



Hospitals in War

Emergency Medical Care During the First Three Months of the Siege of Sarajevo

Nedim Jaganjac, MD, MPH †

At the onset of the 1992-1995 siege of Sarajevo, the newly formed Republic of Bosnia and Herzegovina had neither an army nor a military medical system. The absence of such institutions forced Sarajevo's civilian medical system to assume a military character in order to cope with the large number of civilian and, later, military casualties. Direct military attacks on civilian medical personnel and units, coupled with wartime shortages, prompted further changes in the organization of emergency medical care. During the first three months of the conflict, Sarajevo's Institute for Emergency Medicine responded to an increased patient load and to newly hazardous working conditions by altering its procedures for selecting staff for ambulance runs, by altering procedures for transporting critically ill patients to inpatient facilities, and, ultimately, by decentralizing its operations. [M&GS 1999;6:36-45]

The 1992-1995 war in the former Yugoslavia provides a dramatic example of new trends in warfare where civilians and civilian infrastructure are the primary targets in the context of urban siege. When civilians are targeted in besieged cities, the civilian medical infrastructure has to adapt in order to respond not only to a high number of casualties, but also to a stressful and violent social environment in which the delivery of medical care itself

becomes a dangerous undertaking. The overburdened military medical service cannot effectively cope with civilian casualties in such circumstances; therefore civilian institutions must necessarily shift to a more military paradigm with regard to medical doctrine and service delivery.

This paper describes the historical events that led to the reorganization of the emergency medical service (EMS) in Sarajevo, with the hope that those responsible for the organization of medical services in other conflict-prone urban areas might benefit from the experience of Sarajevo EMS staff members. With early warning and foresight, EMS for civilians in similar situations may be reorganized quickly without risking the lives of medical staff and without wasting precious resources.

At the onset of the crisis the victims of the siege turned to the Institute for Emergency Medicine (IEM) for help, but the Institute's ability to respond was curtailed by

†At the time of publication NJ was Health Specialist at the World Bank in Bosnia, planning health care reconstruction in Bosnia Herzegovina. During the period described in this article, he was a physician in the Institute of Emergency Medicine in Sarajevo.

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shortages of supplies and the divisive character of the conflict.

The IEM was forced to change its operating procedures and organizational structure in order to respond to the crisis[1]. For example:

- the selection of crews for ambulance runs was made, for the first time, with regard to two factors: the ethnicity of the medical staff and drivers and the level of fear of IEM personnel;
- the transfer of patients from IEM premises to the hospital was delayed until nightfall and routes were varied because of proximity to the front line and because of military attacks on medical units;
- work schedules were altered;
- eventually, in order to minimize the need for transporting patients and staff through the front lines, IEM's operations were decentralized to the neighborhood level.

Decentralization of the emergency service was completed by the beginning of June 1992, three months after the beginning of the siege.

Centralized organization of EMS, while uncommon in the US, provides an effective peacetime means of delivering emergency medical care in some countries, and was the established system in Sarajevo prior to the conflict. Once it became clear that the existing EMS system was unable to function in this crisis, two main options for reorganizing medical services in Sarajevo were considered:

1) Placing all medical services under military command for the duration of the war. Although such a step might be justified in some situations, it was not possible in Sarajevo, where military medical institutions were barely functional at the beginning of the war. Taking over the entire organization of medical resources, including more than 7,000 employees, for an estimated 380,000 citizens in Sarajevo would have overwhelmed the newly established military medical service, which, in any case, was primarily responsible for taking care of military casualties and for providing basic medical support to the army.

2) Requiring that the civilian medical service adapt to the war situation by decentralizing services and by modelling them on the kinds of emergency medical services provided by military medical units in wartime. This is the option that was ultimately adopted.

These options were not analyzed deliberately by EMS staff at the beginning of the war; rather they represented a necessary and

spontaneous response by EMS personnel to provide medical help to patients, regardless of whether they were civilians or combatants. The decentralization of EMS was a necessity for two reasons:

1) Patients and victims of unpredictable shelling and sniping had to be reached quickly, since the first moments after injury are critical for survival and delayed treatment of bleeding and shock greatly lessen the chances for survival.

2) Medical staff who were targeted often became victims themselves as they tried to help wounded patients.

While decentralized organization of civilian EMS services in besieged cities should be considered when medical personnel and civilians are targeted, it is difficult to expect that decentralization could begin before the conflict itself, as not all conflicts are easily predicted and meaningful preparation for war is often not possible. Decentralization in Sarajevo took place only after the conflict began, after the expiration of many other options and, unfortunately, after many casualties had already occurred among EMS staff. Nonetheless, an understanding of how the EMS crisis evolved in Sarajevo—and how local health professionals adapted to that crisis—may provide lessons for others caught up in the kinds of complex humanitarian emergencies that are becoming more frequent as we approach the 21st century.

Background

The war in the former Yugoslavia during the early to mid-1990s exemplified many of the most disturbing trends in late 20th century warfare. Despite the prohibitions codified in the 1949 Geneva Conventions and 1977 Additional Protocols, civilian populations were specifically targeted by military forces, as were hospitals, clinics, and ambulances [2]. Civilian casualties outnumbered military casualties by a large margin throughout Bosnia and in parts of Croatia [3], and were especially acute in the city of Sarajevo, the capital of the Republic of Bosnia



The ambulance in which one IEM physician was killed. Bullet holes are visible above the passenger side windshiled wiper. Photo by J. G. Schaller, MD

and Herzegovina.

Sarajevo was under siege by Bosnian Serb forces for more than three years, from 1992-1995. The hilltops above the city were occupied by Bosnian Serb artillery and the buildings in several neighborhoods were occupied by Bosnian Serb snipers. Bosnia and Herzegovina had only existed as an entity for a little more than a month before the siege began and had no army or military forces of its own. All military installations in Sarajevo, including military hospitals, were affiliated with the besieging force, the Yugoslav National Army (JNA). Hence all of the targets attacked by the Bosnian Serbs within Sarajevo were illegal civilian targets.

The Institute for Emergency Medicine Prior to the War

Like most other socialist countries in Central Europe, Bosnia and Herzegovina had a well developed health care system[4] and good health care was considered a priority by both the health care authorities and the government. Before the dissolution of Yugoslavia, the IEM was a sub-unit of the Yugoslav national health system. Its fourfold mandate was to provide direct emergency medical service to the population of Sarajevo, estimated at 521,000 in 1991[5]; to train medical personnel in emergency medicine; to provide special rescue units throughout the country; and to conduct scientific investigations in the field of emergency medicine.

The IEM was, prior to the war, Sarajevo's principal source of emergency medical care (at the beginning of the conflict there were no NGOs or relief organizations in the city). IEM medical staff, with the support of the government through its disaster agencies and military medical authorities, provided all emergency medical services (EMS) to the citizens. The IEM operated the city's ambulance service and operated the clinic at which patients, brought in by ambulance or private vehicle, could be evaluated, stabilized, and either treated or, in case of major trauma or illness requiring hospitalization, transferred to one of the teaching hospitals associated with the medical school at the University of Sarajevo.

The IEM was located in the center of Sarajevo, approximately three kilometers from Kosevo Hospital, the University of Sarajevo's principal medical-surgical teaching facility. Two satellite locations served as base stations in remote parts of the city. Practically any part of the city could be reached within fifteen minutes. The IEM had home visit units, emergency rescue teams, and specialized transport and "walk-in" facilities.

In the prewar period the IEM maintained a staff of 186, including specialists in

emergency medicine and internal medicine, pediatricians, nurses, laboratory and x-ray technicians, mechanics, drivers, and administrative and support staff (at the beginning of the conflict, however, 41 staff members abandoned the IEM and some drivers took their ambulances with them). During the day shifts, other health centers and hospitals from the city provided staff for the surgical, dental, and gynecological departments. The ethnicity of personnel was not taken into account when scheduling staff or deploying ambulance crews prior to the war. In fact, many IEM employees were unaware of their coworkers ethnic affiliations [6].

Work was organized in five shifts, with nine teams ready to go into the field at all times. Two teams were usually sufficient for home visits but at times almost all the teams had to be mobilized.

In Sarajevo, as in any other city in the former Yugoslavia, emergency medical services could be reached from any phone by dialing "94." Nine phones were reserved for "94" calls. An additional number 611-111 was installed in order to help chronically ill patients get advice over the phone. Incoming calls were received in the main dispatcher's room. The dispatcher, an experienced physician, received incoming calls and assessed their priority and urgency. Two special lines connected the IEM with police and helicopter services. The entire IEM building was connected by voice-controlled intercoms.

The dispatcher communicated with mobile teams using VHF radio equipment. All vehicles were equipped with a VHF communication system with 12 operating channels. The central VHF repeater was located on top of the neighboring mountain, at an altitude of 1,677 meters. VHF equipment was also installed at the main hospital and in the trauma ward. All communications, including VHF, telephone, and intercom communications, were recorded 24 hours a day on special recording equipment. Tapes with recorded communications were stored for 30 days and could be replayed. Exact times and dates were automatically registered and displayed. This system helped to ensure a high level of efficiency.

The Institute was also well equipped with different types of specialized medical transport vehicles. Sarajevo, with highly developed tertiary health care, was the main medical referral center for the whole republic. Still, some specific medical conditions required subspecialty treatment elsewhere in the former Yugoslavia and abroad. IEM staff were trained for medical rescue operations in the field. Most of its physicians and nurses were members of helicopter rescue teams that served a geographical area in the range of 200

km around Sarajevo. Helicopters were also used for specialized medical transport. Theoretically helicopters were available at all times and could be in the air with a rescue team within 30 minutes, although the delay was probably closer to one hour in reality. The IEM also had more than 40 specialized ambulances and field vehicles. A garage located in the basement was well equipped and was able to maintain and service vehicles.

Walk-in facilities had five emergency-triage rooms fully equipped for resuscitation, examination, and treatment of patients. Those facilities were connected with emergency laboratories, the x-ray unit, and the observation room. There was no operating theater, but a small surgical room was equipped for minor surgical interventions.

War Begins in Sarajevo

On April 6th, 1992, just a day after the declaration of independence of Bosnia and Herzegovina, everything seemed normal at the IEM.

• At 10:15 a.m. the dispatcher got a call from Jarcedoli, a small neighborhood located on the hilly outskirts of Sarajevo. The caller said that two men had been wounded by troops associated with the JNA. The dispatcher initially believed that he had misheard the caller, and asked him to repeat the story. But the line was cut, ending the call.

• A few minutes later a professor of plastic surgery from Kosevo Hospital, the main hospital in Sarajevo, called from his apartment asking the dispatcher to help him get to the hospital by ambulance. He explained that the street where he lived was under sniper fire and that he could not safely leave his apartment to go to the hospital where, as he was informed by his staff, many injured patients had arrived.

• At 10:30 a.m. another call came in from Jarcedoli: two men were reported to have been shot in their houses by troops associated with the JNA. The dispatcher decided to send two teams with two ambulances to Jarcedoli. As this was a very unusual incident, the dispatcher decided to brief the shift chief. For safety reasons, the shift chief decided to replace one of the team members with another staff member in order to have ethnically mixed teams.

• At 10:35 a.m., as the ambulances were on their way to Jarcedoli, the driver who had been sent to transport the professor of plastic surgery called the surgical hospital by radio and requested that the surgical team there be ready because the professor had been hit in the neck by a sniper's bullet while entering the ambulance.

• At the same time Serbian snipers at the Holiday Inn hotel and at neighboring

apartments opened fire on demonstrators gathered in front of the parliament. At least one person was killed and several were injured. The dispatcher was not informed about this incident and, therefore, did not send out any of the mobile teams. Some of the demonstrators were medical professionals. They helped the wounded and arranged for their transport. They considered it more efficient to help the injured directly rather than search for a telephone and wait for an ambulance to come through the crowded square. Some demonstrators started running after the Serbian extremists who had opened fire into the crowd, but they were stopped by machine gun fire.

• At 10:55 a.m. two ambulances arrived at the scene in Jarcedoli and stopped in front of the last house on a narrow dead end street. Suddenly, heavy artillery fire and anti-aircraft machine-gun fire opened on the ambulances. Both teams alerted the dispatcher that they had been shot at and that they would try to hide in a nearby basement. Together with 40 to 50 civilian residents of the village, the teams found shelter in the basement of one house. The phone lines were cut and only the radios in the ambulances were available for communication. All exits from the house were covered by constant sniper fire. One team leader, however, managed several times to reach one of the vehicles and to inform the dispatcher of the current situation. On one trip back to the shelter he was shot at, fell, and injured his knee. EMS teams and villagers remained trapped in the cellar. They decided to wait for nightfall before trying to escape through the forest back to the city. In the meantime, the dispatcher informed the director and the chief of shift about this event. Local radio and television informed the public of this event and of the position of the two teams that were shot at Jarcedoli.

At this early stage of the conflict the warring factions had no clear idea how the situation would develop. All sides wanted to make a public show of their good will, partly because of the presence of a European Community (EC) monitoring mission. A team led by the Minister of the Interior, the Chief of the EC monitoring mission, and a JNA colonel who was in command of the medical battalion in Sarajevo, were escorted by Bosnian government police forces into Jarcedoli at around 10:30 p.m. All the civilians and the two teams from the IEM were rescued. The two injured men, for whom medical intervention had initially been requested, died because they could not be reached.

At 10:55 a.m. heavy artillery fire and anti-aircraft machine-gun fire opened on two ambulances that had gone to the scene of a sniper attack in Jarcedoli.

Holes in wall of this Sarajevo building indicate sniper positions as seen from the "sniper alley."

Photo by N. Jaganjac



Those incidents clearly foretold the nature of the upcoming conflict. Shooting at demonstrators who requested peace, preventing medical professionals from helping the wounded, and shooting at medical personnel on several occasions on the first day of the war indicated that human rights and the Geneva Conventions would not be respected in this conflict. Terror was created among the Sarajevo population by targeting civilians and vital city institutions such as hospitals, ambulances, and apartment buildings [7].

The War Gains Intensity

During the first few weeks of the war an increasing number of patients were reported shot at and injured. The main problems for the IEM were moving through the city, reaching the patients, transporting chronically ill patients such as those in need of dialysis, and transporting IEM staff to and from the work. Twelve-hour shifts were changed to 24-hour shifts in order to minimize risk.

The majority of people in Sarajevo were still unaware that war had begun and they continued going to work. Many had the impression that this conflict was just temporary and that in few days it would stop. Local media reports, including a message from the Bosnian president on local television, were confusing. There was almost no international media presence in Sarajevo at that time.

By the beginning of May 1992, JNA and Serbian paramilitary attacks on the civilian population had intensified. Random shelling and sniper fire were causing many casualties. Snipers were shooting at people in the streets. Children and the elderly were often shot in the legs. Injured children would attract adults, giving the snipers additional targets. Usually after firing a few shots, a sniper would hide and stay quiet for some time, even for a few days. Often snipers were shooting from their apartments and it was almost impossible to determine the direction from which the gunfire was coming and where to find shelter.

Ambulances and medical workers were

targeted as well. Maternity and pediatric hospitals were shelled and destroyed and patients and personnel were forced to move to the main hospital [8].

Most of the wounds and injuries, however, came from attacks by 64-, 82-, and 120-mm mortars [9]. Tracer bullets set fire to apartment buildings and created panic in the city. Tank shells and heavy artillery were used less frequently, primarily against well protected targets. Unpredictable, random mortar attacks killed and injured people everywhere in the city. Though there was almost no safe place in the city and the street was an extremely dangerous place to be, lack of electricity, heat, water, and food forced people to emerge from their basements in search of necessities.

Access to the hospital become extremely difficult. City transport was often interrupted and health workers and ambulatory patients gathered at the IEM in increasing numbers, seeking transport to the hospital. The IEM organized an ambulance "pick up" service for staff going to work.

In April, May, and June 1992, the IEM attended to more than 3,000 patients with gunshot, shrapnel, and other war-related wounds. On a single day, the 8th of June, 186 civilians with war-related wounds were transported to the hospital.

A City Cut Off From Itself

The main JNA military barracks were located near the main street, eventually known as "sniper alley," which connected the central part of the city to the residential area. By the end of the first week of May, it was almost impossible to get from one section of Sarajevo to the other. Neighborhoods and city blocks became defined as "Serbian-held" or "Bosnian-held" and there were specific front lines. The central part of the city lies in a valley that is no further than one mile from the neighboring hills, which were used as gun-positions by the Serbian paramilitia. Since the city's main hospitals were located in this central area, the residential area was left with practically no operating theater or hospital facilities. To get to the hospital, an ambulance had to pass through "sniper alley," which made it a perfect target for a distance of some 800 meters at the part of the road near the military barracks. (The remainder of the road to the hospital was also dangerous, but not to the same extent.)

Another part of the city, Dobrinja, with some 30,000 residents, was completely cut off from the rest of the town for several months. Health workers who lived in this neighborhood organized a small surgical hospital in the basement of an apartment building and supplied it from a neighborhood warehouse.

By the end of the war, which lasted for more than three years, more than 3,000 major surgical operations had been performed in that makeshift war hospital [10]. For some victims, however, the only hope was to be transported to the main hospital in the city. That journey was extremely dangerous. Local mechanics armored a pickup truck, which served as a military ambulance.

Patient Transport on Sniper Alley

“Sniper alley” became the front line when the newly formed BHA [Bosnia Herzegovina Army] attacked the JNA military barracks, closing the only route to the hospitals. Patients received at the Institute during the day had to wait until night for transport. Every night after midnight, when military activities decreased, volunteers from the IEM transported patients to the hospital. Patients were asked to choose between the risk of an ambulance run and the risk of not being transported to the hospital.

Although some medical workers placed their patients’ lives above their own and were willing to accept the extreme risks in the attempt to get to the hospital, many drivers and health workers refused to drive on this road. Every day at least 10 patients in desperate need of major surgery were received by the IEM, as there was no other operation theater available in that part of the city. Patients could receive only the most basic medical treatment for complicated war wounds and some died in the IEM waiting for transport to the hospital.

Patients who attempted transport to the hospital were loaded into one of two ambulances — usually 8-10 patients per vehicle. Most of the time there were two volunteers from the IEM per vehicle, so that one volunteer could try to help the other in the event of injury from sniper fire. The ambulances would take the main road, would speed as fast as possible, and, when they approached “sniper alley” at maximum speed, would turn the lights off. This was considered less dangerous than speeding up at the approach to the barracks road and, with lights on, presenting an easy target.

On arrival at the main hospital traumatology clinic, the ambulances had to turn their lights off again, since the entrance was also covered by sniper fire. Vehicles approaching the entrance usually stopped 50 meters away, signaled to the staff at the hospital to open the reception gate, and rushed inside.

The JNA had infrared (IR) equipment for night shooting. This equipment could not be used efficiently for automatic weapons fire but only for single shots. Ambulances moved almost 80 miles per hour and were almost

impossible to hit with single shot fire. Machine-gun fire was much more dangerous and efficient but also less precise in the darkness. During the first three months of the war, more than 30 vehicles were damaged by bullets and shrapnel.

On April 24, while passing near one of the front lines in the west part of city near the airport on the way home from work, an ambulance was shot at and a paramedic, sitting in the patients’ compartment in the back of the vehicle, was killed.

On May 17, a convoy of three ambulances returning from the hospital were shot at from the JNA military barracks located in the city center. One physician was killed and one driver was seriously wounded. The same day another IEM physician was wounded by shrapnel on the way to the hospital.

Fuel became strategically important; reserves at city petrol stations were limited. Prior to the war, every petrol station was obliged to have a minimum reserve of fuel for emergency situations and that reserve could be allocated only with the permission of city authorities. The total amount of fuel on reserve was not sufficient for the requirements of the war. Fuel availability became one of the factors that determined the level of activity of the ambulances.

Radio communications, which were monitored by Serbian paramilitia, were also limited. By the end of April the VHF repeater was stolen and all radio communication stopped. Telephone communication was considered as an alternative, but on May 2 the main post office building, where most telecommunications equipment was installed, was attacked and burned.

Security of Health Institutions

The IEM building was directly attacked several times by mortars and anti-aircraft machine-gun fire. Local television and radio stations warned the population not to approach the IEM building during these attacks with the result that, while the building was damaged, no one was hurt. At the time of one of the attacks, physicians and midwives were assisting a pregnant woman in delivery.

On one occasion, at the beginning of June 1992, an armed man entered the IEM and threatened the staff with a Kalashnikov. Fortunately he was stopped by one of the IEM staff. The attacker’s intentions remained unclear but this incident showed that medical staff were vulnerable within the hospital.

Many armed people were constantly moving around the city, making it difficult to control and secure medical buildings and other institutions. Under the Geneva Conventions and Additional Protocols,

Physicians, nurses, and drivers were free to refuse missions that they considered too dangerous. The dispatcher then had to decide which of his colleagues would be exposed to situations of extreme risk. Some dispatchers, finding the choice impossible to make, elected to dispatch themselves instead.

weapons were not allowed in the hospitals, in ambulances, or in any other medical facilities. In reality, implementation of that rule was almost impossible. The JNA military hospital in Sarajevo was guarded by soldiers. When the conflict intensified, this hospital was used by the JNA for military purposes and many alleged that it served as a base for snipers. Understanding that defense of the hospital would be difficult if the BGA decided to take it over, the JNA hospital director decided to relocate to a neighboring military barracks. During negotiations between the JNA and the BGA it was suggested that the International Committee of the Red Cross (ICRC) transform the hospital into a neutral medical institution. This did not happen for several reasons, primarily because the JNA never actually wanted the hospital to be under ICRC supervision. In fact, the ICRC was perceived as a hostile witness by Bosnian Serb forces and by the JNA. On May 18 an ICRC convoy was attacked immediately after entering the city, and one of the delegates was killed[11]. On May 21, the ICRC was forced to pull out of Sarajevo.

The BGA had an interest in taking control of the hospital due to a shortage of medical supplies and the newly formed army's need for a military hospital. Therefore, the BGA and the Minister of the Interior allowed JNA soldiers and alleged snipers to leave in exchange for the hospital. All medical personnel from the hospital were given the choice to move into the barracks with the JNA or to stay in the hospital.

Bosnian police activities, including monitoring of high buildings in the city, intensified against the snipers. At the beginning of the war, snipers were exchanged as war prisoners; later on they were often killed immediately. Some snipers were beaten before being arrested. On one occasion a 72-year-old man reportedly shot two children (ages 4 and 5) from his window. He was arrested by Bosnian police, beaten, and brought to the IEM for treatment. After successful medical intervention he was beaten again by the police officers who had arrested him. IEM medical personnel, aware of all the circumstances, decided to protect their patient, thus risking their own lives. Police officers generally accepted the basic code of behavior governing the protection of patients once the rules were explained to them. The local police station decided to give protection to the IEM 24 hours a day.

Internal Reorganization

Patients from front line areas and from all over the city requested help from the Institute, necessitating a change in the dispatcher procedure for responding to these calls. When calls came in from patients or on their behalf, the dispatcher inquired not only about the condition of the patient but about the local military situation as well. When uncertainty existed, dispatchers called friends or family located in or near the patient's neighborhood in order to obtain updates on the fighting or shelling.

Once the nature of a patient's problem had been defined, the dispatcher described the problem to the IEM staff and asked for volunteers. Physicians, nurses, and drivers were free to refuse—and did refuse—missions that they considered too dangerous. Because the dispatcher was a member of the medical staff, this procedure obliged him to decide which of his colleagues would be exposed to situations of extreme risk. Some dispatchers, finding the choice impossible to make, elected to dispatch themselves instead.

Alternative ways to help patients were considered, including contacting local police and neighboring health centers; requesting assistance from the ICRC and United Nations Protection Forces (UNPROFOR); and negotiating with Serbian forces in order to obtain free passage for the ambulances.

UNPROFOR, with headquarters in Sarajevo, attempted to help the Institute with medical evacuations and in accessing patients. Two main actions were organized with UNPROFOR help. The first of these actions was to transport patients from Hrasnica, part of the city under Igman mountain, through a Serbian controlled area to the city hospital. Sixteen patients with war injuries, some in very critical condition, were rescued.

The second rescue operation involved the evacuation of patients from the burning Institute for Physical Rehabilitation (Ilidza). The hospital, which was at the front-line and was used as a shelter for fighters, was hit by a rocket-propelled grenade (RPG) and set on fire. Staff and patients frantically called for help. UNPROFOR and IEM mobilized 49 vehicles: ambulances, trucks, armored personnel carriers, a military communication vehicle, and an armored command vehicle negotiated their way to the burning rehabilitation center and more than 60 patients, most of them with paraplegia, were rescued. Serbian authorities tried to arrest the center's medical personnel, but the UNPROFOR officer in charge managed to protect them. Patients and staff were transported to UN headquarters and from there to the hospitals in the city. Several other rescue missions

were assisted by UNPROFOR. These efforts were not sufficient, however, for the proper medical care of the population of Sarajevo.

Many individual actions were taken in cases of medical emergency. The father of a three-year-old boy ran through the front line carrying his son to the main hospital. An ambulance was waiting on the other side to help him. A pregnant woman, experiencing difficulties in delivering and in need of surgery, was taken from one ambulance that belonged to the Serbian paramilitary forces to an IEM ambulance, and was transported to the hospital. Many such examples of individual rescue missions, all of them extremely dangerous, were reported.

Health education was another alternative to the increased demand for emergency medical care, and helped to save more lives. Most of the citizens of Sarajevo were already trained in providing first aid but more training and practical advice were needed. On May 16 a health education program was broadcast by Bosnian TV. Unfortunately, that program did not continue as IEM did not have enough staff to continue production. Tragically, the IEM staff member who initiated this program was killed on duty the day after the broadcast.

Advanced life-support (ALS) training courses for IEM staff were organized and three emergency triage rooms were allocated and prepared solely for the treatment of war wounds. Intravenous fluids, bandages, surgical forceps, scissors, and resuscitation equipment were made available in those rooms.

A neighboring pharmacy, heavily damaged by fighting, moved into a room in the IEM building in order to reduce the risk for patients.

By the end of May almost 30 ambulances had been damaged. Frightened staff could not maintain and recover all the vehicles, and so cannibalized many damaged vehicles in order to sustain a minimum operational fleet. Mechanics and engineers who lived in the neighborhood of the IEM volunteered to help restore and maintain ambulances in the garage. Most of these mechanics were retired or unable to go to their regular jobs. In a short time many vehicles were repaired.

A new dirt road, going over the hill behind military barracks, was opened for communication between the two parts of the city. The dirt road was at a greater distance from the JNA barracks than the main road and was therefore more difficult to target, but the vehicles could not travel at high speed, so their exposure time was extended. The infrared equipment used by the JNA was more efficient along this road and anti-aircraft machine-guns were used more often. It was difficult to say which of the two roads was

more dangerous. That assessment depended on weather conditions, visibility, time of day, and current military activities. Safety had to be assessed prior to each trip and the ultimate decision on which road to take was made by the driver personally after advice from the dispatcher.

The Decision to Decentralize Emergency Medical Services

Even though the IEM staff made every possible effort, continuing with the pre-war organization of emergency medical care became more difficult as the situation grew more complicated. Attempts to negotiate directly with members of the Serbian paramilitia regarding the safety of medical personnel failed. Finding alternatives became a necessity.

The main advantage of the existing organization of emergency medical care—good access and the ready availability of emergency medical services—no longer held. A principal question emerged: Was it acceptable to continue the present organization of emergency medical care and expose patients and medical personnel to the high risk of being killed, or should the emergency care system be reorganized in some other form? No one could give an adequate answer to that question at the beginning of the conflict.

The Ministry of Health was not ready to respond to the outbreak of the war or to take a lead in reorganizing medical care or adjusting it to wartime conditions. Only a few professionals in the ministry had official training in management. City authorities were unable to concentrate on the organization of health care due to emerging problems in providing water, food, fuel and electricity, and transport. Most health care institutions were left on their own to deal with organization and to adjust to new conditions.

Vital city services were interrupted, which also affected the work of the IEM. There were frequent interruptions in the provision of electricity and water for the city. The funeral company stopped its work; moreover, the director and some of the key managers left, reportedly stealing essential equipment and goods. By the beginning of May more than 160 bodies were gathered in the small morgue at IEM for almost two weeks. This morgue did not possess refrigerators for bodies. IEM staff were forced to find a solution for this problem and they mobilized staff of the Institute for Forensic Medicine, affiliated with the medical school in Sarajevo, to identify victims. They urged the city government to open a new cemetery.

Crisis Committee for Health

Even before the outbreak of the war, the

Republic Institute for Public Health, predicting a difficult situation and the possibility of war in Bosnia and Herzegovina, organized a "Crisis Committee for Health" [12]. When the war started, this Committee organized daily meetings in an attempt to sustain the provision of health care for the population of Sarajevo. The directors of clinics, hospitals, and health centers participated in these meetings, and developed a strategy to respond to these extremely difficult circumstances. The Committee became the advisory body of the Bosnia and Herzegovina Ministry of Health. Representatives of the IEM attended the meetings as well. Modes of decentralization were suggested that could significantly reduce the time between injury and first medical aid.

This decision was communicated to city authorities and to the representatives of local communities, who understood the need for clinics in their neighborhoods and welcomed this decision. Medical workers, assigned to work in neighborhood clinics, could avoid unnecessarily high risks while travelling to the hospital and back. They were able to provide prompt first medical aid to patients with war wounds in those newly established and often improvised clinics.

By the middle of June more than 100 small clinics, supported by the three main health centers, had been established all over the city. Each health center became responsible for the proper functioning of these clinics. Local community authorities were given different levels of responsibility and had a direct interest in seeing that the clinics were adequately supplied and functioned properly.

The equipment and medical supplies needed to open the clinics were provided from internal, although limited, reserves of the IEM and the health centers. Some medical supplies were also provided by a few international aid organizations. Most of the clinics also served as local pharmacies and directly distributed drugs to patients.

Local police and military were also supportive and took responsibility for organizing the transport of patients to bigger health institutions. Military and police radio communications were used for organizing a better network for medical transport.

By the beginning of June, the BGA had established a medical battalion in Sarajevo. This unit was responsible for reorganizing emergency medical aid for combatants. As the besieged part of the city was only a few square miles in area, it was difficult to define the front line or to distinguish combatants from civilians in the street fighting.

Once the emergency medical services had been reorganized, the IEM was able to continue its work in a more rational way,

although on a smaller scale, for the duration of the war.

Conclusion

Prior to the war, the centralized organization of emergency medical care in Sarajevo was a good and efficient way of providing emergency medical care to the population. Terror directed against the civilian population and disrespect for the neutrality of medical institutions and for their personnel undermined the traditional organization of emergency medical care despite the efforts of the IEM staff. Decentralization of emergency medicine and the organization of medical transport in close collaboration with military and police forces in the city became the only adequate solution.

Almost all IEM staff participated in some way in adapting to these new circumstances. In principal, decisions were made by the director and shift chiefs, but many actions were taken by individuals. Everyone participated in developing strategies for reorganization and in the daily management of the IEM. A whole network of friends, family, neighbors, and city officials was established in order to obtain accurate information about the local situation, to find fuel and spare parts for damaged vehicles, to prepare food for 24-hours shifts, to obtain necessary equipment and supplies, to overcome bottlenecks in the system and, finally, to decentralize emergency medical care in Sarajevo. It would be difficult to imagine that any external aid organization could have achieved what the IEM achieved at the beginning of the war in Sarajevo.

The reorganization of emergency medical care in Sarajevo was one of many examples of the ability of local professionals to adapt to new, diverse, and confusing crisis situations. Sarajevo's health care infrastructure was saved from total collapse by new, often "invisible" structures that emerged in time of crisis.

This ability of local people to cope with crisis should not be underestimated; rather it should be used as a valuable resource when planning international health care assistance during other complex emergencies. ❧

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