CONSIDERATIONS

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USAGE OF ARTIFICIAL INTELLIGENCE IN THE CLINICAL PRACTICE OF UROLOGISTS IN OBSERVATIONS WITH RENAL PARENCHYMAL NEOPLASMS

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Objective: to assess the needs and attitudes of urologists regarding the use of technologies related to artificial intelligence, particularly the web platform «Sechenov.AI_nephro», in the surgical treatment of patients with renal parenchymal neoplasms.

Materials and methods: a qualitative study was conducted through in-depth interviews. A questionnaire was developed for the interviews, including 14 categories of questions covering various aspects of the use of artificial intelligence (AI) aimed at optimizing preoperative planning for patients with renal parenchymal neoplasms. The study involved 8 urologists with extensive experience in the surgical treatment of patients with renal parenchymal neoplasms.

Results: the survey results highlight the growing interest in the implementation of AI technologies in medical practice.

Conclusion: in-depth interviews among urologists in Russia showed that there is a high interest in AI developments in urological practice. At the same time, successful integration of technologies requires overcoming several obstacles, including training specialists and ensuring data security. The «Sechenov.AI_nephro» platform has the potential to become an important tool in optimizing preoperative planning, but its success will depend on the readiness of physicians for new technologies and support from the medical community.

K e y w o r d s: *in-depth interview, artificial intelligence, renal parenchymal cancer, 3D modeling, automatic semantic segmentation*

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Introduction. In modern medicine, digital technologies capable of improving diagnostics, optimizing preoperative planning, and enhancing the quality of patient treatment are gaining increasing importance [1]. Digital technologies based on artificial intelligence (AI) are currently being actively implemented in various fields of medicine, including radiology, where machine learning algorithms assist in interpreting medical images [2]. This allows physicians to personalize and precisely identify pathological changes in the various organs and systems of the human body, thereby reducing the likelihood of diagnostic errors. For instance, clinical decision support systems (CDSS) based on AI help analyze DICOM (Digital Imaging and Communications in Medicine) data from magnetic resonance imaging (MRI) and multispiral computed tomography (CT), identifying minimal renal parenchymal tumors that may be physiologically inaccessible to the human eye. This not only accelerates diagnostics but also facilitates timely initiation of treatment, ultimately leading to acceptable outcomes.

Furthermore, digital technologies assist in preoperative planning by allowing physicians to virtually model different options for upcoming surgical interventions. AI-based CDSS can analyze a large array of patient data, enabling personalized surgical treatment strategies. Additionally, virtually performing the upcoming surgical intervention allows for the prediction of complication risks. The implementation of such technologies in urology opens new horizons for achieving optimal functional and oncological outcomes in surgical treatment. For over 15 years, staff at the Institute of Urology and Human Reproductive Health at Sechenov University have been using 3D modeling of pathological lesions in patients with kidney diseases [3]. In the past three years, Sechenov University has developed the CDSS web platform Sechenov.AI_nephro, which automatically recreates personalized 3D models of pathological lesions

in patients with renal parenchymal tumors based on DICOM data from contrast-enhanced abdominal CT using "computer vision" technology [4].

Urologists now have the capability to perform virtual planning for upcoming surgeries in patients with renal parenchymal tumors without the need for IT specialists or additional programming knowledge. Despite the positive aspects of using the Sechenov.AI_nephro web platform, we, like any developer of a new product or technology, faced the question of assessing the target audience by identifying the requests, needs, and opinions of practicing urologists regarding the possibilities for improving and further utilizing AI-based digital technologies. To address this question, we carried out a qualitative analysis in the form of in-depth interviews among urologists in Russia.

Aim. To assess the needs and attitudes of urologists regarding the use of technologies related to AI, particularly the Sechenov.AI_nephro web platform, for the surgical treatment of patients with renal parenchymal tumors.

Materials and methods. A qualitative study was carried out in the form of in-depth interviews. To analyze the needs of the target audience regarding the application of the Sechenov.AI_nephro web platform, six hypotheses were formulated:

1. Physicians are conservative regarding the application of new technologies, particularly in the process of diagnosis and treatment.
2. The Sechenov.AI_nephro product can be used to support clinical decision-making in the treatment of surgical kidney diseases and potentially other organs (liver, pancreas, colon, stomach, lungs).
3. A price not exceeding 5,000 rubles will be the most attractive for the majority of physicians and patients.
4. Healthcare institutions experience difficulties in using modern digital systems for diagnosis and personalized determination of surgical treatment tactics in cases involving tumors (absence of an alternative tool for diagnosis and treatment decisions).
5. The presence of three-dimensional visualization facilitates better absorption of educational material by students, residents, and trainees in medical universities.
6. The Sechenov.AI_nephro product is currently most relevant for application in academic medicine.

To carried out the interviews, a questionnaire was developed, including 14 categories of questions covering various aspects of using AI to optimize preoperative planning in patients with renal parenchymal tumors (figure). Eight urologists with extensive experience in the surgical treatment of renal parenchymal tumors participated in the study. The urologists provided detailed responses to the formulated questionnaire.

Results. The survey among urologists revealed several key aspects regarding the need for using AI in urological practice.

1. Number of patients with renal tumors. In the respondents' institutions, between 40 to 300 patients with renal parenchymal tumors undergo surgical treatment annually, with a significant portion undergoing organ-preserving surgeries (from 70% to 98%), highlighting the importance of effective and accurate diagnostic methods in planning surgical tactics.

2. Technological solutions and radiological diagnostics. Most urologists utilize modern radiological diagnostic methods, such as ultrasound (US), CT, and MRI, emphasizing CT as the preferred method for diagnosis. Respondent 1 noted:

– The primary choice for diagnosing pathological changes in the kidneys in our clinic is contrast-enhanced CT and MRI.

Some respondents mentioned low characteristics of the equipment being used. Respondent 3 shared:

– We use US and CT. The maximum resolution is a 256-slice MDCT scanner. There are sometimes issues with material support; sometimes the contrast agent is even unavailable.

3. Tumor identification and 3D modeling. Respondents shared their experiences in identifying tumors and using modern IT-technologies, such as 3D modeling. Conclusions about the presence of tumors are mostly based on contrast-enhanced CT. Respondents 3 and 4 perform preoperative construction of a 3D model of the organ for surgical planning:

– The sequence is as follows: US, then CT (including 3D modeling). Constructing a 3D model helps in planning organ-preserving procedures.

4. Cost of methods and payment resources. Often, studies are carried out under the compulsory medical insurance (CMI) framework. For paid services, the cost of performing contrast-enhanced CT starts from 7,000 rubles and higher, as noted by respondents 1, 3, 5, and 7.

5. Challenges in surgical planning. Participants do not experience difficulties in planning surgical interventions. However, some indicate that 3D modeling could simplify the planning process. Respondent 2 explained:

– There are doubts: tumor, cyst, how is it located? Is it worth proceeding with an open intervention because of this? Sometimes the intraoperative features differ... 3D modeling will be very helpful in this regard.

6. Demand for the method. Most urologists see potential in the development and use of 3D modeling technology in medicine as an auxiliary tool in choosing the optimal surgical treatment strategy. Respondent 6 stated:

– This is a super first step; it's like Neil Armstrong walking on the moon. For me, this project is probably the beginning of something bigger. It's the beginning of a pool: a digital model of the organ, a digital model of a healthy person. A significant plus I see in this project is the reduction in the time it takes for a surgeon to become proficient. This significantly shortens the 'learning curve' for a surgeon to the extent that a 'young' surgeon can be entrusted to perform an organ-preserving procedures via laparoscopic access."

Respondent 5 emphasized:

– Currently, in the diagnosis of almost any disease, CT takes the first place because its specificity and sensitivity range from 98 to 100% for some disorders. I really liked your development, Sechenov.AI_nephro. If it reaches such a level now, it would be excellent because this technology shows where the vessels are located, which is very important. All vessels inside the kidney can be seen: which vessel feeds the tumor, whether superselective ischemia can be performed or will it help with partial nephrectomy or not. These are aspects that will significantly expand the surgeon's preparedness for the procedures they will perform.

7. Time costs for determining surgical tactics. Urologists shared information about the time required to establish a diagnosis and determine the treatment strategy. The diagnosis is most often made immediately after reviewing the DICOM data from the patient's CT.

1. **Number of Patients with Renal Tumors**
   How many patients with renal tumors have been registered at your institution over the past year? How many of them underwent surgical treatment? How many received organ-preserving procedures?
2. **Technological Solutions and Imaging Studies**
   What technological solutions do you use in your practice? What imaging modalities are used in your institution? Which of them are prioritized for diagnosis and determining the surgical treatment strategy for patients with renal parenchymal tumors?
3 **Tumor Identification and 3D Modeling**
   What imaging studies do you use to diagnose renal parenchymal tumors? Do you use modern digital technologies such as 3D modeling of the pathological lesion based on DICOM data from CT? Do you think that constructing 3D models of the pathological pesion would help in treating patients?
4. **Cost of Methods and Payment Resources**
   What is the cost of contrast-enhanced MSCT in your institution? From which resource is the payment covered?
5. **Difficulties in Surgical Planning**
   How often do you encounter difficulties in planning surgical treatment based on imaging studies? Do you think 3D modeling can reduce the number of errors or incorrect decisions in determining the surgical approach?
6. **Demand for the Method**
   Do you think using the "Sechenov.AI_nephro" web platform would be in demand in your practice? In your opinion, what would be a reasonable cost for using the "Sechenov.AI_nephro" platform?
7. **Time Expenditures for Determining Surgical Tactics**
   How much time does it usually take to determine the surgical approach for patients with renal parenchymal tumors? What technologies do you currently use at this stage?
8. **Trust in AI for Medical Decision-Making**
   To what extent do you trust AI in supporting clinical decision-making for patient treatment? Do you think the "Sechenov.AI_nephro" service could assist in planning surgical treatment for patients with renal tumors?
9. **Cost of Diagnostics**
   Do you think the cost of generating a 3D model via the "Sechenov.AI_nephro" web platform at 5000 rubles would be acceptable for your average patient?
10. **Offers for Service Testing**
    Have you received offers to test and subsequently purchase the "Sechenov.AI_nephro" platform or similar AI-based digital products?
11. **Need for Digital Solutions for Other Organs**
    In your opinion, for which organs or body systems would a digital 3D modeling solution be necessary to assist in determining treatment strategy?
12. **Willingness to Purchase the Service**
    Are you willing to purchase the "Sechenov.AI_nephro" web platform?
13. **Impact of Technology on Education**
    Do you think that modern technologies, including AI, could reduce the quality of medical education due to students' reliance on AI to perform most tasks?
14. **Use of AI in Student, Resident and Trainee Education**
    What modern technologies, particularly AI, do you use to train students, residents, and trainee?

Figure. A scale

– Within one day, we can obtain a definitive diagnosis for a patient with kidney tumor, shared respondent 7.

8. Trust in AI for clinical decision-making. Respondents expressed a positive attitude towards trusting AI in supporting clinical decision-making. Respondent 7 emphasized:

– What AI does is not just build a 3D model based on one phase of CT; it combines all four phases into a single three-dimensional model. When the surgeon receives information about how the arteries, veins, and urinary tracts look, how they intersect, and where to approach them to minimize trauma and ensure convenience, that's the value of modern 3D reconstruction, which is done very quickly. What colleagues have done with Sechenov.AI_nephro and the speed at which the modeling is done is, of course, superb."

However, most do not have practical experience using AI in their practice. Respondent 5 shared:

– I have not yet worked with AI; it's hard to say anything. I assume that AI will help young specialists acquire the necessary skills faster, which currently can only be gained through experience.

9. Cost of diagnostics. Respondents discussed the issue of a comfortable diagnostic cost for the average patient. Several urologists believe that the Sechenov.AI_nephro web platform serves as an assistant to the physician. Thus, the patient should not participate in the payment process. However, some respondents noted that a price of 5,000 rubles could be acceptable for some patients.

10. Suggestions for testing the service. Almost all respondents reported that they had not received proposals for testing or purchasing similar services.

11. Need for a digital solution for other organs. Survey participants noted that creating 3D models could be beneficial not only in urology but also in all surgical specialties. Respondent 7 emphasized:

– Wherever a physician provides treatment using a scalpel, laparoscopic, or robotic manipulator, 3D modeling is needed.

12. Willingness to acquire the service. Most respondents expressed a willingness to consider acquiring the Sechenov.AI_nephro web platform for implementation in their work, provided there are financial resources available in their institutions.

13. Impact of technologies on education. Respondents are confident that AI can become a useful tool in education and will only improve the quality of education. Respondent 5 added:

– My teachers say that for determining treatment tactics, US and CT are sufficient. I partially agree with this, but not entirely. The number of diagnostic errors tends to decrease as we incorporate high-tech examination methods."

14. Use of ai in training students, residents, and trainees. There is no information in the training courses of medical university instructors about the use of AI in medical practice.

Discussion. In-depth interviews are a qualitative data collection method that allows researchers to gain deep insights into respondents' opinions, beliefs, and experiences. This method involves informal conversations with the opportunity to establish close contact, ensuring serious attention to the interview topic, including increased sincerity in responding to questions [5]. The goal of in-depth interviews is to create a space for open dialogue where respondents can freely share their thoughts and feelings. During in-depth interviews, the interviewer typically asks questions of the respondent without expressing their opinions regarding the discussed topics or the participant's responses [6]. In medicine, in-depth interviews are a powerful tool for exploring the needs and preferences of users of medical products. They help developers and researchers better understand the target audience and tailor their solutions to meet the real needs of users, both medical professionals and patients.

Our results highlight the growing interest in implementing AI technologies in medical practice. The hypothesis that the Sechenov.AI_nephro product can be used to support clinical decision-making in the treatment of surgical kidney diseases and potentially other organs and systems has been confirmed. According to the respondents, the digital solution for reproducing a 3D model of the pathological process will be in demand in any surgical specialty. The use of 3D modeling can personalize the determination of surgical treatment tactics, as confirmed by the respondents' answers. An analysis of publications shows that the use of CDSS in the diagnosis and treatment of patients reduces the number of medical errors even at the planning stage [7,8]. For instance, according to Gusev et al. (2017), the use of automated CDSS at the level of electronic medical records facilitates the application of evidence-based treatment methods, reducing the percentage of complications, adverse outcomes, the frequency of ineffective treatments and prevention, uninformative imaging studies, and high-risk surgical procedures [9]. In a review article by Litvin et al. (2014), it is noted that computer medical systems allow the surgeon to not only verify their own forecasts and diagnostic assumptions but also to use AI technologies in complex clinical cases, which is especially important in conditions where the cost of medical errors is high [8].

The discussion regarding the cost of diagnostics and the accessibility of technologies for patients is an important aspect that needs to be considered when implementing new solutions. Establishing a reasonable price can facilitate broader application of technologies. This confirms the hypothesis that a price not exceeding 5,000 rubles for 3D modeling of a pathological lesion will be the most attractive for the majority of physicians and patients. Some respondents believe that patients would be willing to pay for the construction of a 3D model of a pathological process as a separate service, while most assert that this method should be included in the standard list of CMI services.

There is a lack of studies on the economic evaluation of modern digital technologies in the diagnosis and treatment of patients in the available domestic literature. According to the experience of foreign authors, the data on costs vary. For example, according to Makiyama et al. (2023), creating a 3D-printed model requires outsourcing, with a production time of three to four working days, and the cost of producing one printed model ranges from 150 to 400 USD [10]. In the study by Komai et al. (2013), the authors used commercial software Synapse Vincent (Fuji Medical Systems, Inc., Tokyo, Japan) costing about 60,000 USD for building 3D models of pathological lesions. However, the researchers noted that special programming knowledge is required to work with this program [11]. According to Tapiero et al. (2020), modern capabilities for constructing 3D models of the kidney with tumors, including adding virtual reality technology, are accessible and relatively inexpensive, as the software and headset can be used an infinite number of times, whereas most existing technologies require 3D printing, which is time-consuming and financially burdensome, costing 460-1,000 USD per model [12].

Modern healthcare institutions face difficulties using contemporary digital systems to assist in interpreting radiological imaging methods due to the low number of CDSS medical devices available on the domestic market. The presence of 3D modeling technology for pathological processes in any healthcare institution will increase the clinic's attractiveness to patients. The survey indicated that most urologists are ready to embrace new technologies, opening up opportunities for further research and development in the field of AI. This could lead to improved quality of medical care and increased efficiency in specialists' work.

Questions regarding the impact of AI and its underlying technologies on educational activities in healthcare institutions, particularly in training students, residents, and trainees, also require attention. The hypothesis that the presence of 3D reconstructions of pathological lesions facilitates better material retention by medical university students has been confirmed. According to the respondents, Sechenov.AI_nephro can help young specialists acquire the necessary professional experience more quickly. Supporting this, the study by Komai et al. (2013) demonstrated that creating a 3D model of an organ tailored to each patient provides an advantage by offering additional educational material for residents and students [11]. In another work, Itinson et al. (2020) emphasized that, considering the advantages and achievements in medicine and the educational process, it is entirely inevitable that AI will usher in a new era in medicine, significantly improving disease diagnostics and patient treatment methods [13]. Overall, the results of the in-depth interviews indicate that the implementation of AI in urological practice could be a significant step

toward improving diagnostics and treatment. However, for successful realization, it is necessary to consider the opinions and needs of specialists.

Conclusions. The in-depth interview among urologists in Russia revealed a high interest in AI developments in urological practice. At the same time, successful integration of technologies requires overcoming several obstacles, including training specialists and ensuring data security. The Sechenov.AI_nephro platform has the potential to become an important tool in optimizing preoperative planning, but its success will depend on physicians' readiness to adopt new technologies and support from the medical community.

REFERENCES

1. *Hameed B.M.Z., Shah M., Naik N., Rai B.P., Karimi H., Rice P. et al*. The ascent of artificial intelligence in endourology: a systematic review over the last 2 decades. Curr Urol Rep 2021;22(10):53. doi: 10.1007/s11934-021-01069-3.
2. *Dack E., Christe A., Fontanellaz M., Brigato L., Heverhagen J.T., Peters A.A., Huber A.T., Hoppe H., Mougiakakou S., Ebner L.* Artificial Intelligence and Interstitial Lung Disease: Diagnosis and Prognosis. Invest Radiol. 2023 Aug 1;58(8):602-609. doi: 10.1097/RLI.0000000000000974.
3. *Alyaev Yu.G., Sirota E.S., Proskura A.V.* Digitalization of operations for kidney tumors. M.:GEOTAR-Media. 2021. Russian (Аляев Ю.Г., Сирота Е.С., Проскура А.В. Цифровизация операций при опухоли почки. И.:ГЭОТАР-Медия. 2021).
4. *Zholdubaev A..A., Glybochko P.V., Alyaev Y.G., Butnaru D.V., Shpot E.V., Chernennyi M.M., Chernennyi I.M., Fiev D.N., Proskura A.V., Konyshev A.V., Sirota E.S., Ismailov Kh.M., Shurygina R.K., Amrakhov S.A., Izmaylova A.A., Sarkisyants I.P., Suvorov A.Yu., Pavlov V.N., Urmancev M.F., Baykov D.E., Itkulov A.F., Khafizov M.M.* Automated system for supporting medical decision-making in the treatment of patients with renal parenchyma neoplasms - first experience of using the web-platform «Sechenov.ai_nephro» – multicenter testing results. 2024;5:12–22. Doi: https://dx.doi.org/10.18565/urology.2024.5.12-22 Russian (Жолдубаев А.А., Глыбочко П.В., Аляев Ю.Г., Бутнару Д.В., Шпоть Е.В., Черненький М.М., Черненький И.М.,Фиев Д.Н., Проскура А.В., Конышев А.В., Сирота Е.С., Исмаилов Х.М., Шурыгина Р.К., Амрахов С.А., Измайлова А.А., Саркисьян И.П., Суворов А.Ю., Павлов В.Н., Кабиров И.Р., Урманцев М.Ф., Байков Д.Э., Иткулов А.Ф., Хафизов М.М., Гильметдинов Р.Ф., Антипина А.А., Россоловский А.Н., Дурнов Д.А., Бобылев Д.А., Иванов С.Д. Автоматизированная система поддержки принятия врачебных решений в лечении больных с новообразованиями паренхимы почки – первый опыт использования веб-платформы Sechenov. AI_nephro – результаты многоцентрового тестирования. Урология. 2024;5:12–22. Doi: https://dx.doi.org/10.18565/urology.2024.5.12-22).
5. *Loskutova I.M., Tarchenko V.S., Yudina E.N., Limonova M.A.* Experience in the practical application of the interview method in the empirical base of final qualification works. Social and humanitarian knowledge. 2023. No. 11. Russian (Лоскутова И.М., Тарченко В.С., Юдина Е.Н., Лимонова М.А. Опыт практического применения метода интервью в эмпирической базе выпускных квалификационных работ. Социально-гуманитарные знания. 2023. № 11).
6. In-depth interviews: from preparation to analysis [Electronic resource] // Ferma Branding Agency. – Access mode: https://designferma.com/tpost/2urafjt6h1-glubinnie-intervyu-ot-podgotovki-do-anal Russian (Глубинные интервью: от подготовки до анализа [Электронный ресурс] // Брендинговое агентство Ферма. – Режим доступа: https://designferma.com/tpost/2urafjt6h1-glubinnie-intervyu-ot-podgotovki-do-anal).
7. *Gusev A.V.* Market of medical information systems: review, changes, trends. Doctor and information technologies. 2012;3:6–15. Russian (Гусев А.В. Рынок медицинских информационных систем: обзор, изменения, тренды. Врач и информационные технологии. 2012;3:6–15).
8. *Litvin A.A., Litvin V.A.* Decision support systems in surgery. News of surgery. 2014;22(1):96–100. Russian (Литвин А.А., Литвин В.А. Системы поддержки принятия решений в хирургии. Новости хирургии. 2014;22(1):96–100).
9. *Gusev A.V., Zarubina T.V.* Support for medical decision-making in medical information systems of a medical organization. I: Doctor and information technology. 2017;2:60–72. Russian (Гусев А.В., Зарубина Т.В. Поддержка принятия врачебных решений в медицинских информационных системах медицинской организации. И:Врач и информационные технологии. 2017;2:60–72).
10. *Kazuhide Makiyama, Mitsuru Komeya, Tomoyuki Tatenuma, Go Noguchi and Shinji Ohtake*. Patient-specific simulations and navigation systems for partial nephrectomy. International Journal of Urology. 2023;30:1087–1095. doi: 10.1111/iju.15287.
11. *Yoshinobu Komai, Yasuyuki Sakai, Naoto Gotohda, Tatsushi Kobayashi, Satoru Kawakami, Norio Saito.* A Novel 3-Dimensional Image Analysis System for Case-specific Kidney Anatomy and Surgical Simulation to Facilitate Clampless Partial Nephrectomy. DOI: 10.1016/j.urology.2013.09.053.
12. *Tapiero S., Karani R., Limfueco L., Xie L., Jefferson F.A., Reinwart C., Okhunov Z., Clayman R.V., Landman J.* Evaluation of Interactive Virtual Reality as a Preoperative Aid in Localizing Renal Tumors. J Endourol. 2020 Nov;34(11):1180-1187. doi: 10.1089/end.2020.0234.
13. *Itinson K.S.* Informatization of medical education: artificial intelligence systems in training students and doctors. BGZh. 2020;3(32). URL: https://cyberleninka.ru/article/n/informatizatsiya-meditsinskogo-obrazovaniya-sistemy-iskusstvennogo-intellekta-v-obuchenii-studentov-i-vrachey Russian (Итинсон К.С. Информатизация медицинского образования: системы искусственного интеллекта в обучении студентов и врачей. БГЖ. 2020;3(32). URL: https://cyberleninka.ru/article/n/informatizatsiya-meditsinskogo-obrazovaniya-sistemy-iskusstvennogo-intellekta-v-obuchenii-studentov-i-vrachey).

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