

# PREVENTIVE AND SOCIAL MEDICINE

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## **MEDICAL AND SOCIAL PROFILE OF PATIENTS WITH HYPERTENSIVE (HYPERTENSION) DISEASE WITH PREDOMINANT RENAL INVOLVEMENT ACCORDING TO THE DATASET DATA**

***N.A. Kasimovskaya\**, *A.A. Zotova*, *M.V. Krivetskaya*, *N.A. Ulyanova*, *O.I. Morugina*,  
*K.V. Kasimovsky*, *E.V. Poddubskaya***

*I.M. Sechenov First Moscow State Medical University, Russian Federation*

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e-mail: kasimovskaya\_n\_a@staff.sechenov.ru

[Kasimovskaya N.A. (\*contact person) – DSc (Medicine), Professor, Head of the Department of Nursing Management and Social Work of the Institute of Psychological and Social Care, ORCID: 0000-0002-1046-4349, SPIN-code: 7337-2930; Zotova A.A. – Chief Nurse of University Clinical Hospital №3, ORCID: 0000-0001-6348-5963; Krivetskaya M.V. – Assistant of the Department of Nursing Management and Social Work of the Institute of Psychological and Social Care, ORCID: 0000-0001-8351-5461, SPIN-code: 1204-6531; Ulyanova N.A. – Assistant of the Department of Nursing Management and Social Work of the Institute of Psychological and Social Care, ORCID: 0000-0002-8497-8238, SPIN-code: 8082-9431; Morugina O.I. – Assistant of the Department of Nursing Management and Social Work of the Institute of Psychological and Social Care, ORCID: 0000-0002-3593-6947, SPIN-code: 4870-0572; Kasimovsky K.V. – Lecturer of the Department of Nursing Management and Social Work of the Institute of Psychological and Social Care, ORCID: 0009-0000-5476-3132; Poddubskaya E.V. – PhD (Medicine), Chief Physician of University Clinical Hospital №3, ORCID: 0000-0001-6476-6337, SPIN-code: 8492-3712].

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e-mail: kasimovskaya\_n\_a@staff.sechenov.ru

[Касимовская Н.А. (\*контактное лицо) – доктор медицинских наук, профессор, заведующая кафедрой управления сестринской деятельностью и социальной работы Института психолого-социальной работы, ORCID: 0000-0002-1046-4349, SPIN-код: 7337-2930; Зотова А.А. – главная медицинская сестра Университетской клинической больницы № 3, ORCID: 0000-0001-6348-5963; Кривецкая М.В. – ассистент кафедры управления сестринской деятельностью и социальной работы Института психолого-социальной работы, ORCID: 0000-0001-8351-5461, SPIN-код: 1204-6531; Ульянова Н.А. – ассистент кафедры управления сестринской деятельностью и социальной работы Института психолого-социальной работы, ORCID: 0000-0002-8497-8238, SPIN-код: 8082-9431; Моругина О.И. – ассистент кафедры управления сестринской деятельностью и социальной работы Института психолого-социальной работы, ORCID: 0000-0002-3593-6947, SPIN-код: 4870-0572; Касимовский К.В. – преподаватель кафедры управления сестринской деятельностью и социальной работы Института психолого-социальной работы, ORCID: 0009-0000-5476-3132; Поддубская Е.В. – кандидат медицинских наук, главный врач Университетской клинической больницы № 3, ORCID: 0000-0001-6476-6337, SPIN-код: 8492-3712].

## МЕДИКО-СОЦИАЛЬНЫЙ ПРОФИЛЬ ПАЦИЕНТОВ С ГИПЕРТЕНЗИВНОЙ (ГИПЕРТОНИЧЕСКОЙ) БОЛЕЗНЬЮ С ПРЕИМУЩЕСТВЕННЫМ ПОРАЖЕНИЕМ ПОЧЕК ПО ДАННЫМ ДАТАСЕТА

*Н.А. Касимовская\*, А.А. Зотова, М.В. Кривецкая, Н.А. Ульянова, О.И. Моругина, К.В. Касимовский, Е.В. Поддубская*

*Первый Московский государственный медицинский университет имени И.М. Сеченова (Сеченовский Университет), г. Москва, Российская Федерация*

**Objective.** To present, on the basis of the dataset, the medical and social profile of patients with hypertensive disease (hypertension) with predominant renal involvement and to consider the diagnostic significance of some biomarkers of this disease.

**Materials and methods.** The analysis of the medical and social profile of 436 patients diagnosed with hypertensive disease (hypertension) with predominant renal involvement was conducted according to the dataset. In our research, combined features by age (18–76 years), sex (male, female), anthropometric (height, weight status, body mass index) and clinical (heart rate, blood pressure, blood creatinine, urinalysis (glomerular filtration rate, protein, density, pH)) characteristics were evaluated.

**Results.** The medical and social profile of patients with hypertensive disease (hypertension) with predominant renal involvement is presented by age groups and sex, including anthropometric, clinical and social characteristics according to the dataset (male and female, respectively: aged 18–34 (25.9%; 5.7%), 35–54 (17.2%; 14.9%), 55–76 (25.7%; 10.6%)). The average duration of treatment was  $13.8 \pm 5.8$  days. In our opinion, biomarkers developed on small samples without taking into account the sex and age of patients with this combined pathology require additional research using datasets and artificial intelligence.

**Conclusions.** Large amounts of datasets form the medical and social profile of a patient with a combined pathology, combining the necessary anthropometric and clinical characteristics for the analysis, which allows to integrate information about the patient into artificial intelligence for machine learning and contributes to improving medical care.

**Keywords.** Dataset, prevention, arterial hypertension, chronic kidney disease, biomarkers.

**Цель.** На основании данных датасета представить медико-социальный профиль пациентов с гипертензивной (гипертонической) болезнью с преимущественным поражением почек и рассмотреть диагностическую значимость некоторых биомаркеров данного заболевания.

**Материалы и методы.** По данным датасета проведен анализ медико-социального профиля 436 пациентов с диагнозом «гипертензивная (гипертоническая) болезнь с преимущественным поражением почек»: оценивались комбинированные признаки по возрасту (18–76 лет), полу (мужской, женский), антропометрическим (рост, вес (масса тела), индекс массы тела) и клиническим (частота сердечных сокращений, артериальное давление, креатинин в крови, общий анализ мочи (скорость клубочковой фильтрации, белок, плотность, рН) характеристикам.

**Результаты.** Представлен медико-социальный профиль пациентов с гипертензивной (гипертонической) болезнью с преимущественным поражением почек по возрастным группам и полу и полу, включающий антропометрические, клинические и социальные характеристики по данным датасета (мужского и женского пола соответственно: 18–34 года (25,9%; 5,7%), 35–54 года (17,2%; 14,9%), 55–76 года (25,7%; 10,6%)). Средняя длительность лечения  $13,8 \pm 5,8$  дня. На наш взгляд, биомаркеры, разработанные на малых выборках без учета пола и возраста пациентов с данной сочетанной патологией, требуют дополнительных исследований с применением датасетов и искусственного интеллекта.

**Выводы.** Большие объемы данных (датасет) формируют медико-социальный профиль пациента с сочетанной патологией, комбинируя необходимые антропометрические и клинические характеристики

для анализа, что позволяет интегрировать информацию о пациенте в искусственный интеллект для машинного обучения и способствует совершенствованию оказания медицинской помощи.

**Ключевые слова.** Датасет, профилактика, артериальная гипертензия, хроническая почечная недостаточность, биомаркеры.

## INTRODUCTION

The development of machine learning solutions aimed at identifying the early stages of disease makes it possible to carry out preventive measures more effectively [1].

In the healthcare industry, the development of artificial intelligence and medical decision support systems primarily requires high-quality datasets with maximum coverage of the set of recognition features, resulting classes of recognizable images, primary data sources, information collection, processing, and delivery flows, etc [2]. The development of personalized treatment for patients with multiple diseases in healthcare at the present stage necessitates the creation of a digital portrait (profile) of the patient based on formalized data and knowledge in statics and dynamics [3]. In this regard, the development of datasets for creating profiles of patients diagnosed with hypertensive (hypertension) disease with predominant kidney damage is becoming an important area of research, as arterial hypertension is one of the leading health problems facing humanity today: on average, up to 10 % of the world's population suffers from arterial hypertension (AH). In Russia, arterial hypertension is found in approximately 30 % of the population [4]. Many studies have proven the link between the severity and duration of arterial hypertension and the frequency of chronic kidney disease (CKD) and chronic renal failure [5–7]. As our understanding of the etiology and pathogenesis of AH is improving,

we need to get better at organizing medical care for this disease and improving how we diagnose combined diseases of hypertension and chronic kidney diseases [8; 9]. One of the modern approaches to improving healthcare is the development of datasets for integration into artificial intelligence for further machine learning, as machine learning algorithms improve risk prediction efficiency by using large data warehouses to independently identify additional risk factors and complex interactions between them [10–12].

To develop application software with machine learning elements, it is necessary to actively work on creating high-quality and open (freely downloadable from the Internet) datasets, including for the diagnosis of combined diseases such as arterial hypertension and chronic kidney disease [1].

*The aim of the study* is to present a medical and social profile of patients with hypertensive (hypertension) disease with predominant renal involvement based on the dataset and to consider the diagnostic significance of certain biomarkers of this disease.

## MATERIALS AND METHODS

For the period 2021–2024, a retrospective analysis of the medical records of 18,687 patients of the nephrology department and the artificial kidney department No. 3 of Sechenov University, and a dataset was developed (certificate of state registration of the database

No. 2024625394 dated November 22, 2024) “Characteristics of patients with hypertensive [hypertension] disease with predominant renal involvement.” Permission to conduct the study was confirmed by the local ethics committee (LEC) (LEC protocol No. 15–24 dated June 6, 2024). The study was conducted on the basis of a database (dataset) and includes all patients in the sample diagnosed with “hypertensive (hypertension) disease with predominant renal involvement.” ( $n = 436$ ). The sample is reasonably representative ( $n = 376$ ), with a critical  $t$ -value = 2. The results of the analysis were considered statistically significant at  $p < 0.05$ . The developed dataset includes 43 parameters. The presented study analyzes anthropometric (height, weight (body mass), body mass index) and clinical (heart rate, blood pressure, blood creatinine, general urine analysis (glomerular filtration rate, protein, density, pH) characteristics, patient diagnoses upon admission and discharge, average duration of treatment, social characteristics (employed, retired, unemployed, presence and group of disability), and economic factors (sick leave). The data set selection takes into account the age and gender of patients. Descriptive statistical methods were used. For indicators with an approximately normal distribution, the results are presented as the arithmetic mean  $M \pm SD$  (where  $M$  is the mean and  $SD$  is the standard deviation) for quantitative variables and as  $n$  (%) for qualitative variables. To describe characteristics with a normal distribution, the mean was used with an indication of the standard deviation; for characteristics with a distribution different from normal, the median and interquartile range (25th and 75th percentiles) were indicated. The Shapiro–Wilk test was

used to objectively assess the normality of the distribution. Statistical data processing was performed using MS Excel 2016.

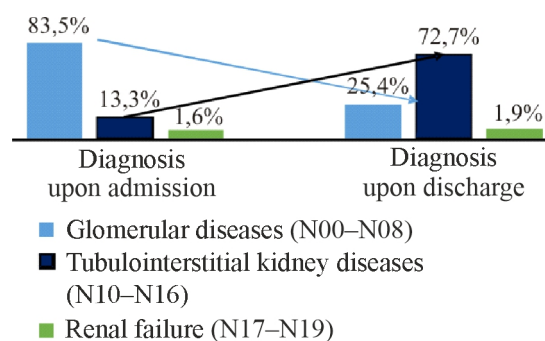
## RESULTS AND DISCUSSION

Early diagnosis of kidney damage is an important element in the examination of patients with arterial hypertension, and currently, researchers are focusing their attention on finding the earliest and most sensitive markers of kidney damage in such patients [13; 14]. At the same time, the study and justification of biomarkers (SBP, DBP, HR, weight, height, BMI, GFR, blood creatinine, complete blood count) of kidney damage and the development of hypertensive nephropathy associated with an increased cardiovascular risk in such patients was often conducted only on small samples and did not take into account age and gender; the data presented are averaged [14–16]. During the period 2012–2015, in a study of uncontrolled hypertension of varying degrees in patients with chronic kidney disease ( $n = 92$ ), Russian authors examined indicators of patient health, presenting only the average age of the study group, based on which conclusions were made about markers of kidney damage and vascular wall damage due to increased blood pressure in patients. The authors point out that patients with uncontrolled BP in the study groups did not differ in age, gender, body weight, height, body mass index, waist circumference, hip circumference, or heart rate. However, the authors note that grade 3 obesity was more common in the resistant hypertension group, which was predominantly observed in men. It is noted that the average age of patients was  $50.7 \pm 12.2$  years,

with men aged  $46.3 \pm 13.4$  years and women aged  $55.2 \pm 8.9$  years [14; 15]. Another Russian study conducted in 2018 ( $n = 70$ ) examined only male patients (48.6 %), whose average age was  $63.2 \pm 8.3$  years. According to the authors, these data indicate a high frequency of CKD markers in patients with hypertension receiving regular antihypertensive therapy with target blood pressure levels achieved [12]. Based on the results of the study, the authors propose models of early kidney damage using small samples of patients with varying degrees of hypertension and an average age, suggesting the use of markers to detect kidney damage at the earliest stages of hypertension [14]. At the same time, the age and gender of patients may influence their health indicators [15]. However, in the studies examined, the age and gender of patients were not included as variables in the analysis.

The use of the dataset included the study of clinical and anthropometric data of patients with hypertensive (hypertension) disease with predominant kidney damage at different ages and taking into account gender. In the first stage of the study, the dataset data allowed us to determine that patients admitted to the hospital were mainly diagnosed with the nosological group “Glomerular diseases” (83.5 %),

while at discharge, the diagnosis of this nosological group was found in only one in four cases (25.4 %). At the same time, diagnoses of the nosological group “Renal failure” upon admission to the hospital were established in only one in ten cases (13.3 %), while upon discharge, the diagnosis of this nosological group was established in 72.7 % of cases (figure). Diagnoses of the nosological group “Diseases characterized by high blood pressure” as the primary diagnosis upon admission to the hospital ward are rare (1.6 %), but are also established slightly more often upon discharge (1.9 %) (Table 1).



*Fig. Characteristics of changes in the primary diagnosis of patients diagnosed with “hypertensive (hypertension) disease with predominant renal involvement” upon admission and discharge from the hospital (per 100 patients)*

Table 1

**Nosological groups of diseases in patients diagnosed with “hypertensive (hypertension) disease with predominant renal involvement” upon admission to and discharge from hospital**

Nosological group (ICD-10)	Diseases, %	
	upon admission	upon discharge
Glomerular diseases (N00–N08)	83.5	25.4
Tubulointerstitial diseases of the kidney (N10–N16)	0.5	0
Renal failure (N17–N19)	13.3	72.7
Diseases characterized by high blood pressure	1.6	1.9

According to the dataset, it was found that in 98.0% of cases, patients were diagnosed with a combined diagnosis of I12, I13 (“Diseases characterized by high blood pressure”). The average length of hospital treatment for patients diagnosed with “hypertensive (hypertension) disease with predominant renal involvement” is  $13.8 \pm 5.8$  days.

A study of the gender and age of patients with hypertensive (hypertension) disease with predominant renal lesions, conducted using the dataset, revealed that the average age of patients included in the dataset ( $n = 436$ ) was  $40.7 \pm 15.1$  years. At the same time, it was found that the study group was heterogeneous in terms of age ( $Cv = 37.1$ ); 63.1 % of the total number of patients were men (average age –

$36.8 \pm 14.8$  years), the study group was heterogeneous in terms of age ( $Cv = 40.2$ ), which justified the need to study the clinical and anthropometric data of patients by age group and gender. To level out the heterogeneity of age characteristics, patients were divided into groups of approximately equal age ranges (18–34 years; 35–54 years; 55–76 years) [15] and by gender (men and women), and an analysis of the health indicators of patients with hypertensive (hypertension) disease with predominant renal lesions was performed.

The gender and age characteristics of patients with hypertensive (hypertension) disease with predominant kidney lesions allow us to present the medical profile of patients (Table 2).

Table 2

**Anthropometric indicators, blood pressure, and heart rate of patients with hypertensive (hypertension) disease with predominant renal lesions of different age groups and gender upon admission to the hospital (according to the dataset)**

Age group, years, % in sample	Indicator, $M \pm SD$						
	Age, years	SBP, mmHg	DBP, mm Hg	HR, beats per minute	Weight, kg	Height, cm	BMI, $kg/m^2$
Men							
18–34 (25.9)	$24.6 \pm 4.5$ CI 15.6–33.6	$149.0 \pm 16.3$ CI 116.4–181.6	$94.3 \pm 8.7$ CI 76.9–111.7	$76.9 \pm 9.3$ CI 58.3–95.5	$81.4 \pm 14.1$ CI 53.2–109.6	$180.6 \pm 6.8$ CI 67.0–194.0	$24.9 \pm 4.0$ CI 16.9–32.9
35–54 (17.2)	$42.8 \pm 5.2$ CI 32.4–53.2	$157.8 \pm 21.9$ CI 114.0–201.6	$96.2 \pm 14.7$ CI 66.8–125.6	$75.0 \pm 8.4$ CI 58.2–91.8	$82.3 \pm 16.7$ CI 48.9–115.7	$174.3 \pm 9.3$ CI 155.7–192.9	$27.0 \pm 5.3$ CI 16.4–37.6
55–76 (25.7)	$62.7 \pm 4.9$ CI 52.9–72.5	$158 \pm 16.5$ CI 125.0–191.0	$94.4 \pm 11.6$ CI 71.2–117.6	$73.7 \pm 7.9$ CI 57.9–89.5	$86.9 \pm 13.7$ CI 59.5–114.3	$175.8 \pm 4.8$ CI 166.2–185.4	$28.2 \pm 4.4$ CI 19.4–37
Women							
18–34 (5.7)	$28.6 \pm 3.9$ CI 20.8–36.4	$149.2 \pm 16.3$ CI 116.6–181.8	$91.8 \pm 7.1$ CI 77.6–106.0	$75.7 \pm 7.7$ CI 60.3–91.1	$67.7 \pm 18.9$ CI 30.0–105.5	$166.5 \pm 4.7$ CI 157.1–175.9	$24.5 \pm 6.4$ CI 12.0–37.3
35–54 (14.9)	$43.9 \pm 5.4$ CI 33.1–54.7	$156.2 \pm 22.3$ CI 111.6–200.8	$93.6 \pm 11.1$ CI 71.4–115.8	$75.3 \pm 7.5$ CI 60.3–90.3	$79.1 \pm 19.6$ CI 39.9–118.3	$166.0 \pm 6.0$ CI 154.0–178.0	$28.7 \pm 6.3$ CI 16.1–41.3
55–76 (10.6)	$62.6 \pm 5.7$ CI 51.2–74.0	$162.7 \pm 23.7$ CI 115.–210.1	$93.2 \pm 10.2$ CI 72.8–113.6	$72.4 \pm 8.4$ CI 55.6–89.2	$77.1 \pm 13.6$ CI 50.0–104.3	$163.6 \pm 6.5$ CI 150.6–176.6	$28.8 \pm 4.9$ CI 19.0–38.6

The results show that the profile of patients with hypertensive (hypertension) disease with predominant kidney damage in men aged 18 to 34 years is as follows: SBP will range from 116.4 to 181.6 mmHg, DBP will be 76.9–111.7 mmHg, HR in patients will range from 58.3 to 95.5 beats per minute, weight (body mass) in patients will range from 53.2 to 109.6 kg with height ranging from 167.0 to 194.0 cm and BMI ranging from 16.9 to 32.9 kg/m<sup>2</sup>. Patients with hypertensive (hypertension) disease with predominant renal lesions, male, aged 35–54 years, will have the following profile: SBP will range from 114.0 to 201.6 mmHg, DBP from 66.8 to 125.6 mmHg, HR will range from 58.2 to 91.8 beats per minute, weight (body mass) will range from 48.9 to 115.7 kg with height ranging from 155.7 to 192.9 cm and BMI ranging from 16.4 to 37.6 kg/m<sup>2</sup>.

Patients with hypertensive (hypertension) disease with predominant renal lesions, male, aged 55–76, will have the following profile: SBP will range from 125.0 to 191.0 mmHg, DBP will range from 71.2 to 117.6 mmHg, HR will range from 57.9 to 89.5 beats per minute, weight (body mass) will range from 59.5 to 114.3 kg with height ranging from 166.2 cm to 185.4 cm, and BMI will range from 19.4 to 37.0 kg/m<sup>2</sup>.

Female patients with hypertensive (hypertension) disease with predominant involvement aged 18 to 34 years will have the following profile: SBP will range from 116.6 to 181.8 mmHg, DBP from 77.6 to 106.0 mmHg, and HR will be in the range of 60.3–91.1 beats per minute, weight (body mass) will be 48.9–115.7 kg with height in the range of 157.1 to 175.9 cm and BMI in the range of 16.4–37.6 kg/m<sup>2</sup>. Patients with hypertensive disease with predominant renal

involvement, female, aged 35–54 years, will have the following profile: SBP will be in the range of 111.6–200.8 mmHg, DBP will be 71.4–115.8 mmHg, HR will be in the range of 60.3–90.3 beats per minute, weight (body mass) will be from 40.0 to 118.3 kg with height in the range of 154.0 to 178.0 cm, and BMI will be 16.1–41.3 kg/m<sup>2</sup>. Female patients with hypertensive disease with predominant renal involvement aged 55–76 years will have the following profile: SBP will be in the range of 115–210.1 mmHg, DBP will be between 72.8 and 113.6 mmHg, HR will range from 55.6 to 89.2 beats per minute, weight (body mass) will range from 50.0 to 104.3 kg with height ranging from 150.6 to 176.6 cm, and BMI will range from 19.0 to 38.6 kg/m<sup>2</sup>.

Thus, at the first stage, it is necessary to use the dataset to create a profile of patients with the disease by age group and gender. At the next stage, the dataset is used to create clinical characteristics of patients with hypertensive (hypertension) disease with predominant kidney lesion. The clinical characteristics include the main indicators at this stage of forming a profile of patients with hypertensive disease with predominant kidney damage according to the dataset: blood creatinine, glomerular filtration rate, urinalysis (protein), urinalysis (density), urinalysis (pH) in different age groups in men and women (Table 3).

The clinical characteristics of male patients with hypertensive disease with predominant renal lesions according to the dataset show an increase in the average blood creatinine level (normal range 62–115 μmol/L) by age: 18–34 years –  $132.0 \pm 94.6$  μmol/L; 35–54 years –  $158.1 \pm 105.8$  μmol/L; 55–76 years –  $203.2 \pm 106.0$  μmol/L.

**Clinical characteristics of patients with hypertensive (hypertension) disease with predominant renal lesions in different age groups and genders (according to the dataset)**

Age group, years	Indicator, $M \pm SD$				
	Creatinine in blood, $\mu\text{mol/L}$	Glomerular filtration rate, $\text{ml/min}/1.73^2$	General urine analysis (protein), $\text{g/l}$	General urinalysis, density	General urinalysis, pH
Men					
18–34	$132.0 \pm 94.6$	$63.2 \pm 30.5$	$0.85 \pm 1.0$	$1015.3 \pm 95.5$	$5.9 \pm 0.5$
35–54	$158.1 \pm 105.8$	$63.1 \pm 30.3$	$0.85 \pm 1.1$	$1019.0 \pm 55.0$	$5.9 \pm 0.5$
55–76	$203.2 \pm 106.0$	$44.3 \pm 22.9$	$1.09 \pm 1.0$	$1020.4 \pm 6.0$	$5.9 \pm 0.6$
Women					
18–34	$168.0 \pm 126.4$	$64.8 \pm 33.2$	$0.85 \pm 1.1$	$1021.4 \pm 5.9$	$5.9 \pm 0.4$
35–54	$136.7 \pm 85.6$	$59.1 \pm 27.9$	$0.67 \pm 0.7$	$1020.3 \pm 6.8$	$6.0 \pm 0.6$
55–76	$150.0 \pm 111.0$	$48.3 \pm 23.0$	$0.56 \pm 0.8$	$1021.6 \pm 5.4$	$6.0 \pm 0.8$

At the same time, this trend is not observed in female patients with hypertensive (hypertension) disease with predominant renal lesions. High blood creatinine levels upon admission to the hospital are more common on average in patients aged 18–34 ( $168.0 \pm 126 \mu\text{mol/L}$ ) and aged 55–76 ( $150.0 \pm 111.0 \mu\text{mol/L}$ ). According to the dataset, the average blood creatinine level is lower in patients aged 35–55 ( $136.7 \pm 85.6 \mu\text{mol/L}$ ).

Researchers point to the importance of glomerular filtration rate (GFR) for assessing the health status of patients with hypertensive (hypertensive) disease with predominant kidney damage who received regular antihypertensive therapy. The authors found that only 48 (68.6 %) individuals had normal GFR values. Markers of CKD—a decrease in  $\text{GFR} < 30 \text{ mg/g}$  and/or albuminuria  $> 30 \text{ mg/day}$ —were detected in almost one-third of patients (31.4 %) [22]. GFR

assessment is recommended as one of the first methods of analyzing renal function. It should be noted that data from populations in countries where studies assessing GFR have been conducted are extrapolated to countries where such studies have not been conducted, unfortunately without taking into account population characteristics. In such cases, GFR estimates are likely to be inaccurate. It should be noted that inaccuracies arise when estimating GFR in patients with high muscle mass (athletes, bodybuilders, sportsmen) and in patients with significantly reduced muscle mass (patients with amputated limbs, severe myodystrophic syndromes, etc.). It is also noted that in the KDIGO guidelines, the Cockcroft–Gault formula was developed and studied prior to the introduction of standardized methods for determining blood creatinine, and after the introduction of such methods, it was not reevaluated, which

calls its validation into question [23]. Therefore, additional research needs to be conducted on large data sets using artificial intelligence to revise indicators, taking into account the characteristics of populations, gender, age, and region of residence.

According to the dataset, it was found that the glomerular filtration rate in patients with hypertensive (hypertensive) disease with predominant kidney damage in males decreases on average with age, since at the age of 18–34 and 55–76 years, GFR is  $63.2 \pm 30.5$  ml/min/ $1.73^2$  (CI 32.7–93.7) and  $63.1 \pm 30.3$  ml/min/ $1.73^2$  (CI 32.8–93.4), respectively, which corresponds to GFR categories C1, C2, C3a, and C3b. Whereas in the 35 to 54 age group, the average GFR is  $44.3 \pm 22.9$  ml/min/ $1.73^2$  (CI 21.4–67.2) and corresponds to GFR categories C4, C3b, C3a, C2, i.e., a sharply reduced GFR may occur. GFR categories (description, indicator) [19]: C1 (normal or high,  $\geq 90$ ), C2 (slightly reduced, 60–89), C3a (moderately reduced, 45–59), C3b (significantly reduced, 30–44), C4 (severely reduced, 15–29), C5 (renal failure,  $< 15$ ). Meanwhile, in female patients with hypertensive (hypertension) disease with predominant renal involvement aged 18–34 years. GFR occurs in the following indicators:  $64.8 \pm 33.2$  ml/min/ $1.73^2$  (CI 31.6–98.0) and corresponds to categories C1, C2, C3a, C3b. At the age of 35–54, GFR is  $59.1 \pm 27.9$  ml/min/ $1.73^2$  (CI 31.2–87.0) and corresponds to categories C2, C3a, C3b. Whereas in patients aged 55–76 years, GFR values were  $48.3 \pm 23.0$  ml/min/ $1.73^2$  (CI 25.3–71.3), which corresponds to that of male patients with hy-

pertensive (hypertension) disease with predominant renal involvement in this age group, categories C4, C3b, C3a, C2. Patients with hypertensive (hypertension) disease with predominant renal lesions are admitted to the hospital with the results of a general urine test, including a protein test (normal:  $< 0.1$  g/l). The results of the dataset analysis revealed that in male patients under 55 years of age with hypertensive (hypertension disease with predominant kidney damage, the average protein level in urine is  $0.85 \pm 1.0$  g/l. After 55 years of age, the level of protein in urine becomes higher ( $1.09 \pm 1.0$  g/L). Meanwhile, in female patients, it was found that the older the age, the lower the average protein levels in urine (18–34 years:  $0.85 \pm 1.1$  g/L; 34–54 years:  $0.67 \pm 0.7$  g/l; 55–76 years:  $0.56 \pm 0.8$  g/l). The results of a general urine analysis (density) (normal range for men and women: 1010–1025) by age group revealed a wide range of density levels in men in the 18–34 years ( $1015.3 \pm 95.5$ , CI 824.2–1206.4) and 35–54 years ( $1019.0 \pm 55.0$ , CI 909.0–1129.0). Meanwhile, in the 55–76 age group, urine density was  $1020.4 \pm 6.0$  (CI 1032.4–1008.4). Urine density indicators in female patients in all three age groups studied are within the normal range for general urine analysis (density). The analysis of the dataset also revealed that the pH indicators of the general urine analysis in all age groups of patients with hypertensive (hypertension) disease with predominant kidney damage are within the normal range (5.3–6.5).

The social status of the patients studied according to the dataset is as follows: 48.1 % of patients are unemployed, 41.1 % are employed, and 9.9 % are retired. Patients had disability group I in 2.0 % of cases, disability group II in 5.3 % of cases, and disability group III in 11.2 % of cases. A sick leave certificate was issued to 30.5 % of patients diagnosed with “hypertensive (hypertension) disease with predominant renal lesions.”

Limitation of the study: the database (dataset) included only patients aged 18–76 years; patients older than 76 years were not included, and therefore data on patients older than 76 years were not included in the study.

### CONCLUSIONS

Thus, based on the study conducted, we conclude that the dataset allows us to form a medical and social profile of a patient with combined

pathology, combining the necessary anthropometric and clinical characteristics for analysis. We note that small samples of patients with combined pathologies may not be valid, which may reduce the representativeness of biomarkers that do not take into account the age characteristics of such patients and their gender. Big datasets allow patient information to be integrated into artificial intelligence for machine learning and used to build patient profiles for analyzing patient health, which will enable healthcare professionals to use datasets in providing medical care to patients with hypertensive (hypertension) disease with predominant kidney damage, thereby contributing to a reduction in medical and social care costs, timely identification of patients and diagnosis, and the implementation of preventive measures, including in rural areas, at first-aid stations, health centers, and primary care medical organizations.

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**Author contributions:**

Kasimovskaya N.A. – defining the concept, research design, data analysis, reviewing and editing the manuscript.

Zotova A.A. – collecting data for the study.

Krivetskaya M.V. – conducting the study, data analysis, writing the draft article.

Ulyanova N.A. – data collection for the study.

Morugina O.I. – literature search.

Kasimovsky K.V. – data processing, statistical analysis.

Poddubskaya E.V. – manuscript review and editing.

All authors approved the final version of the article.

**Study limitations.** The study complies with the standards of the Declaration of Helsinki and has been approved by the Local Ethics Committee, protocol No. 1524 dated June 6, 2024. The study was conducted based on the processing of electronic medical records. It was not necessary to obtain written informed consent from patients, as all data was anonymized.

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