UDC 377.44+614.23/.253.52(58)+658+616-051+331.108.24
DOI: 10.56871/MHCO.2023.89.51.004

STAFFING SHORTAGE OF NURSING PERSONNEL AS AN ACTUAL HEALTH CARE PROBLEM

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For citation: Petrova NG, Ter-Minasova AN, Pogosyan SG, Kalinichenko OV. Staffing shortage of nursing personnel as an actual health care problem. Medicine and health care organization (St. Petersburg). 2023;8(1):43-53. DOI: https://doi.org/10.56871/MHCO.2023.89.51.004

Received: 21.12.2022 **Revised: 15.02.2023** **Accepted: 21,03,2023**

ABSTRACT. The problem of nursing shortage is one of the most important health care problems in the world at whole and in Russia. It affects lowering the level of nursing care quality, the level of interaction between different categories of staff and finally patient satisfaction. Being common for all medical institutions, there are still specific features of these processes in certain regions, including large cities. So the purpose of this study was to analyze the dynamics and trends of the provision of nursing personnel in St. Petersburg. The official statistics data were used with the calculation of extensive, intensive, ratio indicators, dynamic series (with their alignment by the least squares method), calculation of indicators trends up to 2030. It was found that in 2009 the index of provision of nursing personnel in St. Petersburg was 93.6 (per 10 thousand population), and in 2018 it decreased to 81.9 (by 12.5%). There was also a decreasing of this indicator in medical organizations of regional subordination (from 73.6 to 70.3), but the rate of this decreasing was significantly lower (4.5%). In general, the decline in overall was steady, and according to development forecasts it will continue, the dynamics in regional organizations was multidirectional and some growth of the indicator may be seen in the future. The provision of nurses and midwives decreases in dynamics, and the provision of nurses and X-ray technicians is increasing. The ratio of doctors to nursing staff in the city as a whole decreased from 1.5 to 1.4 with a tendency to a subsequent decrease, for regional organizations it increased from 1.16 to 1.4 and in the future it may increase to 2.2. Staffing in general and in regional medical organizations differs slightly and the changes in dynamics are not significant. In future we should expect a decrease of this indicator. Thus, the study showed a pronounced shortage of nursing personnel in medical organizations of St. Petersburg (especially in federal organizations), which requires the adoption of comprehensive measures aimed to stabilize and improve this situation.

KEY WORDS: personnel shortage; nursing personnel.

КАДРОВЫЙ ДЕФИЦИТ СРЕДНЕГО МЕДИЦИНСКОГО ПЕРСОНАЛА КАК АКТУАЛЬНАЯ ПРОБЛЕМА ЗДРАВООХРАНЕНИЯ

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Для цитирования: Петрова Н.Г., Тер-Минасова А.Н., Погосян С.Г., Калиниченко О.В. Кадровый дефицит среднего медицинского персонала как актуальная проблема здравоохранения // Медицина и организация здравоохранения. 2023. Т. 8. № 1. С. 43–53. DOI: https://doi.org/10.56871/MHCO.2023.89.51.004

Поступила: 21.12.2022 **Одобрена: 15.02.2023** **Принята к печати: 21.03.2023**

РЕЗЮМЕ. Проблема кадрового дефицита среднего медицинского персонала является одной из наиболее актуальных проблем здравоохранения в мире и в России, что отражается на качестве всех видов сестринской помощи, уровне взаимодействия разных категорий персонала, удовлетворенности пациентов. При общности этих процессов имеется специфика в отдельных регионах, в т.ч. в крупных городах. Цель настоящего исследования — анализ динамики и тенденций обеспеченности средним медицинским персоналом в Санкт-Петербурге. Для анализа использовались данные официальной статистики с расчетом экстенсивных, интенсивных, показателей соотношения, динамического ряда (с их выравниванием методом наименьших квадратов), расчетом трендов показателей до 2030 г. Установлено, что в 2009 г. показатель обеспеченности средним медицинским персоналом в городе составлял 93,6 (на 10 тыс. населения), а в 2018 г. он снизился до 81,9 (т.е. на 12,5%). Снижение имело место и по медицинским организациям регионального подчинения (с 73,6 до 70,3), однако темп этого снижения был значительно ниже (4,5%). В целом по городу снижение носило устойчивый неуклонный характер и, согласно прогнозу, будет продолжаться. В региональных организациях динамика была разнонаправленной, и в перспективе вероятен некоторый рост показателя. В динамике снижается обеспеченность фельдшерами и акушерками, увеличивается — медицинскими сестрами, рентгенлаборантами. Показатель соотношения врачей и среднего медицинского персонала в целом по городу снизился с 1,5 до 1,4 с тенденцией к последующему уменьшению. По региональным организациям он увеличился с 1,16 до 1,4 и в перспективе возможен его рост до 2,2. Укомплектованность кадрами в целом и по региональным организациям отличается незначительно и мало меняется в динамике, составляя по ставкам более 80% и по физическим лицам более 60%. В перспективе следует ожидать снижения укомплектованности по занятым ставкам. Таким образом, исследование показало выраженный дефицит кадров среднего медицинского персонала (особенно фельдшеров и акушерок) в медицинских организациях города (особенно федерального подчинения), что требует принятия комплексных мер, направленных на стабилизацию и улучшение ситуации.

КЛЮЧЕВЫЕ СЛОВА: кадровый дефицит; средний медицинский персонал.

INTRODUCTION

The most important condition for the development of the national healthcare system is its provision of personnel. The state program of healthcare development of the Russian Federation contains a separate sub-program “Staff resource management in healthcare” [9]. The most numerous personnel component is the nursing staff, without the proper number of which and a high level of qualifications, it is impossible to solve the problem of providing the population with affordable and high-quality medical care [16, 17]. It is difficult to overestimate the role of nursing personnel in primary health care, especially when carrying out preventive and rehabilitation measures, palliative and specialized care, when the patient needs not only treatment, but also care and psychological support [12]. At the same time, with the development of medical and organizational technologies, the functions of all categories of nursing staff are expanding and becoming more complex, who have long ceased to be just a doctor’s assistant and a simple executor of his appointments, which, consequently, increases the requirements for the level of training and qualifications of these specialists [19]. Solving these tasks is complicated by the worldwide problem of shortage of nursing personnel [18]. According to World Health Organization data, there is a shortage of 9 million specialists in the world. In the Russian Federation there is a shortage of about 300 thousand nurses [15]. The staffing level of paramedical personnel by individuals averages 66.8% and is almost one and a half times lower than the staffing level by employed rates [13]. This situation is typical both for the country as a whole and for its certain regions [1, 6, 7, 10, 11, 14]. The shortage of nursing staff and, accordingly,

the low ratio of doctors and nursing personnel cause an imbalance in the medical care system and limit the possibilities for the development of aftercare, patronage, and rehabilitation services. There are a number of reasons contributing to this situation [2, 4, 8]: low wages of paramedical workers, equalizing approaches to pay, low level of social security, inconsistency of educational standards of higher nursing and secondary medical education and the level of their implementation with modern healthcare needs, low prestige of the profession both in society and in the professional medical setting. Given the commonality of the listed problems and trends in the world, Russia, and individual regions, the development of specific ways to solve them requires a thorough analysis of the situation at various levels of management [3, 5].

AIM

The aim of this study is to analyze the dynamics and trends of the provision of nursing personnel in St. Petersburg.

MATERIALS AND METHODS

To conduct the study, data from the Federal State Statistics Service (https://rosstat.gov.ru/folder/13721) and the Rosstat regional office of St. Petersburg and Leningrad Region (https://petrostat.gks.ru/folder/27954) were used. On their basis, a number of extensive and intensive indicators were calculated, time series with the calculation of the corresponding indicators were constructed, their alignment by the least squares method was carried out, and indicators trends were constructed up to 2030. To study long-term dynamics, we chose a ten-year interval (2009–2018) before the start of the pandemic, when, for obvious reasons, there have been significant changes in both the population and the number of medical personnel. To analyze the trends of the number and provision of certain categories of health personnel (which is more inert compared to general indicators of provision), a longer time lag (since 1970) was studied. For a number of indicators, the available databases had information only since 2014, so the article provides an analysis of them. Statistical calculations were made using application package STATISTICA 6.0. As St. Petersburg has medical organizations of both federal and regional subordination, data were analyzed both for the city as a whole (to get a general overview of the situation) and for regional organizations (staff management problems in which can be solved at the level of a constituent entity of the Russian Federation).

RESULTS AND DISCUSSION

If in 2009 the rate of provision of nursing personnel in St. Petersburg was 93,6 (per 10 thousand population), then in 2018 it decreased to 81,9 (i.e. by 12,5%). The analyzed indicator is lower than the all-Russian indicator (86,2), but significantly higher than the similar indicator for Moscow (69,1). The decrease took place both in all medical organizations (including federal ones) and in medical organizations of regional subordination (from 73,6 to 70,3), however, the rate of this decrease in the latter was significantly lower (4,5%), which may be due to the greater interest of staff in working in regional medical organizations, where there are additional (at the expense of the regional budget) payments to medical workers. It is also important to note that while in the city as a whole the decline was sustained a steady, and, according to the forecast made, it will continue (Fig. 1), then in regional organizations the dynamics were multidirectional. Thus, the indicator decreased from 2009 to 2013; in 2014 there was a sharp jump (by 13,2% compared to the previous year); the indicator maintains in 2015, and then its decline is noted again, the rate of which was maximum (4,4%) in 2018. Taking into account the ambiguity of the dynamics, we aligned the dynamic series. At the same time, it was established that the long-term trend is a gradual increase in the indicator of nursing personnel (Fig. 2). By 2030, the level of provision may increase to 76,3 (per 10 thousand population).

A study of the long-term dynamics of the provision of the city population with various categories of nursing staff showed that the provision of paramedics increased at a relatively low rate from 1970 (22,3 per 10 thousand population) to 1990 (27,8 per 10 thousand population), and then began to decline rapidly, and in 2018, compared to 1970, the indicator decreased by 2,4 times, amounting to 9,2. The availability of midwives is constantly decreasing: from 21,9 (in 1970) to 7,0 (in 2018) — a 3-fold decrease.

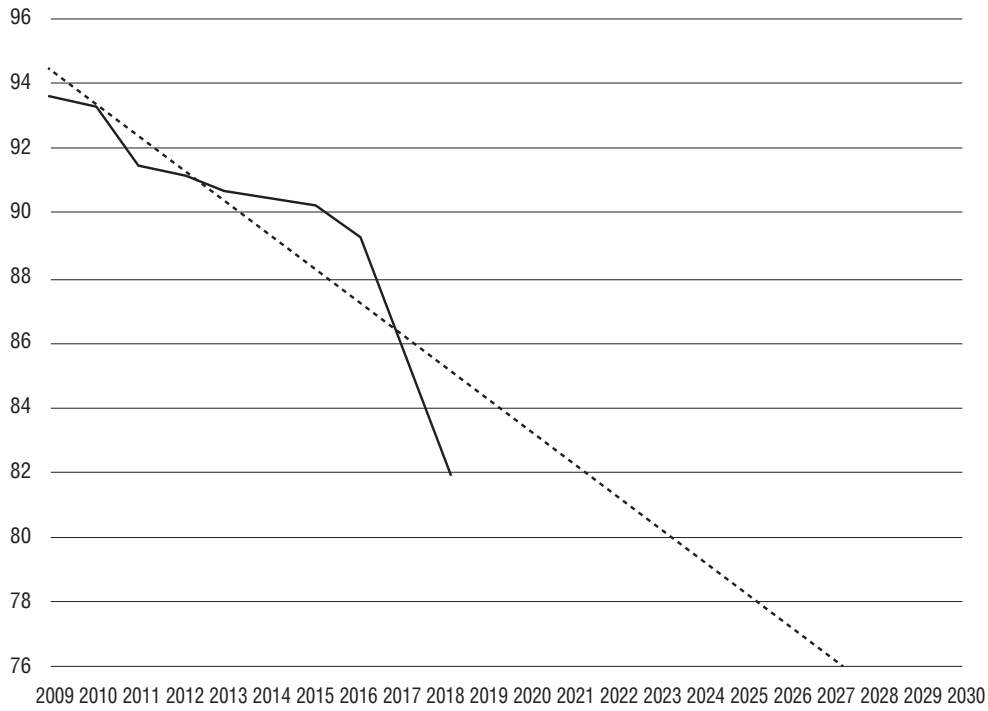

Fig. 1. Dynamics of availability of nursing staff in medical organizations of St. Petersburg (standard and equalized figures) and the trend up to 2030 (per 10 thousand population)

Рис. 1. Динамика обеспеченности средним медицинским персоналом медицинских организаций Санкт-Петербурга (обычные и выравненные показатели) и тренд до 2030 г. (на 10 тыс. населения)

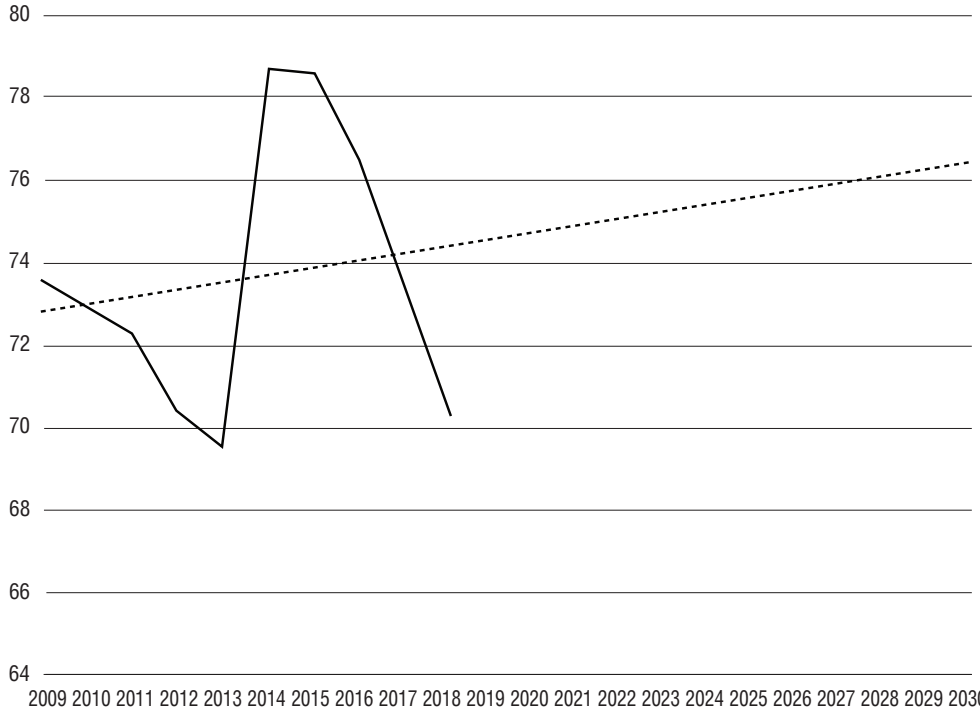

Fig. 2. Dynamics of provision of regional medical organizations with nursing staff (fixed and equal indicators) and forecast till 2030 (per 10 thousand population)

Рис. 2. Динамика обеспеченности региональных медицинских организаций средним медицинским персоналом (обычные и выравненные показатели) и прогноз до 2030 г. (на 10 тыс. населения)

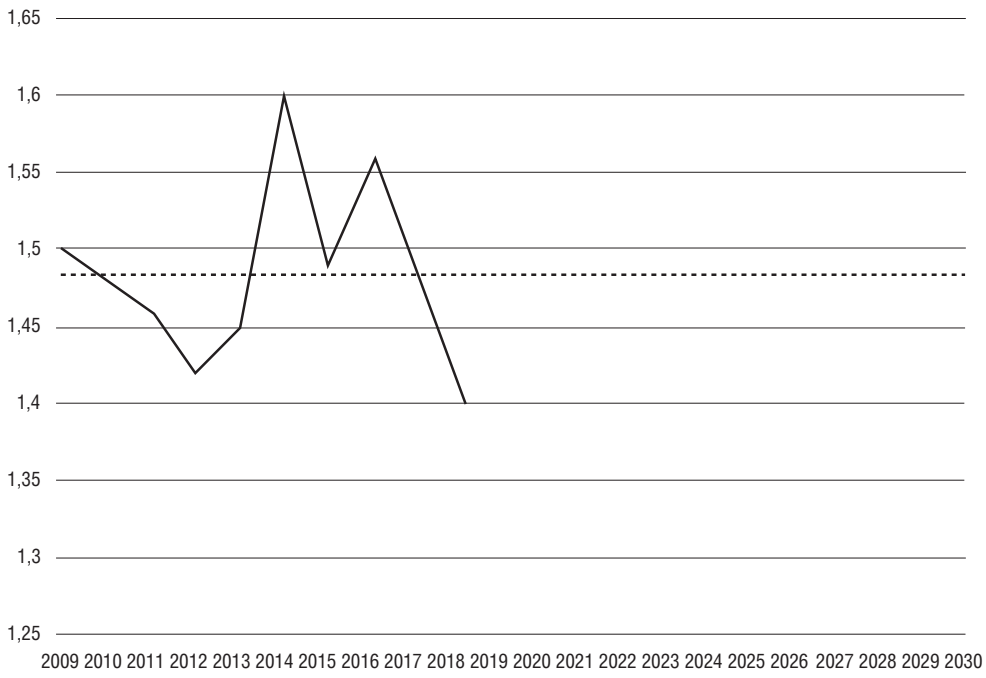

Fig. 3. Dynamics and forecast of the ratio of doctors and nursing staff in St. Petersburg in general

Рис. 3. Динамика и прогноз показателя соотношения врачей и среднего медицинского персонала в целом по Санкт-Петербургу

At the same time, the number of nurses is growing: during the analyzed period it increased 1,6 times (45,3 and 72,5, respectively). The provision of laboratory assistants increased from 1970 (3,5) to 2005 (7,5); subsequently, the indicator began to decline, amounting to 6,0 in 2018, remaining, however, above the 1970 level of 1,7 times. The number of X-ray technicians is constantly increasing: in general, during the analyzed period by 2,6 times (1,0–2,6).

The ratio of doctors to nursing staff is changing over time, remaining, however, significantly lower than the WHO recommended indicator and the indicator planned by government projects. In the city as a whole, starting from 2009, the ratio has tended to decrease (the exceptions were 2014 and 2016), the rate of which was maximum in 2017 and 2018 (5,1 and 5,4% respectively). Over the analyzed period, the fluctuations in the indicator average from 1,42 to 1,56. The leveling of the indicator (Fig. 3) shows that in the long term there is no dynamics of the ratio between doctors and nursing personnel, and in the future it may even decrease slightly.

In regional medical organizations in 2009, the ratio was 1,16; subsequently, its growth was noted (to a maximum value of 1,61 in 2015, when the growth rate was 9,1%), but in 2016–2018 the dynamics again become negative (the ratio in 2018 was 1,4), while the rate of decline in the indicator increases annually (6,0% in 2018). At the same time, the long-term trend is an increase in the indicator, which by 2030 can be 2,2 (Fig. 4).

An important role in analyzing staffing is to study the staffing level both by rates and individuals. In the city as a whole, the percentage of staffing by employed rates is decreasing over time: from 85,8% in 2014 to 82,0% in 2018 (4,4%). At the same time, the staffing ratio by individuals generally has an upward trend (60,9–61,4%), which will continue (Fig. 5).

In regional medical organizations, there is a dynamic reduction in the number of employed positions nursing positions (in 2018, the indicator of visibility was 88,9%); the rate of decline in the indicator was maximum (3,9%) in 2017. The number of individuals decreased over this period by 6,9%, and the dynamics show an increase in the rate of decline in the number of individuals. The staffing rate of nursing staff by employed rates in regional medical organizations exceeds 80% and has a clear downward

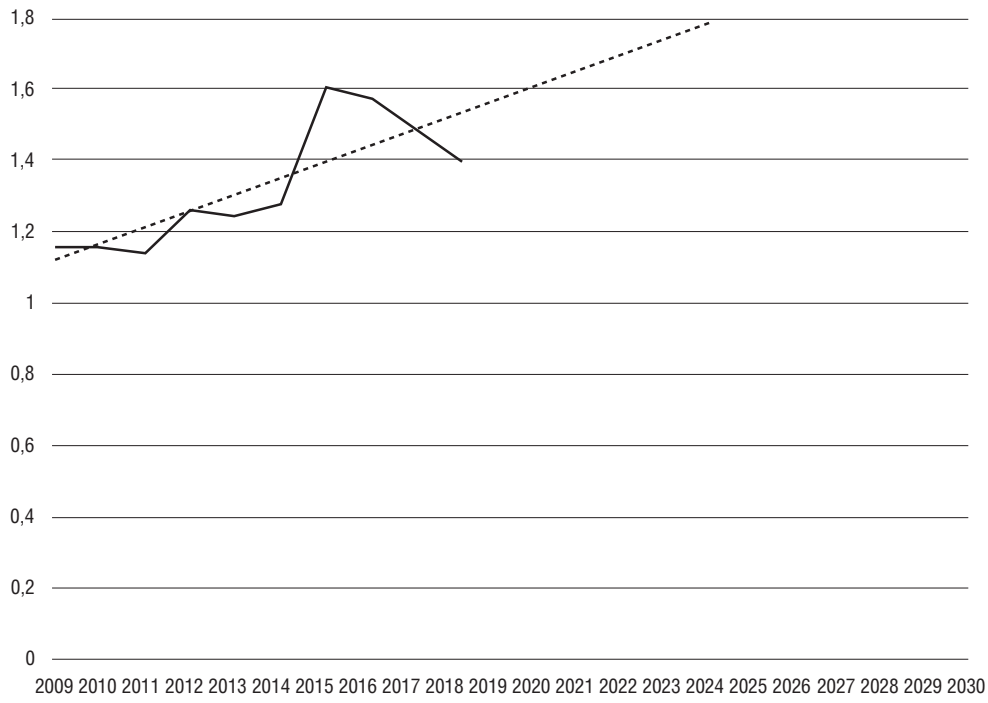

Fig. 4. Dynamics of the ratio of doctors and nurses in regional medical organizations (fixed and equalized indicators) and its developmental forecast until 2030

Рис. 4. Динамика показателя соотношения врачей и среднего медицинского персонала в региональных медицинских организациях (обычные и выравненные показатели) и его прогноз до 2030 г.

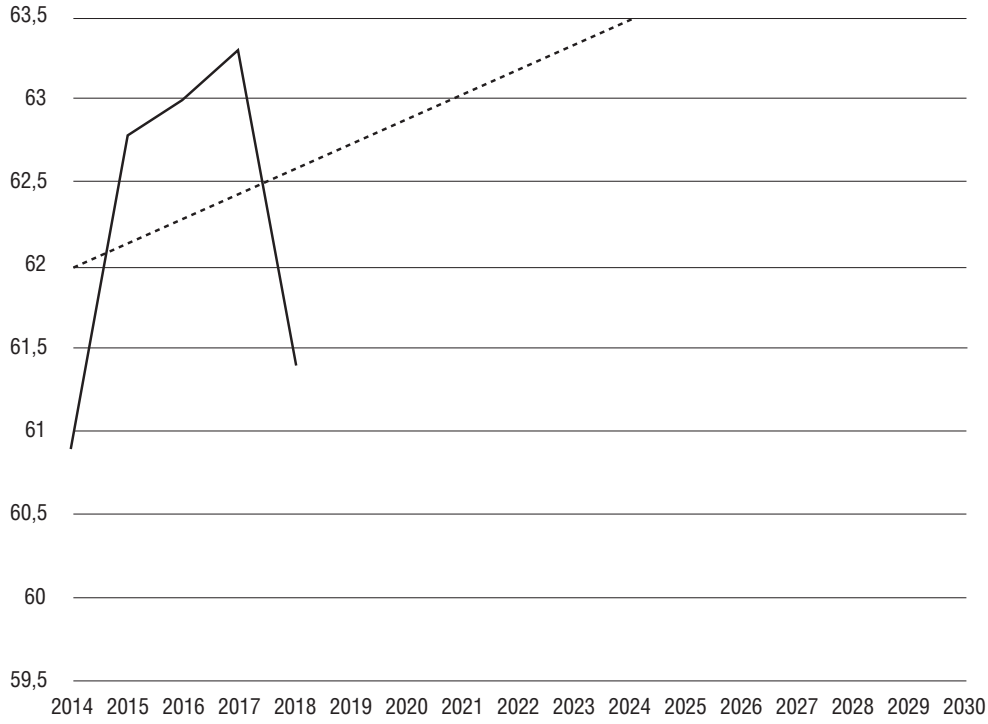

Fig. 5. Dynamics and prognosis of staffing of St. Petersburg medical organizations by natural persons, in percent

Рис. 5. Динамика и прогноз укомплектованности физическими лицами среднего медицинского персонала медицинских организаций Санкт-Петербурга, в процентах

trend (85,8–81,6%; the indicator of visibility in 2018 was 95.1% compared to 2014), and according to the forecast (Fig. 6), this trend will continue; the staffing rate by individuals is slightly higher than 60% (60,3% in 2018) and practically does not change in dynamics with a downward trend in the long term (Fig. 7).

The structure of paramedical personnel is dominated by nurses (accounting for 77,0%). They are followed by: midwives (7,3%), paramedics (7,0%), laboratory assistants (4,6%), pharmacists (0,5%). 7,9% accounts for other categories of paramedical workers. An analysis of the staffing levels of these categories of employees in 2018 in regional organizations showed that by employed rates the indicator ranges from 74,3% (pharmacists) to 87,8% (paramedics), and by individuals — from 45,3% (laboratory assistants) up to 71,9% (paramedics). Thus, it can be stated, firstly, that among all categories of paramedical workers there is a shortage of personnel, and relative "well-being" with staffing is achieved through part-time job, and, secondly, that the tensest situation is with laboratory assistants and pharmacists and other personnel.

A study of the level of provision of the city by various categories of paramedical workers showed the following (Table 1). The highest availability (64 per 10 thousand population) is noted in the staff of nurses, and in St. Petersburg it is higher than the Russian average (59,7), and significantly ($p < 0,05$) higher than in Moscow. Also in St. Petersburg, the number of nurses with higher education is almost twice as high as in Russia, and 2,5 times than in Moscow. Among the various categories of nurses, the maximum provision is of pediatric nurses (74,0), which also significantly exceeds that in the Russian Federation and Moscow. Next comes the indicator of the provision of ward (procedural) nurses (18,8), which is higher than the comparable indicators. The number of nurse anesthetists and operating room nurses (3,61 and 3,14, respectively) is higher than the national average and in Moscow. At the same time, the provision of district nurses (2,0) and general practice nurses/family nurse practitioners (0,75) is very low (and lower than in the Russian Federation and Moscow). The number of physical therapy nurses is 2,15, which is comparable to the all-Russian indicator and

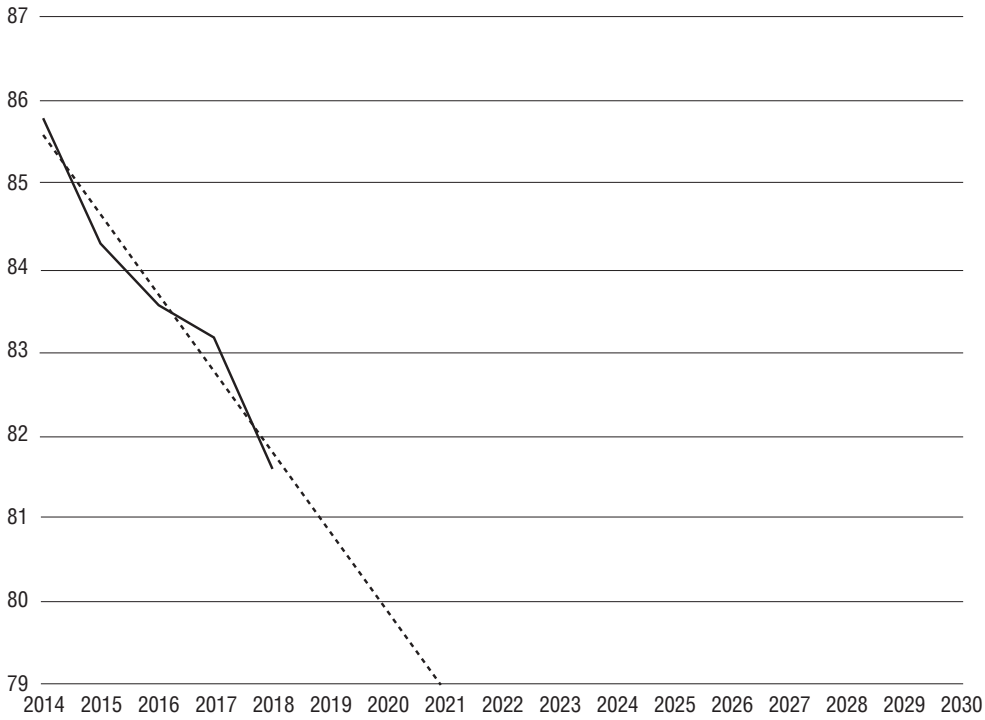

Fig. 6. Dynamics and Prognoses of Staffing Ratio by Employed Rates in Regional Medical Organizations, in percent

Рис. 6. Динамика и прогноз показателя укомплектованности штатов по занятым ставкам в региональных медицинских организациях, в процентах

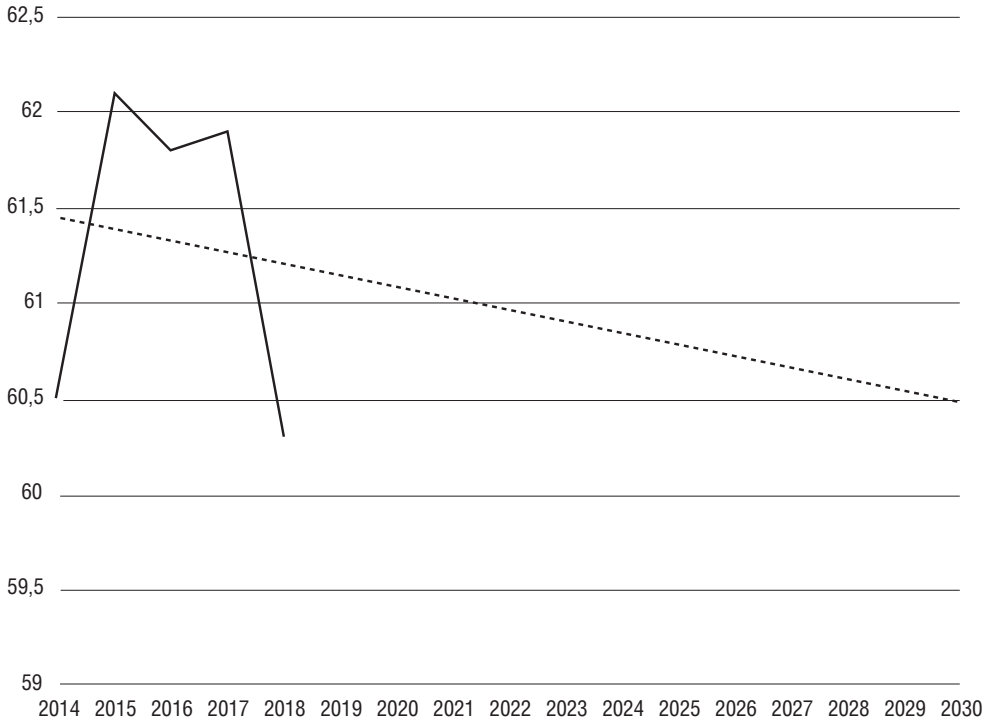

Fig. 7. Dynamics and prognoses of staffing ratio of regional medical organizations by natural persons, in percent

Рис. 7. Динамика и прогноз показателя укомплектованности региональных медицинских организаций физическими лицами, в процентах

Table 1

Availability of various categories of nursing staff in 2018 per 10 000 population

Таблица 1

Показатель обеспеченности различными категориями кадров среднего медицинского персонала в 2018 г. на 10 тыс. населения

Nursing staff categories / Категория СМП	**St. Petersburg / Санкт-Петербург**	**Russia / Россия**	**Moscow / Москва**
Nursing managers / Организаторы сестринского дела	1,4	0,91	1,18
Midwives / Акушерки	4.4	8,5	4,1
Paramedics / Фельдшеры	4,97	7,68	6,08
Laboratory Technicians / Лаборанты	0,58	1,0	0,33
Nurses, incl. / Медицинские сестры, в т.ч.	64,0	59,7	50,8
With higher education / Имеющие высшее образование	0,67	0,36	0,25
General practice / Общей практики	0,75	0,94	0,93
Ward / Палатные	18,8	17,4	16,3
District / Участковые	2,0	3,38	2,06
Pediatrics / По педиатрии	44,8	46,8	50,6
Anesthesiology / По анестезиологии	3,61	3,07	2,77
Operating / Операционные	3,14	2,24	2,7
By Rehabilitation / По реабилитации	0,02	0,01	0
Massage / По массажу	1,87	1,29	1,01
Physical therapy / По физиотерапии	2,15	2,05	1,06
Nursing management specialists / Специалисты по управлению сестринской деятельностью	0,26	0,17	0,16
Physical Therapy Instructors / Инструкторы ЛФК	0,61	0,32	0,33
X-ray technicians / Рентгенлаборанты	2,55	2,19	2,30

twice as high as the indicator in Moscow; the number of nurse massage therapists — 1,87 (slight excess). The minimum provision (0,02) is noted among rehabilitation nurses. In second place in terms of availability is such category of nursing personnel as paramedics (4,97), and in third place are midwives (4,4). In both cases, this indicator is lower than the all-Russian one, and in the first case, it is lower than the indicator for Moscow. The provision of X-ray technicians is 2,55 (approximately at the level of comparable indicators); nursing administrators and specialists in nursing management — 1,4 and 0,26, respectively (above the all-Russian and Moscow indicators). The number of physical therapy instructors is relatively low (0,61), although the indicator is almost twice as high as in Russia as a whole and in Moscow. Therefore, it can be stated that the most pressing problem for the city's healthcare is the provision of personnel in the primary care network — district nurses (general practice nurses), as well as paramedics.

CONCLUSION

Thus, the analysis showed that the problem of providing medical organizations in St. Petersburg with nursing personnel not only remains relevant, but will also persist for at least another 10 years. The existing indicator of provision and staffing is strongly related to the presence of part-time job, because these indicators by individuals are significantly lower than those by employed rates. The dynamics in the human resources of paramedics and midwives are especially unfavorable. Due to insufficient provision, the ratio of doctors to nursing personnel remains low, which makes it difficult for both to perform functional duties. All this requires the adoption of a system of measures aimed at increasing the number of paramedical staff in the city, including a significant increase in wages (excluding part-time jobs), active promotion and increasing the prestige of the profession, the availability of social benefits, strengthening interaction between employers and educational institutions, the introduction of targeted admissions with possible payment for training at the expense of employers in the most in-demand specialties, provision of opportunities for career and professional growth, etc.

ADDITIONAL INFORMATION

Author contribution. Thereby, all authors made a substantial contribution to the conception of the study, acquisition, analysis, interpretation of data for the work, drafting and revising the article, final approval of the version to be published and agree to be accountable for all aspects of the study.

Competing interests. The authors declare that they have no competing interests.

Funding source. This study was not supported by any external sources of funding.

ДОПОЛНИТЕЛЬНАЯ ИНФОРМАЦИЯ

Вклад авторов. Все авторы внесли существенный вклад в разработку концепции, проведение исследования и подготовку статьи, прочли и одобрили финальную версию перед публикацией.

Конфликт интересов. Авторы декларируют отсутствие явных и потенциальных конфликтов интересов, связанных с публикацией настоящей статьи.

Источник финансирования. Авторы заявляют об отсутствии внешнего финансирования при проведении исследования.

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