

Planning of Trauma Orthopedist Population

Lindenbraten A.L.

N.A. Semashko National Research Institute of Public Health
Moscow, Russia
lindenbraten13@rambler.ru

Shipova V.M.

N.A. Semashko National Research Institute of Public Health
Moscow, Russia
vschipova@yandex.ru

Kindarov Z.B.

Chechen State University
Grozny, Russia
e-mail: Z.kindarov@chesu.ru

Grishina N.K.

N.A. Semashko National Research Institute of Public Health
Moscow, Russia
otdel-77@mail.ru

Gordova L.D.

Main Sociomedical Examination Bureau
in Kursk Region of the Russian Ministry of Labor
Kursk, Russia
doctor968@yandex.ru

Abstract – The paper presents the analysis of modern regulatory labor framework in traumatology orthopedics, calculations of staffing number of trauma orthopedists. This task requires the definition of the required number of health workers of any profile and comparison of these data with the actual number of positions. The study is conducted using such methods as analysis of the best practices, analytical, comparative analysis.

Keywords – *worktime standard, trauma orthopedist, planned and standard indicators, visit, bed, bed day.*

I. INTRODUCTION

One of strategic objectives of the Decree of the Russian President of 07.05.2018 is to close the gap of staff shortage in medical institutions providing primary health care [1–5]. This task requires the definition of the required number of health workers of any profile and comparison of these data with the actual number of positions [2, 6–8].

II. METHODS AND MATERIALS

The study is conducted using such methods as analysis of the best practices, analytical, comparative analysis. The paper presents the analysis of regulatory labor framework in traumatology orthopedics, as well as calculations of staffing number of trauma orthopedists. Standard and actual number of these positions is estimated.

III. RESULTS

Proceeding from the available information, the standard number of healthcare positions is defined by two ways:

- according to staffing standards;
- according to the volume of work and standard costs per work unit.

In recent years the staffing standards are established by the orders on the procedure for any type of help. At present, the

traumatology orthopedics is governed by the following decrees of the Russian Ministry of Health:

- Decree No. 901n “On the approval of the procedure of healthcare to adult population in traumatology and orthopedics” (annexes 2, 5, 8, 12, 15) of 12.11.2012);
- Decree No. 927n “On the approval of the procedure of healthcare to injured people with concomitant, multisystem and isolated injuries followed by shock” (annexes 2, 5) of 15.11.2012.

These documents are made on the basis of all other orders on procedures and unfortunately contain all their system weaknesses and wrong provisions, namely the following:

- disregard of labor norming calculation;
- violation of nomenclatures of medical organizations, specialties, positions, bed density;
- invalid data on the number of positions to ensure day-and-night service;
- lack of standards in divisions, positions;
- inconsistency of labor norming volumes in different concurrent documents;
- economic inconsistency of approved worktime standards.

Besides, there are the decrees of the Russian Ministry of Health establishing the Regulations on rendering primary medical and sanitary help to adult population (No. 543n of 15.05.2012) and to children (No. 92n of 07.03.2018). The worktime standards for trauma orthopedists are also stipulated in these documents.

The results of the survey demonstrate that the comparison of standard data regarding medical care to adult population in out-patient and polyclinic conditions show inconsistency of

worktime standards in different concurrent documents (Tab. 1).

TABLE I. STANDARD NUMBER OF TRAUMA ORTHOPEDISTS PROVIDING OUTPATIENT CARE OF ADULT POPULATION

Position	Decree No. 901n	Decree No. 543n
Head of department	1 per 8 or more trauma orthopedists	1 position per 8 or more medical positions
Trauma orthopedist	1 per 15 thousand adult population	1 position for reception of adult patients with injuries and musculoskeletal disorders per 20,500 of adult population; 1 round-the-clock post per 100,000 of assigned population for round-the-clock out-patient traumatological help
Nurse	1 per 1 trauma orthopedist	2 positions per each position of trauma orthopedist; 1 position per shift for round-the-clock first-aid station given there is work on cast application
Paramedic	1 per 3 rooms	1 per each position of a medical specialist (trauma orthopedist)

Thus, according to the decree No. 901n the position of a trauma orthopedist is established per 15 thousand adult population, and by the decree No. 543n – per 20.5 thousand. There is also no uniformity in the volume of work standards for middle grade and junior medical staff. The decree No. 901n recommends one position of a nurse per one trauma orthopedist and one paramedic per 3 rooms, while the decree No. 543n-2 suggests one position of a nurse and 1 position of a paramedic per each position of a trauma orthopedist.

The differences in work standards are even more surprising in case of providing healthcare to children (Tab. 2).

The decree No. 901n recommends one position of a trauma orthopedist per 12.5 thousand child population, which corresponds to 0.8 positions per 10.0 thousand children, and the decree No. 92n 1.5 – one position per 10.0 thousand children. The standard number of paramedics is missing in the decree No. 92n for all outpatient doctors, including a trauma orthopedist. The standards for the position of the head of department and a nurse are similar in both decrees shown in Table 2.

TABLE II. STANDARD NUMBER OF TRAUMA ORTHOPEDISTS PROVIDING OUTPATIENT CARE OF CHILD POPULATION

Position	Decree No. 901n	Decree No. 92n
Head of department	1 per 8 or more trauma orthopedists	1 position per 8 or more medical positions
Trauma orthopedist	1 per 12,5 thousand child population	1,5 positions per 10,0 thousand children
Nurse	1 per 1 trauma orthopedist	1,5 positions to assist a trauma orthopedist
Paramedic	1 per 3 rooms	n/a

Figure 1 clearly shows the differences in work standards of a trauma orthopedist in different concurrent documents, i.e. orders and regulations on primary health care.

Staffing standards do not only serve the basis for staff schedule of a medical organization, but also the source data for staff training.

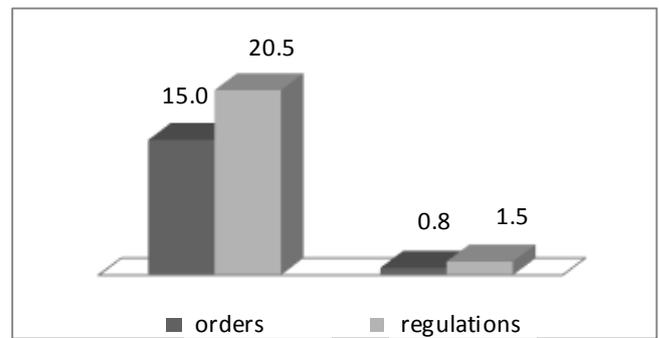


Fig. 1. Standard number of trauma orthopedists according to different documents (per 10.0 thousand corresponding population)

The calculation of staffing standards shows that according to decree No. 901n the standard number of trauma orthopedists providing out-patient and polyclinic help to the population of the country is about 10 thousand positions, including 7.8 thousand providing healthcare to adult population (117909:15) and 2.3 thousand providing healthcare to children (28358:12.5). Taking into account the positions of the heads of departments this general figure will make about 11 thousand positions.

If we apply the decrees under the Regulations on primary healthcare, i.e. decrees No. 543n and No. 92n, then the number of positions of trauma orthopedists will also make about 10 thousand, including 5.8 thousand providing healthcare to adults (117909:20.5) and 4.3 thousand providing healthcare to children (2835.8x1.5), and taking into account the positions of the heads of departments – about 11 thousand positions.

There is a need to add the standard number of trauma orthopedists providing round-the-clock out-patient traumatological help to this number of positions. As Table 1 shows, 1 round-the-clock post per 100,000 of the assigned population is planned for this type of help. This statement does not indicate the place of residence of the population (urban or rural areas), administrative significance and the population size of the area where this type of help is possible. Earlier these positions were established as follows: “The positions of trauma orthopedists providing round-the-clock out-patient traumatological help are established in one of municipal polyclinics of the city (city administrative region) with the population of at least 200 (in regional, krai, republican centers – at least 100) thousands people depending on the volume of such help and estimated norms of service, but not less than 1 round-the-clock post” [3].

If following the decree No. 901n and taking into account that the number of positions ensuring round-the-clock service of one post equals 5, then the necessary number of positions of trauma orthopedists for 2019 providing emergency out-patient help will make 7.3 thousand (146793744:100000 x5).

The number of positions per the workload of trauma orthopedists is calculated by the outpatient labor norming method [3, 4]. Such calculations consider the following data:

- time standards for appointments;
- planned and standard indicators of the number of appointments.

Time standards for appointments of a trauma orthopedist were established last century, these data are not stipulated in modern legal documents [5].

Since 2013 an appointment as the main planned and standard indicator of out-patient and polyclinic help was replaced with a visit on the occasion of a disease, and the appointment was only applied as a preventive measure. Since this period the territorial programs of state guarantees do not list planned and standard indicators neither concerning appointments, nor visits. But even during this period when planned and standard number of appointments was given, these indicators, which were initially specified in traumatology and orthopedics, later became part of the surgery. Therefore, the calculations on the workload are not given at the federal level due to lack of source data, such calculations can be made in certain medical organizations.

According to the decree No. 901n the position of the head of the department of traumatology and orthopedics is established per 40 beds and more, a trauma orthopedist – per 17 beds, a charge nurse (desk nurse) and junior nurse on patient care – 4.75 positions to ensure round-the-clock service. There is no standard for a position of a scrub nurse.

The calculation of the number of traumatologists providing hospital help imply direct account of the number of beds. At the same time, it is possible to calculate both actual and planned number of beds. In 2017 the actual number of beds in traumatology made 38,229, in orthopedics – 9107, in total – 47,336 beds [5]. The position of a trauma orthopedist is planned per 17 beds, and medical care to injured people with concomitant, multisystem and isolated injuries followed by shock – per 15 beds. Since the public health statistics does not contain such differentiation of patients, the calculation is made per 17 beds. The number of positions of trauma orthopedists providing hospital help will make 2.8 thousand (47336:17) across the country and taking into account the heads of department – about 3 thousand positions.

To calculate the number of positions of trauma orthopedists per planned number of beds it is necessary to transfer the planned number of bed-days specified in territorial programs to the number of beds. The number of beds was a key planned and financial indicator until 1999, which, for the purpose of financing increase, led to the increase of the bed density irrespective of its use. The transition to a new planned indicator (number of bed-days) during that period allowed excluding financing of nonfunctioning beds. Since 2014 the new planned and standard indicator has been introduced: case of hospitalization (complete treatment case). At the same time other planned and standard indicators of hospital organizations, such as the average duration of stay of a patient in a hospital, planned number of bed-days, were also maintained. Such position of the authors of the Program seems quite reasonable since the case of hospitalization is only one link in the general chain of hospital care planning.

Figure 2 shows the dynamics of planned and standard number of bed-days in traumatology and orthopedics.

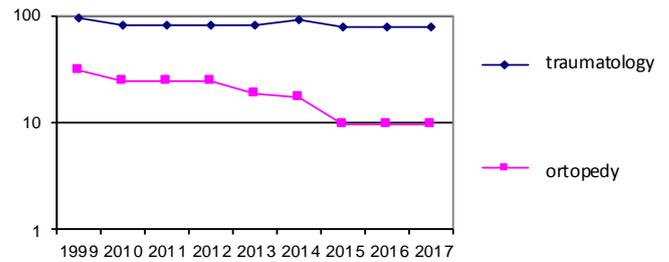


Fig. 2. Planned and standard number of bed-days in traumatology and orthopedics

The figure, illustrating semilogarithmic measuring grid for comparison, shows the reduction of bed-days in traumatology corresponding to the general change of the number of bed-days and sharp reduction of the number of bed-days in orthopedics.

Further, the territorial programs for 2018 and 2019 unite these two medical profiles into one: traumatology and orthopedics.

Table 3 shows the medical workload serving the basis for calculation of the required number of beds.

Figure 3 shows the recalculation algorithm for the number of bed-days into the number of beds within territorial programs.

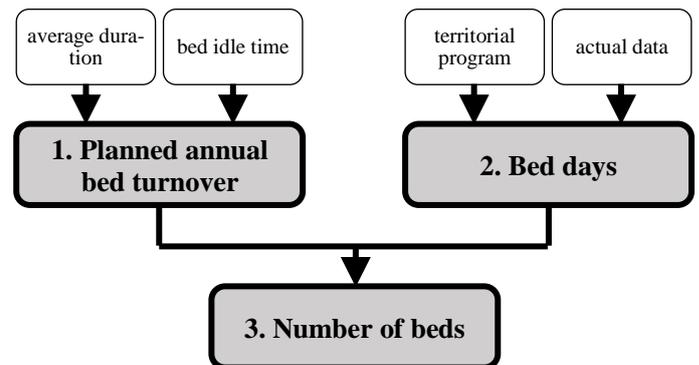


Fig. 3. Calculation pattern of the number of beds according to the number of bed-days and planned bed turnover

The first stage of the calculation defines the planned annual turnover of beds (F) according to the formula:

$$F = \frac{365 - t_1}{T + t_0} \quad (1)$$

where: t_1 – average idle time of a bed on repair (10–15 days);

t_0 – idle time of a bed due to turnover, i.e. time necessary for bed sanitation after the discharge of a patient and admission of a new patient and waiting time of hospitalization

(1.0 for all profiles, except: phthisiology – 3; obstetrics – 2.5–3; infectious diseases – 3; abortion beds – 0.5, etc.);

T – average duration of stay of a patient.

TABLE III. RECOMMENDED WORKLOAD OF SPECIALIZED MEDICAL CARE IN IN-PATIENT CONDITIONS ACCORDING TO MEDICAL PROFILES FOR 2019¹ IN COMPARISON WITH 2018².

Medical profile	Recommended number of hospitalization cases (per 1000 citizens annually)		Average duration of stay of 1 patient (days)		Recommended number of bed-days (24-hour stay) per 1000 citizens	
	for 2019	for 2018	for 2019	for 2018	for 2019	for 2018
Traumatology and orthopedics	8.10	7.90	11.1	11.0	89.91	87.69
Total for specialized in-patient medical care	189.03	188.35	11.7	11.8	2213.87	2214.25

The planned bed turnover in traumatology and orthopedics for 2019 is calculated according to formula 1 and shows that this number makes 29.1 $\{(365-12.5):(11.1+1.0)\}$. The calculation considers the average idle time of a bed due to repair equal to 12.5 days as an average recommended by territorial programs (10–15 days).

The planned number of beds (K) per 10.0 thousand people is defined by the following formula:

$$K = (A \times 10):(365-12.5-t \times F), \quad (2)$$

where: A – number of bed-days per 1000 people;

t – idle time of a bed due to its turnover;

F – annual bed turnover.

The planned and standard indicator of the number of bed-days established by territorial programs is calculated per 1000 people, while the number of beds in statistical books and in healthcare practice is defined per 10.0 thousand people. Hence, the indicator equal 10 is entered into the numerator of a formula. The calculations show that the number of planned beds in traumatology and orthopedics equals 2.8 per 10.0 thousand people $\{(89.91 \times 10):(365-12.5-1 \times 29.1)\}$, which in total makes 40,955 beds (2.8x14626.7).

The total standard number of positions of trauma orthopedists per planned number of beds is 2.4 thousand (40955:17), and taking into account the positions of the heads of departments – 2.5 thousand.

Thus, the total standard number of trauma orthopedists is over 20 thousand positions, including:

- 11 thousand providing out-patient and polyclinic care;

- 7.3 thousand providing emergency traumatological help;
- 3 thousand providing hospital care on the basis of the actual number of beds or 2.5 thousand providing hospital care on the basis of planned number of beds.

The actual number of trauma orthopedists (natural persons) makes 12.3 thousand [5]. Considering the secondary employment, which on average equals 1.2, these doctors can hold about 15 positions (12.3x1.2). Therefore, the shortage of trauma orthopedists is about 5 thousand positions.

IV. CONCLUSION

The above analysis allows concluding the following:

- there is a need to revise the decree No. 901n due to recommendations of the Ministry of Labor on the revision of labor standards every 5 years from the date of their approval and due to the number of wrong provisions of the labor document;
- there is a need to consider the current shortage of trauma orthopedists in relation to their standard number in training of medical shots and their differentiation according to profiles;
- the proposed method of calculation of standard number of trauma orthopedists can also be used for other medical positions.

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¹ Letter of the Russian Ministry of Health No. 11-7/10/1-511 “On formation and economic justification of the territorial program of state guarantees of free medical care to citizens for 2019 and for the planning period of 2020 and 2021” of 21.12.2018.

² Letter of the Russian Ministry of Health No. 11-7/10/2-8616 “On formation and economic justification of the territorial program of state guarantees of free medical care to citizens for 2019 and for the planning period of 2020 and 2021” of 13.12.2017.