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Analysis of changes in indicators of provision of medical care at Poltava military hospital in 2022–2023

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Аналіз змін показників надання медичної допомоги Полтавського військового госпіталю в 2022–2023 роках

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Introduction

The Russian-Ukrainian war began in 2014 and for the first eight years was a hybrid conflict. In 2022, it entered an active phase, accompanied by open hostilities between the armed forces of both states [1, 2]. During the period of hybrid war (2014–2022) and at the present time, there has been frequent use by the Russian armed forces of various types of weapons with high striking characteristics, the use of which is prohibited by international law [3, 4]. Given this fact, military doctors of Ukraine raised the question of the impact of these types of weapons on the severity of gunshot wounds, the localization of lesions, as well as on the survival of the wounded and the features of their further treatment. The results obtained were used to update clinical recommendations and modernize military hospitals of the appropriate level to ensure readiness to provide medical care in the event of the use of prohibited high-energy weapons, in particular bullets with an expansive shell [5].

Ukrainian military doctors have been tasked with treating and rehabilitating servicemen injured by modern high-energy weapons, including severe abdominal injuries. An example of such a weapon is an expansive bullet – a specially designed munition that, when hit, fragments into several smaller projectiles, causing significant damage to soft tissues and internal organs. A bullet with an expansive bullet can penetrate high-class body armor [6]. Such ballistic properties can cause extremely severe abdominal injuries, including extensive damage to internal organs, multiple intestinal ruptures with massive contamination of the abdominal cavity, as well as a critically high risk of uncontrolled bleeding, hemorrhagic shock, and massive retroperitoneal hematomas [7]. The ballistic features of expansive bullets lead to the formation of multiple full-thickness gunshot wounds to the colon wall, while isolated defects are extremely rare [8].

Such gunshot trauma from expansive bullets can be fatal for combat patients, even with the golden hour and damage control surgery. The ballistic characteristics of expansive bullets predict expansion upon impact, followed by multiple fragmentation or a mushroom-shaped bullet shape, resulting in greater tissue damage [9].

The Russian-Ukrainian war is accompanied by numerous cases of severe and life-threatening injuries among both military personnel and civilians. The uncontrolled use of high-energy weapons leads to catastrophic injuries that significantly complicate the provision of medical care and often make full rehabilitation impossible [7, 10]. Chest and abdominal injuries are among the most common gunshot injuries in combat and armed conflict and are often seen as combined thoracoabdominal injuries. Such injuries are associated with a high mortality rate and significantly complicate rehabilitation in survivors due to multiple injuries to organs and major vessels of the chest and abdomen, bone fractures, and severe maxillofacial trauma [11]. Modern weapons are designed to inflict critical and severe injuries to multiple organs, represented by separate chest or abdominal wounds or combined wounds, including abdominal and thoracoabdominal cases. [10, 12, 13].

Considering such a picture, the important role of specialized medical institutions that provide medical assistance to wounded servicemen both at the stage of immediate treatment and for further rehabilitation can be seen.

The aim of the research. To understand the complexity and structure of medical care for military personnel, where the hospital is the central point of its provision, it is necessary to analyze the number of patients treated, the average length of stay in the hospital, and the patient contingent.

Object, materials and methods of research

The object of the study was the Poltava Military Hospital. The hospital's performance indicators for 2022-2023 were analyzed. The work used bibliosemantic and statistical methods. To analyze performance indicators, the calculation of the growth/decrease rate for the main

performance indicators was used: the provision of medical care by patient categories, the load on departments, the average duration of treatment, etc. Statistical processing was carried out using MS Excel 2016.

Research results

Overall, the number of patients in the hospital has increased by 4.97% since 2022 and was highest among military personnel undergoing contract service (Table 1). Thus, this number increased by 14.75% from 2047 in 2022 to 2349 in 2023. Accordingly, bed days also increased from 19736 to 32396, which amounted to an increase of 64.15%. In second place were officers, whose number increased from 414 to 436 in 2023 (growth rate 5.31%), bed days also increased from 3724 to 5402 (growth rate 45.06%). These indicators, on the contrary, decreased in soldiers, whose number ranged from 148 to 24 (rate of decrease -83.78%) and bed days from 1801 to 295 (rate of decrease -83.62%) and cadets from 77 to 27 and bed days from 567 to 227 (rate of decrease -59.96%). Such categories of military personnel as employees of the Ministry of Defense of Ukraine, the Security Service of Ukraine, the Ministry of Emergencies, the Ministry of Internal Affairs, and conscripts were not treated in the hospital during the specified period. Beds were operated on a contractual basis. In 2023, there was only one patient – a family member of a serviceman. In 2022, a day hospital was opened in the polyclinic, where ten patients of the officer corps and pensioners could be treated, who did not require constant round-the-clock supervision. In 2023, due to the shift in emphasis to the seriously ill, inpatient 24-hour care takes center stage.

If we consider the use of bed capacity since the beginning of the war in Ukraine by military category, we can note that the largest number of patients was among those serving on a contract basis in surgical and traumatology departments: from 533 in 2022 to 617 in 2023 (growth rate 15.76). In traumatology – from 289 to 671 (growth rate 132.18). Similar changes occurred with such an indicator of inpatient care as bed days. In second place in terms of the number of patients in the department was the neurological and therapeutic department. Although, as can be seen from the table, already in 2023 the number of patients in the neurological department decreased from 534 to 339 (growth rate -36.52). In therapy, there are slight fluctuations, ranging from 414 to 394 (growth rate -4.83).

In second place among the categories of military personnel who were inpatients were officers, the number of whom in the hospital as a whole increased slightly from 414 to 436 people (growth rate 5.31%), bed days increased by 45.06%. The largest share of officers was in the therapeutic department and amounted to 153 in 2022 and 142 in 2023 (decrease rate – -7.2) in the surgical department, the number of those treated increased by 39.6%.

The smallest number of people treated in the hospital were soldiers. 148 in 2022 and 24 in 2023 (rate of decrease – -83.7%). Accordingly, bed days decreased by 83.6%.

Overall, the largest number of patients in the hospital during the two years of the war was in the surgical department –27% (Fig. 1).

In second place is the number of patients in the therapeutic department – 24% (Fig. 1). Obviously, the fact that the largest number of patients was in this department suggests that the military also suffer from chronic diseases, in addition, military personnel who have completed their service in the ranks of the Armed Forces of Ukraine are also treated in this medical institution.

The third position in the structure of patient nosologies is occupied by neurological diseases – 20%. Such a place in this specific weight of neurological diseases can be explained by the fact that in addition to chronic ones, patients with craniocerebral injuries are evacuated to the hospital.

Analyzing the average duration of treatment at the Poltava Military Hospital for the period 2022-2023, it was found that during the reporting period there was an increase in the duration of treatment of contract servicemen (by 47.78%), officers (by 35.96%) and cadets (by 8.11%), while the duration of treatment of conscript servicemen showed a decrease of 8.26% (Table 3)

The average duration of treatment in the surgical department was 10.8 in 2022, but decreased to 10.25 (by 14.3%) in 2023. A different picture was observed in the trauma department: in 2022, the average indicator for the department was 9.25, and in 2023 it increased by 22.1% and was already 11.3. As for the therapeutic departments, there is a decrease in the average duration of treatment in the infectious department (by 17%)

Table 1

Dynamics of bed utilization of the polyclinic and inpatient facilities of the military hospital for 2022–2023

	2022		2023		Growth rate	
	amount	bad-days	amount	bad-days	amount	bad-days
Left with a certain consequence	2777	26315	2915	38730	4,97	47,18
Officers	414	3724	436	5402	5,31	45,06
Contractors	2047	19736	2349	32396	14,75	64,15
Soldiers	148	1801	24	295	-83,78	-83,62
Cadets	77	567	27	227	-64,94	-59,96
Other categories	91	487	79	410	-13,18	-15,81
Transferred	915	6900	710	7871	-22,40	14,07

Table 2

Dynamics of the use of bed capacity of the surgical (surgery, traumatology) profile and the therapeutic (infectious, therapeutic, neurological, dermatovenereological) profile of the military hospital for 2022–2023

	2022		2023		Growth rate		2022		2023		Growth rate	
	amount	bad days	amount	bad days	amount	bad days	amount	bad days	amount	bad days	amount	bad days
	Surgical Department						Traumatology Department					
Left with a certain consequence	717	6472	841	10034	*17,29*	*55,04*	350	3702	734	11342	*109,71*	*206,37*
Officers	106	895	148	1589	*39,62*	*77,54*	51	470	60	945	*17,65*	*101,06*
Contractors	533	4806	617	8040	*15,76*	*67,29*	289	3163	671	10375	*132,18*	*228,01*
Soldiers	25	546	7	88	*-72*	*-83,88*	3	36	1	15	*-66,67*	*-58,33*
Cadets	13	82	14	126	*7,69*	*53,66*	1	5	0	0	*-100*	*-100*
Other categories	40	143	53	180	32,5	25,87	6	28	2	7	-66,66	-75
Transferred	286	1824	155	1498	*-45,8*	*-17,87*	112	1092	119	1525	*6,25*	*39,65*
	Infectious Diseases Department						Therapeutic Department					
Left with a certain consequence	388	2699	206	1235	*-46,91*	*-54,24*	613	6268	555	7015	*-9,46*	*11,92*
Officers	25	171	14	83	*-44*	*-51,46*	153	1403	142	1808	*-7,19*	*28,87*
Contractors	224	1490	180	1080	*-19,64*	*-27,52*	414	4431	394	5011	*-4,83*	*13,09*
Soldiers	86	673	6	37	*-93,02*	*-94,5*	17	209	5	57	*-70,59*	*-72,73*
Cadets	53	365	6	35	*-88,68*	*-90,41*	6	84	3	33	*-50*	*-60,71*
Other categories	0	0	0	0	0	0	23	141	11	106	-52,17	-24,82
Transferred	7	29	14	60	*100*	*106,9*	273	2194	296	3186	*8,42*	*45,21*
	Neurological Department						Dermatology and Venereology Department					
Left with a certain consequence	637	6215	423	5684	*-33,59*	*-8,54*	62	893	156	3420	*151,61*	*282,98*
Officers	73	705	66	867	*-9,59*	*22,98*	5	71	6	110	*20*	*54,93*
Contractors	534	5060	339	4590	*-36,52*	*-9,29*	53	786	148	3300	*179,25*	*319,85*
Soldiers	14	308	5	98	*-64,29*	*-68,18*	3	29	0	0	*-100*	*-100*
Cadets	3	24	2	23	*-33,33*	*-4,17*	1	7	2	10	*100*	*42,86*
Other categories	13	118	11	106	-15,38	-10,16	0	0	0	0	0	0
Transferred	234	1707	120	1542	*-48,72*	*-9,67*	3	54	6	60	*100*	*11,11*

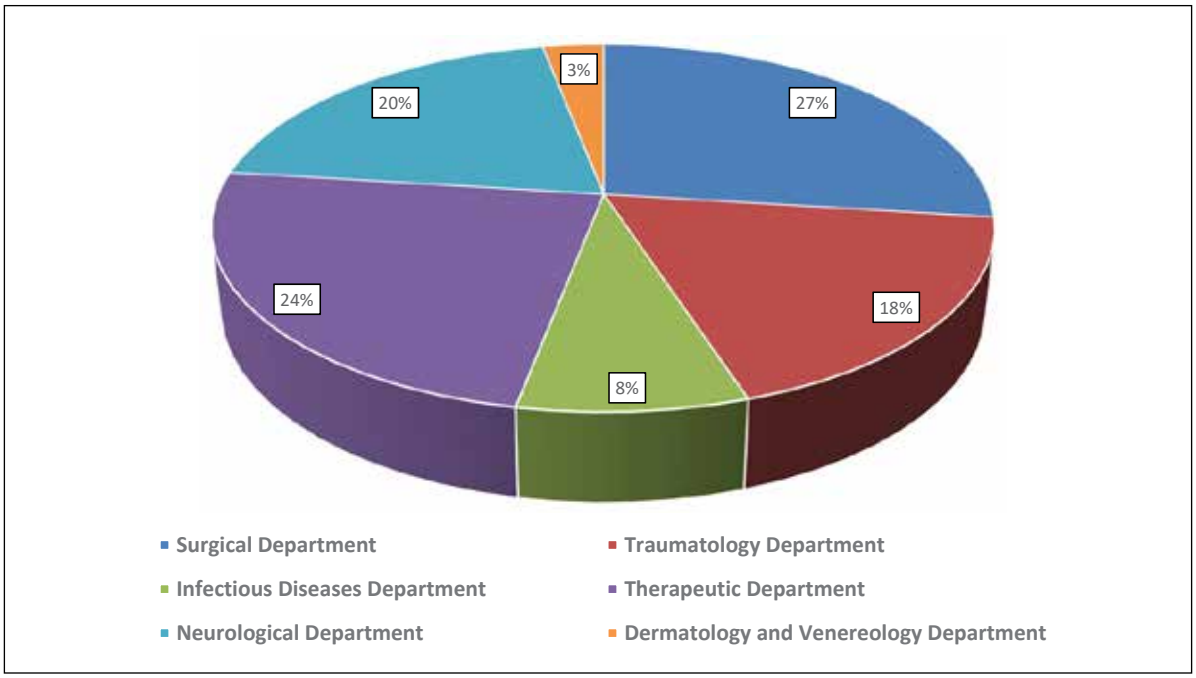

Fig. 1. The specific gravity of patients by department profiles

Table 3

Dynamics of the average duration of treatment in inpatient hospital conditions by staff for 2022–2023

	2022	2023	Growth rate
Average duration of treatment for soldiers and sergeants on conscription	12,1	11,1	-8,26
Average duration of treatment for cadets	7,4	8	8,11
Average duration of treatment for officers	8,9	12,1	35,96
Average duration of treatment for contract servicemen	9	13,3	47,78

Table 4

Dynamics of the average duration of treatment in departments of surgical (surgery, traumatology) profile and therapeutic (infectious, therapeutic, neurological, dermatovenereological) profile by personnel for 2022–2023

	2022	2023	Growth rate	2022	2023	Growth rate
	Surgical Department			**Traumatology Department**		
Average duration of treatment for soldiers and sergeants on conscription	20,6	9,3	*-54,85*	11,7	15	*28,21*
Average duration of treatment for cadets	6,5	8,5	*30,77*	5	0	*-100*
Average duration of treatment for officers	7,9	10,8	*36,71*	9,8	15,1	*54,08*
Average duration of treatment for contract servicemen	8,2	12,4	*51,22*	10,5	15,1	43,81
Average score by department	10,8	10,25	-14,35	9,25	11,3	22,16
	Infectious Diseases Department			Therapeutic Department		
Average duration of treatment for soldiers and sergeants on conscription	7,8	6,2	*-20,51*	11,9	11,4	*-4,2*
Average duration of treatment for cadets	6,9	5,4	*-21,74*	12,8	11	*-14,06*
Average duration of treatment for officers	6,8	5,8	*-14,71*	9,4	12,1	*28,72*
Average duration of treatment for contract servicemen	6,6	5,9	*-10,61*	9,6	12	25
Average score by department	7,025	5,825	*-17,08*	10,925	11,625	*6,4*
	Neurological Department			Dermatology and Venereology Department		
Average duration of treatment for soldiers and sergeants on conscription	20,5	19,6	*-4,39*	9,7	0	*-100*
Average duration of treatment for cadets	8	11,5	*43,75*	7	5	*-28,57*
Average duration of treatment for officers	9,1	13	*42,86*	14,2	18,3	*28,87*
Average duration of treatment for contract servicemen	8,9	13,4	*50,56*	15	21,8	*45,33*
Average score by department	11,625	14,375	*23,65*	11,475	11,275	-1,74

and the dermatovenereological department (by 1.74%), and an increase in the duration of treatment in the therapeutic (by 6.4%) and neurological (by 23.6%) departments (Table 4).

Such dynamics may indicate changes in the organization of the hospital's work, when surgical care was distributed to other health care facilities in the Poltava region.

Discussion of research results

The hospital provides assistance to the wounded and injured as a result of the war, and surgical care is one of its most important types. If we consider all types of injuries, the paramount importance of surgery becomes obvious.

According to the classification, combat surgical pathology includes gunshot and non-gunshot injuries and injuries from various types of weapons and is defined as combat surgical trauma. Gunshot injuries are divided into gunshot wounds, explosive wounds, and blast injuries [14]. Gunshot wounds are caused by the action of the damaging factors of firearms, including small arms, fragmentation and high-explosive fragmentation ammunition, anti-personnel weapons, and explosive ammunition. In our opinion, to avoid terminological confusion, it is advisable to clearly distinguish between the concepts: the term "fragment" should be used in relation to fragments (damaging elements) of mines, shells, bombs, etc. (for example, "blind soft tissue wound with the presence of foreign bodies (metal fragments)"), while the term "fragment" should refer to bone fragments formed as a result of a gunshot fracture (for example, "fragment fracture of the femur" or "gunshot fracture of the pelvic bones with the presence of bone fragments in the soft tissues") [15].

Firearms are weapons designed to mechanically strike a target at a distance with a projectile that receives directed motion in the barrel due to the energy of explosives and has sufficient striking ability [16]. Explosion is the rapid release of a significant amount of energy due to physical, chemical

or nuclear changes in the explosive and the expansion of the volume of the substance and its transformation products, resulting in high pressure, which causes the destruction and movement of objects in the environment. The explosion causes damage to the body, which is called an explosive injury. In the case of direct contact with an explosive device or its location at a small distance, all possible factors of the explosion act on the victim. In this case, explosive injuries occur: destruction and detachment of body parts [15]. However, if the main or even the only component of the explosive injury is shrapnel wounds, it is more appropriate to classify them as gunshot wounds, since the mechanism of injury and the characteristics of the action of the damaging factors in this case are similar [16].

As for military conflicts, skull injuries caused by high-speed bullets or explosion fragments create their own unique set of problems, such as complex fracture patterns, oscillating/rotating trajectories, multiple entry and exit wounds, traumatic aneurysms, brain cavitation and leakag [17].

Compared to the time of the anti-terrorist operation in 2015, in the conditions of the healthcare facility of the Ministry of Defense of Ukraine in military unit A 3309, 33.3% of the inpatients were also neurological patients. In addition, over 800 outpatient visits to a neurologist were registered within two weeks [18].

Prospects for further research

Based on the fact that there is an increase in demand for medical care based on institutions providing assistance to military personnel, the next step in our research will be to analyze the quality of medical care provided to military personnel. We are planning to conduct patient surveys regarding satisfaction with the quality of medical care.

Conclusions

Thus, the hospital's performance indicators showed that during the reporting period, the number of patients treated in the hospital increased by 14.75% compared to 2022 and was the largest among military personnel undergoing contract service.

The largest number of patients was among those serving on a contract basis in the surgical and traumatology departments: from 533 in 2022 to 617 in 2023 (growth rate 15.76). In traumatology – from 289 to 671 (growth rate 132.18). Surgical diseases occupy the leading positions in the morbidity structure. The average duration of treatment of patients in the hospital was the largest in the neurological department – 19.6 in 2023.

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Purpose. To understand the complexity and structure of medical care for military personnel, it is necessary to analyze the number of patients treated, the average duration of hospital stay, and the contingent of patients.

Materials and methods. The object of the study was the Poltava Military Hospital. The hospital's performance indicators for 2022–2023 were analyzed. The work used bibliosemantic and statistical methods.

Results. In general, the number of patients in the hospital has increased by 4.97% since 2022 and was the largest among military personnel undergoing contract service. Thus, this number increased by 14.75% from 2047 in 2022 to 2349 in 2023. Accordingly, bed days also increased from 19736 to 32396, which amounted to an increase of 64.15%. If we consider the use of the bed fund since the beginning of the war in Ukraine by military categories, it can be noted that the largest number of patients was among those serving on a contract basis in the surgical and traumatology departments. In second place among the categories of military personnel who were inpatients were officers, the number of whom in the hospital as a whole increased slightly from 414 to 436 people, bed days increased by 45.06%.

Conclusions. The hospital's performance indicators showed that during the reporting period, the number of those treated in the hospital compared to 2022 increased by 14.75% and was the largest among military personnel serving on a contract basis. Surgical diseases occupy the leading positions in the morbidity structure. The average duration of treatment of patients in the hospital was the largest in the neurological department – 19.6 in 2023.

Key words: military personnel, injuries, hospital performance indicators.

Мета: Для уявлення складності та структури медичної допомоги військовослужбовцям необхідно проаналізувати кількість пролікованих, середню тривалість знаходження у стаціонарі та контингент пацієнтів.

Матеріали та методи. Об'єктом дослідження виступав Полтавський військовий госпіталь. Було проаналізовано показники роботи госпіталя за 2022–2023 рр. У роботі використовувалися бібліосимантичний, статистичний методи.

Результати. У цілому в госпіталі спостерігається збільшення кількості хворих із 2022 р., яка зросла на 4,97% і була найбільшою у військових, які проходять контрактну службу. Відзначено зростання цього числа на 14,75%, із 2 047 у 2022 р. до 2 349 у 2023 р. Спостерігалося і зростання показника ліжко-днів – із 19 736 до 32 396, або на 64,15%. Розглядаючи використання ліжкового фонду Полтавського військового шпиталю від моменту початку війни в Україні за категоріями військових, можна відзначити, що найбільша кількість пацієнтів була серед тих, які проходять військову службу на контрактній основі і проходять лікування в хірургічному та травматологічному відділеннях: від 533 у 2022 р. до 617 у 2023 р. (темп приросту – 15,76) у хірургічному відділенні та від 289 до 671 (темп приросту – 132,18) у травматологічному відділенні. На другому місці за кількістю хворих у відділенні були неврологічне і терапевтичне відділення. Уже в 2023 р. кількість пацієнтів неврологічного відділення знизилася з 534 до 339 (темп росту – -36,52), а в терапевтичному відділенні спостерігалися відносно незначні коливання, які становили зміну показника від 414 до 394 (темп росту – -4,83).

Розглядаючи використання ліжкового фонду Полтавського військового шпиталю з початку війни в Україні за категоріями військових, найбільша кількість пацієнтів була серед тих, які проходять військову службу на контрактній основі. На другому місці серед категорій військовослужбовців, які знаходилися на стаціонарному лікуванні, були офіцери, кількість яких у цілому по госпіталю виросла незначно – від 414 до 436 осіб, ліжко-дні відповідно зросли на 45,06%. Водночас спостерігалося значне зменшення цих показників у солдат, кількість яких сягала від 148 до 24 (темп зниження – 83,78%) та ліжко-днів – із 1 801 до 295 (темп зниження – -83,62%), і курсантів – від 77 до 27 та ліжко-днів – із 567 до 227 (темп зниження – -59,96%). Такі категорії військових, як службовці Міністерства оборони України, СБУ, МНС, МВС, призовники, за зазначений період в госпіталі не лікувалися.

Аналізуючи середню тривалість лікування в Полтавському військовому госпіталі за період 2022–2023 рр., установлено, що за звітний період відбулося збільшення тривалості лікування військовослужбовців контрактної служби (на 47,78%), офіцерів (на 35,96%) та курсантів (на 8,11%), а тривалість лікування військовослужбовців строкової служби зменшилася на 8,26%. Середня тривалість лікування в хірургічному відділенні у 2022 р. становила 10,8, але в 2023 р. знизилася до 10,25 (на 14,3%). Інша картина спостерігалася в травматологічному відділенні: у 2022 р. середній показник по відділенню становив 9,25, а в 2023 р. він зріс на 22,1% і становив уже 11,3. За терапевтичним профілем спостерігається зменшення середньої тривалості лікування в інфекційному (на 17%) та шкірно-венерологічному (на 1,74%) відділеннях та збільшення тривалості лікування в терапевтичному (на 6,4%) та неврологічному (на 23,6%) відділеннях.

Висновки. Показники діяльності стаціонару показали, що протягом звітного періоду кількість пролікованих у госпіталі порівняно з 2022 р. зросла на 14,75% і була найбільшою у військових, які проходять контрактну службу. Провідні позиції у структурі захворюваності посідають хірургічні хвороби. Середня тривалість лікування хворих у стаціонарі була найбільшою в неврологічному відділенні – 19,6 у 2023 р.

Ключові слова: військовослужбовці, травми, показники роботи госпіталю.

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