

What happens to post-burn surgical rehabilitation in the Ural Federal District? Ways to improve health care

M.Yu. Korostelev¹, N.G. Shikhaleva¹, A.V. Gubin², S.O. Ryabykh¹, O.B. Borzunova¹

¹Ilizarov National Medical Research Centre for Traumatology and Orthopedics, Kurgan, Russian Federation

²National Medical Research Center of Traumatology and Orthopedics n.a. N.N. Priorov, Moscow, Russian Federation

Introduction Eleven million burn injuries have been recorded in the world annually, and 180 thousand of them result in death. Burns are the fourth leading cause of trauma. Mortality in adult patients with burns in the Russian Federation is 4.8 % and 5.3 % in the Ural Federal District. **Materials and methods** A retrospective analysis of statistical data on the provision of specialized inpatient medical care to patients with thermal trauma in the regions of the Ural Federal District for five years has been undertaken. **Results** In most regions of the Ural Federal District, there are no transfer protocols for patients with burn injuries. The load on the existing capacity of hospital beds in the regions is uneven. Most of the thermal trauma patients in specialized departments are treated conservatively. Not a single "burns" department of the Ural Federal District has a certified plastic surgeon. **Conclusion** The following organizational measures are a need: introduction of a unified approach to statistical reports, deployment of surgical beds at departments for burn injury management to provide specialized medical care to patients with various wound defects, referral transfer of patients with the consequences of thermal injury to a specialized federal institution and creation of a unified register of burn patients.

Keywords: combustiology, burn, plastic surgery, thermal injury, wound defects

INTRODUCTION

Burn injuries have been underestimated. However, these injuries lead to serious consequences and death. Burn injuries, especially severe ones, are accompanied by immune and inflammatory reactions, metabolic changes and distributive shock, which are difficult to cope with and which may result in multiple organ failure [1].

According to WHO estimates, 11 million burn injuries of all types have been registered annually in the world, 180 thousand (1.64 %) of them end in death [2]. Burns are the fourth leading cause of injury [3].

In 2018, 49,262 cases of burns and 3,441 cases of frostbite were registered in the Russian Federation. They account for 1.9 and 0.1 % of all injuries and poisoning cases, respectively [4]. In the structure of hospitalized

trauma cases in the Russian Federation in 2018, thermal and chemical burns make 2.8 % among adult and 6.1 % among pediatric patients. Mortality rate was 4.8 % in adult patients with burn injuries in the Russian Federation and 5.3 % in the Ural Federal District. Also in the Ural Federal District, the highest mortality rate in the Russian Federation was recorded among patients with burn injuries older than working age (11.2 %). Mortality in children with burn injuries in the Russian Federation was 0.26 % while in the Ural Federal District it was 0.28 %.

Purpose of the study was to identify problems and search for the ways to improve the provision of medical care to patients in the field of "burns management" in the regions of the Ural Federal District.

MATERIAL AND METHODS

The study is a retrospective analysis of statistical indicators in the provision of specialized inpatient medical care to patients with thermal trauma in the regions of the Ural Federal District rendered in 2014–2018. The data of statistical reports, questionnaire surveys of burn centres (departments) and Ministries (Departments) of the health care system of the Ural

Federal District were analysed. Exception was the Yamalo-Nenets Autonomous Okrug (YaNAO), where there is no separate burns department but there are specialized beds for such trauma in surgical units. The questionnaires included indicators of inpatient performance in providing medical care to patients over a five-year period.

RESULTS AND DISCUSSION

In the analyzed period, 32,761 patients with burn injuries were treated at the hospitals of the Ural Federal District, including 19,546 adults (59.7 %) and 13,215 children (40.3 %). The number of pediatric

patients discharged decreased by 33 % over five years. The reduction in the number of discharged adult patients began in 2016 and amounted to 16 % in three years (Fig. 1).

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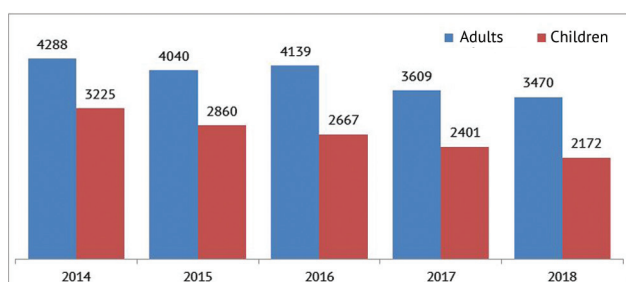


Fig. 1 Dynamics of the number of patients with burn injury discharged from hospitals of the Ural Federal District

A decrease in the number of patients treated in 2018 compared to 2014 (Fig. 2) was noted in all regions, with the exception of adult patients in the Sverdlovsk region, where the number of discharged patients increased by 36 people (3 %). The largest twofold decrease in the number of injured, detected in the Tyumen region, may have been due to the changes in statistical records, which is also confirmed by the incidence of burn injury in the Tyumen region in 2014 (Table 1).

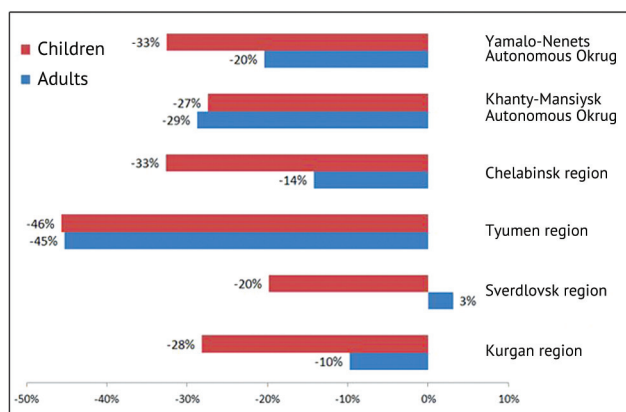


Fig. 2 Relative indicators of the decrease in the number of discharged patients in 2018 to 2014

Table 1

Incidence index for burn injuries treated in inpatient settings in the Ural Federal District

Region	Incidence index (per 1,000)				
	2014	2015	2016	2017	2018
Kurgan region	0.73	0.66	0.68	0.61	0.60
Sverdlovsk region	0.49	0.50	0.55	0.47	0.46
Tyumen region	1.12	0.91	0.76	0.63	0.61
Chelabinsk region	0.47	0.47	0.45	0.42	0.37
Khanty-Mansiysk Autonomous Okrug – Ugra	0.61	0.52	0.50	0.48	0.44
Yamalo-Nenets Autonomous Okrug	0.58	0.56	0.53	0.46	0.43

The incidence index for burn injuries in the Ural Federal District in 2018 has decreased compared to 2014 from 0.60 to 0.46 per one thousand of the population, decreasing evenly in all regions. The highest rates of burn injury incidence over five years have been recorded in the Kurgan and Tyumen regions, the lowest in the Chelyabinsk region (Table 1).

There are five burns departments and one burns centre (Chelyabinsk) in the Ural Federal District for specialized inpatient treatment of thermal trauma, in which 196 specialized beds have been deployed. The number of beds in 2018 decreased in all regions, totally in the district by 43 beds (18 %). Nevertheless, the rate of provision with beds for thermal trauma in three regions of the District significantly exceeds the rate in the RF (0.18 per 10,000 population) (Fig. 3).

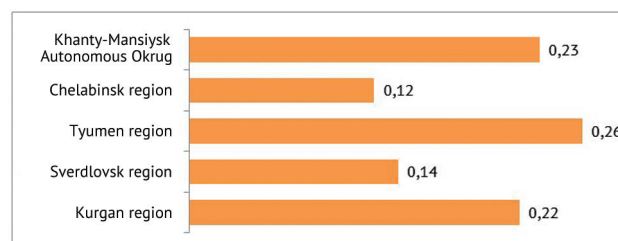


Fig. 3 Indices of the provision with beds for thermal trauma patients per 10,000 of population in the regions of the Ural Federal District in 2018

According to the results of the surveys, it was revealed that only 79.74 % of the injured were treated in specialized beds; the rest of the patients received treatment being admitted to regular surgical units. This testifies to the absence of a clear referral system in the field of burns management. There is an order for a protocol of referral in the Chelyabinsk region.

Attention is drawn to the lack of a unified approach in statistical reporting in the regions. Some departments make calculation according to on the area of burns, others to the depth of tissue damage. Thus, it is impossible to compare the qualitative and quantitative indicators of thermal injuries. To unify the data, it should be recommended to the heads (heads) of burns departments and centers to use the reporting statistical formula of the chief specialist in thermal trauma of the region, developed under the guidance of Professor A.A. Alekseev and approved by the All-Russian public organization of thermal trauma doctors "World without burns" (<http://combustiology.ru>). It should be noted that this formula was developed only for burns departments and centers and does not include data for the analysis of burn injuries from regular units in the whole region.

The data obtained in the analysis of the surgical work of the burns departments indicate the absence of data in the statistical reports of the MIAC in some regions (Table 2). If we compare the obtained data with the total number of injured per year, then we can conclude that most patients in specialized departments were treated conservatively. There was a significant fivefold decrease in the "ratio of the persons who were treated surgically to patients discharged", which might be caused by incorrect statistical reporting. At the same time, in a number of normative documents of the Ministry of Health of Russia this profile of medical care is called "surgery (combustiology)".

The burns department of the Kurgan region operates with a stable overload, with a high rate of provision of beds per 10,000 population (Table 3). An insufficient index of "bed capacity" was registered in the burns departments of the Sverdlovsk region with a low indicator of bed availability. In the Khanty-Mansiysk Autonomous Okrug (KhMAO), this index has grown by 12 % since 2014 with a high rate of bed availability.

We believe that these collisions have been also associated with the lack of a coordinated statistical reporting system.

The long-term consequences of burn injuries have an enormous physical, mental and social impact on the injured and their families [5–7]. Rehabilitation of patients with the consequences of burns continues to be one of the most difficult problems in reconstructive and plastic surgery [8, 9]. Cicatricial deformities and contractures are inevitable due to the severity of the primary lesion and the lack of a systematic tactical approach to recovery operations. Patients with burns

contractures account for 36.5 % of all patients who underwent reconstructive surgery [10]. According to the literature, reconstructive operations are a need for every second patient with the consequences of burns [11]. In our opinion, about 40 % of patients who suffered a deep burn injury will need reconstructive and restorative plastic operations in the future. The proportion of patients with skin cancer, developed due to scars, accounts for 1.5–6.0 % of the total number of patients with skin cancer [12, 13]. Skin cancer developed on post-burn scars is extremely aggressive. The rate of its metastasis and recurrence is higher if compared with skin cancer originating from non-scar tissue.

Here are several photographs of our patients who suffered thermal trauma and received reconstructive surgery on the affected segments (Fig. 4, 5, 6). The localization and area of scars in patients varies and requires an individual approach, taking into account the needs of patients to improve the quality of life.

Table 2

Number of interventions for wounds and burns performed at the thermal trauma centres in the Ural Federal District

Regions	Number of interventions				
	2014	2015	2016	2017	2018
Kurgan region	–	–	–	–	–
Sverdlovsk region	404	389	391	–	–
Tyumen region	390	454	451	–	–
Chelabinsk region	693	474	668	–	–
Khanty-Mansiysk Autonomous Okrug – Ugra	369	227	245	330	285
Yamalo-Nenets Autonomous Okrug	–	–	–	–	–
Total	1856	1544	1755	330	285
Ratio of patients operated on to discharged ones	25 %	22 %	26 %	5 %	5 %

Table 3

Bed capacity work at centres and departments for management of burns

Region		Bed capacity work				
		2014	2015	2016	2017	2018
Kurgan region		362.9	336.1	340.7	350.0	348.0
Sverdlovsk region	adults	262	258	137	279.9	273.3
	children	238	250	280		
Tyumen region		318.5	324.9	336.2	339	327
Chelabinsk region		330	302	328	308	339
Khanty-Mansiysk Autonomous Okrug – Ugra		288.1	273.7	331.0	334.3	321.8
Yamalo-Nenets Autonomous Okrug		–	–	–	279.9	273.3



Fig. 4 Photo of a 45-year-old patient. Diagnosis: post-burn contracture of the neck, impaired neck movements, impaired swallowing and breathing



Fig. 5 Photo of the hands of a 54-year-old patient. Diagnosis: post-burn deformities and contractures of the joints of both hands



Fig. 6 Photo of a 16-year-old patient. Diagnosis: extensive scars of the right half of the body. long-term non-healing sluggishly granulating wounds in the area of scars

What actually happens to post-burn surgical rehabilitation of the injured? We asked to answer this question in the reports supplied by the regions. Information on this issue was not provided by most regions of the Ural Federal District. There is information on reconstructive operations in patients with post-burn scars and deformities in the Chelyabinsk region, Sverdlovsk region and Khanty-Mansiysk Autonomous Okrug in 2014; in 2018 the information on operations was presented only in the KhMAO report. It means that either no reconstructive surgeries were performed, or they were not counted.

However, patients with long-term non-healing trophic ulcers, patients who received various wounds by mechanical means, and patients with benign skin diseases occupy the "post-burn" beds. On the one hand, in fact, these are non-core patients for burn departments, but on the other hand, it is burns injury specialists (Rus. term "combustionologists") who currently have the skills to successfully treat soft-tissue and skin pathology. Major reconstructive

interventions require professional competence and certification in plastic surgery, and not just advanced training in reconstructive surgery. According to the Procedure for the provision of medical care to the population in the field of "plastic surgery", approved by order of the Ministry of Health of the Russian Federation dated 05/31/2018 N 298, reconstructive and restorative operations in patients with the consequences of burns are within the competence of plastic surgeons. It is confirmed by the successful work of "burn" departments in the leading surgical centres in the European part of the Russian Federation (Vishnevsky National Medical Research Centre of Surgery, Privolzhsky Research Medical University) where doctors specializing in plastic surgery practice. In the Ural Federal District, there are no such specialists in thermal trauma departments.

In this regard, it is advisable to refer patients with the consequences of thermal injury to a specialized federal institution that meets modern requirements for the provision of specialized and high-tech care to patients with the consequences of burn injury. Organizationally and economically justified route in the Ural Federal District may be the referral of patients of this nosological group to the clinic of reconstructive plastic surgery and hand surgery of the Federal State Budgetary Institution Ilizarov National Medical Research Centre for Traumatology and Orthopaedics the RF Ministry of Health which has not only the necessary material and technical support, staffed with specialists practicing plastic surgery, experienced in the management of burns but also has a long-year experience in the treatment of various post-traumatic deformities and defects.

The most important element of planning specialized care for patients with thermal trauma and its consequences should be a unified register of patients with burns and its updating both within the framework of the specialized medical association and institutions for management of thermal trauma.

CONCLUSION

Despite the social significance of thermal injury and the high relevance of rehabilitation of patients with acute burn injury and with post-burn scars and deformities in the long-term period [12, 14–16], the specialty "combustiology" remains one of the few medical specialties in Russia for which the Order of the procedure of rendering assistance has not been adopted.

In the regions of the Ural Federal District, there are no referral schemes for patients with burn injuries. The capacity of the existing specialized beds in the regions is uneven; most of the thermal trauma patients

in specialized departments are treated conservatively. Not a single "burns" department of the Ural Federal District has a certified plastic surgeon.

It is necessary to introduce a unified approach to statistical reporting. It is feasible to deploy surgical beds at "burns" departments to provide specialized medical care to patients with various wound defects requiring autodermplasty. The issues of referring patients with the consequences of thermal injury to a specialized federal institution and the creation of a unified register of "burn injury" patients require organizational solutions.

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Information about the authors:

1. Mikhail Yu. Korostelev, M.D., Ilizarov National Medical Research Centre for Traumatology and Orthopedics, Kurgan, Russian Federation, Email: 2351724@mail.ru
2. Natalia G. Shikhaleva, M.D., Ph.D., Ilizarov National Medical Research Centre for Traumatology and Orthopedics, Kurgan, Russian Federation, Email: nshikhaleva@mail.ru
3. Alexander V. Gubin, M.D., Ph.D., National Medical Research Center of Traumatology and Orthopedics n.a. N.N. Priorov, Moscow, Russian Federation, Email: shugu19@gubin.spb.ru
4. Sergey O. Ryabykh, M.D., Ph.D., Ilizarov National Medical Research Centre for Traumatology and Orthopedics, Kurgan, Russian Federation, Email: rso_@mail.ru
5. Olga B. Borzunova, Ilizarov National Medical Research Centre for Traumatology and Orthopedics, Kurgan, Russian Federation, Email: olbor99@mail.ru