services in 2005 in Yerevan, the capital city of Armenia. This survey was only administered once.

Sampling Strategy

We distributed a written questionnaire to all 181 ambulance staff physicians via the chiefs of the substations. The questionnaire was returned anonymously in a sealed envelope to the chief of the

substation who collected all the questionnaires and delivered them to the central station at a weekly meeting.

Survey Instrument

We developed a self-administered questionnaire that included questions regarding perception of emergency services of the study participants. The questions were a subset in a larger survey about cardiopulmonary resuscitation (CPR). The questionnaire was developed in English and then translated into Armenian. It was pilot tested and revised accordingly.

Ethical Considerations

The study was granted an exemption by the Yale School of Medicine HIC and was approved by the IRB at the American University of Armenia. Administration of the survey was contingent on initial oral consent. A verbal script was developed to provide participants with information including the project description, and assurance of confidentiality. They were also informed regarding the risks and benefits of participation.

Data Collection and Analyses

Questionnaires were administered to all physicians at all ambulance substations in Yerevan and collated. This strategy allowed us to survey the majority of those who were working on the ambulances at the time. The response rate was 99%. Data was entered and analyzed using SPSS 16 and Stata/IC 10 statistical software packages. Basic descriptive and logistic analysis including means, frequencies, odd ratios, standard deviations, Chi-Square and associations were carried out for the data.

Qualitative study: In-depth interviews and focus group discussion

Study Design

Considering that quantitative assessments alone provide an incomplete picture of the quality of healthcare services and do not fully address underlying factors influencing quality, we developed and

implemented a qualitative study using focus group discussions and semi-structured in-depth interviews to understand and describe the state and evolution of emergency care in Armenia.

Study Participants

Key informants were identified using purposive and convenient sampling methods to provide pertinent information for the assessment, based on key informants' experience and expertise in EMS services. Four groups of participants took part in the qualitative study: (1) cardiologists who provide care for acute myocardial infarction and other acute conditions, (2) health specialists from the emergency service stations, (3) medical students, and (4) high school students. Twenty-two key informants (12 females and 10 males) participated in three focus group discussions (FGDs) supplementing the one on one in-depth interviews (IGIs).

Research Instrument

The guide for semi-structured in-depth interview and focus group discussion guide was developed based on conventional qualitative research methods. The guides were first developed in English and then translated into Armenian. The questions in each guide were adapted to each specific participant's roles, responsibilities and professional experience in the areas associated with EMS.

Data Collection and Analysis

We performed the qualitative assessment during September-October 2005. The mean duration of the focus group discussions was 50 minutes and the mean duration of in-depth interviews was 45 minutes. All focus group discussions and in-depth interviews were transcribed. For analysis we used standard research techniques of heterogeneity and triangulation[2323] utilizing conventional inductive content analysis techniques. The analysis section of this study was based on the results from judgments and experiences derived from the in-depth interviews and focus group discussions. Study participants were categorized into four groups: cardiologists, general practitioners, medical students, and high-school students.

Ethical Considerations

The study was granted an exemption by the Yale School of Medicine human investigation committee (HIC) and was approved by the institutional review board (IRB) at the American University of Armenia. Administration of the survey was contingent on initial oral consent. A verbal script was developed to

provide participants with information including the project description, and assurance of confidentiality. Participants were also informed regarding the risks and benefits of participation. All participants were informed that their participation was voluntary, and that their confidentiality was fully respected. Audio-recording was undertaken only with permission of all participants. If a participant did not want to be audio-recorded, only written notes were taken. Participants were allowed to withdraw from the interview at any time.

Results

Please see Figure 2 in the Figures section of the preprint.

Statistically significant difference, p ≤ 0.05

Figure 2: General population attitude towards EMS in Yerevan, Armenia from 2005 to 2010

Thirty percent (30%) of ambulance staff doctors believe that in a true emergency it is smarter to drive to the hospital than to call an ambulance. Ninety nine (99%) percent said they would treat patients regardless of their ability to pay for services. Forty seven (47%) percent of ambulance staff physicians believe there are serious problems with the current emergency medical system. Twenty (20%) percent of ambulance doctors indicated that they have recently been in situations where they lacked proper equipment or medications to respond to a situation and only 50% believe they have adequate resources to deal with any emergency.

Discussion

General population attitude toward emergency situations and EMS performance in Yerevan: Time trend analysis for years 2005, 2009, and 2010

The trend analysis for six attitude questions toward Emergency Medical Services in Yerevan was conducted for the period of October 2005 - June 2010 to identify trends in the attitude of the general population over a five-year period. There was a pattern of positive change in belief of the general

population that "in a case of need the ambulance team will respond in a timely manner: and statistically significant positive increase in the belief "that the ambulance dispatcher will not request payment for services before deciding to respond to the call" (p=0.04). These positive changes led to a highly statistically significant systematic increase in the percent of people who in a medical emergency will decide to wait for the ambulance rather than to take the patient directly to the hospital (p=0.01) (Figure 4).

However, people were less likely to call the ambulance in 2010 than in 2005 when their family member (p=0.002) or a stranger (p=0.05) had a serious medical emergency. The trend in the percentage of people who were confident that the ambulance team would treat them "even if they could pay for services" increased from 53% to 59% in 2005- 2009 and then declined to 50% in 2010. The changes were not statistically significant in any of these trends over time (p>0.05).

In summary, over the three survey periods there was a trend towards increased trust in the EMS system. The idea that the ambulance will respond in a timely manner and not request payment before accepting the call (p=0.04) gained traction. Increased trust in EMS means more people will wait for the ambulance than drive the patient to the hospital themselves (p=0.01), a key factor for prompt care.

The concerns highlighted by the general public appear to be echoed in the physician survey. Although it is reassuring that the physicians intend to treat patients regardless of their ability to pay, it stands stark in contrast to belief of the general public that they will be asked to pay up front (50%). In addition, thirty three percent of ambulance staff physicians believe that patients are better off to drive themselves to the hospital. There appear to be significant barriers to trust in the system by both doctors and patients. Forty seven percent of physicians expressed serious concerns regarding the emergency services that they and their colleagues are providing. In addition, serious deficits in equipment and medications further deepen their concern. These barriers can delay or hamper treatment and offer an opportunity for improvement in both public education and continuing medical education for physicians in the ambulance system.

Discussion of themes

EMS organization and structure

In-depth interviews and focus group discussions conducted in 2005 as part of a needs-assessment yielded interesting themes. The comments were transcribed and analyzed manually for thematic saturation. Physicians working in emergency medical services who participated in the study also relayed the history and organization of the ambulance system and the training center in Yerevan. Some relayed the advantage of the current system, namely emphasizing that the presence of a medical doctor in an ambulance team is a rare practice for other countries and is an advantage for the Armenian population. The quotes that follow are taken from focus group discussions (FGDs) and in-depth interviews (IDIs).

*After independence, in 1993 on the basis of the Department of Emergency Services, we established the Educational-Methodological Center. From 1993 to 1995 we trained 36 specialists and formed 12 brigades. Each of these brigades involved a doctor, a nurse, and a driver. They learned how to work in team and effectively divide responsibilities. At that time, in the Educational-Methodological Center we also organized training of people without medical background – policemen, firemen, etc. Overall 7000 people were trained in CPR techniques. (*General practitioner, FGD)

The idea and organization of our ambulance service system is very good. Having a general practitioner in regular brigade and a cardiologist in cardio brigade is a big advantage for the quality of services provided to our population. Other countries also understand these advantages but cannot practice the same thing because ambulatory visits of doctors are very expensive there, while our professionals work for a little salary. (Cardiologist, IDI)

Barriers to the work of emergency medical services

Among different technical barriers for the effective work of the ambulance services in Armenia as one the most crucial, the study participants indicated the delays in ambulance arrivals to patients. They associated this problem mostly with the state ambulance services, proving its ineffectiveness by the lack of incentives for the doctors as it was until recently a free of charge service for the population of Armenia. They believed that though the private ambulance services are more expensive, in emergency situations it is safer to call a private ambulance, because they respond quickly.

*It happened to our neighbors… it was a heart attack. When they called ambulance, doctors arrived after a long time and even being late they moved up to the stairs very slowly, like nothing happened. (*High-school student, FGD)

*Our neighbors once called the ambulance for some heart problem and they arrived very fast. They told that delay in couple minutes might be fatal for that man… The cars of private [paid] ambulance services are usually on time, because they receive money for that. You cannot say the same thing about the state ambulance or regional services. (*Medical student, FGD)

Other rationales given by the study participants for the lateness of the ambulance arrivals were the bad technical conditions of state ambulance cars and bad physical conditions of roads leading to slow driving and the lack of rules for other drivers to give way to ambulances.

Ambulances are in a very bad condition and they move very slowly, so in the most of times they are too late to help patient. (High-school student, FGD)

Other drivers do not understand that on the streets they should give advantage to the ambulance cars keeping left-driving-side free. It had happened many times when drivers of the ambulance get into accidents on the streets. (Medical student, FGD)

The study participants also specified inadequate organization of emergency services as another reason for the late ambulance arrivals. However, participants from the emergency medical services explained the same problem by the insufficiency of specialized cardio brigades available in the state services. Though professionals believed that population caused by emotional and stressful conditions tend to exaggerate the problem of delays, they tried to understand also the feelings of patients' relatives.

Usually, the first ambulance brigades that come to the patient are not cardiologists. After confirming that the patient needs a specialized care, they call for the special cardio brigade. And we start waiting for the second brigade... we were waiting 45 min, while the ambulance center is located pretty close to our home, you can get there for about 15 min walk. (High-school student, FGD)

The delays are happening when we have difficulties in finding a free ambulance brigade. I mean sometimes all cardio brigades (they not many) are busy in the moment of call and it takes certain time to forward the brigade from one address to another. (General practitioner, FGD)

You know, it is difficult for patient's relatives wait even for a few minutes. They count every minute as an hour. Thus sometimes they think it took too long for emergency brigade to arrive.... But we should understand people too, because if it concerns cases of cardiac arrests then during those official 30 minutes patient could die 5 times. (General practitioner, FGD)

Medication and equipment

All study participants agreed that the quality and the quantity of medication and equipment in the state emergency medical services are insufficient in Armenia and incomparable to other countries with the developed emergency services. Many participants, despite indicated problems, were optimistic about current and further gradual improvements, while others were more critical about existing problems and preferred radical changes.

Medication and equipment are insufficient in [emergency medical] *services in Armenia. In the Europe they* [ambulance team] *have adequate drugs in necessary amount and the ambulance car is equipped up to date, thus doctors are able to resuscitate the patient immediately, on the way to the hospital. (*High-school student, FGD)

Without doubt, looking back on previous years we have had improvement not only in the quantity of medication, but also in its quality and variation. However, the quality of equipment is a problem not only for our [Yerevan] *services, but also for the whole Republic. The main obstacle is financing. (*General practitioner, FGD)

This is the area [emergency medical services] *where we cannot be excused because we live in not developed enough country. The life of people in the first place and condition that assure safe life should be adequate for anybody. Thus we need to have better drugs and equipment. (*General practitioner, FGD)

Professional qualifications and service reimbursement

Some study participants highlighted deficient qualifications of the medical staff as a barrier for the effective work of the state emergency medical services. They reported that the knowledge of the medical personnel is out of date, especially those in regions. There were concerns that this shortage of knowledge might be crucial for the lives of patients. However, other participants, comparing public and private services, believed that it is more matter of financial incentives, low level of technical support and insufficient medications rather than inadequate qualifications of specialists.

In the state emergency services, the qualification of doctors is poor. I am not saying for everyone, 10% might be very qualified professionals, but in general, we should aspire to have a better state of emergency service. It is very sad, but the qualification of the doctors who work in the regions is even worse. They

*simply do not know what to prescribe for the patient, who has anaphylactic shock. (*Medical student, FGD)

*If the medical doctor would be paid accordingly to his qualifications and time as well as supported by adequate medication and equipment the result would not be disappointing. We can see that by comparing Erebuni Medical Center [private] ambulance system with the state ambulance. (*Cardiologist, FGD)

Recommendations and Conclusions

The post-Soviet transition has largely been a crisis of prioritization especially in the healthcare sector. In the process, emergency care has remained underdeveloped. Emergency care systems development is important on many levels; to boost other health programs in place such as cardiac, stroke and trauma care, to mitigate risks to the Armenian population and for disaster planning including mass casualty events and even war. The understanding of current challenges to emergency medical services developed by examining qualitative in-depth and focus group discussions combined with the quantitative surveys administered to the public and the ambulance physicians has revealed several areas in need of improvement. Themes that have emerged highlight a distrust from the public about financial motivations, speed of care, as well as insufficient training. On the physician side there are grave concerns about equipment, medications and most importantly their own training, preparedness, and on-going education. It is vital that data driven strategies combined with a comprehensive plan to retrain the workforce take the forefront in the next stage of development.

Declarations

Ambulance Service, JSC and the countless doctors, and medical students who took the time to answer our survey and interviews so thoughtfully.

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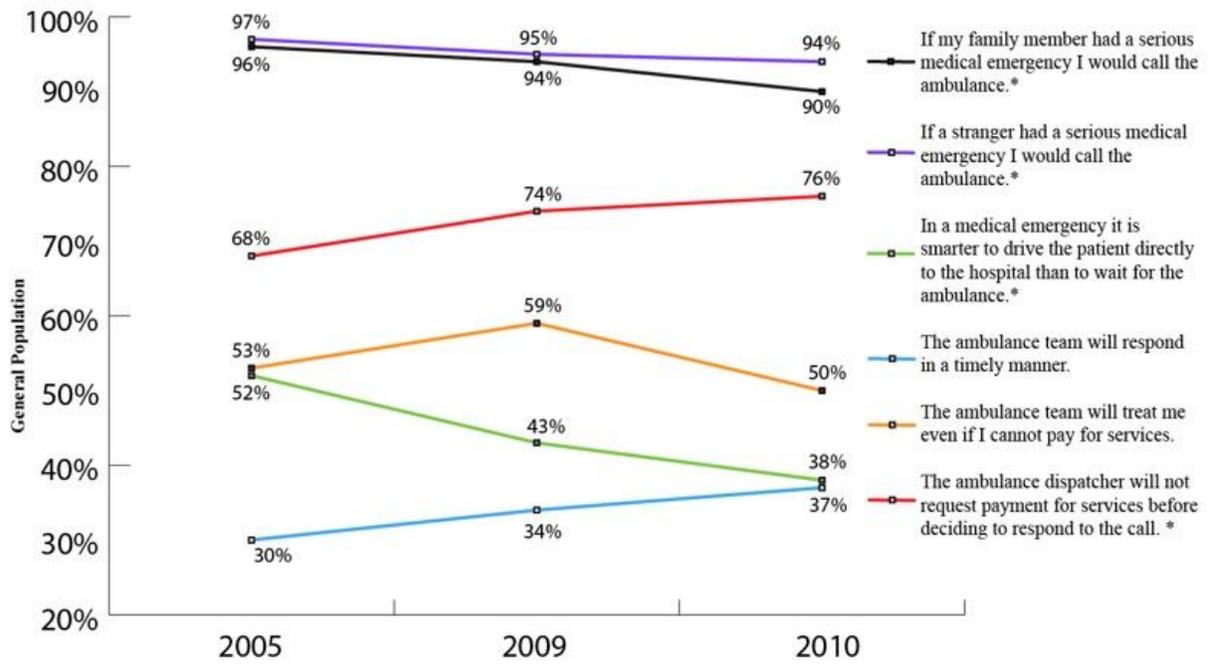
Figures

Figure 1

Republic of Armenia

Figure 2

General population attitude towards EMS in Yerevan, Armenia from 2005 to 2010