

State of emergency medicine in Azerbaijan

Harsh Sule · Shirin Kazimov · Oktay Shahmaliyev · Adam Sirois

Received: 14 January 2008 / Accepted: 7 February 2008 / Published online: 13 March 2008
© Springer-Verlag London Ltd 2008

Abstract

Background There has been no previous study into the state of emergency medicine in Azerbaijan. As a legacy of the Soviet Semashko system, the “specialty” model of emergency medicine and integrated emergency departments do not exist here. Instead, pre-hospital emergency care is delivered by ambulance physicians and in-hospital care by individual departments, often in specialty hospitals. Emergency care is therefore fragmented, highly specialized and inefficient.

Aims The Emergency Medicine Development Initiative (EMDI) of the International Medical Corps (IMC) was designed to improve the quality of emergency care in four pilot regional centers in Azerbaijan. The objective of this study was to assess the baseline emergency medical capacity of these four centers.

Methods EMDI staff conducted a four-part baseline survey in April 2006 to assess emergency care in Ganja (the second largest city in Azerbaijan), Kurdamir, Shamkir and Yevlakh. Data collection involved interviews with relevant personnel and a retrospective records review in each city.

Results *Pre-hospital:* The number of ambulance teams per 10,000 inhabitants is below the number required by local regulations. On average, 45% of 27 medications and 37% of 17 pieces of critical equipment were available. Of the emergency procedures, 21% could be performed in the pre-hospital setting. *In-hospital:* Admission rates were near 100% for the admissions department—an area that is

supposed to function as an emergency department would. On average 57% of 40 medications and 42% of 22 pieces of critical equipment were available. Of the emergency procedures, 62% could be performed in the in-hospital setting.

Conclusions The emergency medical system surveyed in Azerbaijan is inefficiently organized, under-financed, poorly equipped and lacks adequately trained staff. Reforms need to be directed towards achieving international standards, while adapting new models for service delivery into the existing framework and improving system capacity as highlighted by this baseline assessment.

Keywords Azerbaijan · Soviet Union · Semashko · Baseline assessment · Emergency department · Emergency medicine · Ambulance physician

Introduction

The health-care system in Azerbaijan (Fig. 1) is a legacy of Soviet times. Based on the Semashko system that was implemented in the Soviet Union, the goal was to ensure universal access to health care through a centrally organized system. While the Soviet health system promised wide coverage to all patients in all areas of the country, with an emphasis on free care based on strong governmental support, the system did not produce innovations in care and gradually fell behind its counterparts around the world.¹

Today in Azerbaijan, the structure of the health-care system is essentially unchanged since Soviet times. Access to primary care is provided via multiple facilities, including

Disclaimer: The views expressed in this paper are those of the author (s) and not those of the editors, editorial board or publisher.

H. Sule (✉) · S. Kazimov · O. Shahmaliyev · A. Sirois
International Medical Corps,
18 U. Hajibeyov St., Apt. 86-93,
Baku, AZ 1000, Azerbaijan
e-mail: hsule@alumni.northwestern.edu

¹ Health Care Systems in Transition: Azerbaijan. European Observatory on Health System and Policies, 2004.



Fig. 1 Map of Azerbaijan and neighbouring countries, population 8,120,247 (July 2007 est), main language spoken Azerbaijani. Map and information from Central Intelligence Agency World Factbook. (<https://www.cia.gov/library/publications/the-world-factbook/geos/aj.html>)

small health stations known as feldsher-accoucher points (staffed by feldshers-mid-level health-care providers who focus on primary health care in rural areas not staffed by physicians and accouchers-similar to midwives who assist with pregnancy/childbirth-related issues), doctor ambulatory clinics and larger polyclinics (multi-profile outpatient facilities). Pre-hospital emergency care is provided by ambulances that are always staffed by a physician and operate under the philosophy that you “bring the hospital to the patient”. In-hospital emergency care is provided in multi-specialty hospitals directly by specialists in specialty wards or in larger cities by dedicated specialty hospitals. The concept of an in-hospital, integrated emergency department (ED) does not exist in practice. In theory, the admissions department should function, at least physically, as an emergency department, but even these departments are characterized by specialist-driven care and not by the presence of a comprehensive emergency medicine specialist. In most hospitals emergency patients simply proceed to the specialty department of their choice (cardiology, surgery, orthopaedics, etc.) bypassing the admissions department, thereby reducing it to simply a patient registration/paperwork department.

While the Ministry of Health owns, manages and sets national standards for the hospitals, funding for health-care facilities comes from the Ministry of Finance via the local district executive committee.¹ Unfortunately, the delivery of

health care was initially further compromised by significant economic challenges post-independence. However, despite one of the world’s highest per capita gross domestic product (GDP) growth rates², the health-care system continues to be fragmented, compartmentalized, highly specialized and inefficient. Due to low physician salaries, the use of illegal/informal payments by patients in attempts to secure care from a system that lacked adequate funding and resources was prevalent in the Soviet Union³, and this continues to be prevalent in Azerbaijan today¹.

It is in this environment that the Ministry of Health of Azerbaijan has started working with inter-governmental organizations, such as the World Bank and various non-governmental organizations, to reform health care. The Emergency Medicine Development Initiative (EMDI) is one such project that provides technical assistance to the Government of Azerbaijan in a collaborative effort to reform and strengthen the delivery of pre-hospital and in-hospital emergency medical services within the broad parameters of the country’s health-care system. The project is implemented by a consortium of organizations led by International Medical Corps, in cooperation with the Johns Hopkins University and the United States’ Centers for Disease Control and Prevention (CDC). The program was financed through a public-private partnership known as the Global Development Alliance, supported by the United States Agency for International Development (USAID) with matching funds from BP and its partners in the Azeri-Chirag-Gunashli, Baku-Tbilisi-Ceyhan and South Caucasus Pipeline projects, Hess, and Chevron. The Project is funded for a period of 2.5 years starting 19 September 2005.

Specifically, the project was intended to improve the quality, effectiveness and efficiency of both the pre-hospital and in-hospital components of emergency care in its four pilot regions (selected based on their proximity to the Baku-Tbilisi-Ceyhan pipeline and the major highway in Azerbaijan) and related hospitals: the Central District Hospitals in Kurdamir, Shamkir and Yevlakh, and Emergency Hospital Number Three in Ganja. A multi-faceted approach was developed and included, renovation of the physical plant, provision and installation of modern medical equipment, training in evidence-based emergency medicine (EM) and improved ED clinical and management tools.

² International Monetary Fund Public Information Notice (PIN) no. 07/59: Executive Board Concludes the 2007 Article IV Consultation with the Republic of Azerbaijan. 30 May 2007. Available via <http://www.imf.org/external/np/sec/pn/2007/pn0759.htm>. Accessed on 10 January 2008.

³ Mihalyi P. Post-Socialist Health Systems in Transition: Czech Republic, Hungary and Poland. Central European University, Dept. of Economics, 2000. Available via http://www.ceu.hu/econ/economic/health_ceuw.pdf. Accessed on 26 July 2007.

Table 1 List of pre-hospital emergency equipment, procedures and medications surveyed

Equipment	Procedures	Medications	
12-lead ECG apparatus	Anterior nasal packing	Adenosine	Epinephrine
Bag valve mask	Basic CPR	Albuterol	Furosemide
Cervical collar	Cardioversion	Amiodarone	Heparin
Combi-tube	Cricothyroidotomy	Analgesics-NSAID	Isoproterenol
Defibrillator	Defibrillation	Analgesics-opioid	Isotonic solution
Dressing supplies	ECG	Antibiotics-IV	Lidocaine
Endotracheal tubes	External cardiac pacing	Aspirin	Magnesium
Laryngeal mask airway	Foley catheterization	Atropine	Naloxone
Laryngoscope	Glucose testing	Beta-blocker	Nitrates-IV
Oral airways	Intubation	Calcium channel blocker	Nitrates-oral
Oxygen cylinder with mask	Joint reduction	Calcium chloride	Procainamide
Small surgery kit	Naso-gastric tube placement	Dextrose 50%	Sodium bicarbonate
Sphygmomanometer	Needle thoracostomy	Diazepam	Steroids
Splints	Nerve block	Dopamine	
Stethoscope	Pericardiocentesis		
Suction unit	Splint application		
Ventilator	X-ray		

ECG, electrocardiogram; CPR, cardiopulmonary resuscitation; NSAID, non-steroidal anti-inflammatory; IV, intravenous

Prior to commencing any reform efforts it was important to conduct a thorough baseline assessment of the emergency care system in these pilot areas. This would not only allow for targeted and effective implementation, but would also allow EMDI to accurately assess progress throughout the course of and at the end of the project. With this in mind a detailed baseline assessment survey was developed and administered to define the existing capacity for emergency medical care in the four pilot areas. This report presents the results of this baseline assessment.

Methods

Survey design

The goals of the survey were two-fold:

- To accurately determine the needs and develop strategies for the improvement of emergency care by assessing baseline demographics and capabilities in the pilot regions.
- To identify key indicators that will be useful to track outcomes pertaining to EMDI's performance.

The pilot areas are defined as the three districts/regions of Kurdamir, Shamkir and Yevlakh and the city of Ganja. The structure of health-care services in Ganja is different since administratively it is a city, as opposed to Kurdamir, Shamkir and Yevlakh, which are districts. The pilot hospitals are the Central District Hospitals in Kurdamir, Shamkir and Yevlakh, and Emergency Hospital Number Three in Ganja.

Survey tools

The EMDI team developed and translated into Azerbaijani a four-part assessment tool comprising the following modules:

- District/Regional Hospital Emergency Medical Assessment–Part I
- District/Regional Hospital Emergency Medical Assessment–Part II
- District/Regional Ambulance Emergency Medical Assessment–Parts III & IV

Development of this tool was based on knowledge of local infrastructure, lists of procedures and equipment deemed vital to emergency medical care by EMDI's technical consultants from the Johns Hopkins University and the University of Illinois at Chicago, and assistance from local health authorities. The procedure list was based on the 2003 Society of Academic Emergency Medicine's Model of Clinical Practice of Emergency Medicine.⁴

Tables 1 and 2 represent the emergency equipment, procedures and medications surveyed.

Survey team

The survey team was comprised of EMDI staff members, with non-native Azerbaijani/Russian speakers paired with appropriate interpreters for the purpose of data collection.

⁴ Society of Emergency Medicine. 2003 Model of the Clinical Practice of Emergency Medicine-Appendix 1: Procedures and Skills Integral to the Practice of Emergency Medicine. Available via http://www.abem.org/public/_Rainbow/Documents/2005%20Model%20-%20Final.pdf. Accessed on 10 January 2008.

Table 2 List of in-hospital emergency equipment, procedures and medications surveyed

Equipment	Procedures	Medications
Bag-valve mask manual ventilator	Abdominal paracentesis	<i>Analgesia</i>
Blood pressure monitor	Anterior nasal packing	NSAID, IV <i>IV therapy</i>
Cardio-respiratory monitors	Arthrocentesis	NSAID, oral
Defibrillator	Blood transfusion	Opioid, IV
Electrical back-up generator	Burr holes	Opioid, oral
Fire extinguisher	Cardiac pacing	<i>Cardiac</i>
Glucometer	Cardioversion	Adenosine
Intravenous flow pump	Central venous access	Amiodarone
Laryngoscope	Craniotomy	Aspirin
Mechanical respiratory ventilator	Cricothyroidotomy	Atropine
	Defibrillation	Beta-blocker
	ECG	Calcium chloride
	Emergency ultrasound	Calcium channel blocker
	Foley catheterization	Dopamine
	Glucose testing	Epinephrine (1:1,000 or 1:10,000)
	Intracranial pressure monitoring	Furosemide
	Respiratory support (CPAP, BiPAP)	Ringers lactate
	Slit lamp exam	Steroids
	Splint application	<i>Anesthesia</i>
	Suprapubic catheter	Diazepam
	Thoracocentesis	Etomidate
	Thoracostomy	Ketamine
	Thoracotomy	Propofol
	Thrombolysis	Succinylcholine
	Tonometry	Vecuronium
		<i>Nebulizers</i>
		Albuterol
		Ipratropium bromide
		Procainamide

ECG, electrocardiogram; CPR, cardiopulmonary resuscitation; NSAID, non-steroidal anti-inflammatory; IV, intravenous; CPAP, continuous positive airway pressure; BiPAP, bi-level positive airway pressure

Table 3 Ambulance teams per 10,000 inhabitants

	Ganja	Kurdamir	Shamkir	Yevlakh
Number of ambulance teams per 10,000 inhabitants	0.68	0.10	0.26	0.27

Timeline

The survey was conducted in April 2006. However, the data gathered were with respect to the period beginning 1 January 2005 and ending 31 December 2005.

Data collection

Archived data were collected for the four pilot hospitals, and when relevant, for the entire city or district. This was done directly from records in individual departments of hospitals, central statistics departments of hospitals, local health departments and individual ambulance stations. Repeat visits were necessary in some cases to obtain all available data.

Quality control

The quality of records related to demographics is poor throughout Azerbaijan. Within hospitals, while certain paperwork is filed with the statistics department, individual departments keep separate hand-written logbooks. Unfortunately, discrepancies were present between similar data as reported by the statistics department and individual departments. Attempts were made to ascertain the most accurate data through individual conversations. Additionally, due to the informal payment system that exists in Azerbaijan, there is no assurance that all patients visiting a health-care facility are registered. This is a significant limitation and is impossible to overcome in a retrospective survey such as this.

Data processing and analysis

Data were initially transcribed by hand on the survey tools. This was then entered into Microsoft Excel, and relevant data analysis was performed within this program.

Table 4 Standards of pre-hospital care

	Ganja	Kurdamir	Shamkir	Yevlakh
Critical care equipment	47%	24%	41%	35%
Emergency procedures	24%	12%	35%	12%
Medications	59%	30%	48%	41%

Table 5 Hospital admission rate by inpatient department

	Ganja	Kurdamir	Shamkir	Yevlakh
Admissions	n/a	100%	100%	89%
Traumatology (orthopaedics)	70%	25%	17%	84%
Reanimation (critical care)	103%*	n/a	100%	100%
Therapeutics (internal medicine)	n/a	1%	3%	81%
Surgery	n/a	9%	57%	84%
Gynecology	n/a	2%	38%	76%
Hospital-wide average	n/a	2%	46%	63%

*Likely documentation error in the department
n/a, not available (due to inadequate record-keeping in the department)

Results

Pre-hospital care

Table 3 represents the number of ambulance teams per 10,000 inhabitants. Per local regulations the target in Azerbaijan is 1 per 10,000.

Table 4 represents the percentage of pre-hospital equipment, procedures and medications that are actually available on the ambulances. Some of the equipment reported as being available, such as EKG machines/monitors and stethoscopes, are actually privately owned by the physician working on that ambulance.

In-hospital care

Table 5 demonstrates the admission rate at each of the four hospitals. Unfortunately, due to poor record-keeping the information for most departments at Ganja's Emergency Hospital Number Three was not available and similarly for the Reanimation Department in Yevlakh.

The inpatient acuity rate reported in Table 6 is calculated as a percentage of all admissions that are admitted to a critical care unit.

Table 7 represents the percentage of in-hospital critical care equipment, emergency procedures and medications that are available in the entire hospital. The entire hospital was surveyed for this section since no dedicated emergency department exists.

Table 6 Inpatient acuity rate

	Ganja	Kurdamir	Shamkir	Yevlakh
Percentage of patients admitted to critical care	7.21%	1.24%	3.74%	0.49%

Table 7 In-hospital emergency care standards

	Ganja	Kurdamir	Shamkir	Yevlakh
Critical care equipment	41%	36%	59%	32%
Emergency procedures	69%	56%	72%	50%
Medications	63%	63%	40%	60%

Discussion

The findings of this baseline assessment performed by IMC are disconcerting and demonstrate a lack of emergency medical capacity not only in disaster situations, but also in routine emergency cases. Most hospitals cannot provide an adequate response if multiple critical patients present simultaneously. Additionally, most life-threatening situations cannot be treated adequately due to a lack of critical equipment and medications, and inadequate training of medical personnel in evidence-based emergency medicine.

Pre-hospital emergency care It is difficult to generalize population needs in terms of ambulances since terrain and distance must be taken into account too. In Azerbaijan, in accordance with local regulations, there should be one ambulance team per 10,000 inhabitants (similar to US averages). While there are over 10 ambulances in each of the pilot districts and Ganja, there is a significant shortage of physicians who can work on these ambulances. Even Ganja, which is the second largest city in the country, does not achieve this goal. Regarding the availability of critical care/emergency equipment, the results while variable were consistently under 50 percent, with basic equipment such as defibrillators, laryngoscopes, suction units and cervical collars unavailable. Similarly, only a small number of life-saving procedures could be performed in the pre-hospital setting, with an even fewer number of emergency medications being available. As a result of this, physicians are forced to purchase equipment and medications privately, and then consider charging patients informally for their use. Between this and the inadequate training of pre-hospital personnel, patients/families do not perceive any benefit to calling an ambulance in case of an emergency (the study also recorded that a significant minority of emergency visits to hospitals are via ambulance). This lack of confidence in the pre-hospital system translates to patients/families often transporting themselves to the hospital even in critical situations.

In-hospital emergency care While it is challenging to assess in-hospital emergency care thoroughly in the absence of a systematic manner in which the emergency patient is managed, the results of this assessment are significant. First, the admissions departments that in theory are

supposed to function as emergency departments admit almost 100% of patients seen. This corroborates the experience on the ground, which is that these departments are not actively involved in patient care, rather are merely registration/paperwork departments. Also, the relatively low acuity rates raise the question whether patients are being admitted to a lower level of care than necessary. Additional information on patient outcomes by department would be useful to investigate this further. Finally, several life-saving medications such as vasopressor drips and antibiotics are not available or are in severely short supply, thereby forcing patients/families to purchase these medications independently. Since counterfeit medications are a significant problem in Azerbaijan, this potentially puts the patient at risk. The fact that there are inadequate supplies and inadequately trained personnel in some of the largest hospitals outside the capital city of Baku is concerning.

Economic disruptions following the collapse of the Soviet Union, war and its associated refugees and internally displaced persons, as well as political changes have placed significant pressures on the health system in Azerbaijan. Specifically, due to poor staffing and training, lack of equipment and medications, and the absence of adequate administrative and clinical protocols, it is impossible for the current health-care systems in the four pilot sites of Ganja, Kurdamir, Yevlakh and Shamkir to take care of the emergency medical care needs of their population. Even more disconcerting is the fact that even though Azerbaijan is a country that is prone to natural disasters and is a country that has recently been at war, the medical capacity to mount a response to any crisis is inadequate. While the philosophy may be that you “bring the hospital to the patient”, the reality on the ground is that neither the hospital nor the ambulance is adequately equipped to provide quality emergency medical care.

The need for improvement of the medical infrastructure and clinical capabilities in Azerbaijan is tremendous. However, on the positive side, the country has access to significant resources so that with the political will and with appropriate planning the quality of health care in Azerbaijan can rapidly be raised to international standards. Several international organizations, including USAID, the World Bank and IMC, are providing invaluable resources in the form of capacity building and technical support. The Ministry of Health has also begun to undertake health reform that addresses the need for good primary care, health finance reform, rehabilitation of infrastructure and improved emergency care. Through the Emergency Medicine Development Initiative, IMC and its partners in the Global Development Alliance hope to assist the Government of Azerbaijan in its efforts to introduce international standards

for emergency care and thereby improve the health of the people of Azerbaijan.

Funding

The work of this project was funded by the Global Development Alliance—a consortium of the United States Agency for International Development, BP and its partners in the ACG/BTC/SCP pipeline projects, Chevron and Hess—and implemented by International Medical Corps. The authors declare that they have no conflict of interest or

disclosures. Furthermore, the views and data expressed in this report are the sole responsibility of the authors and do not represent the views of IMC, USAID, BP and its partners in the ACG/BTC/SCP pipeline projects, Chevron or Hess.

Acknowledgements The authors would like to thank Dr. Chayan Dey and Dr. Thomas Kirsch, technical consultants from the Johns Hopkins University to the project, Dr. Robert Furno from the University of Illinois at Chicago, the Ministry of Health of Azerbaijan and regional health authorities in the pilot districts of Ganja, Kurdamir, Shamkir and Yevlakh for their assistance with this baseline assessment.