

Organization of the medical support to massive groups in hospital under conditions of active battle.

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Brought in here results of treatment of injured during a military conflict in 2008 in one of the region of Georgia, Samachablo, so named south-Oseti. Indicated are specificities of organizing medical help at the time of a large number of victims entering in medical centers. Here are presented report of treatment and the results are analyzed.

Key words: organization, medical support, injured

In memory of Gori's Military Hospital's surgeon G. Abramishvili, who was killed during bombing the hospital.

“They brought the injured during the night to the hospital, chaos began, doctors, nurses and orderlies were getting confused, they couldn't carry out their tasks and people were getting in each other's way.”

A. Vishnevski “Surgeon's Diaries”

A well-known surgeon wrote the above about the situation in one hospital during the Second World War – a state that can be created in any country, any time, in any medical institution if there is a catastrophe groups of injured add to hospital's potential abilities, only medical personnel doesn't have experience with non-standard insuperable situations.

On the other hand, it is impossible to make direct planning for the dislocation and efficiency of stationary medical institutions and to make an estimate of the expected number of injured. After World War II there are few cases described where medical institutions received at one time so many wounded, as did the Gori hospital during the active battle of August 2008 in the Tskhinvali region. In N. Ireland during the war and terrorist acts over 7 months of 1996, Queen Victoria Hospital cared for 1471 injured. Of those, 363 were hospitalized (24,6%) [W.H. Rutherford (1987)]. In 1983, in Beirut airport as a result of terrorist attacks 346 people were injured, of whom 214 died on the scene. Medical help was needed for 112 people, who were taken to various hospitals. (Erik Berg at

all,1989). In 1992-93 during the ongoing conflict in the region of Abkhazia, the number of people brought to the hospital daily were from 80 (Gantadi 1993 15 August) to 130 (Gagra 1992 2, October). In Afghanistan, (1979-1989) and in the N. Caucasus (1994-1996) and (1999-2002), only rarely 50-100 injured entered the hospital in a 24 hour period during active fighting. (E. Gumanenko, 2008).

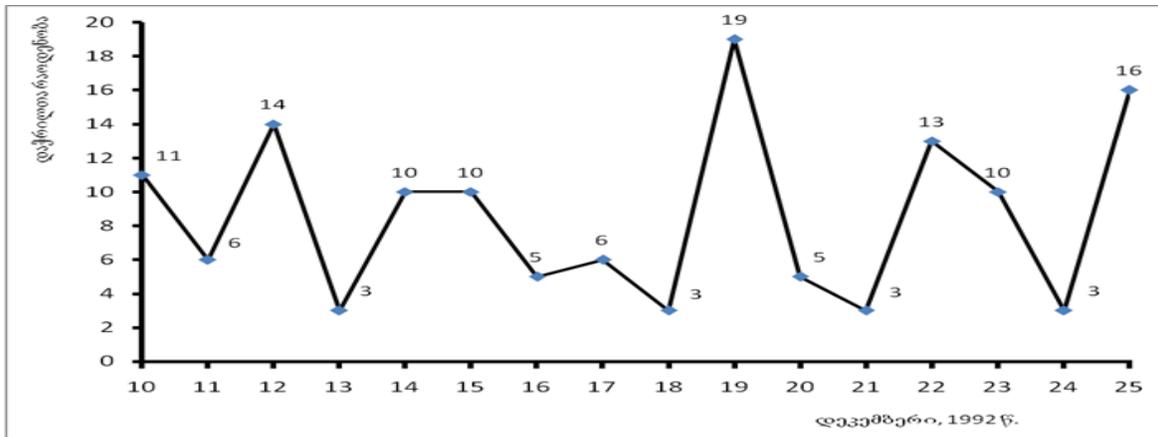
This article represents an analysis of the experience about medical services provided in 24 hour (mainly 12-14 hours) during the entrance of large number of injured at one time. In this situation it is most important to make such kind of organization that when the massive flow of injured comes it doesn't cause a catastrophe. The definition of catastrophe doesn't only mean the quantity of victims. It can have a place in the case of 20 victims and not occur in the case of receiving 603 victims within 14 hours (Gori August 2008).

During the military actions in the central Kartli region (including the bombing of Gori, villages and non-military objects), the military hospital responded to 1265 victims in 4 days, including 52 civilians and 112 corpses, 12 of which were civilians. Also people admitted to the hospital were those left behind after evacuation: 22 elderly and chronically ill patients and 231 injured, among them 48 civilians; besides these statistics, 60 soldiers who had injuries that didn't require emergency assistance (psychological traumas, admitted to the therapeutic ward and waiting for evacuation). This figure isn't included in our statistics but we are mentioning it here because they occupied medical personnel and created a small expense during the massive influx of injured to the hospital. The dynamics of entrance within a short time period creates problems for the medical personnel. The daily number of injured who entered the hospital on August 8-11 2008 was, respectively, 603, 443, 186 and 63. To explain the difficulty of the situation, the dynamics of entry was such; admission was primarily during daylight hours (12-14 hours), during this period there were a constant influx of 20-25 injured patients. It is well known that the large majority of injured in battle only have mild to moderate injuries, but any admittance of injured requires a place, personnel and time, something which is always in deficit in this type of insuperable situation. At this time, along with all of the other problems, psychological problems are added to both the injured and the medical staff.

The experience of medical institutions, from the beginning of military action in Abkhazia 1992-1993, showed us that in the case of entrance of a large influx of injured at one time, their insufficient organization progressively increases difficulty and at some point causes panic, which in hence

causes aggression toward the medical staff. If disorganization doesn't become resolved soon, collapse of the medical institution will occur.

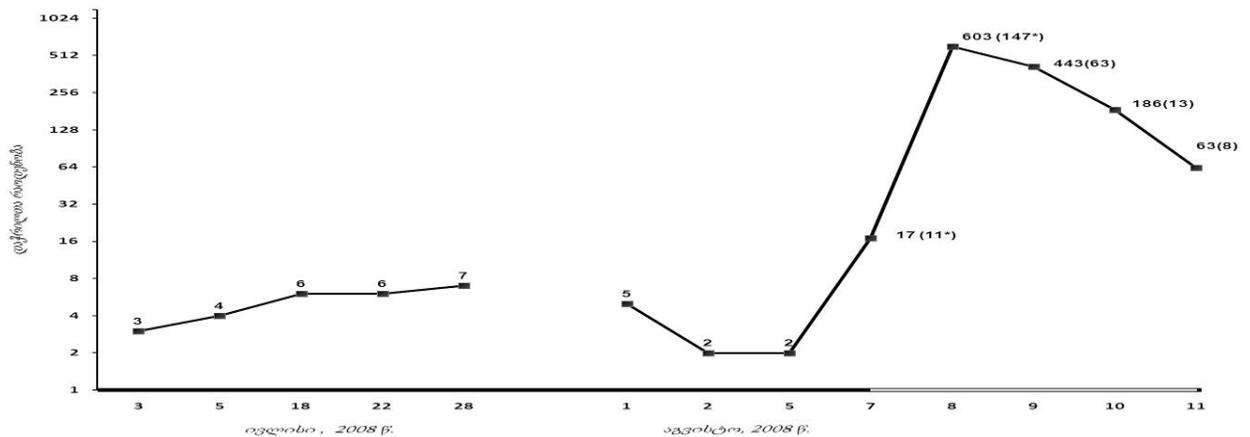
Our data differs from previous times and from other countries, as well as from data from Abkhazia's battles. First, this has to be done with the day (24 hour admission), the quantity of injured admitted, the rhythm of entrance, to compare with one Abkhazian hospital's statistics from 16 days of work (Ochamchiri December 1992). At that time, battles were more frequent than episodic conflicts.



Vertical: number of wounded. Horizontal: December 1992

Figure 1: “Dynamics of Entrance of Injured in Battle in Abkhazia region's Ochamchire Hospital” (Dec1992).

Over 16 days of conflict in December 1992, the indicated hospital (60 beds of all types, 3 operating tables) received 146 injured; 42 corpses (28,8%); 91 were hospitalized (62,3%); 100 cases required surgery (including minor operations)(68,5%); 3 of the injured died; injuries due to bomb explosions, causing severe mixed injuries for 20 (13,7%). The most common injuries were due to bullet wounds (by sniper) or shards. For this quantity of injured, in spite of the small hospital size, it was possible to organize medical assistance, material resources and rest breaks for the medical personnel. The situation in Tskhinvali's region was absolutely different, during large scale battles in terms of the large numbers of injured and from the perspective of the dynamics of entrance to the hospital.



Horizontal: July 2008, August 2008, vertical: Number Hospitalized

□ Provocations at the border

□ Military Action

Figure 2: “Dynamics of Entrance of Injured in the Hospital during Provocations and Military action (Tskhinvali Region August 2008)”

The presented diagram also shows that before the start of military action, in July, increasing provocations from the separatist side occurred (note: diagram doesn't show number of death) because of which the hospital in Gori was already maximally mobilized and in that sense was prepared in advance.

The group of admitted to the hospital in Gori factors of damage and structure of damage clearly differed from World War II and Afghanistan military statistics. Thus, the ratio of bullet to shard injuries taken from WWII statistics was 43.2%-56.8%, closely related to the Afghanistan statistics (E.K Gumianenko 2008). Our statistics, according to damaging factors and structural function, are shown in the following table

Damaging Factor	Quantity
1.0 Open	804
1.1 Firearm	766
1.1.2 Shard	582
1.1.1 Bullet	184
1.1.3 Cold Weapon (knife)	38
2.0 Closed	469
2.1 Explosion	342
2.2 Other	127
3.0 Thermal	22

Table 1 Damaging Factor Structure

It is obvious that in Central Kartli and during the bombing of non-military objects, for soldiers and civilians, the injury was mostly caused by explosions (shrapnel); bullet wounds accounted for 184, explosions-shrapnel was 582, i. e. 24%/76% respectively. If we also take into account the ratio between explosions (shrapnel) and closed wounds (concussion, contusion, closed damage of internal organs, soft tissue macerations) it amounts to 16,6%-83,4%.

In Abkhazia during military action (Ochamchiri December 1992 statistics) the rate of wounds due to explosion was not more than 13, 7%. This amount generally came from injury of foot-soldiers by hand grenades and mines, two things which are not included in our current case. Totally, from 1263 patients, 231 were hospitalized and 60 operations were carried out during 4 days. The number of hospitalized could be considered as insignificant, but a large number of medical personnel was occupied with triage, shock and evacuations. Only 93% of the hospitalized (215 people) had life threatening injuries, or their injuries on admission required inpatient observations. More than half of injuries (64.3%) were multiple or combined injuries; isolated injuries (damages)- injury of one anatomic region in 101 (43,7%) patients; multiple damages- one anatomic region or one zone and one mechanism- several injuries 44 (19%); multiple injury-several anatomic regions or zones and one mechanism 84 (36,4%); combined injury-different mechanisms (thermal-mechanical injury) 2 (0.9%). Priority for determining the severity of multiple wounds is based on categorization by location; the quantity of multiple traumas are divided into skull and brain 32 (38,1%), thoracic 15 (15,9%), abdomen 15 (17,9%), magisterial vessels 13 (15,5%), limbs 6 (7,1%), spine 3 (3,6%).

In the critical medicine ward, treatment was carried out on 77 injured. 231 patients were hospitalized, realistically during three days (8, 9, 10 August) the volume of work carried out should be considered seriously.

When we confirm the fact that a medical institution, during a 12 hour period, without serious difficulty, can receive 603 injured, with a poor prognosis for the coming days, we should point out that this should have been almost impossible because of the following factors:

- 1.0 The national health system, public and military medical institutions' lack of coordination and preparedness (Federal factor);
- 2.0 The country's medical infrastructure and health system's lack of financial support (Federal factor);
- 3.0 Provision of medical assistance without complete organization within the institution;
- 4.0 Medical institutions with staff and logistic support and human resources without rational implementation
- 5.0 Lack of professional training for staff in the management of trauma
- 6.0 Lack of direct support for evacuation
- 7.0 Inability to extend time for this type of situation

In the case of fulfillment of all of the above mentioned points, the hospital bed reserve and quantity of rooms and operating theaters lose their vital meaning.

During WWII, treatment was based on steps of accepted principles, which have been revised in recent times, certain concrete medical tactics can't be complete negative- medical assistance during battle in Tskhinvali's region was carried out in 2, 3 and rarely 4 steps. Gori Military hospital technically and materially is modern but after a number of hours of admission of a few hundred injured, its function couldn't be compared to the III-IV level inpatient medical regimes.

The first category for medical help was the military medical field hospital which was made up of Tbilisi's leading civilian physicians and was located 15 km from the front. At this point first aid response medical life saving measures, stabilization and evacuation preparations for injured (ABC principles for completion and first aid, different from the American system of basic life support) were carried out not by paramedics but by surgeons and emergency physicians. Gori's front hospital was freed from the flow of injured which were from the field hospital because they were sent directly to Tbilisi's hospitals, which included a significant number of injured.

The search and rescue from the battle zone, quality medical help and the best conditions for transportation to the hospital played an important role in prevention of loss of resource. It wouldn't be correct to compare the medical response in the Abkhazia region during battle to today's situation but it should be mentioned that although the number of hospital mortalities wasn't more than 3% , the first aid and life support on the front line and transportation quality was much worse than in the Tskhinvali region. This difference is proven by the following figures from December 1992 where 146 injured and 42 corpses (28,8%) were brought to Ochamchiri's hospital compared with 1265 injured and 112 corpses (8,8%) which were brought to Gori's hospital. From these statistics it be deduced that during the events of August, excessive force and massive bombing was executed by the opposing forces. Abkhazia's case can be summarized by the following statement "As good as the situation is in the hospital, as bad is the situation on the field".

Evacuation of the injured from Gori Military Hospital to Tbilisi's hospitals worked as a continuous flow including the transport of the critically injured who needed maintenance of vital organs during transport (respiratory assistance). Under the condition of massive entrance of injured, the hospital closest to the front's main strategy was not to take even one injured as an inpatient after providing medical assistance.

Well organized rescue and transportation of injured from the battle field within 20-30 minutes meant that those who came to the hospital were either severely injured without hope of survival or those who needed specialized medical attention. Medical doctrine requires that in the case of receiving large numbers of injured; the first priority should be for the severely injured with the maximal chance for survival at the expense of minimal time and cost. The maximal operating time should be 2-2.5 hours. The most important negative organization aspect is not a medically incomplete operation but the crossing of optimal borders, which are most precious for the situation, time. The withholding of medical assistance from those who are still living but will not survive is decided by the chief surgeon, which is a huge moral responsibility and causes negative emotions in civilian medical personnel who haven't had experience working in similar situations.

There were 7 functioning operating tables in the hospital. The operating tactic and size was dependent on the medical tactical situation and varied from temporarily life threatening or damage for battle from necessary measures to high level of specialized assistance (inferior vena cava, magisterial veinoplasty with auto-vein, lobectomy and other).

The main priority in the overused operating unit was to take measures for damage control. For example, slowing internal bleeding by dense tamponade or completely stop bleeding, isolating the injury from infection sources in the abdomen; in simple cases end suture and knotting of abdominal organs; intestinal resection of injured parts without anastomosis or tamponade in damaged organs which couldn't be completely repaired. In this case the operation is finished with a single cutaneous suture or laparostomy. The operation duration ranged from 1-4 hours, the average was 2.4 ± 0.5 hours. Post-operatively the patients were kept in the critical care unit for 1-4 hours or were immediately transported with respiratory support to Tbilisi's clinics (transportation duration was 1 hour). The optimal period for performing large numbers of operations is after dark when the intensity of military action decreases, and often stops completely. The nighttime hours also proved to be the optimal time for some operations to be performed such as surgical treatment of soft tissue gunshot wounds. We have found that having good organization of highly qualified, specialized medical help in close proximity to the battle zone is a very useful possibility

Qualified and specialized medical help close to the battle field and preparations for evacuation gives the possibility to not only save the lives of the injured but to take measures to preserve their high quality of life and prevent disability. Under these conditions the hospital may possibly function as a qualified II-IV level medical institution. An important aspect of medical assistance is medical categorization and evaluation of optimal conditions when patients who are delayed 2-4 hours before receiving medical assistance are not seriously affected. Successful administration of medical help for those evacuated from Gori's hospital to Tbilisi's clinics 80 km away is illustrated in Table 3.

Performed Operatin structure	Quantity
Repeated wound control	161 (13,8%)
Primary or repeated wound treatment	300 (25,7%)
Toracotomy	14 (1,2%)
Laparotomy (including laparostomy)	28 (2,40%)
Limb amputation	7 (0.60%)
Skull trepanation	24 (2,1%)
Limb immobilization	204 (17,5%)
Conservative treatment	241 (20,6%)
Other manipulation	187 (16,1%)
Total	1166 (100%)

Table 2: Gori's Military hospital evacuated injured who received medical attention in Tbilisi's clinics.

s*Emergency and planned procedures are included.

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სამედიცინო დახმარების ორგანიზება სამედიცინო დაწესებულებებში დაზარალებულთა მასიური შემოსვლის დროს.

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მოტანილია საქართველოს ერთ-ერთ რეგიონში, სახელდობრ სამაჩაბლოში, ე.წ. სამსრეთ ოსეთში 2008 წელს განვითარებული საომარი კონფლიქტის დროს დაზარალებულთა მკურნალობის შედეგები. მითითებულია სამედიცინო დაწესებულებაში დიდი რაოდენობით დაზარალებულთა ერთდროულად შემოსვლის დროს სამედიცინო დახმარების ორგანიზაციის თავისებურებები. ჭარმოდგენილია ჩატარებული მკურნალობის ანგარიში და გაანალიზებულია მიღებული შედეგები.

გასაღები სიტყვები: მზადყოფნა, სამედიცინო დახმარება, დაზარალებულები.