Battle casualties during Iraqi Iranian war 1980-1988

Tharwat I. Sulaiman * FRCS,CABS

Summary:

Background- *Every war in the world has its characteristics and the Iraqi Iranian war 1980-1988 has been neglected for along time due to political factors . this study tried to illustrate some of the features of casualties during this war .*

Methods *– review of records of all veterans evacuated to an advanced dressing station (ADS) serving a corps sector over one year starting from the 1st of Jan. 1982 to the 31st of Dec. 1982.*

Results *– the total number of casualties reached this station was 3020 veterans . Mortality rate before reaching to the station was about 20%. The majority of veterans (70%) were evacuated to the next station and most of them (90%) were injured during combat. Severe injuries constituted only 11% of casualties evacuated while the majority of those evacuated were those with intermediate and simple injuries . the most common causative agent was shrapnel in 80% and extremities were the most common injured parts of the body (62%) and abdominal injuries were the least common(3.3%).*

Conclusion – *in spite of all the differences as compared to other war experiences , the mortality, causative factors, severity and site of injuries were comparative to other wars since Vietnam war till the last war in Iraq 2003 with limited differences.*

Key words*- war, casualties, triage, evacuation, Iraq, Iran*

Introduction:

War injuries differ in nature from civil injuries, and require special knowledge about the mechanism of injury and its management. They can be caused by high velocity missiles (bullets, shells, mines, etc.), motor vehicle accidents, and other military activities, and obviously the nature of these injuries differs according to the causative agent. Each war in the world has its own surgical problems; the principles of management of war wounds and war surgery have been laid down, and the experience of World War 11 is considered as the main source of knowledge about missile wounds in the time of war. The principles of management are based upon the experience of thousands of surgeons on millions of patients, and these surgical principles have stood the test of time successfully(1). The army medical services should be directed to provide every skill and facility for the care of all casualties, to maintain manpower at the best possible level, and to help those wounded who risked their lives and spared no efforts for the sake of their country.

The Iraq- Iran war can be regarded as the first thorough experience for most of the Iraqi surgeons and medical staff in the management of war injuries, because the previous military action in Northern Iraq was limited and of a special entity (guerilla warfare).

**Department of Surgery/ College of Medicine /Baghdad University.*

At the beginning of the war, military medical services were insufficient to fulfill the needs of all the casualties, but active, rapid, and synchronized efforts with the civil medical services were put into action during the early months of war to achieve the best medical services for the wounded.

The aim of this article is to illustrate the different activities carried out at the different evacuation echelons in a corps sector. It deals with the emergency management, the sorting of casualties and the evacuation of the wounded along the evacuation echelons. It will also discuss the details of grouping, priorities, and the causative agents of injuries managed and evacuated through an Advanced Dressing Station(ADS) over a 12 month period from the 1st of January, 1982 to the 31st of December, 1982.

Methods

From 1st of January to the 31st of December 1982 a review was made of the records of an advanced dressing station (ADS) serving a corps sector for a retrospective analysis of Iraqi military forces casualties evacuated to this unit to obtain information about mortality, evacuated wounded, and those returned to duty. The causative factors, site of injury, and degree of severity were also recorded and each system was studied alone according to the severity of injury and the type of causative agent.

Few wounded were dropped from this study due to the lack of complete information in the records. The details about those who were

delivered dead to the (ADS) were not mentioned, again due to the lack of complete records.

For each wounded patient a special form was made out during the process of evacuation to notify his name, age, unit, full address, site of injury, causative agent, nature of injury, its seventy, the priority of evacuation, the time of injury, the time of reception and the time of evacuation from the A.D.S in addition to the medical management provided in this unit. These forms were made in two copies ; one to be sent with injured to the next echelon and the second was kept in the ADS . These second copies were reviewed for information of this study.

Sorting and Evacuation

Before resorting to the results we have to give an idea about the methods of sorting of casualties and the triage system that were applied during this war .

Sorting (triage)

Sorting implies the evaluation and classification of casualties for purposes of treatment and evacuation. Military medical officers are responsible for sorting of casualties, and they carry out this responsibility according to many factors. These factors are: the severity of the injury, the need for treatment, and the medical and surgical care available for their treatment. Triage is also affected by the changing military tactical situation.

During the Iraq- Iran war, the NATO medical classification (2) was accepted and followed as a guide for sorting of casualties; and by this classification, casualties were divided into 4 groups:

Group A- Those whose injuries were so slight that they could be managed by self-help.

Group B- Those whose wounds required medical evaluation and care, but could be managed by the simple treatment and dressing available in the A.D.S.

Group C- Those whose injuries demanded surgical attention and operation, and they were further categorized into 3 priorities:

Priority 1: cases requiring resuscitation and urgent surgery.

Priority 2: cases requiring early surgery, possibly associated with resuscitation.

Priority 3: cases requiring less urgent surgery.

Group D-Those who were dead or who had such severe injuries that death was inevitable.

This sorting led to the most logical and orderly evacuation of the wounded, as it successfully employed medical facilities, stretchers and ambulances and the medical and surgical expertise that participated in the process of evacuation. Disturbances of sorting were sometimes inevitable, and were mostly due to limited experience of doctors and medical staff, lack of some medical facilities and the changing military situation.

Evacuation:

Evacuation is the process of collecting and clearing casualties from the battlefield to the areas where definitive treatment can be provided. This process was carried out through a chain of evacuation echelons, that were variable depending on the properties of war, the shape of the battle lines, the distance to the base hospitals , the medical facilities available, and military situation. The determinants of evacuation were the condition of the wounded, the availability of medical care at the echelon concerned, and the availability of transportation, as well as the military tactical situation.

The medical and surgical care in each echelon differs from the others in details, but the general principles of providing emergency treatment; sorting and evacuation were the same. The evacuation echelons followed in this war were similar to those used in World War 11, and these were:

1- First echelon- (the regimental or battalion aid station)

This must be about 3-5 km. from the front lines, but in this war, it was usually placed nearer to the front lines. The casualties reached this echelon directly from the battle- field either by self- help or with the aid of colleagues, or by stretchers. The medical officer rapidly provided emergency medical treatment and decided rapidly whether to evacuate the wounded or return him to his unit. No surgical management could be provided here except for relieving respiratory obstruction, combating haemorrhage, relieving pain and simple dressing.

2- Second echelon- (The collecting and clearing station- CCS)

It must be far from the battle- field and safe from the direct involvement in the fighting. During this war it was usually about 5-15 km. from the front lines, and was usually within the range of enemy's artillery fire.

There must be at least one echelon providing medical care for the sector of a brigade, but during this war there were 2- 3 such echelons providing medical care, and draining a sector of a division, without specification for a specific brigade because usually the battle field was usually so compact that a division might defend a front line of few kilometers . Here the medical officers had a greater chance to save lives as they work in a relatively safe place and have enough time and medical facilities for emergency management like controlling haemorrhage, administration of intravenous solutions and even blood, thus preventing or combating shock, relieving respiratory obstruction and relieving pain. The medical officers were also capable of performing primary management of sucking wounds of the chest or relieving tension pneumothorax and proper splinting of fractures.

In this station the wounds should be checked,

and a change of dressing may be required. Sorting at this stage must be done, and many of the wounded can be returned to their units, but in practice most of the wounded were evacuated, even those with wounds that required simple dressing only and a few hours rest. They were evacuated due to the lack of space to admit them, and for psychological reasons.

Evacuation from this station was usually carried out by ambulances.

3- Third echelon- (Advanced dressing station)

According to the Iraqi Medical Services scheme, such a station must be responsible for draining a sector of a division, but during this war, 1 or 2 such stations acting together were responsible for draining a sector of a division, and sometimes even a corps sector.

The Advanced Dressing Station must be far away from the battlefield and safe from the effects of artillery, and that was usually so during this war.

This station must be well equipped and well staffed to cope with the needs of the wounded. Thoracic drainage, tracheostomy, endotracheal intubation, prompt control of external haemorrhage, treatment of shock with plasma or blood transfusion, relieving pain and the prompt splinting of fractured bones; all these measures were conducted at this station to save lives and provide the best medical aid for the wounded.

Sorting and evacuation were usually conducted efficiently, and most of the soldiers with minor injuries were returned to their units after simple dressing, or after admission in the ward for 24- 72 hours.

Ideally there must be a field hospital near the ADS or the CCS for the management of those who require urgent surgery (priority 1 & 2), but such hospitals were not in use except for one which was about 20 km. from the nearest ADS, so it had lost its field benefit, and behaved like any base hospital.

Evacuation from this echelon was usually carried out by ambulances, and although evacuation by helicopters was sometimes used, it was of limited value practically because of the limited number of helicopters available for the purpose of evacuation, the deficiency of well- trained staff for this purpose and because of the short evacuation lines to the next echelon.

A very efficient means of evacuation at this level was the large buses, which were, converted to accommodate those with moderate or severe injuries. Unconverted buses were also used for evacuating the wounded with minor injuries who required complementary treatment which could not be provided in the ADS for one reason or another. (Group B).The conversion of the buses was done by removing the seats and installing stretches to accommodate the wounded.

4- Fourth Echelon- (The General Hospital)

General hospitals were located in the communication zones and they provide medical support to a corps sector or army area. During this war the nearest one was about 50-60 km. from the A.D.S. in the sector concerned. These hospitals should be well equipped, well staffed and capable of dealing with the wounded, especially those of Group C. From this echelon, the wounded were either returned to their duties after treatment, or transferred to the base hospitals, or sent to their homes for convalescence after completion of treatment. In general movement of casualties from one echelon to another in the forward areas was usually accomplished within hours.

The main problem during evacuation was the apparent deficiency in medical staff and ambulances or other means of evacuation especially during the early days of the war. This problem was solved within few months during which a large number of doctors, dressers, and medical personnel were brought to all the echelons of evacuation; but the problem that remained was the limited experience of the medical staff as regards war injuries, their mechanism, and their management. This problem continued to exert its bad effect on the process of evacuation for a long time, until all the medical staff acquired experience in dealing with these injuries. The problem of ambulances was solved soon after the commencement of the war; on the other hand, there was no problem due to the lack of equipment or medical facilities, as these were generously provided. The changing tactical military situation laid a heavy burden on the military medical services to match the needs of the wounded. Sometimes this chain of evacuation may have been disturbed by bypassing one of these echelons. This was either due to faults, or due to an abnormal military situation. Changes in the evacuation chain may also occur due to the heavy burden that may be laid upon one echelon or another, as it may receive casualties from more units than it could cope with. Faults of ambulances drivers and their personal preference or lack of knowledge of the evacuation lines has led to many disturbances as they sometimes bypassed some echelons and led to disturbances.

Results

The total number of casualties evacuated through an advanced dressing station (ADS) during 12 months from the 1st of January 1982 to the 1st of January 1983 was 3020 wounded (tab.1). Of this, 575 arrived dead (19.14%), and 2168 (71.79%) were evacuated to a general hospital. 274 (9.05%) were returned to their duties, most of them after being admitted to the A.D.S. for a period of 24- 72 hours.

TABLE (1): Total Casualties Passed Through Ads During One Year

TOTAL	ARRIVED DEAD		RETURNED TO DUTY		EVACUATED	
NO.	NO.	%	NO.	%	NO.	%
3020	575	19.1	274	9.1	2168	71.8

Most of the evacuated injuries were due to shrapnel (tab.2) as it constituted 80.40% of the total injuries (1743 wounded). Bullets were responsible for only 10.10% of cases (219 wounded), while other military activities (in action or otherwise) were responsible for 9.5% of the total injuries (206 wounded), and these include- car and other motor vehicle accidents, blunt trauma, blast injuries, and burns.

TABLE (2): Evacuated Injuries- Causative Agent

TOTAL	BULLETS		OTHERS		SHELLS	
2168	219	10.1%	206	9.5%	1743	80.4%

This study also showed that out of the 2168 wounded that were evacuated, those wounded in action numbered were 1937 veterans (89.35%) (Tab.3), and those who were injured during quiet periods, or during action, but not due to the direct effect of combat constituted 10.65% (231 wounded).

TABLE (3): Evacuated Injuries In Relation To Combat Of Total 2168 Casualties

DURING COMBAT		OTHERWISE	
1973	89.35%	231	10.65%

The degree of severity of injuries is classified in (tab.4), which shows that the most common degree of severity recorded and the wounded most commonly evacuated were those with moderate severity wounds(1014 - 46.8%).

severe		intermediate		simple	
233	10.8%	1014	46.8%	921	42.4%

TABLE (4): Evacuated Injuries According To The Degree Of Severity Of Injuries- 2168 Casualties

This is obvious as most of the severely injured died before reaching the A.D.S. On the other hand, a good number of those with minor injuries were returned back to their units, and only 921 of them

MUSCULO-SKELETAL		combined		chest		HEAD		Facio-maxilla-ry		ABDOM-EN		TOT-AL
62.3%	1350	16.1%	348	7.4%	161	7.4%	160	3.6%	78	3.3%	71	2168

TABLE (5): Evacuated Injuries; Site Of Injury

(42.8%) were evacuated. The number of wounded with severe injuries that were evacuated was only 233 (10.8%).

Tab.5 shows the classification of injuries according to the site of injury and the system involved.

Musculoskeletal injuries were the most commonly evacuated injuries. They numbered 1350 (62.3%) and those included both soft tissue injury and damage of the bones of both the upper and lower extremities, pelvic injuries and isolated injuries of the vertebral column and spinal cord.

The next most common injuries were the combined injuries (multiple injuries) and those numbered 348 (16.07%). Chest injuries accounted for 7.43% of the total evacuated wounded, and they numbered 161. Head injuries made up 7.38% (160 cases), and maxillofacial injuries came next with 3.60% (78 cases). The least common injuries were abdominal injuries, which accounted for 3.27% only 71 cases.

Returned to duty: (tab. 6)

Those included 274 wounded (9.07%) of the total casualties reaching the ADS) and most of them had minor- moderate degree injuries (Groups A & B). Musculoskeletal injuries constituted more than the half-55.5% (153 cases). Chest injuries came next with 36 cases (13.1%), and maxillofacial injuries accounted for 12.4% (34 patients). Combined injuries made up 11.3% (31 cases), while head injuries constituted only 5.5% and abdominal injuries were only 2.1% of the total wounded returned to duty.

MUSCULO SKELETAL	CHEST	FACE	COMBINED	HEAD	ABDOMEN	TOTAL
55.49%	13.15%	12.42 %	11.32%	5.48%	2.14%	274

Shrapnel was responsible for 72% of the injuries of those who were returned to duty. Bullets caused only 3 injuries. Other causes were responsible for 25.9% of the cases and this means that a good percentage of those returned to duty were injured by causes other than missiles.

classification of evacuated injuries according to severity showed that the commonest injury encountered was the musculoskeletal injury, which accounted for 62.3% of the cases (1350 wounded); of these 4.2% (58 cases) had severe injuries, while moderate injuries constituted 50.3% (679 cases), and minor injuries made up 45.5% (613 cases). Most of these injuries were due to shrapnel and occurred during action or were due to shell

explosions (table 7)

TABLE (7) Evacuated Injuries ; Classification According To Action, Causative Agent And Degree Of Severity

Site of injury	During fight	No fight	shrapnel	bullet	others	severe	moderate	simple	total
Musculoskeletal 62.3%	1218	132	1055	197	98	58	679	613	1350
Combined 16%	287	61	279	62	7	70	138	140	348
Chest 7.4%	144	17	139	17	5	25	78	58	161
Head 7.4%	151	9	147	10	3	36	66	58	160
Maxillofacial 3.6%	69	9	58	16	4	6	27	45	78
Abdomen 3.3%	68	3	65	3	3	30	26	15	71

As expected with any multisystemic injuries (16%) , quite a large number of these injuries were moderate or severe. Shrapnel was responsible for the majority of these injuries (80.17%), and most of them occurred during action (82.47%).

All chest wounds 7.4% must be considered penetrating and serious whatever the external wound is, until proved otherwise. Severe injuries (15.5%) and moderate injuries (48.4%) together made up more than half the evacuated chest injuries. Bullet injuries to the chest were limited (only 5 cases), which may be due to the fact that these injuries were usually fatal. Evacuated head injuries 7.4% were mostly caused by shrapnel (91.9%). Bullet injury to the head was usually fatal. Closed head injuries due to blunt trauma were limited (6.25%). Most patients with head injuries were usually evacuated to the General Hospitals because of the severity of their injuries and the difficulty in evaluating the degree of seventy. About half of the evacuated wounded with neck and maxillofacial injuries were classified as having minor injuries (57.7%), while severe injuries were less commonly encountered in the ADS due to the good protection provided to this area by the soldier's hand, by his posture and by his helmet; or because most of the severely injured died before reaching the A.D.S. due to respiratory obstruction. Most of these injuries occurred during action (88.4%) and they were mostly caused by shrapnel (74.36%).

About half of Abdominal Injuries were of the severe type (42.3%), while the moderate type constituted 36.6%. Most of these injuries occurred during action and they were mainly caused by shrapnel (95%).

Discussion

This study tried to give an idea about the Iraqi Iranian war (1980-1988) and review the general features of the war and compare them with previous and recent experience of war injuries .

Generally speaking this war was an experience of classic war that lasted 8 years between two neighbor countries and was characterized by quiescent periods intervened by heavy combats about twice a year. The study covered the casualties in a corps sector over about one year on the assumption that all sectors were nearly similar in their military activities which made the study eligible to give a clear idea about the whole war. The casualties occurred either due to direct combat or due to the effect of artillery or other accidents during the quiescent periods

Injuries in general are responsible of about 10% of all deaths worldwide, with road traffic accidents , self inflicted injuries , violence and war injuries being the most common causes of traumatic death (3). Of the 30 leading causes of death ,war injuries were the 21st most common cause of death (3) as battle casualties sustained in conventional warfare are more likely to be lethal than are injuries sustained by civilians and depending on the tactical situation , mortality may range from 20 % to more than 80% of all casualties (4) . the mortality during the Iraqi Iranian war was about 20%, a figure that was similar to the mortality of many previous war experiences like Vietnam war (5),and many of the recent wars like Afghan (operation enduring freedom) (4) Persian Gulf War , Baranjia and East Slovenia in Croatian war. The mortality rate in Bosnia war only was less than 10%(6). So in spite of all the differences in the nature of different war experiences , the type of weapons used in each war, the tactical situation , evacuation lines time of evacuation , the triage system used and experience of personnel , the mortality rates ranged between 10-20%.

Casualty distribution was nearly similar to that of Vietnam war where about 11% died on battle field and another 9% died during evacuation or after arriving to the hospital . 72% of casualties were evacuated and 9% returned to duty after being managed in the ADS . These figures were similar to the casualties of American troops in Somalia where the mortality there mounted to 14%(5) and in Croatean offensive with mortality mounted to 1/6 (7), although in central Bosnia war the mortality was about 5% in the field (8)

One of the features of this war was the effect of artillery and rockets that was responsible for the majority of injuries during combat or otherwise . The effect of air forces was limited on the Iraqi side because the Iranian air force was weaker and not efficient enough . Bullet injuries even during combat were much less common and usually fatal because it affected head and neck , chest or severe

abdomen.

The long , tortuous, uneven lines were responsible for much of motor vehicle accidents especially at night as the combat zones were mixture of plane and mountainous areas and usually the movement was during night whether during action or otherwise which should be in complete darkness as the supply areas were not so far from the front lines which made any movement traceable by the enemy . This movement during night increased the incidence of motor vehicles accidents . On the other hand movement during the day light made the troops exposed to the artillery of the enemy .

Blunt trauma was registered due to the effect of artillery on the shelters whether in the front lines areas or in the posterior located units as direct hits might collapse the shelters on the soldiers .

For all the above reasons fragments injuries were the most common type of injuries (80%) that was higher than Vietnam war (40%) or American casualties in Somalia (30%) (5). In contrast bullets were responsible for only (10%) of casualties , a much less incidence than in Vietnam war (30%) or Somalia (55%). Other military activities leading to blunt trauma, burns or penetrating injuries not caused by shrapnel or bullets was responsible for only 10% of casualties , that was comparable to that of Vietnam or Somalia (5). In Afghan war (5,9,10) and Lebanon (11)fragments along with bullets were the most common cause of casualties , a similar incidence to the Iraqi Iranian war. On the other hand in Croatean war, shell fragments were responsible for 47% of casualties and bullets for another 15% and other activities in 20% of casualties (4,5,6) and during the 2003 Gulf conflict where 62% sustained fragmentation injuries and 37% sustained gunshot injuries (12,13). On the other hand the united states casualties during second Gulf war were from non battle causes in about 30% of cases (12) .

From all the figures above one can judge that in spite of different war conditions , different weapons and protective measures used in each war , the etiology of casualties were nearly similar with slight differences which might be imposed by these factors . In all these war experiences the artillery remained the overwhelming factor which played a great role even during direct combat .

The majority of casualties happened during action and due to direct effect of combat (90%), and this might be due to the heavy artillery effect during action . Non battle casualties were less common(10%) due to lengthy frontlines and inability of the enemy artillery to cover wide areas and the good precautions taken by the troops to arrange for good shelters and the obligations of restricting movement in the back . These precautions were built gradually after passage of few months from the beginning of war as the troops had learned gradually how to build shelters and how to protect themselves by restriction of movement especially during the day light .

Moderately injured veterans constituted the majority of evacuated casualties in this war and this is logic as most of the severely injured will die before reaching the advanced dressing station as this station is at least one hour away from the front lines . On the other hand most minor injuries will not reach the ADS or will be returned to duty after simple dressing and treatment . This classification of severity of injuries was also recorded during Gulf war 2003 and afghan war (9), but in Croatean war the number of severely injured was similar to those who were slightly injured (8) .

The most common site of injury in this war was that of the extremities or the back and pelvis (62%). Musculoskeletal injuries were the commonest because the extremities are the parts of the body least protected, as one usually tries to protect his head, face, chest, and abdomen, and for this reason, these parts were less commonly injured. Extremities were also the most common site of injury in other conflicts in Afghan war, Somalia , Gulf war1991 , Operation Iraqi freedom 2003 and Croatean war (5,9,13, 14), while during Lebanon war 45% of injuries involved the torso(11)and the body parts of the greater density of penetrating injuries was the face and the head . The same was reported in Bosnia as head injuries accounted for 20 % of casualties (6) probably because of the special features of civil war and the limited use of artillery as compared to bullets and snipers .

in Croatean war (13) and Iraqi freedom operations (14) the extremities were involved in 92% of all injuries among civilian and soldiers , as both operations were leaded by heavy air force bombing and heavy rockets bombardment which means more fragments injuries and less protection of exposed parts of the body namely extremities.

The next most common injuries in this war was chest injuries (7.5%)followed by head injuries and maxillofacial with the least common were abdominal injuries . but we feel that these injuries more common but they were usually fatal and did not reach the ADS and not considered in the evacuated casualties.

Head injuries were expected to be more common, but many of those with head injuries died before reaching the ADS, as they cannot survive their severe injuries. The incidence of head injuries might also be lowered by the use of the protective steel helmet..

Abdominal injuries were the least common because the abdomen is usually well protected by the position of the soldier during combat or these injuries were so heavy and immediately fatal . A very small external wound due to shrapnel might enclose very serious internal damage, so utmost care should be taken during sorting and evacuation and management of such injuries. Some

of these injuries were very severe with large abdominal wall defects and evisceration of the bowels. Shock due to serious internal haemorrhage from the liver, spleen, kidneys or major vessels may be encountered, and urgent action is necessary to combat shock before rapid evacuation to a field hospital or a general hospital. A large number of these patients died before reaching the General Hospital, but unfortunately, no information regarding these cases could be obtained from the records.

The number of chest injuries can be considered also as lower than expected as the use body armor was very limited during this war so a good percentage of them had severe injuries incompatible with survival . Of those with chest injuries reached the ADS and only a few of them were returned to duty.

This classification of injuries didn't match with the results recorded in Vietnam or Somalia where there were more injuries of the head in spite of the use of Kevlar helmet especially in Somalia (5). Chest injuries in these two wars were less, and this could be explained in Somalia as the veterans used body armor while it was not clear why chest injuries were less in Vietnam war.

combined injuries of the extremities and other anatomical locations were found in 16% of casualties ;nearly similar to the results of Gulf war 1991(13), and this was the case in this war where the artillery was used heavily and fragments were the most common causative agent.

Most of those returned to duty from the ADS were minor injuries belonging to the A and B priority , most of them were superficial wounds of the extremities, chest , and face where it was possible clinically to eliminate deep penetration with internal damage , but it was rarely possible to return injured patients in the abdomen or head because it was difficult to eliminate deep penetration without x-ray facilities which was not always available and even if it was available the rash of casualties during combat made it difficult to offer.

So in spite of all the measures to offer the best surgical and medical services, even in areas very near to the battlefield, the mortality rate among casualties before reaching the A.D.S. was about 20% of all casualties evacuated through this station. The most commonly encountered injuries in this station were those of minor-moderate severity, while the commonest evacuated injuries were those of moderate severity. A good percentage of the wounded with minor injuries were returned back to their duties.

Most of the injuries occurred during action or were due to missiles in the front areas (mostly shell explosions). Although bullets and road traffic accidents were responsible for about 20% of the injuries, shrapnel were the commonest causative agents and this indicates that artillery played a big role both during action and during quiet periods. This figure may also be due to the fact that many of those wounded by bullets did not survive their severe injuries and died before reaching the A.D.S. Another possible explanation for this is that the majority of action occurred during night- time, and therefore pistol- fire and small guns could not be used with accuracy.

Musculoskeletal injuries were the commonest injuries encountered during this war, and this was expected, as these parts were the least protected, and they constitute a good proportion of the whole body surface area.

Head injuries, chest injuries, maxillofacial and abdominal injuries were less common because these areas were well protected in one-way or another. The number of head injuries, chest , and abdominal injuries seen was less than expected because most of those wounded died before reaching the A.D.S.

A good percentage of those with minor injuries who were returned to duty had been injured by causes other than missiles, and the majority of them had musculoskeletal injuries.

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