Age dynamics of doctor's professional competencies

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Abstract

The article presents the results of a study with 288 doctors of various age groups and specialties aimed at determining the level of professional competencies and its changes. To conduct this study, sociological, analytical, and statistical methods, as well as organizational modeling were used. Based on the results, grounds for the need to find effective solutions in order to support the professional literacy of doctors of older age groups were given. Organizational solutions to this problem were given, including unique health-saving and advanced training (treatment in training) technologies, transformation of the methodological support of medical activity based on the implementation of expert systems, as well as reduction of cognitive load on doctors of nearing-retirement and retirement age through professional retraining in one narrow specialty.

Keywords: medical competencies, professional effective longevity, cognitive abilities, quality of life.

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Возрастная динамика профессиональных компетенций врача

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Аннотация

В статье отражены результаты исследования 288 врачей различных возрастных групп и специальностей на предмет определения уровня и динамики профессиональных компетенций. В работе применялись социологический, аналитический, статистический методы, а также метод организационного моделирования. По итогам работы дано обоснование необходимости поиска эффективных решений поддержки профессиональной грамотности врачей старших возрастных групп. Предложены организационные решения данной проблемы, в том числе оригинальные технологии здоровьесбережения и повышения квалификации (лечебная учеба), трансформация методического обеспечения врачебной деятельности на основе внедрения экспертных систем, а также снижение когнитивной нагрузки на врачей пенсионного и предпенсионного возраста путем монопрофильной переквалификации.

Ключевые слова: врачебные компетенции, профессиональное эффективное долголетие, когнитивные способности, качество жизни.

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Introduction

In recent years, there have been more and more medical specialists from older age groups (60+), which is mainly related to the global population aging [1]. To date, in the Russian Federation, every fifth doctor is in this age group, and in the USA, every fourth [2–6].

On the one hand, occupational longevity seems to increase the share of experienced specialists. On the other hand, it increases the number of elderly people burdened with senile diseases, including memory disorders. Due to the risk of serious medical errors associated with age-related changes, healthcare officials face the need to provide regular medical examinations in order to detect cognitive insufficiency. University of California, San Diego, introduced a health screening program for medical workers of older age groups, including assessment of cognitive functions with MicroCog [7–8]. The examination is voluntary, however, it becomes obligatory if a doctor misidentifies patients, unreasonably refers them to other specialists, loses focus when filling in medical records, has serious vision or hearing problems or hand tremors [9].

Heads of medical institutions are justified in their increased alertness towards the professional activity of elderly employees, as patient management also requires the analysis of large amounts of information; underestimating a single symptom can result in a wrong diagnosis with all entailed consequences. It is important to identify the cognitive changes at the very beginning, since more than a half (55–70%) of patients with moderate cognitive disorders develop dementia over the next five years, which is a definitive contraindication to continuation of medical practice [10–11].

At the same time, a senior age is not always an obstacle. A huge number of specialists in retirement age are still engaged in medical practice. According to the University of Michigan (USA), the majority (71%) of surgeons continue a full-time practice past the age of 60, and 38% perform surgery in their 70s [12]. In some cases, senior age can even help with their work, for example, when establishing psychological contact with a patient. For doctors aged 41–50 years, the risk of receiving a complaint from a patient is 1.73 times higher than for older doctors, and for doctors aged 31–40 years it is 2.36 times higher [13–15]. However, the risk of age-related changes is like a sword of Damocles for every elderly doctor, as well as a motive to search for rational solutions to prolong professional competencies.

Materials and methods

The object of the study is 288 doctors of various specialties studying at the Faculty of Advanced Training for Physicians, Department of General Medical Practice (Family Medicine), Moscow Regional Clinical Research Institute named after M.F. Vladimirsky (“MONIKI”).

This study used sociological, analytical, and statistical methods, as well as organizational modeling.

Results

288 doctors of various specialties were divided by age groups – Fig. 1.

Figure 1 – Distribution of respondents by age groups.
Рисунок 1 – Распределение респондентов по возрастным группам

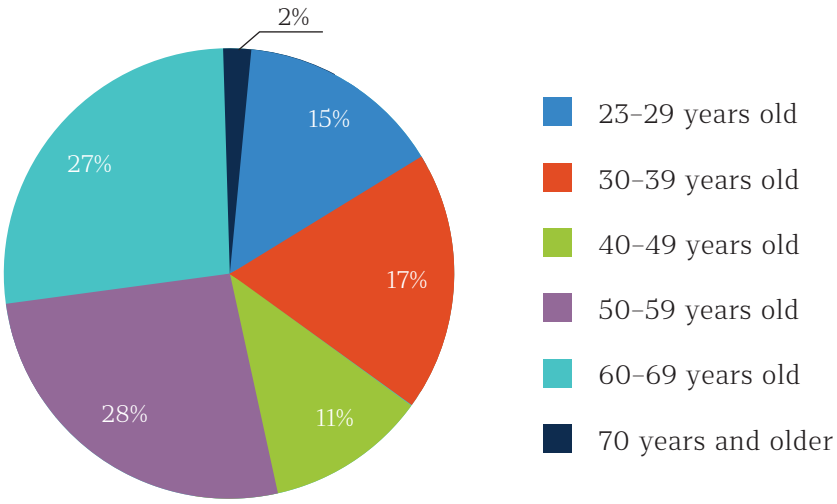


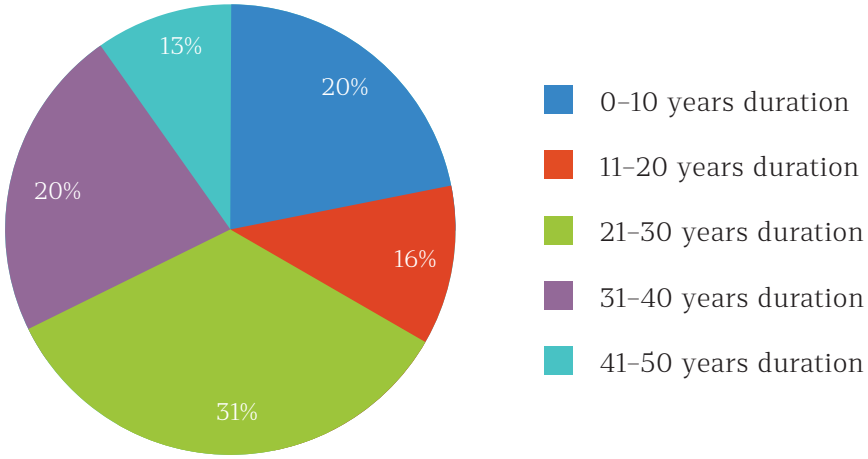
Table 1 – Specialty distribution of the respondents.
Таблица 1 – Распределение респондентов по специальностям

Specialty	Number (people)
Internal medicine specialist	164
General practitioner	78
Cardiologist	3
Functional diagnostics specialist	4
Neurologist	31
Physiotherapist	2
Pediatrician	3
Gastroenterologist	2
Biophysicist	1

Most of the respondents are internal medicine specialists (164 people) and general practitioners (78 people) (Tab. 1).

Medical experience ranged from 4 to 48 years (Fig. 2).

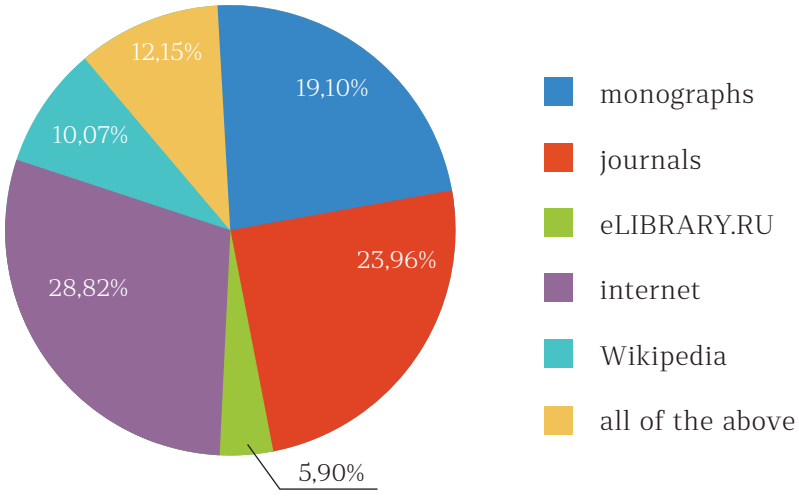
Figure 2 – Duration of respondents' medical experience.
Рисунок 2 – Продолжительность медицинского стажа респондентов



Most often, medical experience of the respondents ranged from 21 to 30 years.

Doctors' working hours ranged from 3 to 12 hours a day. Most of them worked 5 days a week for 9 hours. The majority (28.82%) of doctors used non-core Internet search services, medical journals (23.96%) and monographs (19.1%) as a source of medical information. 29 doctors (10.4%) used the online encyclopedia Wikipedia in their professional activity, and only 5.9% used the online library eLIBRARY.RU. All respondents regularly improved their qualifications and underwent various specialized courses at different universities.

Figure 3 – Sources of medical information.
Рисунок 3 – Источники медицинской информации



We assessed the professional level of respondents upon their knowledge of indications and contraindications, as well as drug interactions for the most often prescribed drug by the respondent (Priority Medicine). The answers were compared with the instructions for the use of medicine (according to the current version of the State Registry of Medicines of the Russian Federation) and evaluated them as accurate, false positive and false negative. The answer was considered as false positive when respondent wrote wrong indications, contraindications and drug interaction. False negative results were those that were presented in the instructions, but not given in the answer.

It would seem that the doctor who prescribes a Priority Medication several times a day, day by day and year by year should remember all its characteristics, especially indications and contraindications. In fact, less than a half (45.14%) of doctors know the exact indications of the Priority Medication. Only one respondent out of five (19.1%) mentioned the contraindications correctly, and drug interaction – only two doctors out of a hundred (2.1%) (Fig. 4-6).

Figure 4 – Knowledge of the Priority Medication indications.
Рисунок 4 – Знание показаний Приоритетного лекарства

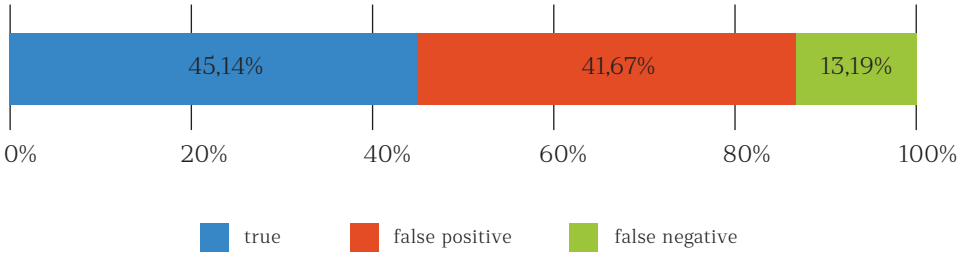


Figure 5 – Knowledge of the Priority Medication contraindications.
Рисунок 5 – Знание противопоказаний Приоритетного лекарства

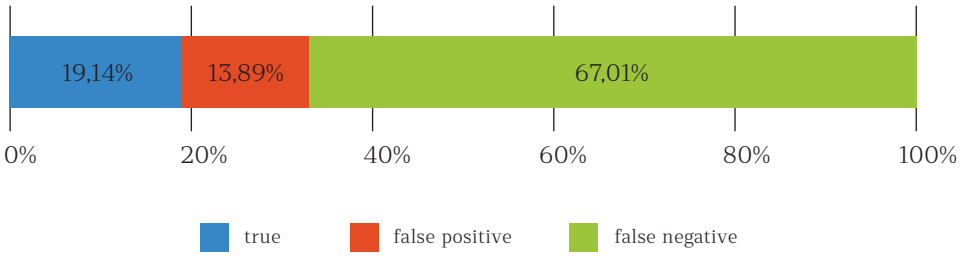
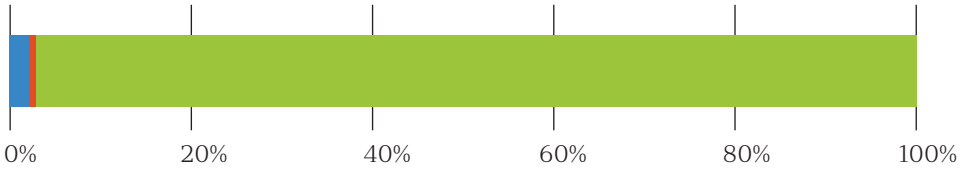


Figure 6 – Knowledge of the drug interaction with Priority Medication.
Рисунок 6 – Знание лекарственного взаимодействия Приоритетного лекарства

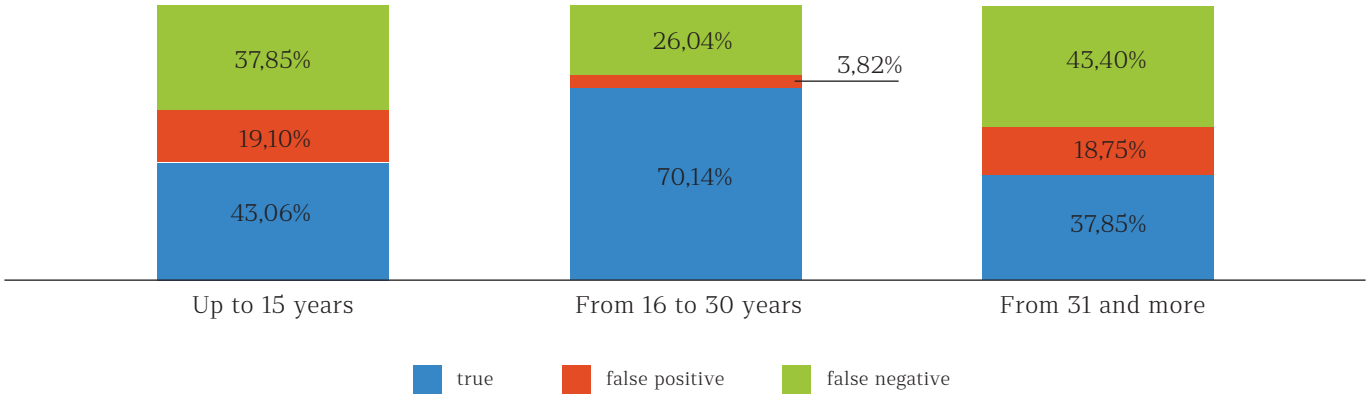


true	false positive	false negative
2,08%	1,04%	96,88%

Doctors over the age of 50 gave the worst answers, and in some cases (drug interaction of the Priority Medication) did not give a single correct answer.

The best awareness (70.14%) regarding the indications of the Priority Medication was observed in the group of doctors with medical experience from 16 to 30 years, while in the group of doctors with more than 30 years of experience the number of correct responses decreased to 37.85% (Fig. 7).

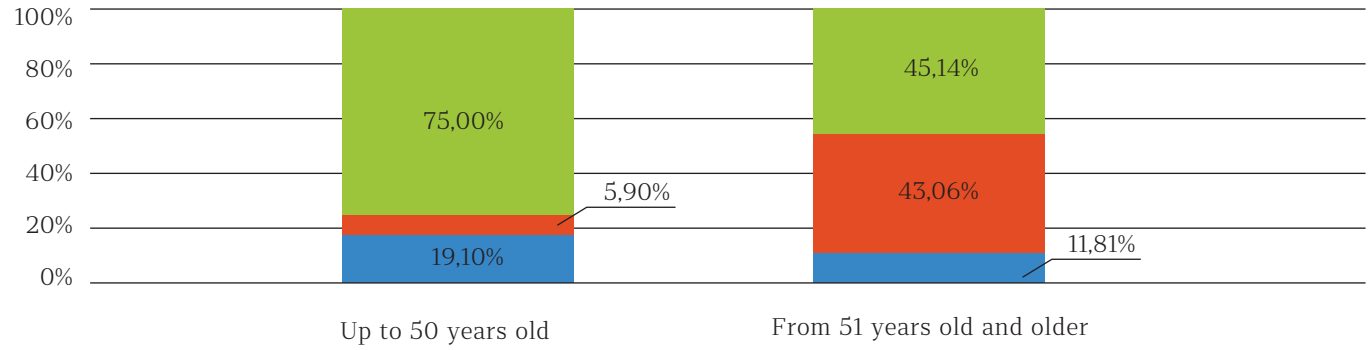
Figure 7 – Awareness of doctors with different experience of the Priority Medication indications.
Рисунок 7 – Осведомленность врачей с различным стажем относительно показаний Приоритетного лекарства



There was an increase in the proportion of false negative and false positive responses in the group of doctors with the longest professional experience, which indirectly indicates an age-related decrease in the level of professional competencies (Fig. 7).

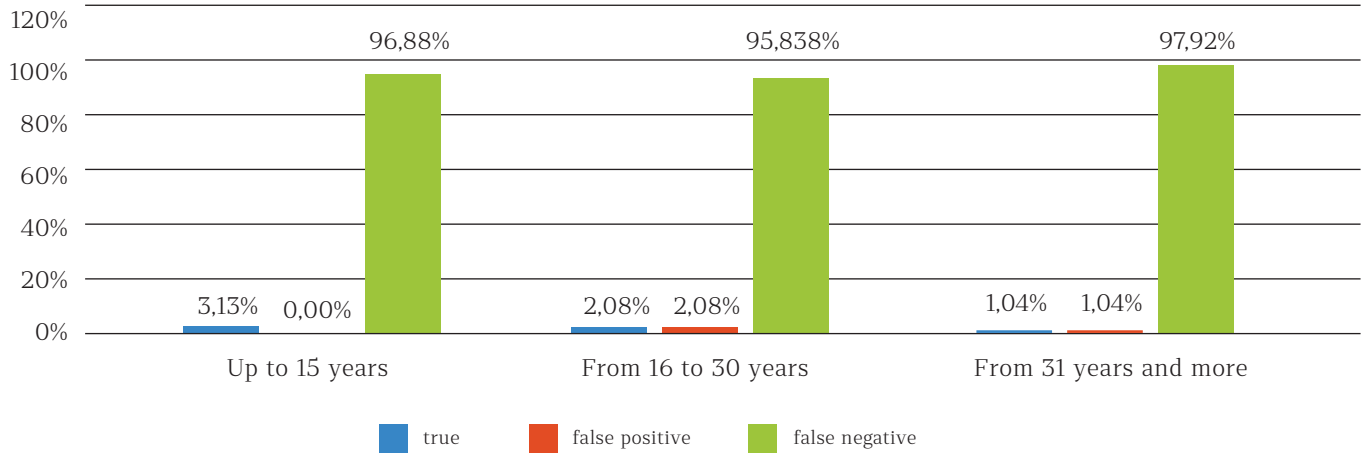
Doctors of older age groups are less aware of the contraindications of the Priority Medication. At the same time, the number of false-negative responses in older age groups is significantly smaller (Fig. 8).

Figure 8 – Awareness of doctors different ages regarding the contraindications of the Priority Medicine.
Рисунок 8 – Осведомленность врачей разного возраста относительно противопоказаний Приоритетного лекарства



The lowest awareness of doctors (in most cases, less than 3.13%) is related to drug interaction of the Priority Drug. The number of false-negative responses is the highest (95.83–97.92%), and is practically the same in all age groups (Fig. 9).

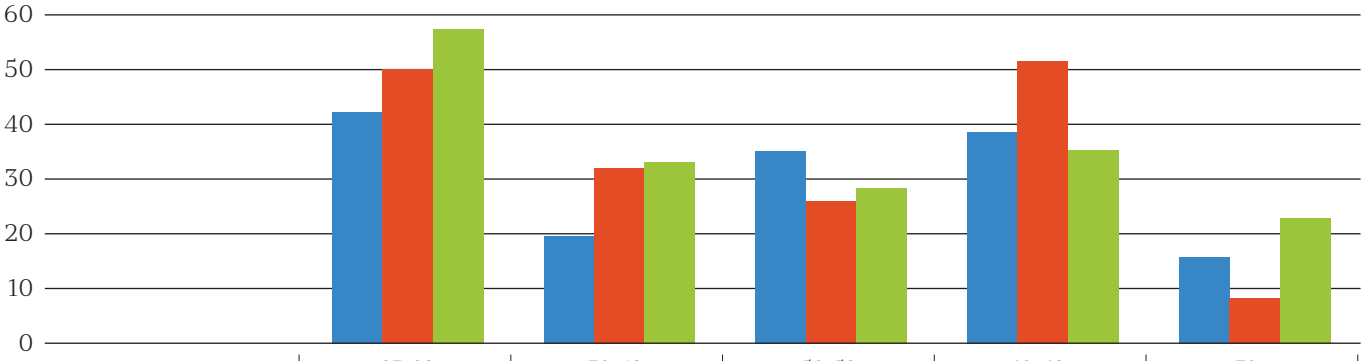
Figure 9 – Knowledge of doctors with different experience of drug interaction of the Priority Medication.
Рисунок 9 – Осведомленность врачей с различным стажем относительно лекарственного взаимодействия Приоритетного лекарства



An alternative way to check the level of professional competence was to assess the knowledge about indications and contraindications of drugs included in the anaphylactic shock pack: epinephrine hydrochloride, atropine sulfate and diphenhydramine, which they all used less or more frequently. During testing, each respondent was asked to choose one correct answer to the questions out of four proposed: "Which pathology is not included in the list of indications for prescribing the drug?" and "Which pathology is not included in the list of contraindications for prescribing the drug?".

According to the results obtained, the best knowledge about indications and contraindications is observed in the age groups of 23–29 and 60–69 years (Fig. 10–11). However, even in the leading groups the level of knowledge about these basic medications did not exceed 40% for the majority of characteristics.

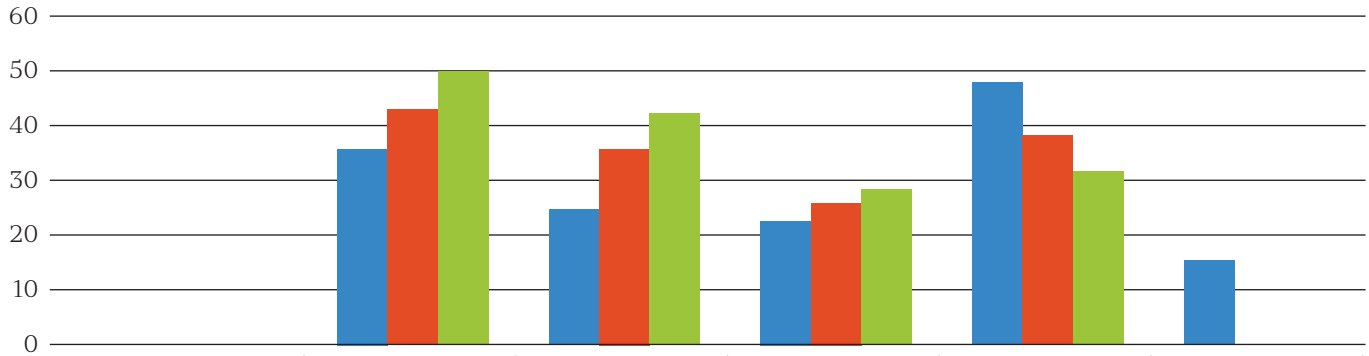
Figure 10 – The proportion of correct answers about the indications of medications.
Рисунок 10 – Доля точных ответов по показаниям лекарственных средств



	23–29 years old	30–49 years old	50–59 years old	60–69 years old	70 and older
epinephrine hydrochloride	42,9	19,3	35,3	38,1	15,4
atropine sulfate	50	32,3	25,.5	40,5	7,7
diphenhydramine	57,1	33,9	27,5	35,7	23,1

Doctors in the age of 70 and older had the worst answers, and in some cases (contraindications to atropine sulfate and diphenhydramine) did not give a single correct answer.

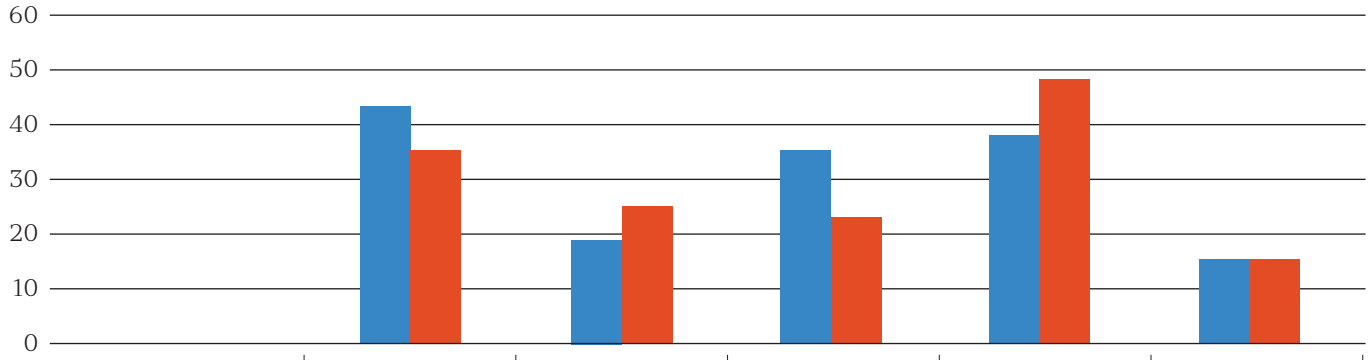
Figure 11 – The proportion of correct answers about the contraindications of medications.
Рисунок 11 – Доля точных ответов по противопоказаниям лекарственных средств



	23–29 years old	30–49 years old	50–59 years old	60–69 years old	70 and older
epinephrine hydrochloride	35,7	24,2	23,5	47,6	15,4
atropine sulfate	42,9	35,5	25,.5	38,1	0
diphenhydramine	50	41,9	27,5	31	0

In general, the level of knowledge about contraindications to anaphylactic shock pack was practically the same as in the case of indications (Fig. 12).

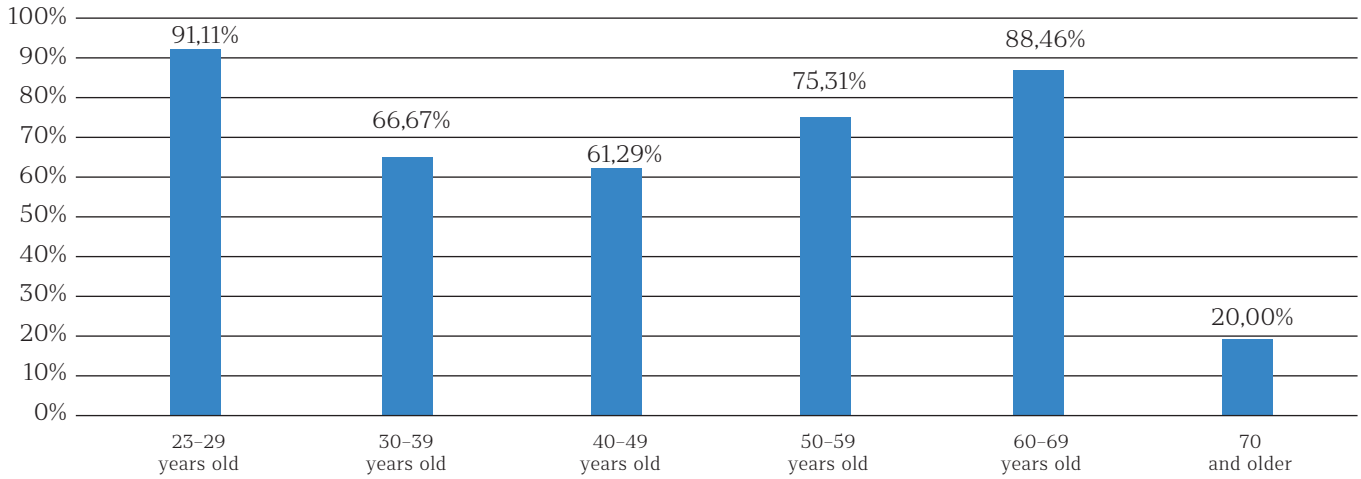
Figure 12 – The proportion of correct answers about indications and contraindications of medications in different age groups.
Рисунок 12 – Доля точных ответов по показаниям и противопоказаниям лекарственных средств в различных возрастных группах



	23–29 years old	30–49 years old	50–59 years old	60–69 years old	70 and older
indications	42,9	19,3	35,3	38,1	15,4
contraindications	35,7	24,2	23,.5	47,6	15,4

Professional literacy largely depends on knowledge of regulatory documents. In order to assess this indicator, we used the text of the Article No 41 of the Constitution of the Russian Federation regulating the organization of medical care in the country, the Article No 323 of the Federal Law On the Basics of Health Protection of the Citizens in the Russian Federation, as well as the procedure of medical care provision, the standards of the bed fund and outpatient admission according to professional specialization of the respondent (Fig. 13).

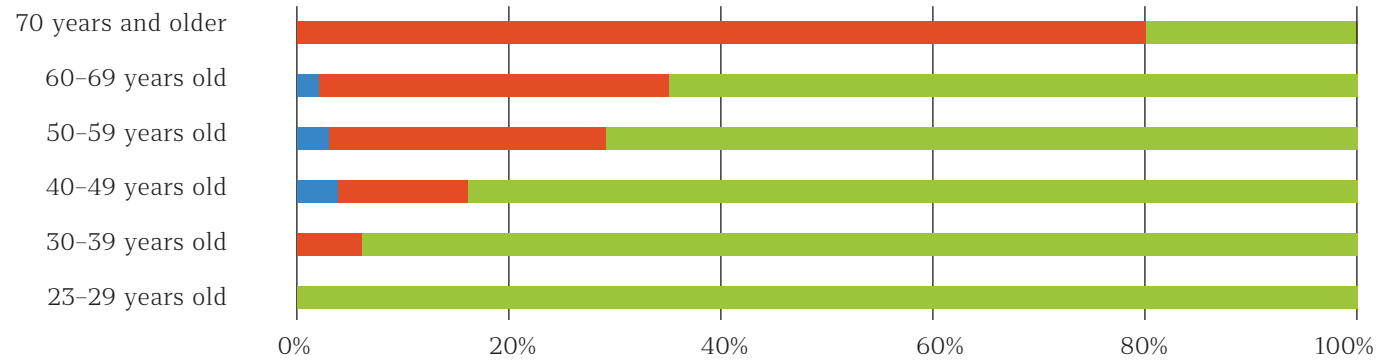
Figure 13 – Knowledge of regulatory documents.
Рисунок 13 – Знание нормативных документов



The best knowledge of regulatory documents was observed among doctors in the age of 23–29 and 60–69 years, and the worst was in the age group past age 70 (Fig. 13). It is necessary to mention that there is a parallel between this category and knowledge about the indications and contraindications to anaphylactic shock drugs.

The majority (74.4%) of respondents noted an increase in the effectiveness of diagnosis over the past 5 years, including 100% in the 23–29 age group, 93.75% in the 30–49 age group, 71.6% in the 50–59 age group, 64.1% in the 60–69 age group, and 20% in the 70+ age group. 22.9% of respondents did not note the corresponding dynamics, 6.25% of which were in the 30–49 age group, 25.93% in the 50–59 age group, 33.33% in the 60–69 age group, and 80% were over 70 years old. Worse diagnosis was mentioned by respondents aged 40–49 (3.23%), 50–59 (2.47%), and 60–69 (2.56%) (Fig. 14).

Figure 14 – Dynamics of diagnostic performance.
Рисунок 14 – Динамика результативности диагностики



	23–29 years old	30–39 years old	40–49 years old	50–59 years old	60–69 years old	70 and older
negative dynamics	0%	0%	3,23%	2,47%	2,56%	0%
without dynamics	0%	6,25%	12,90%	25,93%	33,33%	80,00%
positive dynamics	100%	93,75%	83,75%	71,60%	64,10%	20,00%

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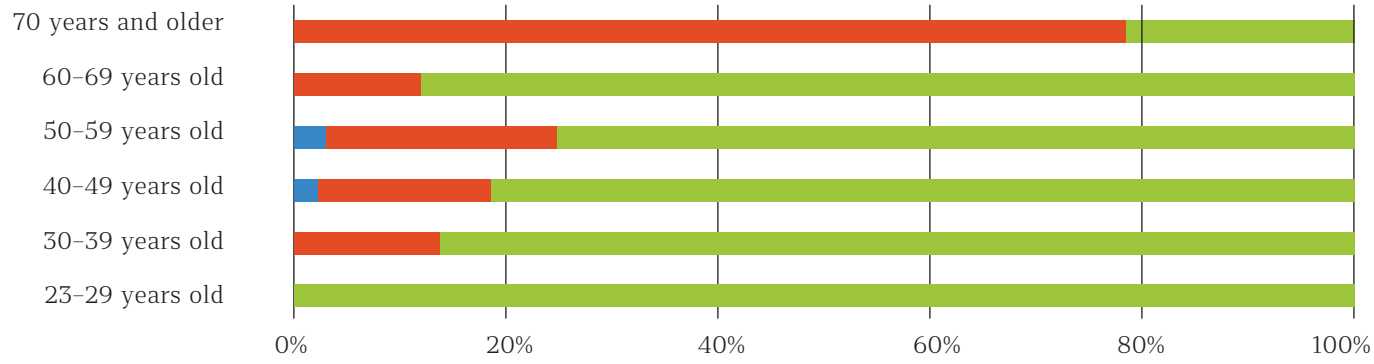
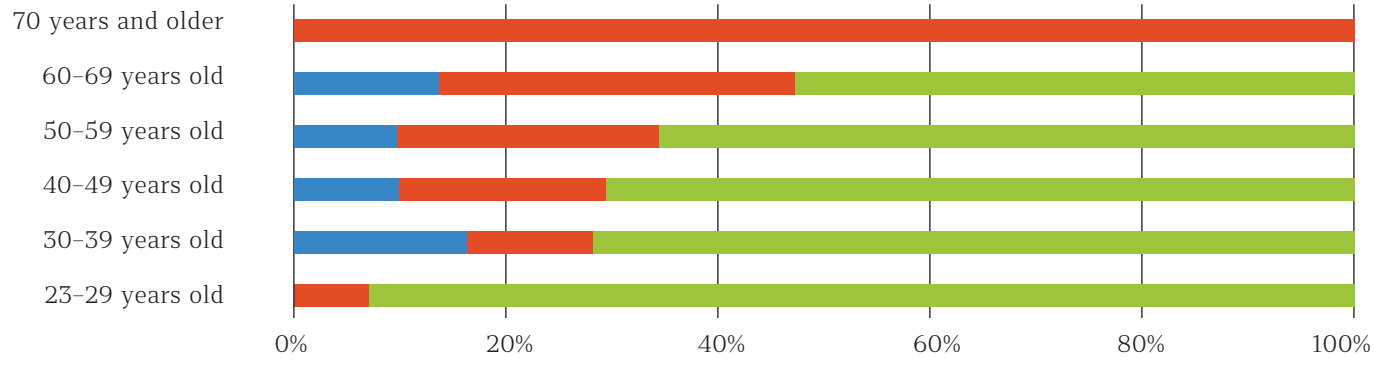
Figure 15 – Dynamics of treatment effectiveness.
Рисунок 15 – Динамика результативности лечения



	23–29 years old	30–39 years old	40–49 years old	50–59 years old	60–69 years old	70 and older
negative dynamics	0%	0%	3,23%	3,70%	0%	0%
without dynamics	0%	14,58%	16,13%	22,22%	12,82%	80,00%
positive dynamics	100%	85,42%	80,65%	74,07%	87,18%	20,00%

The majority (68.1%) of respondents noted positive dynamics in the effectiveness of establishing psychological contact with the patient, including 93.33% in the 23–29 age group, 72.92% in 30–39 age group, 70.97% in 40–49 age group, 66.67% in 50–59 age group, 55.13% in 60–69 age group, and 100% in over 70 years. No dynamics was observed by 20.2% of respondents, 28.21% of whom belonged to the 60–69 age group, 23.46% to 50–59 age group, 19.35% to 40–49 age group, 10.42% to 30–39 age group. Difficulties in establishing psychological contact with the patient were noted by 11.7% of respondents, including 16.67% of respondents aged 60–69, 9.88% aged 50–59, 9.68% in the 40–49 age group, 16.67% in 30–39 age group (Fig. 16).

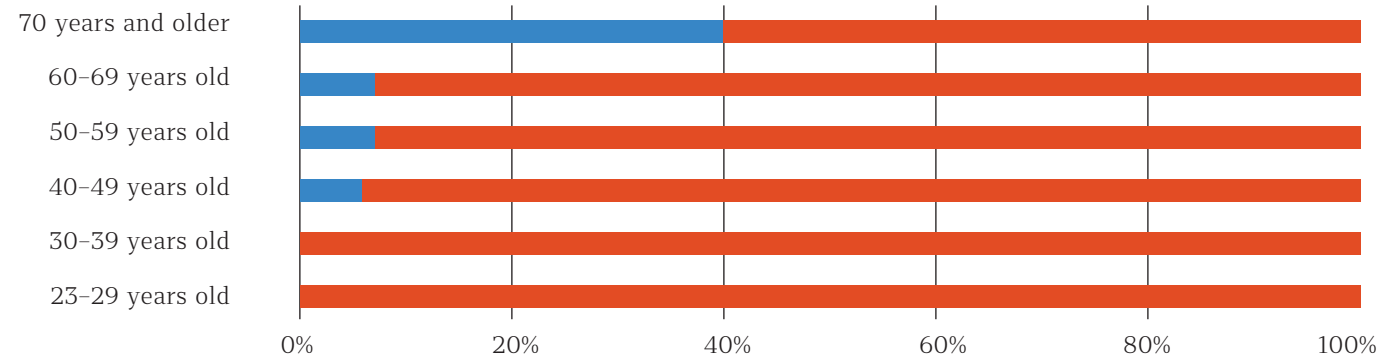
Figure 16 – Dynamics of psychological contact with patient.
Рисунок 16 – Динамика психологического контакта с пациентом



	23–29 years old	30–39 years old	40–49 years old	50–59 years old	60–69 years old	70 and older
negative dynamics	0%	16,67%	9,68%	9,88%	16,67%	0%
without dynamics	6,67%	10,42%	19,35%	23,46%	28,21%	0%
positive dynamics	93,33%	72,92%	70,97%	66,67%	55,13%	100,00%

According to the results of the memory self-assessment test, no dementia was detected. 8 (4.3%) of respondents had mild cognitive disorders; including (6.45%) in the 40–49 age group, (7.41%) in the 50–59 age group, 6 (7.69%) in the 60–69 age group, and 5 (40%) in the 70+ age group (Fig. 17).

Figure 17 – The proportion of cognitive disorders.
Рисунок 17 – Доля когнитивных расстройств



	23–29 years old	30–39 years old	40–49 years old	50–59 years old	60–69 years old	70 and older
negative dynamics	0%	0%	6,45%	7,41%	7,69%	40,00%
without dynamics	100,00%	100,00%	93,55%	92,59%	92,31%	60,00%

Respondents shared their opinion on the effectiveness of the new system of continuing medical education (CME). All of them consider it worse than the previous one, which was presented by certification with a five-year step of advanced training courses and professional development. The majority (91%) think that the CME system is not effective enough. Only 9% of respondents have positive opinion.

Findings

1. Doctors have poor knowledge about indications, contraindications and drug interactions of medications, which indirectly indicates an insufficient level of medical competence.

2. There is a tendency towards an age-related decrease in professional competencies and the effectiveness of prescribed treatment.

3. There is a tendency to an age-related increase in the proportion of cognitive disorders among doctors.

4. According to the majority of doctors, the current system of advanced medical training in terms of Continuing Medical Education does not meet the requirements.

Conclusion. Organizational solutions to the identified problems

Proposal 1 – Regular medical check up

The increased influence of risk factors of mental illnesses and pathological conditions determines the need for regular check-up of doctors with chronic diseases aged 55 and older (the Target Group).

In accordance with the order of the Ministry of Health of the Russian Federation No. 124n[1], each doctor of the Target Group should be included in the check-up group based on personal morbidity profile. Special attention should be paid to cognitive disorders. Since the main factors determining the development of cognitive disorders are ischemic cerebral disorders, the list of preventive measures for the Target Group should include measures for the prevention of cardiovascular diseases, including the assessment of systemic hemodynamic parameters as an effective way of early prevention of arterial hypertension.

In order to prevent alternative risk factors for dementia, a number of measures, such as prevention of smoking, physical inactivity, diabetes mellitus, obesity, dyslipidemia, vitamin B_{12} and folic acid deficiency, hyper- or hypothyroidism, are taken. If the doctor of the Target group has arterial hypertension or chronic heart failure, out-of-office monitoring of cardiac and systemic hemodynamic parameters is organized, followed by the selection of corrective treatment.

Proposal 2 – Universal program of routine medical examination for older doctors

Cognitive functions are basics in medical activity. In addition to the examinations approved by Order 124n, it is advisable for the doctors of the Target

[1] Order of the Ministry of Health of Russia dated March 13, 2019 No. 124n "On approval of the Procedure for preventive examination and medical examination of certain groups of the adult population".

Group to undergo routine medical examination. The generally accepted cognitive function monitoring scales (the Mini-Mental State Examination (MMSE) and the Montreal Cognitive Assessment (MoCA)) are mostly intended for detecting dementia, but they are not effective in detecting initial cognitive changes. McNair and Kahn self-assessment scale are a better choice for detection of mild cognitive impairment. This questionnaire would be better for examination of doctors in terms of professional ethics.

Proposal 3 – Medical activity using electronic search engine

We developed a Differentiated Treatment search system (the Search System) that operates on the basis of the State Registry of Medicines. It can register the patient complaints and the diseases to create a rating of treatment methods that correspond the indications and have no contraindications for this patient. At the stage of history taking, the search engine ranks medicines and other treatment methods according to the most common match of "complaint-indication" and "disease-indication" and excludes medications that have contraindications for these complaints or diseases. Such organization of the diagnostic and treatment process helps to eliminate errors associated with the underestimation of the influence of treatment methods.

Proposal 4 – Clinical recommendations improvement and integration into electronic algorithms to support a decision-making process

An important measure to support the professional activity of doctors included in the Target Group is to provide information and methodological support of expert systems, which are electronic diagnostic and treatment algorithms based on current clinical recommendations and standards of medical care.

Modern medicine is moving towards the development of algorithms for clinical recommendations. Outdated standards of medical care – a uniform list of medical and diagnostic procedures related to a particular disease – are being replaced by algorithms for supporting doctor's decision-making. All of them take into account disease presentation in a particular patient. Consistent patient examination for certain disease signs allows to make a diagnosis and prescribe relevant treatment taking into account personal characteristics and the course of the disease.

The most progressive measure of methodological support for the professional activity of doctors are expert systems that provide automated diagnostics with comprehensive audio, video and information support. Such organization of medical and diagnostic activities minimizes errors associated with incompetence and lack in attention of the doctor, including those caused by cognitive deficits. The scientific team of the N.A. Semashko National Research Institute of Public Health has developed a hardware and software complex (HSC) with an integrated expert system "Monitoring and correction of systemic hemodynamics in the treatment of arterial hypertension", which allows to determine the optimal combination of antihypertensive drugs and their dosage taking into account characteristics of the patient's cardiovascular system, as well as drug interaction. Specialized or single-profile consultations according to a clear algorithm, each step of which is supported by video and audio instructions, will minimize cases of wrong medical decisions. Clinical studies have shown that the HSC "Monitoring and correction of systemic hemodynamics in the treatment of arterial hypertension" has increased the effectiveness of treatment of arterial hypertension by more than 3 times.

The scientific team of the N.A. Semashko National Research Institute of Public Health has also elaborated expert systems aimed at treating chronic heart failure, as well as diagnosing and treating of cognitive disorders.

Proposal 5 – Methodological modules for older doctors at geriatric contact centers

One of the causes that reduces professional competence of older doctors is low computer literacy. Having sufficient qualifications and experience, the doctors of the Target Group have poor knowledge of digital sources of information and prefer printed information. As a result, there is a lack of awareness about the latest medical technologies, modern medicines, and changes in patient routing. In this regard, the Target Group needs methodological support of professional activity to a greater extent than young colleagues. The methodological module of a regional telemedicine or contact center can become a platform for such support.

The functions of the module are information support for the medical and diagnostic activities of doctors of the Target group, as well as operational access to the following databases (DB):

1. Database of regulatory documents (federal, regional, departmental orders, decrees, instructions) regulating professional activity;

2. Database of clinical recommendations, standards and procedures for providing medical care according to specialization;

3. Database of diagnostic methods: characteristics and appointment;

4. Database of therapeutic factors: characteristics, availability, delivery;

5. Patient routing database: appointment for a doctor-doctor consultation;

6. A set of audio and video manuals for the examination and treatment of patients with specialized pathology;

7. Educational videos in schools for patients on specific conditions;

8. Educational videos of schools for relatives on care and social services for certain diseases.

Doctors of the Target Group can contact the advisory center and access necessary diagnostic manuals (scales, tests, manuals) and instructions of their application.

When prescribing treatment, it will be possible to immediately specify indications and contraindications for each treatment plan during the consultation.

In most regions of the Russian Federation, there are regional unified medical information analysis systems (EMIAS) that provide access to medical information and personalized accounting of medical care. EMIAS unites various parts of healthcare and patient flow management. Each doctor of the Target Group should have access to EMIAS. It is advisable to integrate algorithms to support a doctor's decision-making on the most relevant problems, as well as scales and questionnaires regulated for the diagnosis and choice of corresponding treatment.

With the support of the N.A. Semashko National Research Institute of Public Health, scales and questionnaires of complex geriatric assessment used to identify senile asthenia and related diseases have been integrated in the EMIAS of the Moscow Region. Such a strategy of information support can significantly increase the effectiveness of diagnostics and to avoid errors of irrational thinking caused by age-related changes.

Proposal 6 – Changes in work schedule

This proposal is aimed at reducing mental and physical stress. Thus, the doctor of the Target Group may be offered a simplified work schedule without shifts at night, weekends and holidays, as well as a part-time schedule (0.75–0.25).

According to the Labor Code of the Russian Federation, the working week of medical workers should not exceed thirty-nine hours. Depending on the professional area, position, specific aspects, occupational hazards, working time may be reduced to 24 hours a week.

It seems rational to consider doctors of the Target Group as the category of specialists engaged only in outpatient consultations and to establish standard working time of 33 hours per week.

As an alternative measure, doctors of the Target Group can give consultations to a limited number of patients with the same and widespread disease. Such organizational solution can maintain the same amount of work due to a huge number of visits on common diseases, while reducing the cognitive load on the Target Group doctor by increasing the proportion of similar decisions.

In this case, it is advisable to rely on the most common senile pathologies. Priority should be given to those diseases that the elderly doctor suffers from, as personal problems can stimulate these specialists to improve their skills, master new medical and diagnostic techniques and find organizational solutions. In turn, the learning process can be a kind of training of cognitive functions.

Proposal 7 – Repurposing

Repurposing aimed at reducing cognitive load includes retraining and transfer of doctors of the Target group to consult patients with the most common geriatric syndromes, including metabolic syndrome, cognitive disorders, increased risk of falls, musculoskeletal degenerative changes. These medical conditions involve doctors of several specializations and require some interdisciplinary organizational solutions. The absence of a responsible specialist often results in continuing patient referral from one doctor to another. Doctors specializing in comorbid conditions will increase treatment effectiveness, as doctors of the Target Group can take similar decisions on treatment and reduce the cognitive load.

Proposal 8 – Treatment in training

Within the framework of the research project "Scientific grounds to development of health-preserving organizational technologies for the population", the scientific team of the N.A. Semashko National Research Institute of Public Health elaborated a set of additional professional training programs designed for doctors of the Target group, including "Prevention, early detection, diagnosis and treatment of cognitive disorders", "Neurogeriatrics", "Diagnosis, treatment and prevention of metabolic syndrome in elderly patients", "Monitoring of systemic hemodynamics in the diagnosis and treatment of arterial hypertension". The experience of training specialists in these areas allows us to make a conclusion about the future development in this direction. As an alternative to routine forms of training, we offer the technology of "treatment in training" based a cycle of continuing medical education along with the examination regulated by order 124n, and treatment based on the personal profile of morbidity in a multidisciplinary hospital, that is a regional geriatric center.

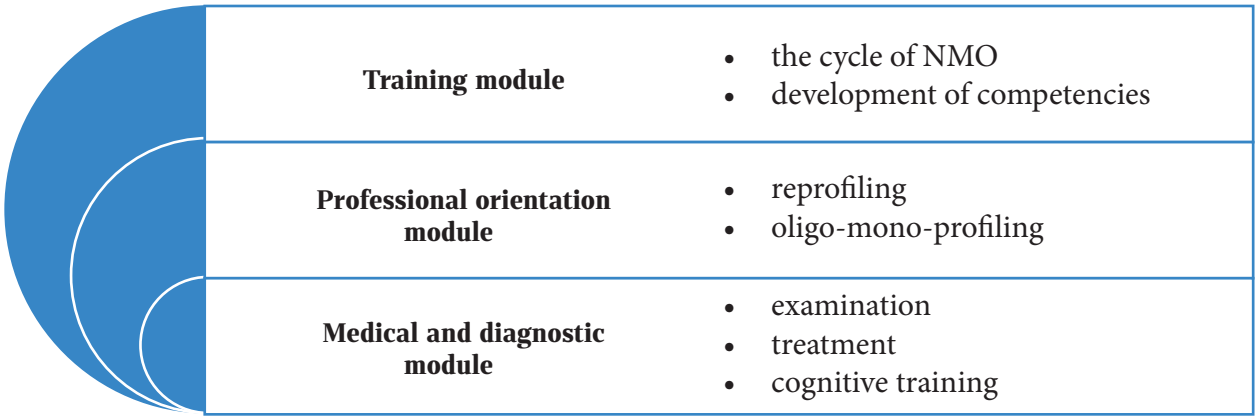
Treatment in training program comprises of 3 modules: educational, therapeutic and diagnostic and professional guidance. At the first stage, Target groups are formed on the basis of applications and study directions approved by the health authorities and territorial compulsory health insurance funds. Education is funded from targeted assets by the territorial compulsory health insurance funds.

Potential trainees are grouped according to their main specialties (therapeutic, surgical, diagnostic), topics and preferences in repurposing approved by the heads of medical institutions. Then, relevant time is chosen and documents are drawn up. The date of hospitalization is agreed.

At the appointed time, the trainees are hospitalized in a multidisciplinary geriatric hospital, where they are

examined by appropriate specialists and referred to the departments in accordance with their morbidity profile. Along with examination and treatment, doctors have studies on the relevant continuing medical education topic, where they improve their competencies for future professional activity. Cognitive training should be included in the complex of treatment and rehabilitation measures within the framework of "Treatment in training" program (Fig. 18).

Figure 18 – "Treatment in training" organizational structure.
Рисунок 18 – Организационная технология «Лечебная учеба»



Summarizing the above, we can propose implementation of an organizational technology that includes a set of the measures as an effective solution to support the professional longevity of doctors, especially the professional literacy of doctors of older age groups. The implementation of this technology to support effective longevity of doctors will maintain their professional skills and will help to preserve their health, thus guaranteeing the provision of high-quality medical care to the Russian population.

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