DOI: https://doi.org/10.17816/DD95661

Всероссийский рейтинг отделений лучевой диагностики: результаты конкурса 2020 года

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АННОТАЦИЯ

Вопросы менеджмента качества медицинской помощи и организации работы отделений лучевой диагностики всегда актуальны и требуют постоянного контроля и аналитической экспертизы. Московское региональное отделение Российского общества рентгенологов и радиологов (МРО РОРР) с 2018 года проводит независимую оценку отделений лучевой диагностики во всех регионах России. Цель рейтинга — выявить лидеров отрасли, а также распространить лучшие практики по всей стране. По результатам анкетирования выявлены положительные тенденции развития службы диагностической помощи по всей стране и критические точки, влияющие на качество работы медицинских организаций.

Представлен анализ функционирования 123 отделений лучевой диагностики в 2020 году. По окончании приёма заявок на участие в рейтинге был сформирован перечень из 163 медицинских организаций, расположенных в 15 городах 7 федеральных округов. Процедура оценки была разбита на три этапа. На первом этапе состоялось онлайн-анкетирование: каждой из организаций-участников было предложено ответить на вопросы по устройству работы отделения, оснащённости, перечню и особенностям выполнения диагностических исследований, а также работе с пациентами. Во время второго этапа проводился клинический и технический аудит набора анонимизированных исследований с заключениями. Следует отметить, что техническому аудиту уделялось особое внимание, поскольку ряд медицинских организаций нарушал методику проведения исследований. Третий этап включал проверку информации о медицинских организациях в открытых источниках. Во время первого и второго этапов начислялись баллы, на основании которых были выбраны финалисты, лидеры и победители рейтинга.

По итогам оценки всех этапов 31 организация вышла в финал, 6 попали в группу лидеров и 5 стали победителями, при этом 45% финалистов относились к Центральному федеральному округу. Прослеживается наибольшая заинтересованность аудита работы в муниципальных и частных медицинских учреждениях, нежели ведомственных и федеральных. Помимо перечня победителей собрана некоторая база данных, которая может представлять собой срез состояния службы лучевой диагностики в Российской Федерации.

Проведение подобных конкурсов направлено в первую очередь на повышение качества и безопасности проведения рентгенологических исследований. Методика проведения конкурса совершенствуется каждый год.

Ключевые слова: лучевая диагностика; организация здравоохранения; стационар.

Как цитировать

Семенов Д.С., Панина О.Ю., Хоружая А.Н., Кудрявцев Н.Д., Васильев Ю.А., Ледихова Н.В., Шулькин И.М., Морозов С.П. Всероссийский рейтинг отделений лучевой диагностики: результаты конкурса 2020 года // *Digital Diagnostics*. 2022. Т. 3, № 1. С. 43–54. DOI: https://doi.org/10.17816/DD95661

Рукопись получена: 18.01.2022 **Рукопись одобрена:** 11.03.2022 **Опубликована:** 08.04.2022

ЭКО•ВЕКТОР

DOI: https://doi.org/10.17816/DD95661

All-Russian rating of radiology departments: 2020 competition results

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ABSTRACT

The issues of quality medical care management and organization of the work of the department of radiation diagnostics are always relevant and require constant monitoring and analytical expertise. Since 2018, the Moscow regional branch of the Russian Society of Radiologists and Radiologists (MRO PORR) has been conducting an independent assessment of the departments of radiation diagnostics in all the regions of Russia. The rating aimed to identify industry leaders and spread the best practices throughout the country. The survey results identified the positive trends in the development of diagnostic care services throughout the country and critical points that affect the quality of work of medical organizations.

This study presents an analysis of the functioning of 123 departments of radiation diagnostics in 2020. After meeting the inclusion criteria, a list of 163 medical organizations in 15 cities of 7 federal districts was formed. The evaluation procedure was divided into three stages. The first stage consisted of an online survey, wherein each of the participating organizations was asked to answer questions about the department's work arrangement, equipment, list, and features of performing diagnostic tests, as well as working with patients. The second stage consisted of a clinical and technical audit of a set of anonymized studies with conclusions. Special attention was paid to technical audits since several medical organizations violated the methodology of conducting research. The third stage included checking the information about medical organizations in open sources. During the first and second stages, points were awarded, based on which the finalists, leaders, and rating winners were selected.

According to the evaluation results of all stages, 31 organizations reached the final stage, 6 were in the group of leaders, and 5 were winners, whereas 45% of the finalists belonged to the Central Federal District. Greater interest was found in the auditing work in municipal and private medical institutions than in departmental and federal ones. Some database has been collected, in addition to the list of winners, which may represent a cross-section of the state of the radiation diagnostics service in the Russian Federation.

Conducting such competitions is primarily aimed at improving the quality and safety of X-ray examinations. The methodology of the competition is improved every year.

Keywords: health facility administration; radiology department; hospital.

To cite this article

Semenov DS, Panina OU, Khoruzhaya AN, Kudryavtsev ND, Vasilyev YuA, Ledikhova NV, Shulkin IM, Morozov SP. All-Russian rating of radiology departments: 2020 competition results. *Digital Diagnostics.* 2022;3(1):43–54. DOI: https://doi.org/10.17816/DD95661

Received: 18.01.2022 **Accepted:** 11.03.2022 **Published:** 08.04.2022

DOI: https://doi.org/10.17816/DD95661

全俄放射诊断科评级：2020年竞赛结果

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简评

医疗质量管理和放射诊断科工作组织的问题总是迫切的，需要不断的监控和分析鉴定。自2018年以来，俄罗斯X射线学家和放射学家学会莫斯科地区分会对俄罗斯各个地区进行放射诊断的独立评估。该评级的目的是发现行业领导者，并在全国内传播最佳实践。根据调查结果，确定了全国诊断救护服务发展的积极趋势以及影响医疗机构工作质量的关键点。

对2020年123个放射诊断科的运行情况提供了分析。在参与评级申请受理结束时，已形成7个联邦区15个城市163家医疗机构的名单。评估程序分为三个阶段。在第一阶段，进行了在线问卷调查：要求每个参与组织回答有关部门组织、装备程度、执行诊断测试的列表和特点以及与患者合作的问题。在第二阶段，对一组匿名研究进行了临床和技术审核，并得出结论。值得注意的是，由于一些医疗组织违反了研究方法，因此技术审计受到特别关注。第三阶段包括验证公开来源中的有关医疗组织的信息。在第一阶段和第二阶段加算评分，并在此基础上选出评级的入围者、领导者和获胜者。

根据各阶段的评估结果，31个组织进入决赛，6个进入领导组，5个成为获胜者，而45%的入围者属于中央联邦区。对市政和私营医疗机构的审计兴趣大于对部门和联邦机构的审计兴趣。除了获奖者名单之外，还编制了一些数据库，这可以代表俄罗斯联邦放射诊断服务状况的断面。

此类竞赛主要旨在提高X射线检验的质量和安全。竞赛的方式每年都在改进。

关键词：放射诊断； 医疗机构； 住院部。

To cite this article

Semenov DS, Panina OU, Khoruzhaya AN, Kudryavtsev ND, Vasilyev YuA, Ledikhova NV, Shulkin IM, Morozov SP. 全俄放射诊断科评级：2020年竞赛结果. *Digital Diagnostics.* 2022;3(1):43–54. DOI: https://doi.org/10.17816/DD95661

收到： 18.01.2022 **接受：** 11.03.2022 **发布日期：** 08.04.2022

INTRODUCTION

Issues of medical care quality management and organization in radiology departments (RDs) are always relevant and require continuous monitoring and analytical expertise [1, 2]. Qualitative improvement of the diagnostic process becomes particularly important to continuously increase the number of examinations conducted [3, 4].

The Moscow Regional Branch of the Russian Society of Roentgenographers and Radiologists (MRB RSRR) has been independently evaluating RDs in all regions of Russia since 2018. These ratings aim to identify industry leaders and disseminate best practices within the country. The expert group gradually collects and analyzes information from colleagues through questionnaires and open-source data analysis, and the results of anonymized examinations—radiological, radioisotopic, and ultrasound—were audited. Data analysis on medical facilities forms a picture of the radiology service in Russian healthcare.

Therefore, this study aimed to analyze the functioning of 123 RDs in 2020. The positive trends in the development of diagnostic services across the country and critical points affecting the performance of medical facilities were also identified.

MATERIALS AND METHODS

At the end of the application process, 163 medical facilities were included in the list. The procedure was divided into three stages to comprehensively assess the performance of RDs.

During the first stage, an online survey was conducted. Each participating organization was invited to answer questions on the functioning of the department, equipment, list and features of diagnostic tests, and patient care. Questions were categorized into modality groups, such as computed tomography (CT), magnetic resonance imaging (MRI), radiography (RG), mammography (MMG), positron emission tomography (PET), radionuclide diagnosis (RND), and ultrasound (US) scanning. The total number of questions was 150: 25 for CT, 19 for MRI, 23 for RG, 17 for MMG, 17 for PET, 14 for RND, 16 for US, and 19 general questions. In addition to questions on modalities, specific items regarding the relevance of data provided were included in the survey (e.g., the compliance with current regulatory documentation and completeness of the implementation of Russian and international recommendations).

Each survey question was assessed using a numerical scale: additional points were awarded for each "correct" answer, corresponding to the standards and recommendations, whereas points were deducted for each violation of the department rules and regulations or the use of ineffective solutions. A maximum of 40 points could be scored for the survey, and the threshold score for passing the first stage was 15.

At the second stage, the examinations were audited clinically and technically. Medical facilities provided a set of anonymized examinations with conclusions to the expert group of the NPKTs DiT DZM (Research and Practical Clinical Center for Diagnostics and Telemedicine Technologies of Moscow Healthcare Department): each facility provided two pelvic (male) MRI scans, abdominal MRI, contrast-enhanced abdominal CT, low-dose chest CT (LD-CT) if available, chest RG, MMG, PET/CT, and three breast and thyroid US scans. The maximum possible score for the audit stage was 60 points.

At the third stage, information on the medical facility was checked in open sources, that is, official websites and data from reporting forms (such as Form No. 30). No points were assigned for this stage.

At the end of these stages, the total points were calculated, and the winners were selected based on these results. For a participant to be included in the group of prize-winners, threshold points were required: >15, 50, and 70 points for the finalists (a passing score according to the survey results), leaders, and winners, respectively. Each group—leaders and winners—could include any institutions that reached the required points.

RESULTS

Of the 163 participants, 123 RDs completed the first stage of the survey, with 50% taking up to 140 patients per day and 33.33% taking 140–420 patients.

The rating covered 15 cities (Moscow, St. Petersburg, Khanty-Mansiysk, Kazan, Yakutsk, Nizhny Novgorod, Krasnoyarsk, Stavropol, Omsk, Chita, Voronezh, Cheboksary, Irkutsk, Samara, and Tyumen) from seven federal districts. Due to the limited number of cities, these ratings may not be directly scalable to the entire country; however, the presented methodology and results may become the basis for a more extensive study of the radiology services in Russia.

In the first stage, 31 medical facilities reached the final stage, and medical institutions from four regions, that is, Moscow (2 participants), Central, Volga, and Ural Federal Districts were the top five, with scores of 24.04–34.34 points.

The second stage of the independent assessment of the RDs is an audit of the examination packages provided by participants to the NPKTs DiT DZM experts and a review of open sources. From September 18, 2020 to October 11, 2020, 11 organizations out of all finalists submitted examinations. The NPKTs DiT DZM experts checked a total of 182 examinations (22 CT, 44 MRI, 20 RG, 20 MMG, 20 NDCT, 8 PET, and 48 US scans).

The technical audit received special attention, since several medical facilities violated the methodology of conducting examinations. For example, a standard abdominal CT scan should start from the lower lobes of the lungs and cover the area up to the upper third of the femur. Some departments raised the lower boundary of the scanning area to the iliac crests, excluding the pelvic organs, which is a

mistake. Individual cases with non-standard targets were not included in the analysis.

Based on the total score at the second stage, the top three were institutions from the Ural, Volga, and Central Federal Districts (24.57, 23.04, and 21.75 points respectively).

After calculating the results of all stages, 31 organizations, 6 leaders, and 5 winners reached the final stage, with 45% of the finalists belonging to the Central Federal District. Medical facilities were represented by municipal (14), private (10), departmental (2), and federal (5) institutions. Based on the type of medical care, the institutions were outpatient (7), inpatient (3), and specialized (21). Thus, the auditing work was highest at municipal and private medical institutions, rather than at departmental and federal ones.

In addition to the list of winners, some databases were created to represent a cross-section of the state of the radiology service in the Russian Federation. These materials are discussed in more detail below (with no reference to specific departments, since this information is excluded from analysis).

GENERAL ASPECTS OF THE RADIOLOGY SERVICE

Making an appointment

For the patient, the interaction with RDs begins with an appointment for the examination. This process is sufficiently elaborated in all participants of the survey based on both the number of recording methods and informing the changes. Regarding the first, the most common form was recording at the attending physician (after an initial or repeated consultation with a specialist), followed by the frequency of recording at the reception desk and by phone. Appointments through an application on the website of a medical institution, in the patient's personal account, via messenger or a mobile application could be made in rare cases.

The majority of the departments (78%) remind the patient of the examination; of these, only 34% send information on the preparation for the examination in advance. A survey and a conversation between the patient and the physician before the examination is conducted in 56% of cases, an oral interview is held in 38%, and no interaction with the patient is provided in 6% of cases.

Issuing examination findings

The findings are mostly provided on a digital medium (CD or DVD) or on film (23 cases) through a personal account or cloud data storage (16 cases). In the current clinical practice, findings on film are only appropriate for some radiographic offices and when using the operation of the analog equipment. When choosing a new technology, digital media would be a good option. Some private clinics do not give up the "film" to be client-oriented. This is practiced only when a physician does not have an automated workstation and asks for the examination findings on film [5].

Availability of examinations

Aside from the convenience of the appointment, an important factor is the opening hours of the department and the possibility to arrange same-day appointments (in case the patient is ready for the examination). This issue is particularly important to increase the coverage of screening programs [6, 7]. The availability of examinations for emergency patients is best in Moscow and worst in the Volga Federal District (12 points vs. 2 points, respectively).

The ability to perform radiological services on the day of application (Fig. 1) was provided for X-ray examinations and CT and US scans (104, 95, and 78 cases, respectively). For these modalities, both the readiness of the department to

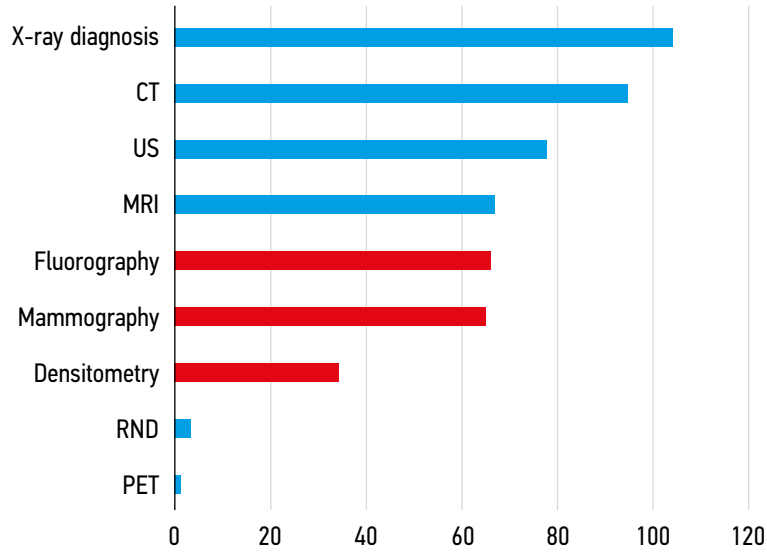

Fig. 1. Availability of same-day X-ray examinations.

Note. CT, computed tomography; *US*, ultrasound; *MRI*, magnetic resonance imaging; *RND*, radionuclide diagnosis; *PET*, positron emission tomography.

DOI: https://doi.org/10.17816/DD95661

receive the patient on the day of application and the patient's preparation for the examination (for abdominal examinations, MMG, and US of pelvic organs in women of childbearing age) are important. However, in the survey, the researchers were interested in the readiness of the department to receive a patient.

PET/CT and RND (1 and 3 cases, respectively) were the least available procedures in terms of same-day appointments because of the complicated logistics of delivering radiopharmaceuticals for these types of examinations and the need for careful planning of the required volume, depending on the number of records per day. Moreover, patients require preparation before PET/CT and RND to exclude pseudopositive accumulation of radiopharmaceuticals; however, this is beyond the scope of the survey.

Appointments on weekends were available at 94 (67%) RDs, only Saturday appointments could be performed at 26 (19%) RDs, and 20 (14%) RDs did not work on weekends. Based on modality, X-ray examinations, CT, and MRI were available on weekends (Fig. 2), whereas PET and RND were the least available.

Based on the survey results, the availability of screening tests, such as fluorography, MMG, and densitometry, on the day of application is lower than that of MRI or CT scans. The former types of examination are logically explained by the trend toward screening withdrawal, whereas the latter two obviously require more attention in terms of throughput and office efficiency. Another reason for the decreased availability of these examinations may be the peculiarities of medical service pricing.

Patient safety

Patient safety in diagnostic examinations is one of the priority tasks [8]. While radiation safety in Russia is strictly regulated at the legislative level [9], several other aspects are specifically included in the survey. Thus, 92% of radiologists, 54% of radiographers, 40% of nurses, and 25% of US physicians were certified cardiopulmonary resuscitators. However, with the system modernization of primary specialized accreditation for specialists and continuous medical education, the vast majority of the employees will be competent in first aid.

Follow-up after intravenous contrast enhancement in RDs: Patients were released immediately after the examination in 5 cases (4%) or <15 min in 16 (12%) cases; the follow-up lasted for 15–30 min in 68 (50%) cases or >30 min in 47 (35%) cases. Notably, some program participants omitted this item from the survey.

Unfortunately, regardless of the measures taken to prevent accidents and medical errors, they are inevitable in practice. Global experience shows the feasibility and effectiveness of recording, such incidents for subsequent analysis; however, domestic medicine lags behind in this direction [2]. Nevertheless, the survey demonstrated that 70% of departments take measures to prevent accidents in one form or another. Joint reviews of complex cases are conducted as needed in 86 (62%), weekly in 49 (36%), and not conducted in 3 (2%) cases. The complaint registry is available in 64 of 136 RDs.

One medical institution did not have internal quality control, whereas only 29 of 135 respondents engage external experts for auditing. The auditing practice implemented by the NPKTs DiT DZM showed the high efficiency of this approach with low labor costs [9].

To the question "Do you actively use second opinion?," the answer "Yes, via email" was given by 67 (48%) respondents; "Yes, via PACS/RIS" by 51 (37%) respondents; and 21 (15%) respondents do not use the option (data by modalities are detailed in Fig. 3).

Remote description of examinations may be regarded as a "privilege" for a physician; however, during the coronavirus disease 2019 pandemic, this turned out to be a necessity [4]. In addition, this approach greatly increases the availability of expert opinions from experienced specialists [5, 10]. Our data

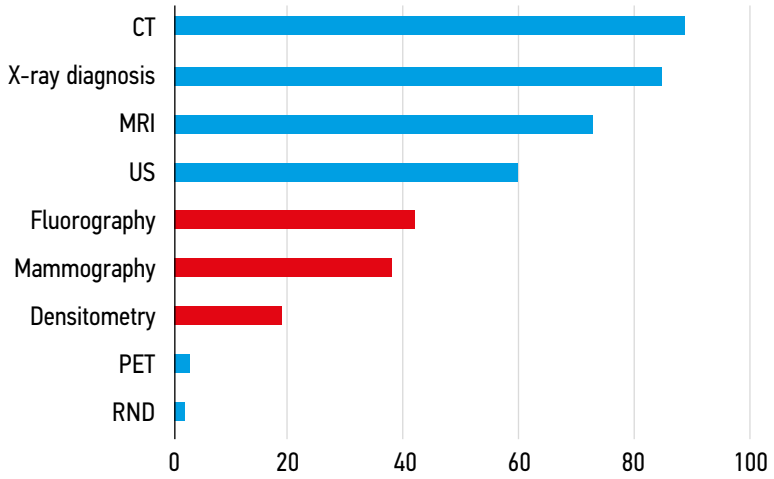

Fig. 2. Appointments in radiology departments (RDs) on weekends.

Note. CT, computed tomography; *MRI*, magnetic resonance imaging; *US*, ultrasound; *PET*, positron emission tomography; *RND*, radionuclide diagnosis.

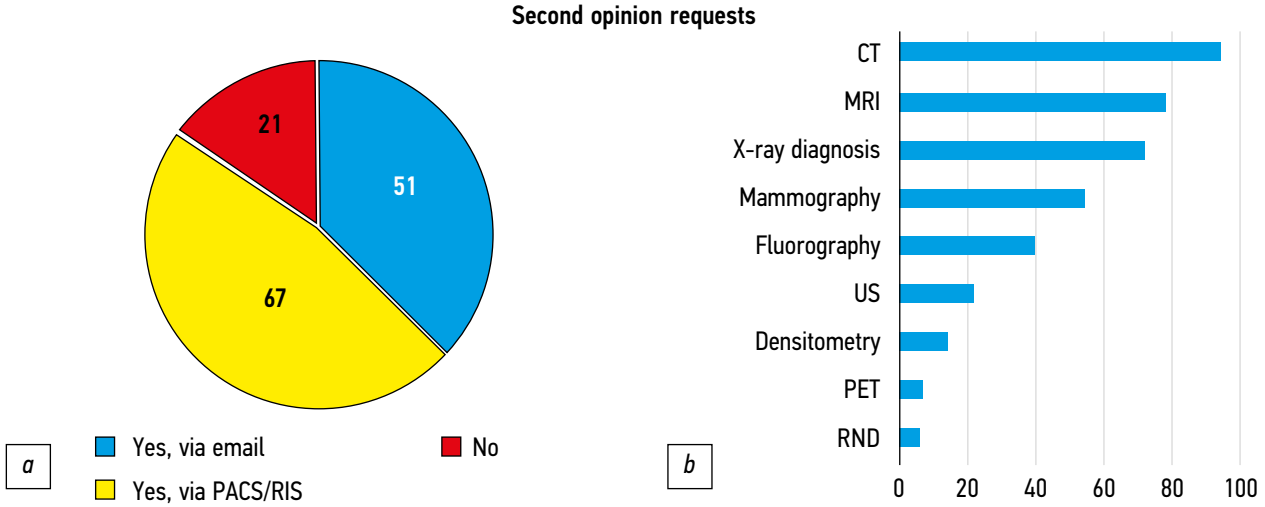

Fig. 3. Characteristics of second opinion requests in RDs: *a*, general information on its availability; *b*, data on modalities for which specialists most commonly request a "second opinion." Most frequently (94%), further CT scan examination is required.

Note. CT, computed tomography; *MRI*, magnetic resonance imaging; *US*, ultrasound; *PET*, positron emission tomography; *RND*, radionuclide diagnosis.

showed that 30% of radiologists describe patients' scans directly in the office where examinations are performed; 30% of cases reported that the physician's office is remote, but is located in the same building; and 40% of respondents practice remote description, in particular, by experts from other medical facilities. While some complex examinations require the direct presence of a radiologist, a separate office is still necessary for proper and effective work.

DIAGNOSTIC EQUIPMENT AND EXAMINATION METHODOLOGY

CT scanners are installed in 100 RDs, which are all equipped with automatic injectors for administering contrast agents. Remarkably, 22 machines have ⩾128 slices, and 18 have dual-energy CT (DECT) function.

The list of examinations performed varies from department to department and obviously depends on the equipment and peculiarities of the patient flow. The prevalence of different types of CT scans is shown in Fig. 4. Apparently, LD-CT, which is performed in 65 out of 100 departments, and whole-body CT are the most common (54). Furthermore, 28 RDs perform CT-guided surgeries, including minimally invasive interventions.

Among the departments that participated in the survey, 68 were equipped with US diagnostic machines, and most were equipped with convex, linear, and transvaginal transducers (Fig. 5).

The rating of the most common examinations is headed by breast and male pelvic US scans (60 and 57 medical facilities, respectively). In 46 departments, minimally invasive US-guided interventions are performed, namely, therapeutic punctures and drainage, fine-needle aspiration biopsy of the thyroid gland, and prostate and internal organ biopsies (liver, kidneys, pancreas, and others). Less frequently, hepatic elastometry, peripheral nerve US scanning, and compression elastography (28, 24, and 23 medical institutions, respectively) are performed.

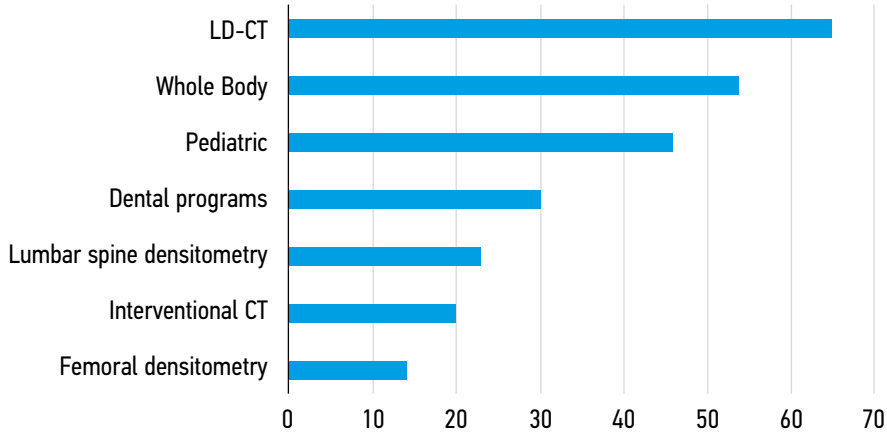

Fig. 4. Prevalence of CT scans performed in the RDs of the rating participants.

Note. CT, computed tomography; *LD-CT*, low-dose computed tomography.

The analysis showed that at least among the rating participants, the availability of X-ray machines is lower than that of CT scanners. A total of 91 devices (including 60 mobile and 44 dental) are installed in these medical institutions; and 76 of these are digital.

Most medical facilities (77) perform fluoroscopy; however, special examinations are not available in all institutions (Fig. 6).

A total of 63 departments are equipped with mammographs, and the proportion of digital devices is comparable to X-ray machines (86% vs. 84%). The most common examinations are ductography and targeted MMG (61 and 59 departments, respectively). The availability of mammographic examinations is shown in Fig. 7.

A total of 22 machines are equipped with tomosynthesis, and 28 have a biopsy attachment: 21 and 17 departments with vertical access and horizontal table, respectively. Vacuum aspiration biopsy is less available, that is, only in 11 out of 63 departments.

In terms of work organization, all rating participants perform MMG in two views, and <3% of examinations are repeated due to technical problems. Moreover, the Bi-RADS scale is used in 59 departments; however, physicians in only 44 departments are additionally certified in MMG.

The departments of the rating participants have 84 MRI scanners with 1.5, 3, and <1.5 Tesla induction (58, 21, and 5 departments, respectively). Most manufacturers include a

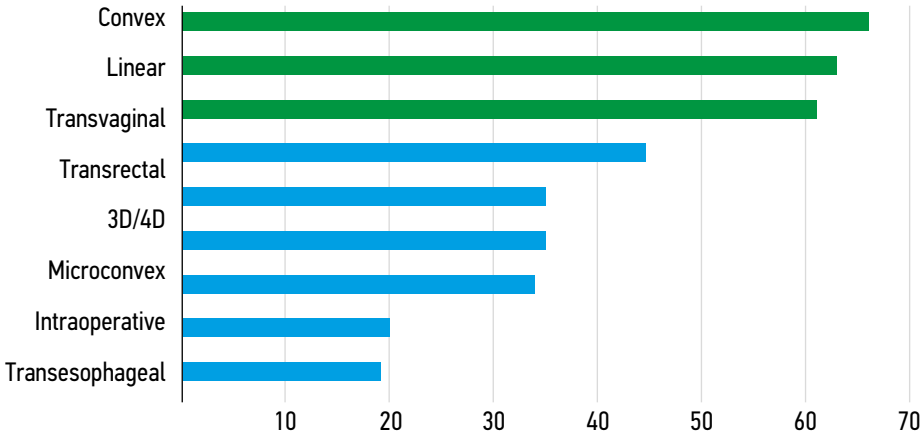

Fig. 5. Transducers of ultrasound diagnostic devices.

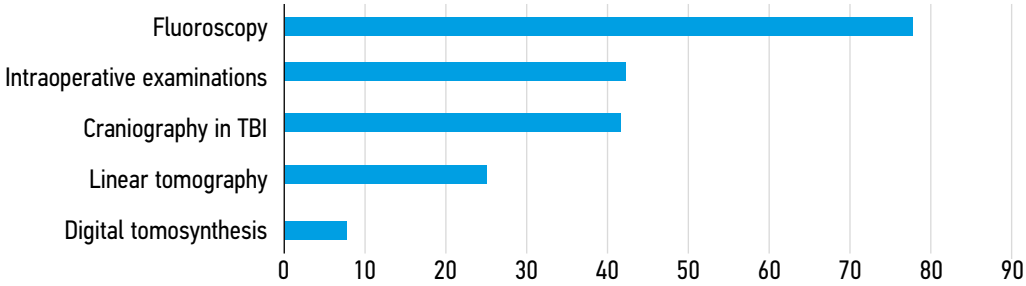

Fig. 6. Availability of specialized X-ray examinations.
Note. TBI, traumatic brain injury.

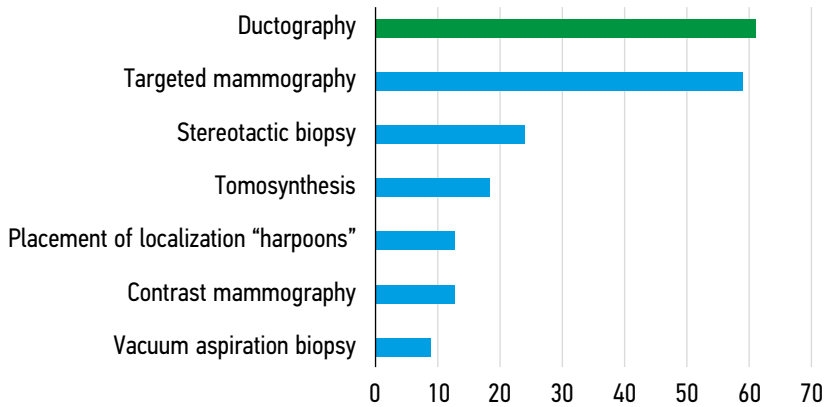

Fig. 7. Availability of mammographic examinations.

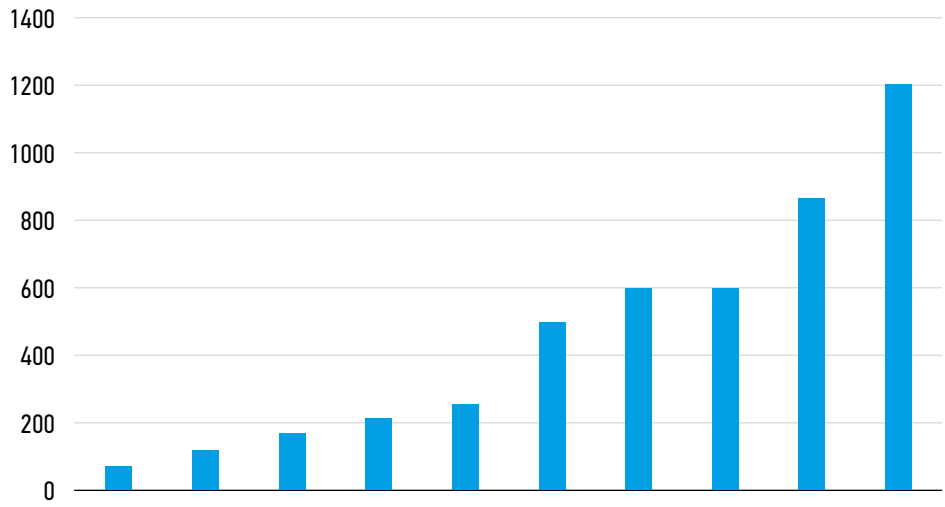

Fig. 8. Number of visitors per day in the top ten RDs based on the rating.

minimum set of radiofrequency coils for the most common examinations (head and neck, abdomen, and small pelvis) as the standard equipment. However, a peculiarity of this modality is the frequent "profiling" of the MRI office on a small group of examinations, depending on the particular medical facility. Thus, cardiac MRI, tractography, and surgical interventions (MRI-guided biopsy) are performed in 27, 36, and 6 surveyed departments, respectively.

One of the most common non-standard examinations is MR angiography, which is performed in 76 departments. However, this applies primarily to angiography of the brachiocephalic arteries. Concurrently, only 32 and 23 departments perform aortic examinations and angiography of the lower extremities, respectively.

PET (including CT) is not as widespread as the other diagnostic methods; however, only five departments are equipped with this type of machines. The PET part of the equipment in most cases (three of five) has four detector rings, and CT has ⩾64 slices. All departments have their own production of radiopharmaceuticals, whereas four of five have only fluorodeoxyglucose. In practice, examinations are performed using 11C-methionine, 18F-choline, 18F-tyrosine, 18F-DOPA, 18Ga-PSMA, and 18F-PSMA.

Regarding the examination features, all departments (with few exceptions) use means to ensure patient and staff safety; however, the automatic administration of radiopharmaceuticals is used only in one medical institution. Furthermore, two of five PET departments only examine cancer patients.

Based on scoring results, the top ten RDs were determined. This list included a wide variety of medical facilities with capacity ranging from 70 to 1,200 people per day and an average of 459 (Fig. 8).

Certainly, all of these organizations are well equipped and have at their disposal a wide range of equipment, including additional options. Each of the 10 RDs has a data storage and transmission system and remote description capabilities, follows the standardized protocols and international guidelines (such as PI-RADS and BI-RADS), audits examinations, and carefully implements measures to ensure safety of both patients and staff.

CONCLUSIONS

The results of the competition provided an insight into the level of organization among RDs in different regions of the Russian Federation. The main advantage of the participation of medical institutions in this competition is the opportunity to have an independent assessment of the department's work by the expert council of MRB RSRR, identify strengths and weaknesses, and receive personal recommendations. Such competitions are primarily aimed at improving the quality and safety of X-ray examinations.

The methodology of the competition is improved every year. Hopefully, the number of rating participants will increase in the future, and a single RD standard will be created across the country.

ADDITIONAL INFORMATION

Funding source. This article was prepared as part of research (No. in the Unified State Information System for Accounting of Research, Development, and Technological Works, EGISU: AAAA-A21-121012290079-2) under the Program of the Moscow Healthcare Department «Scientific Support of the Capital's Healthcare» for 2020–2022.

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

Authors' contribution. All authors made a substantial contribution to the conception of the work, acquisition, analysis, interpretation of data for the work, drafting and revising the work, final approval of the version to be published and agree to be accountable for all aspects of the work. The largest contribution is distributed as follows: D.S. Semenov — drawing up a questionnaire, collecting information, collection and analysis of literature, writing text;

O.U. Panina — collection and analysis of literature, working with data, writing text; A.N. Khoruzhaya — counting and analysis of data, writing text, finalizing the article; N.D. Kudryavtsev — counting and analyzing data, writing text; Yu.A. Vasilyev — data analysis and statistics; N.V. Ledikhova — drawing up a questionnaire, expert support; I.M. Shulkin — creation of a research plan, preparation of a questionnaire; S.P. Morozov — concept and formation of the research question.

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