



## Original Article

# The Role of Modern Methods of Dental Services in Reducing Oral Diseases without the Need for Pharmaceutical Services

D. Yu. Kharitonov\* , N.A. Gladskikh, A.V. Podoprigora, V.V. Dmitriev, N.S. M oiseeva, R.A. Kostin

Voronezh State Medical University named after N.N. Burdenko, Voronezh, Russia

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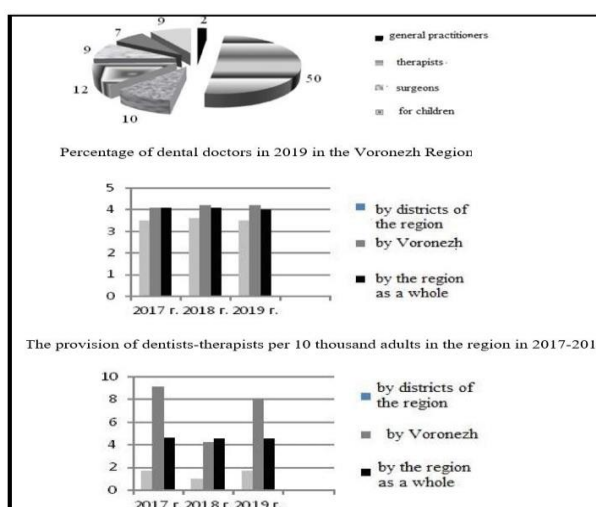
Pharmaceutical service

## ABSTRACT

Oral diseases such as dental caries, pharyngeal cancers, and periodontitis are the global health problems, particularly in developing nations. In several developing nations, oral health care utilization is limited. It should also be mentioned that due to the high use of drugs in patients in need of dental treatment and the possibility of drug interactions in drugs used with dental anesthetics, a dentist should be fully familiar with the mechanism of action of various drugs possible emergencies. Within the framework of this work, the formation method was studied, and a mechanism for calculating the integral indicator of the provision of dentists with the dental profile of the people of the Voronezh area was developed. In the formulation of the problem, it was determined to obtain a complex integral indicator in a graphical and analytical form, characterizing the dynamics of changes in the provision of dentists with the dental profile of the population of the region of Voronezh. When fulfilling the task, a database of various indicators of the dental service staff of the region of Voronezh for 2014-2020 was utilized. As a result of the work conducted, mathematical and algorithmic support was developed, and a software module that provides the user with the ability to work with various data on the staff of the Voronezh region's dental service; based on these data, the calculation of a complex integral indicator for 2014-2020 and a visual presentation of all data.

## GRAPHICAL ABSTRACT

**The role of modern methods of dental services in reducing oral diseases without the need for pharmaceutical services**



\* Corresponding author: D. Yu. Kharitonov

✉ E-mail: [Email: kritkantorn.suwannaphant@gmail.com](mailto:kritkantorn.suwannaphant@gmail.com)

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## **Introduction**

Oral disease is one of the most common infectious diseases in humans. People suffer from at least one of these two important diseases of the mouth and teeth (tooth decay and gum disease) [1-4]. Changing the habits and diet of the people of the society, not observing oral health, neglecting the importance and health of teeth in children are the most important causes of the increasing deterioration of oral health indicators in different societies [5, 6]. On the other hand, dental services are the mainly services that require high precision and are mostly expensive. Therefore, the importance of prevention and planning services for health care is highlighted. Due to the fact that oral diseases are mainly associated with severe pain, in most cases, treatment should be accompanied by medication. It is not uncommon for several people with these diseases to have medication disorders. Therefore, it seems very important for dentists to know about the drugs used by these people [7-10].

Oral health is one of the essential necessities of a good life, one of the important indicators of community health, and one of the 11 important slogans of the 21st century. For this reason, paying attention to the amount and variety of household demands for dental services is one of the essential pillars for developing detailed and comprehensive oral health planning. Obviously, there is a direct relationship between the quality of dental services, the value of services, and patient satisfaction. Quality of service increases the value of service and customer satisfaction [11, 12]. In recent decades, the Russian Federation's component institutions, including the dentistry service, have been given the largest authority to offer medical treatment to the people [13-15]. The dental service in the Voronezh Region's healthcare system is now distinguished by the quality and abundance of support to the public, using new dental technology, as well as the continuous improvement of experts' professional levels [16, 17].

To meet the population's needs for dental services, constant monitoring and analysis of various indicators of the dental service's resources, activities, and structure are necessary.

The development of methods for the optimal assessment of the indicators of interest for each area of analysis requires an individual approach; however, solving the problem will lead to a significant simplification, optimization, and, therefore, acceleration of a comprehensive analysis of the dental services in the region of Voronezh [18, 19].

In the study, it was required to analyze the staffing of the Voronezh region's dental service. An analysis of the availability of dentists with a dental profile is not possible without a study of various indicators characterizing the number, level of training of dental personnel, and the needs of the population in it [20, 21]. At the same time, comparison by individual indicators is possible; however, the analysis of a comprehensive assessment of the provision of dentists with a dental profile is rather difficult. To assess the situation that has developed in different years, an indicator is needed that makes it possible to comprehensively assess the provision of doctors with the dental profile of the region, taking into account the various components and their significance.

## **Materials and Methods**

It is critical considering the flaws in the official accounting papers when analyzing and evaluating the preventative and therapeutic activity results to lower the frequency of conditions amongst the people in the dental profile [22, 23]. As a result, the work outcomes are summarized every year by creating an analytical assessment of the Voronezh Region's dental service [24, 25]. This research allows a dentist operating in outpatient clinics to develop a measure to manage their work and handling the health care vertical at a regional level. In the region of Voronezh, the share of first-time applicants for dental care fell by 3.9 % in the first quarter of 2020, while the share of first-time applications for kids fell by 6.5 %. Without a doubt, the evidence acquired from the investigated sources reveals that crisis conditions in numerous domains of society exacerbate sanitary and social factors that have an effect on dental morbidity in a deteriorating way. This always guides the practical and theoretical aspects of the job to re-assess the

parameters of these factors and find ways to improve the continuing preventive effort. Regarding the strategic coherence of practice and science, this effort in the region of Voronezh is consistent with recent international experience in establishing deterrent schemes to decrease dental morbidity [26].

To construct a complex integral indicator of the provision of dental doctors at the first stage, based on the method of "discrete correlation Pleiades," a minimum list of significant and not interconnected with each other indicators is formed that characterize the provision of the population with dental doctors [27]. At the second stage, based on the methods of long-term statistical review and a priori ranking according to the available databases, experts' estimates of the significance of the obtained indicators and point estimates of the correspondence of the quantitative expression of indicators with the actual needs of the population are formed. At the third stage, based on the method of sums, the obtained data form the desired integral indicator [28, 29].

The list of indicators should most fully reflect all the characteristics necessary for a comprehensive analysis of the dental service staff. But at the same time, the number of indicators must be limited to reasonable limits; otherwise, data analysis will become seriously complicated, if at all possible [30].

the Voronezh region's dental service identified the following components for the formation of the integral indicator: The number of full-time positions of dental doctors (at budgetary appointments), including Dentists (X1), Dentists-therapists (X2), Children's dentists (X3), Dentists orthodontists (X4), Dentists (X5), Number of full-time positions of dental doctors providing paid medical services, including, Dentists (X6), Dentists-therapists (X7), Dentists for children (X8), Dentists orthodontists (X9), Dental doctors (X10).

After forming the optimal set of indicators for each of them, a scoring system is developed. The long-term statistical review method analyzes databases over the past several years and forms a point gradation for each indicator. The Voronezh

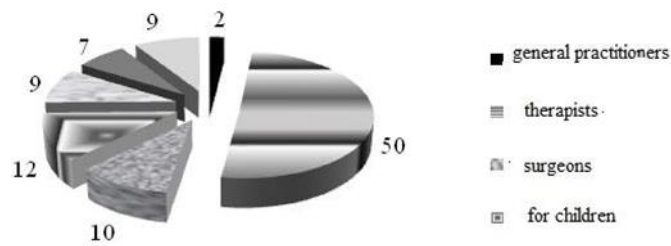
region's dental service has developed a scoring system for each indicator.

There are other methods of forming scores of indicators. However, in this case, when there is a multi-year database, the method of a long-term statistical survey is the most appropriate one. In the absence of such a database, "discrete correlation constellations" are used to form point estimates of indicators [31]. It requires a large number of time-consuming calculations, so it is rarely used to form scores. For an expert assessment of the significance of the components, the method of a priori ranking was used, making it possible to objectively assess experts' subjective opinions.

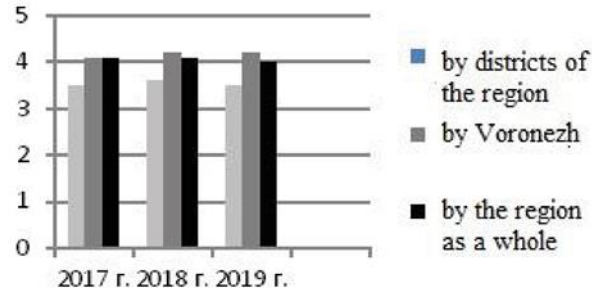
According to the generated ranking matrix, the experts' agreement is assessed based on the concordance coefficient at the next stage. The W value is within the range [0...1]. At  $W = 1$ , experts are unanimous in assessing the significance of the indicators; at  $W = 0$ , there is no agreement.

## Results and Discussion

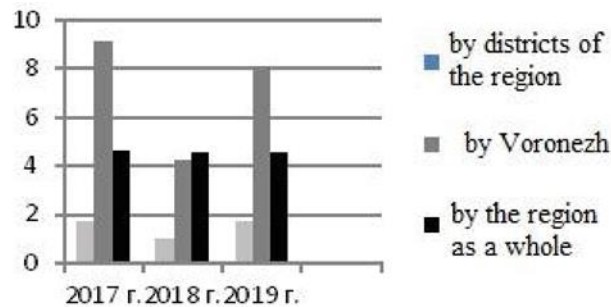
In recent years, dental professionals' structural composition has stayed practically unchanged. Outpatient dental care in the region was provided by 1201 dental physicians and 612 non-governmental dental faculties in 2019 in the region. In the reported year, dentists made up 8.8 of the area's dental structure. Specialists working in the public sector (9.1% in 2018). Recently, the potential efficiency of public sector dental staff has been considered. In the whole region, 1308.5 full-time positions of dentists in 2019 (compared to 1319 in 2018) were assigned, 1151 people (compared to 1164.25 in 2018), and 1156 people (in 2016-1156). For occupied positions, the percentage of employees was 88%, and for individuals, 88.3%. Figure 1 shows the 1% of dentists in 2019 by position. Figures 2 and 3 indicate the availability of dental therapists for 2017-2019, which focuses on the therapeutic APUs' work in the region, both in adults and children.



**Figure 1:** The dental doctors' percentage in the region of Voronezh (in 2019)



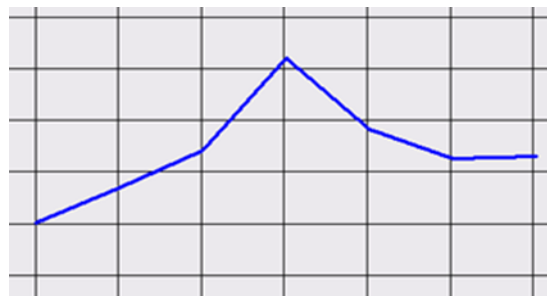
**Figure 2:** The dentists-therapists provision per 10,000 adults in the region of Voronezh (2017-2019)



**Figure 3:** The dentists-therapists' provision for 10,000 children in the region of Voronezh (2017-2019)

The method of sums is used to calculate the integral indicator. The obtained value of the crucial indicator can be used as a numerical assessment of the general condition of the dental service on a 10-point scale. For the automated formation of an integral indicator of the provision of dentists with a dental profile, an algorithm was developed and implemented into practical use, which makes it possible to comprehensively assess the staff of doctors of the dental service in the region of Voronezh, taking into account various components and their significance [32, 33].

In the course of the work, the following were studied: forming a list of indicators, determining the numerical values of indicators based on long-term data, and ranking indicators according to their significance. The presented integral indicator can be used with minor modifications to analyze other areas of human activity, which determines the universality of the developed method. The results achieved are not the final product and are open to further modification and expansion of the analysis capabilities (Figure 4).



**Figure 4:** The interface of a computer program

## Conclusions

The current study tried to develop a mechanism for calculating the integral indicator of the provision of dentists with the dental profile of the population of Voronezh (a region in Russia). It should be noted that a database of various indicators of the dental service staff of this region for 2014-2020 was used. As a result of this paper, mathematical and algorithmic support was developed, as well as a software module that provides the user with the ability to work with various data on the staff of the dental service of the region of Voronezh, based on these data, the calculation of a complex integral indicator for 2014-2020 and a visual presentation of all data. The following are the priority directions for the growth of the Voronezh Region's dental service, as well as suggestions to similar areas:

- Rigorous adherence to the scheme of governmental guarantees for the dental care provision to the region's inhabitants;
- Supplying medical care to children and adults with dental problems by providing dental departments and offices with proper equipment according to the criteria of outfitting Procedures;
- Enhancing the accessibility, quality, and safety of dental treatment for the general public;
- Prevention is a top priority in the health protection arena, especially in the school dental service's work in the region's districts;
- Acceptance into a program of continuing medical education.

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## Authors' contributions

All authors contributed toward data analysis, drafting and revising the paper and agreed to be responsible for all the aspects of this work.

## Conflict of Interest

We have no conflicts of interest to disclose.

## ORCID:

D. Yu. Kharitonov

<https://www.orcid.org/0000-0001-6125-5881>

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