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ORGAN DONATION AND TRANSPLANTATION IN THE RUSSIAN FEDERATION IN 2021

14th Report from the Registry of the Russian Transplant Society

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Objective: to monitor the current trends and developments in organ donation and transplantation in the Russian Federation based on data from the year 2021. **Materials and methods.** Heads of organ transplant centers were surveyed through questionnaires. Data control was done using the information accounting system of the Russian Ministry of Health. We performed a comparative analysis of data obtained over years from various federal subjects of the Russian Federation and transplantation centers. **Results.** Based on data retrieved from the 2021 Registry, 45 kidney, 29 liver and 17 heart transplantation programs were existing in the Russian Federation as of the year 2021. The kidney transplant waiting list in 2021 included about 10.5% of the 60,000 patients receiving dialysis. Organ donation activity in 2021 was 4.5 per million population, with a 78.4% multi-organ procurement rate and an average of 3.0 organs procured from one effective donor. In 2021, there were 9.5 kidney transplants per million population, 4.2 liver transplants per million population and 2.0 heart transplants per million population. Same year, the number of transplant surgeries performed in the Russian Federation increased by 18.3% compared to the year 2020, reaching the level of 2019. In Moscow, organ donation activity was 23.7 per million population, that of 2019. In 2021, the city of Moscow and the Moscow region accounted for 12 functioning organ transplant centers, performing 57.7% of all kidney transplants and 70.5% of all extrarenal transplants in the country. The number of organ recipients in the Russian Federation has exceeded 140 per million population. **Conclusion.** In 2021, donor activity and volume of transplant care in Russian regions recovered. This was after the decline in 2020 that resulted from the new coronavirus disease (COVID-19) pandemic. In addition, 7 new transplant programs were established. Further development of regional organ donation and transplantation programs, improvement in their efficiency, increase in the activity of transplant centers and development of inter-regional collaboration are expected in the Russian Federation in 2022.

Keywords: organ donation, kidney, liver, heart, lung transplantation, transplant center, waiting list, registry, COVID-19, Shumakov National Medical Research Center of Transplantology and Artificial Organs.

INTRODUCTION

Current trends and developments in organ donation and transplantation in Russia are monitored via the National Registry under the auspices of a specialized organ transplant commission created by the Russian Ministry of Health and the Russian Transplant Society. Previous reports have been published in 2009–2021 [1–12].

Information contained in the Registry is provided to the following international registries:

- International Registry of Organ Donation and Transplantation (IRODaT);
- Registry of the European Renal Association – European Dialysis and Transplant Association, ERA-EDTA Registry;
- Registries of the International Society for Heart and Lung Transplantation, ISHLT Registries.

Since 2016, the National Registry has served as a tool for ensuring quality control and data collection integrity in the information system used for registering human donor organs and tissues, donors and recipients. The system operates under executive order No. 355n of the Russian Ministry of Health, dated June 8, 2016.

Annual reports from the Registry contain not only statistical data for the reporting period, but also systematic analysis of the data with an assessment of the current state of transplantation care in the Russian Federation, trends and prospects for further development in this healthcare sector.

Since 2019, the Registry has also been used for monitoring the implementation of the departmental target program "*Organ Donation and Transplantation in the Russian Federation"*, approved via executive order

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No. 365 of the Russian Ministry of Health, dated June 4, 2019.

Data for the Registry is collected via questionnaires administered to appropriate officials at all transplantation centers in the Russian Federation. There is a comparative analysis of all data gathered over years from Russian regions, transplant centers and from international registries.

The working group would like to thank all permanent and new participants in the Registry who have provided data, as well as the Russian Ministry of Health, and the Central Research Institute for Healthcare Organization and Informatization.

TRANSPLANT CENTERS AND WAITING LISTS

In the Russian Federation, there are transplant centers in 35 federal subjects with a total population of 103.4 million people (see Fig. 1).

In 2021, kidney transplantation (KT) was performed in 45 centers, liver transplantation (LiT) in 29, heart transplantation (HT) in 17, pancreas transplantation (PTx) in 3, lung transplantation (LnT) in 3, and small bowel transplantation in 1.

In 2021, various transplant interventions were performed in 57 medical institutions. Of these, 19 were federal institutions, including 12 institutions of the Russian Ministry of Health, 2 institutions of the Russian Ministry of Science and Higher Education, 4 institutions of the Federal Biomedical Agency, 1 institution of the Russian Ministry of Defense, and 38 are institutions run by federal subjects of the Russian Federation.

Eight medical institutions that were hosting transplant centers did not perform organ transplants in 2021 due to their repurposing for treatment of COVID-19 patients.

In 2021, there were 6,313 potential recipients on the KT waiting list in the Russian Federation, i.e., 10.5% of the total number of patients on hemodialysis and peritoneal dialysis (about 60,000 according to unpublished data from the Registry of the Russian Dialysis Society). Of these, 1,567 were waitlisted in 2021 for the first time. There were 2,272 potential recipients on the LiT waiting list in 2021; 886 of them were included in the list for the first time in 2021. In 2021, there were 736 potential recipients included in the HT waiting list; 326 of them were included in the list for the first time in 2021. Between 2012 and 2021, as the number of organ transplants increased in the Russian Federation, the number of patients waitlisted for KT almost doubled, the LiT waiting list increased 4.7 times, while HT waitlist increased 1.8 times [4–12].

In 2021, 2,318 organ transplants (15.9 per million population) were performed in Russia – 271 were pediatric organ transplants. See Tables 1 and 2.

The number of organ transplants in the Russian Federation increased by 18.3% (+358) compared to 2020. The rate of increase in transplant activity in the Russian Federation in 2021 was higher by 43.2% than was envisaged in the departmental target program “Organ Donation and Transplantation in the Russian Federation”, approved by executive order No. 365 of the Russian Ministry of Health, dated June 4, 2019.

From 124 (in January) to 230 (in November) organ transplants were performed monthly – about 200 on average. See Fig. 2.

In 2021, 69 to 138 KT, 37 to 69 LiT and 15 to 30 HT were performed per month in the Russian Federation.

Based on data obtained from the Federal Registry for High-Tech Medical Care, 2,052 (88.5%) organ transplant surgeries were performed in 2021, using funds from the compulsory medical insurance system that were allocated for provision of high-tech medical care for organ transplant. There were 1,842 (94.0%) of such surgeries in 2020. See Fig. 3. Another 266 (11.5%) organ transplants were performed using funds from the federal subjects of the Russian Federation and the federal budget.

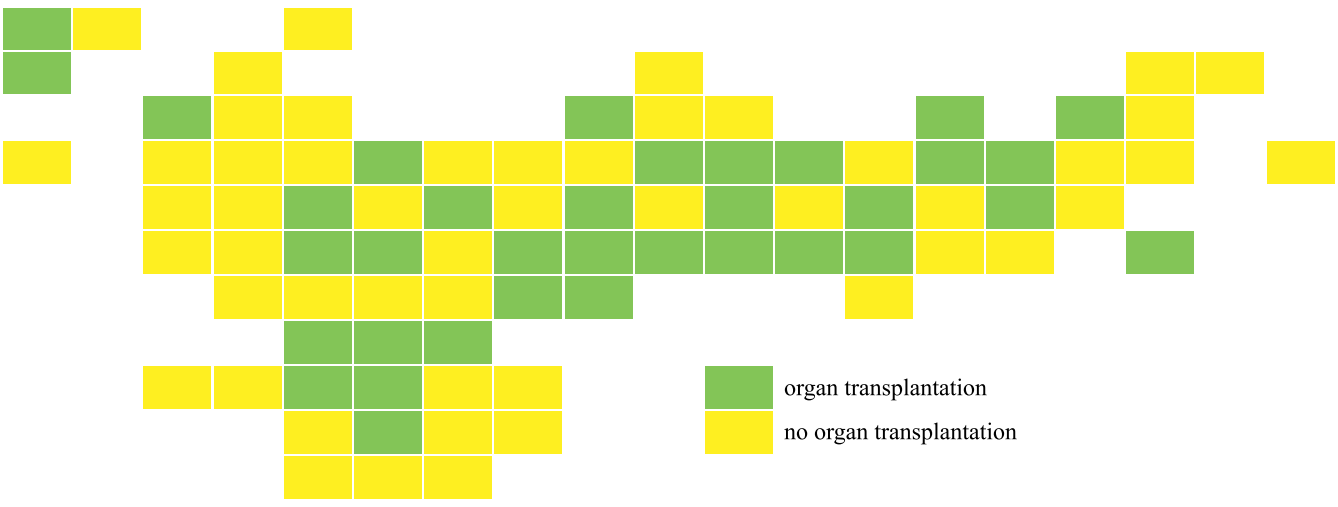

Fig. 1. Geographic distribution of organ transplant centers in Russia in 2021

Since 2010, when funding was included in the Registry as an indicator, the number of organ transplants performed using the funds allocated for provision of high-tech medical care for organ transplant has increased 2.6-fold. Meanwhile, the proportion of organ transplants performed using these funds has increased by 30.3%.

The financial costs per unit of high-tech medical care for transplantation in 2021 were as follows:

– 991,870 rubles for kidney, pancreas, kidney-pancreas, small bowel, lung transplant;
– 1,257,557 rubles for heart-liver transplant;
– 1,797,532 rubles for heart-lung transplant.

(Resolution No. 2299 of the Government of the Russian Federation, dated December 28, 2020).

ORGAN DONATION

In 2021 donor programs were carried out in 33 federal subjects of the Russian Federation.

In Perm Krai, the Republic of Sakha (Yakutia), and the Republic of Buryatia, only living related KT were performed.

In 2021, new donor programs were launched in 3 federal subjects of the Russian Federation. There are:

– Republic of Buryatia, living related kidney donation,
– Primorsky Krai, deceased organ donation,
– Ivanovo Oblast, deceased organ donation.

There were a total of 652 effective deceased organ donors (4.5 per million population) in 2021. See Table 3.

Effective deceased organ donors in the Russian Federation grew by 15.6% (+88) compared to 2020.

Table 1

Organ donation and transplantation in the Russian Federation in 2021

Indicator	Number (abs.)	Indicator per million population*
Organ donation		
Total number of organ donors	1,016	6.9
Deceased donors	652	4.5
Living (related) donors	364	2.5
Organ transplantation		
Total number of organs transplanted	2318	15.9
share of pediatric transplants	271	–
Kidney	1,384	9.5
from deceased donors	1,183	–
from living-related donors	201	–
share of pediatric transplants	122	–
Liver	618	4.2
from deceased donors	455	–
from living-related donors	163	–
share of pediatric transplants	134	–
Heart	290	2.0
share of pediatric transplants	15	–
Pancreas	10	0.1
Lungs	13	0.1
share of pediatric transplants	0	–
Heart-lung	2	–
share of pediatric transplants	0	–
Small bowel	1	–
share of pediatric transplants	0	–

* Population of the Russian Federation in 2021: 146.2 million people (www.gks.ru).

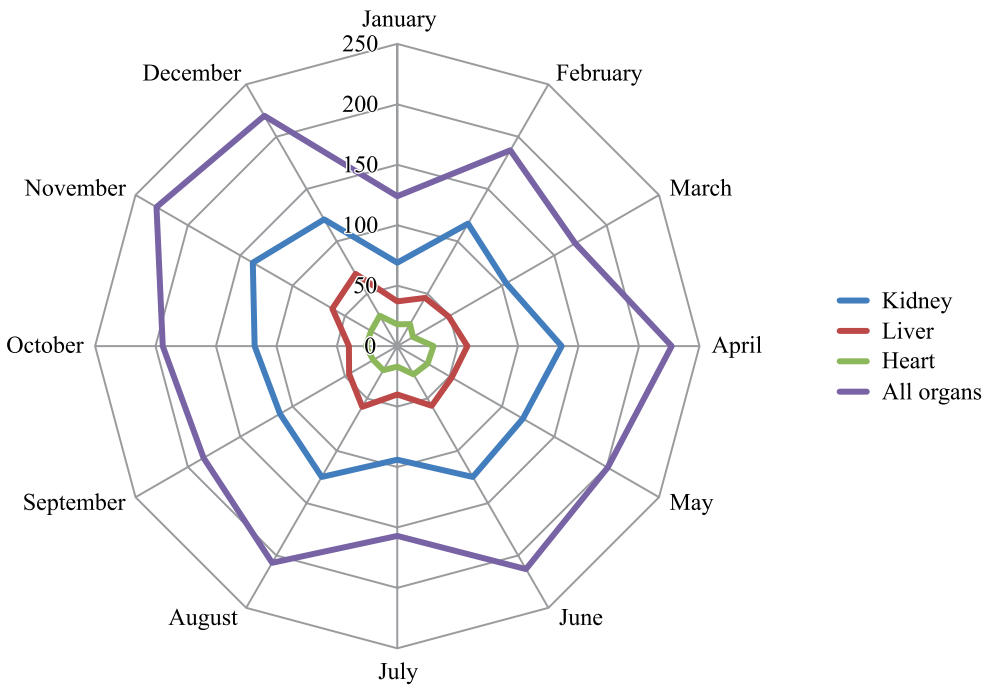

Fig. 2. Organ transplantation by month in 2021

Table 2

Transplant activity in the Russian Federation in 2021

S/N	Transplant center, region, federal district	**Total**	**Kidney (total)**	Kidney (cadaveric)	Kidney (living related)	**Liver (total)**	Liver (cadaveric)	Liver (living related)	**Heart**	**Pancreas**	**Lungs**	**Heart-lungs**	**Small bowel**
1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.1.	Shumakov National Medical Research Center of Transplantology and Artificial Organs, **Moscow, Central Federal District**	**684**	**283**	185	98	**177**	76	101	**211**	**2**	**9**	**2**	**0**
1.2.	Branch of the Shumakov National Medical Research Center of Transplantology and Artificial Organs, **Volzhsky, Southern Federal District**	**32**	**28**	12	16	**4**	4	0	**0**	**0**	**0**	**0**	**0**
2	Lopatkin Research Institute of Urology and Interventional Radiology – a branch of the National Medical Research Center for Radiology, **Moscow, Central Federal District**	**51**	**51**	39	12	**0**	0	0	**0**	**0**	**0**	**0**	**0**
3	Russian Children's Clinical Hospital, **Moscow, Central Federal District**	**40**	**40**	38	2	**0**	0	0	**0**	**0**	**0**	**0**	**0**
4	Petrovsky National Research Centre of Surgery, **Moscow, Central Federal District**	**23**	**14**	12	2	**8**	0	8	**0**	**1**	**0**	**0**	**0**
5	Burnazyan Federal Medical and Biophysical Center, **Moscow, Central Federal District**	**54**	**13**	11	2	**41**	14	27	**0**	**0**	**0**	**0**	**0**
6	Bakulev Scientific Center of Cardiovascular Surgery, **Moscow, Central Federal District**	**3**	**0**	0	0	**0**	0	0	**3**	**0**	**0**	**0**	**0**
7	National Medical Research Center for Children's Health, **Moscow, Central Federal District**	**15**	**15**	3	12	**0**	0	0	**0**	**0**	**0**	**0**	**0**
8	Botkin City Clinical Hospital, **Moscow, Central Federal District**	**127**	**87**	87	0	**40**	40	0	**0**	**0**	**0**	**0**	**0**
9	Sklifosovsky Research Institute of Emergency Care, **Moscow, Central Federal District**	**369**	**231**	231	0	**122**	121	1	**5**	**7**	**3**	**0**	**1**
10	Loginov Moscow Clinical Research and Practical Center, **Moscow, Central Federal District**	**6**	**0**	0	0	**6**	6	0	**0**	**0**	**0**	**0**	**0**
11	Vladimirsky Moscow Regional Research Clinical Institute, **Moscow Oblast, Central Federal District**	**59**	**40**	40	0	**19**	19	0	**0**	**0**	**0**	**0**	**0**
12	Federal Clinical Center for High Medical Technologies under the Federal Biomedical Agency (119), **Moscow Oblast, Central Federal District**	**27**	**25**	19	6	**0**	0	0	**2**	**0**	**0**	**0**	**0**
13	St. Joasaphus Belgorod Regional Clinical Hospital, **Belgorod, Central Federal District**	**5**	**4**	4	0	**1**	1	0	**0**	**0**	**0**	**0**	**0**
14	Voronezh Regional Clinical Hospital No. 1, **Voronezh, Central Federal District**	**4**	**4**	4	0	**0**	0	0	**0**	**0**	**0**	**0**	**0**
15	Tula Regional Clinical Hospital, **Tula, Central Federal District**	**5**	**5**	3	2	**0**	0	0	**0**	**0**	**0**	**0**	**0**
16	Ryazan Regional Clinical Hospital, **Ryazan, Central Federal District**	**15**	**11**	11	0	**4**	4	0	**0**	**0**	**0**	**0**	**0**
17	Ivanovo Regional Clinical Hospital, **Ivanovo Oblast, Central Federal District**	**1**	**1**	1	0	**0**	0	0	**0**	**0**	**0**	**0**	**0**

Continuation table 2

1	2	3	4	5	6	7	8	9	10	11	12	13	14
18	Stavropol Regional Clinical Hospital, **Stavropol, North Caucasian Federal District**	**10**	**6**	6	0	**4**	4	0	**0**	**0**	**0**	**0**	**0**
19	Ochapovsky Regional Clinical Hospital No. 1, **Krasnodar, Southern Federal District**	**45**	**27**	27	0	**10**	10	0	**8**	**0**	**0**	**0**	**0**
20	Volzhsky Regional Urological Center, **Volzhsky, Southern Federal District**	**20**	**20**	7	13	**0**	0	0	**0**	**0**	**0**	**0**	**0**
21	Rostov Regional Clinical Hospital, **Rostov-on-Don, Southern Federal District**	**56**	**35**	35	0	**14**	13	1	**7**	**0**	**0**	**0**	**0**
22	Russian Research Center of Radiology and Surgical Technologies, **St. Petersburg, Northwestern Federal District**	**12**	**0**	0	0	**12**	12	0	**0**	**0**	**0**	**0**	**0**
23	Almazov National Medical Research Centre, **St. Petersburg, Northwestern Federal District**	**22**	**0**	0	0	**0**	0	0	**22**	**0**	**0**	**0**	**0**
24	Pavlov First St. Petersburg State Medical University, **St. Petersburg, Northwestern Federal District**	**26**	**19**	16	3	**6**	6	0	**0**	**0**	**1**	**0**	**0**
25	St. Petersburg Research Institute of Emergency Medicine, **St. Petersburg, Northwestern Federal District**	**22**	**20**	20	0	**2**	2	0	**0**	**0**	**0**	**0**	**0**
26	City Mariinskaya Hospital, **St. Petersburg, Northwestern Federal District**	**10**	**10**	10	0	**0**	0	0	**0**	**0**	**0**	**0**	**0**
27	Kirov Military Medical Academy, **St. Petersburg, Northwestern Federal District**	**10**	**0**	0	0	**10**	10	0	**0**	**0**	**0**	**0**	**0**
28	Leningrad Regional Clinical Hospital, **St. Petersburg, Northwestern Federal District**	**22**	**22**	22	0	**0**	0	0	**0**	**0**	**0**	**0**	**0**
29	Volosevich First City Clinical Hospital, **Arkhangelsk, Northwestern Federal District**	**2**	**2**	1	1	**0**	0	0	**0**	**0**	**0**	**0**	0
30	Meshalkin National Medical Research Center, **Novosibirsk, Siberian Federal District**	**8**	**0**	0	0	**0**	0	0	**8**	**0**	**0**	**0**	**0**
31	State Novosibirsk Regional Clinical Hospital, **Novosibirsk, Siberian Federal District**	**72**	**25**	19	6	**47**	29	18	**0**	**0**	**0**	**0**	**0**
32	Research Institute for Complex Issues of Cardiovascular Diseases, **Kemerovo, Siberian Federal District**	**3**	**0**	0	0	**0**	0	0	**3**	**0**	**0**	**0**	**0**
33	Belyaev Kemerovo Regional Clinical Hospital, **Kemerovo, Siberian Federal District**	**51**	**51**	49	2	**0**	0	0	**0**	**0**	**0**	**0**	**0**
34	Podgorbunsky Regional Clinical Emergency Hospital, **Kemerovo, Siberian Federal District**	**4**	**0**	0	0	**4**	4	0	**0**	**0**	**0**	**0**	**0**
35	Irkutsk Regional Clinical Hospital, **Irkutsk, Siberian Federal District**	**18**	**11**	11	0	**7**	7	0	**0**	**0**	**0**	**0**	**0**
36	Regional Clinical Hospital, Altai Krai (Barnaul), **Siberian Federal District**	**17**	**16**	16	0	**1**	1	0	**0**	**0**	**0**	**0**	**0**
37	Federal Center for Cardiovascular Surgery, **Krasnoyarsk, Siberian Federal District**	**1**	**0**	0	0	**0**	0	0	**1**	**0**	**0**	**0**	**0**
38	Federal Siberian Research and Clinical Center, **Krasnoyarsk, Siberian Federal District**	**21**	**17**	17	0	**4**	4	0	**0**	**0**	**0**	**0**	**0**
39	Regional Clinical Hospital, **Krasnoyarsk, Siberian Federal District**	**27**	**16**	16	0	**8**	8	0	**3**	**0**	**0**	**0**	**0**
40	Sverdlovsk Regional Clinical Hospital No. 1, **Yekaterinburg, Ural Federal District**	**41**	**27**	27	0	**11**	11	0	**3**	**0**	**0**	**0**	**0**
41	Chelyabinsk Regional Clinical Hospital, **Chelyabinsk, Ural Federal District**	**10**	**6**	6	0	**2**	2	0	**2**	**0**	**0**	**0**	**0**
42	Regional Clinical Hospital No. 1, **Tyumen, Ural Federal District**	**15**	**12**	12	0	**1**	1	0	**2**	**0**	**0**	**0**	**0**

End of table 2

1	2	3	4	5	6	7	8	9	10	11	12	13	14
43	District Clinical Hospital, **Khanty-Mansiysk, Ural Federal District**	**9**	**6**	4	2	**1**	1	0	**2**	**0**	**0**	**0**	**0**
44	Samara State Medical University, **Samara, Volga Federal District**	**47**	**47**	46	1	**0**	0	0	**0**	**0**	**0**	**0**	**0**
45	Saratov State Medical University, **Saratov, Volga Federal District**	**8**	**8**	0	8	**0**	0	0	**0**	**0**	**0**	**0**	**0**
46	Regional Clinical Hospital, **Saratov, Volga Federal District**	**4**	**4**	4	0	**0**	0	0	**0**	**0**	**0**	**0**	**0**
47	Volga Regional Medical Center, **Nizhny Novgorod, Volga Federal District**	**28**	**14**	11	3	**14**	7	7	**0**	**0**	**0**	**0**	**0**
48	Republican Clinical Hospital, **Kazan, Volga Federal District**	**80**	**52**	49	3	**28**	28	0	**0**	**0**	**0**	**0**	**0**
49	Interregional Clinical Diagnostic Center, **Kazan, Volga Federal District**	**3**	**0**	0	0	**0**	0	0	**3**	**0**	**0**	**0**	**0**
50	Republican Clinical Hospital, **Ufa, Volga Federal District**	**50**	**40**	40	0	**10**	10	0	**0**	**0**	**0**	**0**	**0**
51	Republican Cardiology Clinic, **Ufa, Volga Federal District**	**5**	**0**	0	0	**0**	0	0	**5**	**0**	**0**	**0**	**0**
52	Perm Regional Clinical Hospital, **Perm, Volga Federal District**	**3**	**3**	0	3	**0**	0	0	**0**	**0**	**0**	**0**	**0**
53	City Clinical Hospital for Emergency Medical Care No. 1, **Orenburg, Volga Federal District**	**6**	**6**	6	0	**0**	0	0	**0**	**0**	**0**	**0**	**0**
54	Republican Hospital No. 1 – National Center of Medicine, **Yakutsk, Far Eastern Federal District**	**2**	**2**	0	2	**0**	0	0	**0**	**0**	**0**	**0**	**0**
55	Semashko Republican Clinical Hospital, **Ulan-Ude, Far Eastern Federal District**	**2**	**2**	0	2	**0**	0	0	**0**	**0**	**0**	**0**	**0**
56	Primorsky Regional Clinical Hospital No. 1, **Vladivostok, Far Eastern Federal District**	**6**	**6**	6	0	**0**	0	0	**0**	**0**	**0**	**0**	**0**
Total		**2318**	**1384**	**1183**	**201**	**618**	**455**	**163**	**290**	**10**	**13**	**2**	**1**

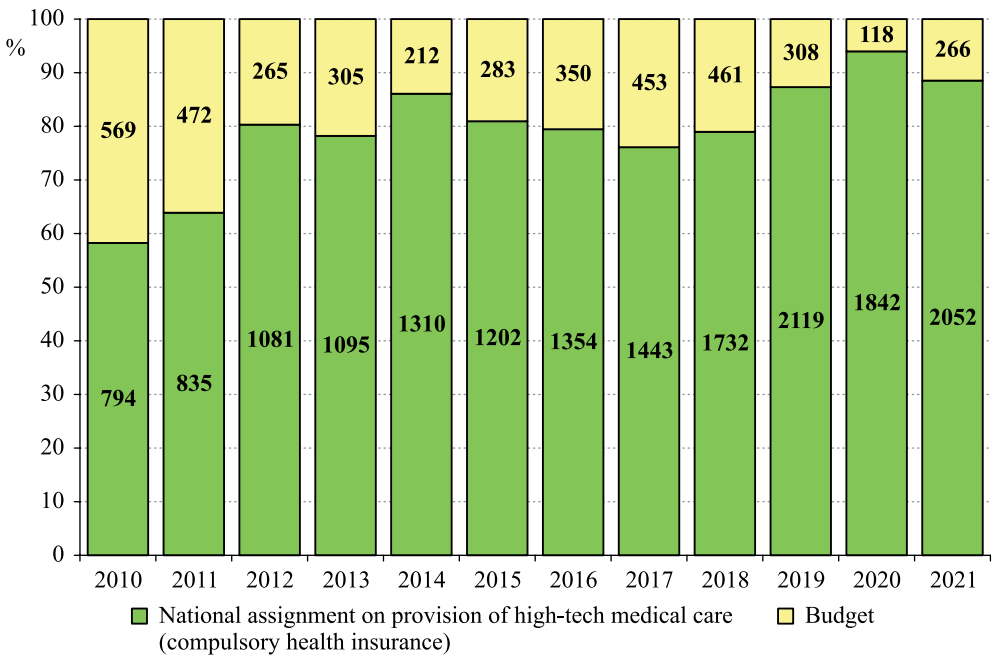

Fig. 3. Funding for organ transplants in the Russian Federation in 2010–2021

Table 3

Indicators associated with organ donation activity in the regions of the Russian Federation in 2021

S/N	Region	Organ Donation Coordinating Center (region)	Population (million)	Number of donor bases	Effective donors (absolute, per million population)		including brain-dead donors (absolute, %)		including multi-organ donors (absolute, %)		Total number of organs harvested	including harvested kidneys	Organ-to-donor ratio	Percentage of harvested kidneys
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	Moscow	Moscow Coordinating Center for Organ Donation, Moscow (Botkin City Clinical Hospital)	12.6	23	298	23.7	290	97.3	250	83.9	957	545	3.2	91.4
2	Moscow Oblast	Vladimirsky Moscow Regional Research Clinical Institute, Moscow	7.7	13	36	4.7	35	97.2	32	88.9	128	68	3.6	94.4
3	Belgorod Oblast	St. Joasaphus Belgorod Regional Clinical Hospital, Belgorod	1.5	1	2	1.3	2	100.0	1	50.0	5	4	2.5	100.0
4	Voronezh Oblast	Voronezh Regional Clinical Hospital No. 1, Voronezh	2.3	3	3	1.3	3	100.0	1	33.3	8	6	2.7	100.0
5	Tula Oblast	Tula Regional Clinical Hospital, Tula	1.4	1	4	2.9	4	100.0	4	100.0	14	7	3.5	87.5
6	Ryazan Oblast	Ryazan Regional Clinical Hospital, Ryazan	1.1	1	11	10.0	11	100.0	7	63.6	33	21	3.0	95.5
7	Ivanovo Oblast	Ivanovo Regional Clinical Hospital, Ivanovo	1.0	1	1	1.0	1	100.0	1	100.0	4	2	4.0	100.0
8	Krasnodar Krai	Ochapovsky Regional Clinical Hospital No. 1, Krasnodar	5.7	2	13	2.3	13	100.0	12	92.3	44	26	3.4	100.0
9	Volgograd Oblast	Branch of Shumakov National Medical Research Center of Transplantology and Artificial Organs, Volzhsky, Southern Federal District	2.5	2	10	4.0	10	100.0	4	40.0	26	19	2.6	95.0
10	Rostov Oblast	Rostov Regional Clinical Hospital, Rostov-on-Don	4.2	1	21	5.0	21	100.0	21	100.0	63	42	3.0	100.0
11	Stavropol Krai	Stavropol Regional Clinical Hospital, Stavropol, North Caucasian Federal District	2.8	1	5	1.8	5	100.0	4	80.0	14	10	2.8	100.0
12	St. Petersburg	Center for Organ and Tissue Donation, St. Petersburg (St. Petersburg Research Institute of Emergency Medicine)	5.4	5	25	4.6	25	100.0	25	100.0	84	44	3.4	88.0
13	Leningrad Oblast	Leningrad Regional Clinical Hospital, St. Petersburg	1.9	1	12	6.3	12	100.0	9	75.0	35	22	2.9	91.7
14	Arkhangelsk Oblast	Volosevich First City Clinical Hospital, Arkhangelsk, Northwestern Federal District	1.1	1	1	0.9	1	100.0	0	0.0	4	2	4.0	100.0
15	Novosibirsk Oblast	State Novosibirsk Regional Clinical Hospital, Novosibirsk	2.8	4	15	5.4	14	93.3	13	86.7	39	21	2.6	70.0

End of table 3

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
16	Kemerovo Oblast	Belyaev Kemerovo Regional Clinical Hospital, Kemerovo	2.6	15	28	10.8	18	64.3	15	53.6	74	52	2.6	92.9
17	Irkutsk Oblast	Irkutsk Regional Clinical Hospital, Irkutsk	2.4	1	8	3.3	8	100.0	7	87.5	18	11	2.3	68.8
18	Altai Krai	Regional Clinical Hospital, Barnaul	2.3	1	7	3.0	7	100.0	6	85.7	20	14	2.9	100.0
19	Krasnoyarsk Krai	Krasnoyarsk Clinical Hospital, Krasnoyarsk	2.9	12	12	4.1	12	100.0	10	83.3	32	18	2.7	75.0
20	Sverdlovsk Oblast	Sverdlovsk Regional Clinical Hospital No. 1, Yekaterinburg Chelyabinsk Regional Clinical Hospital, Chelyabinsk	4.3	2	14	3.3	14	100.0	12	85.7	41	27	2.9	96.4
21	Chelyabinsk Oblast	Chelyabinsk Regional Clinical Hospital, Chelyabinsk	3.4	1	3	0.9	3	100.0	2	66.7	10	6	3.3	100.0
22	Tyumen Oblast	Regional Clinical Hospital No. 1, Tyumen	1.5	3	8	5.3	8	100.0	4	50.0	21	14	2.6	87.5
23	Khanty-Mansi Autonomous Okrug – Yugra	District Clinical Hospital, Khanty-Mansiysk	1.7	1	2	1.2	2	100.0	2	100.0	7	4	3.5	100.0
24	Samara Oblast	Samara State Medical University, Samara	3.1	4	24	7.7	18	75.0	3	12.5	48	47	2.0	97.9
25	Saratov Oblast	Regional Clinical Hospital, Saratov	2.4	1	6	2.5	6	100.0	4	66.7	16	12	2.7	100.0
26	Nizhny Novgorod Oblast	Volga Regional Medical Center, Nizhny Novgorod	3.2	3	7	2.2	7	100.0	6	85.7	18	11	2.6	78.6
27	Republic of Tatarstan	Republican Clinical Hospital, Kazan	3.9	2	35	9.0	35	100.0	32	91.4	84	51	2.4	72.9
28	Republic of Bashkortostan	Republican Clinical Hospital, Ufa	4.0	6	21	5.3	21	100.0	12	57.1	55	40	2.6	95.2
29	Orenburg Oblast	City Clinical Hospital for Emergency Medical Care No. 1, Orenburg	1.9	1	4	2.1	4	100.0	4	100.0	12	8	3.0	100.0
30	Primorsky Krai	Primorsky Regional Clinical Hospital No. 1, Vladivostok	1.9	1	3	1.6	3	100.0	0	0.0	6	6	2.0	100.0
31	Departmental program of the Federal Biomedical Agency of the Russian Federation	Burnazyan Federal Medical and Biophysical Center, Moscow	–	1	3	–	3	100.0	3	100.0	13	6	4.3	100.0
32	Departmental Program of the Federal Biomedical Agency of the Russian Federation	Federal Siberian Research and Clinical Center, Krasnoyarsk	–	4	10	–	10	100.0	5	50.0	23	17	2.3	85.0
		Total	**146.2**	**119**	**652**	**4.5**	**626**	**96.0**	**511**	**78.4**	**1956**	**1183**	**3.0**	**90.7**

The rate of increase in donor activity in the Russian Federation in 2021 was higher by 17.3% than planned by the departmental target program "Organ Donation and Transplantation in the Russian Federation", approved by executive order No. 365 of the Russian Ministry of Health dated June 4, 2019.

In 2021, the proportion of effective deceased organ donors >60 years of age was 16.1% (see Fig. 4). Male donors were 65.2%, females were 34.8%.

Donor activity per population of the regions implementing donor programs (95.5 million) amounted to 6.8 per million population (see Tables 4 and 5).

Moscow posted the highest donor activity at the European level – 23.7 per million population (20.9 in 2020). In two more federal subjects of the Russian Federation, Kemerovo Oblast and Ryazan Oblast, donor activity exceeded 10.0 per million population. In Ryazan Oblast, the level of donor activity increased almost twofold from 5.5 to 10.8 per million population; similarly, donor activity significantly increased in the Republic of Tatarstan from 5.4 to 9.0 effective deceased donors per million population.

In 2021, Irkutsk Oblast and Stavropol Krai witnessed a drop in donor activity – from 6.7 to 3.3 and from 4.6 to 1.8 effective postmortem donors per million population, respectively.

Moscow and Moscow Oblast accounted for 51.2% (334) of effective donors in 2021.

There were 626 effective brain-dead donors – 96.0% of the total pool of effective donors (see Fig. 5).

All donor programs use a protocol for determining human death based on brain death diagnosis. In 25 federal subjects of the Russian Federation, organ donor programs worked only with brain-dead donors.

There were 511 multi-organ procurements in 2021, accounting for 78.4% of the total number

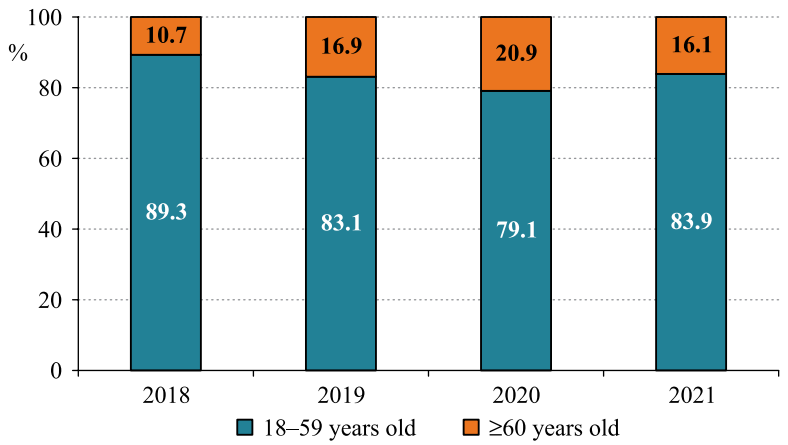

Fig 4. structure of effective organ donors in 2018–2021

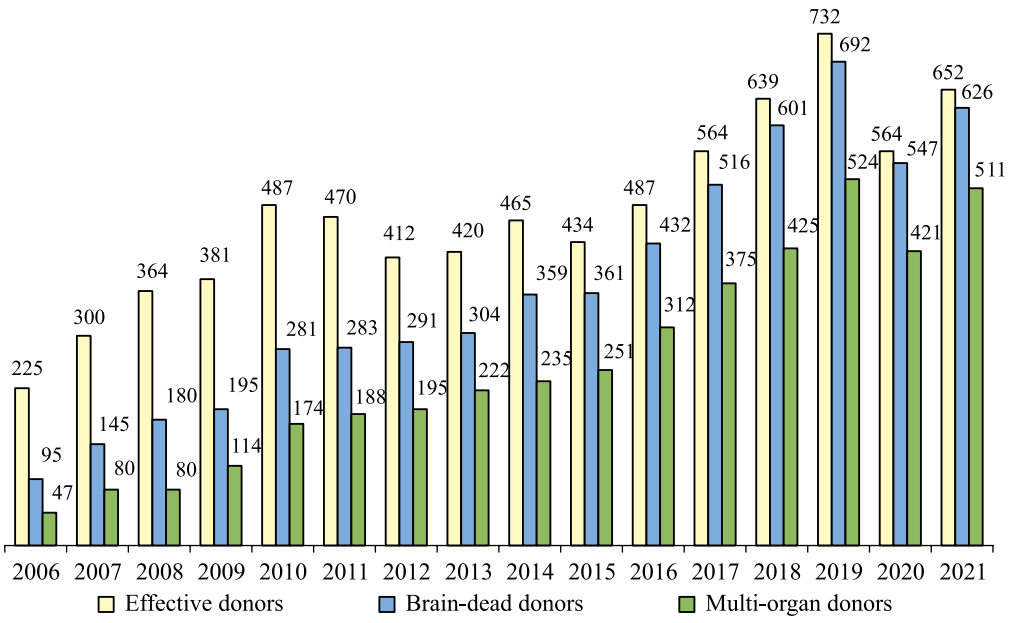

Fig. 5. Structure of effective organ donors in the Russian Federation in 2006–2021

of procurements (652). Compared to the year 2020, the number of multi-organ procurements increased by 21.4% (+90). In 18 donor programs, multiple organs were procured from >70% of patients, and in 6 programs, multi-organ procurement was done in all (100%) the patients. The 6 programs are Tula Oblast, Ivanovo Oblast, Rostov Oblast, St. Petersburg, Khanty-Mansi Autonomous Okrug – Yugra, and Orenburg Oblast.

Moscow and Moscow Oblast accounted for 282 multi-organ donors (55.2% of the total number of multi-organ donors) in the country in 2021.

The average number of organs procured from one donor in 2021 was 3.0 (2.9 in 2020). The highest number of organ procurements, as before, came from federal subjects that performed extrarenal organ transplantation and/or at federal subjects where there was interregional coordination: Moscow Oblast (3.6); Tula Oblast (3.5), Khanty-Mansi Autonomous Okrug – Yugra (3.5), St. Petersburg (3.4), Moscow (3.2), Ryazan Oblast (3.0), and Rostov Oblast (3.0).

In 2021, donor kidney utilization exceeded 90.0%, reaching 90.7%. In 22 regions, utilization was within the optimal 90–100% range, in 3 regions it was between 80% and 90%, and in 5 programs it was <80%.

Table 4

Rating of regions by donor activity in 2021

Federal Subject of the Russian Federation (Region)	Population in 2020 (million)	Number of effective donors (per million population)		Ranking		Change in ranking
		2021	2020	2021	2020	
Moscow	12.6	23.7	20.9	1	1	–
Kemerovo Oblast	2.7	10.8	10.0	2	2	–
Ryazan Oblast	1.1	10.0	5.5	3	6	+3
Republic of Tatarstan	3.9	9.0	5.4	4	8	+4
Samara Oblast	3.2	7.7	7.5	5	3	–2
Leningrad Oblast	1.8	6.3	6.1	6	5	–1
Novosibirsk Oblast	2.8	5.4	5.4	7	7	–
Republic of Bashkortostan	4.1	5.3	4.4	8	11	+3
Tyumen Oblast	1.5	5.3	3.3	9	16	+7
Rostov Oblast	4.2	5.0	4.3	10	12	+2
Moscow Oblast	7.7	4.7	2.8	11	17	+6
St. Petersburg	5.4	4.6	4.6	12	9	–3
Krasnoyarsk Krai*	2.9	4.1	3.4	13	15	–2
Volgograd Oblast	2.5	4.0	4.0	14	13	–1
Irkutsk Oblast	2.4	3.3	6.7	15	4	–11
Sverdlovsk Oblast	4.3	3.3	1.4	16	23	+7
Altai Krai	2.3	3.0	3.9	17	14	–3
Tula Oblast	1.4	2.9	2.0	18	19	+1
Saratov Oblast	2.4	2.5	0.0	19	29	+10
Krasnodar Krai	5.6	2.3	2.3	20	18	–2
Nizhny Novgorod Oblast	3.2	2.2	1.6	21	22	+1
Orenburg Oblast	1.9	2.1	0.5	22	28	+6
Stavropol Krai	2.8	1.8	4.6	23	10	–13
Primorsky Krai	1.9	1.6	0.0	24	–	+9
Belgorod Oblast	1.5	1.3	1.3	25	24	–1
Voronezh Oblast	2.3	1.3	1.7	26	21	–5
KhMAO - Yugra	1.7	1.2	1.8	27	20	–7
Ivanovo Oblast	1.0	1.0	0.0	28	–	+9
Arhangelsk Oblast	1.1	0.9	0.9	29	26	–3
Chelyabinsk Oblast	3.5	0.9	0.9	30	27	–3
Omsk Oblast	1.9	0.0	1.1	31	25	–6
The Republic of Sakha (Yakutia)	1.0	0.0	0.0	32	30	–2
Russia (85 federal subjects of the Russian Federation)	146.2	4.5	3.9		–	

* – The donor program of the Federal Siberian Research and Clinical Center, Krasnoyarsk is excluded.

Table 5

Deceased organ donors in 2006–2021

S/N	Region	2006	2007		2008		2009		2010		2011		2012		2013		2014		2015		2016		2017		2018		2019		2020		2021	
		Number of effective donors	Number of effective donors	Change over the year (abs.)	Number of effective donors	Change over the year (abs.)	Number of effective donors	Change over the year (abs.)	Number of effective donors	Change over the year (abs.)	Number of effective donors	Change over the year (abs.)	Number of effective donors	Change over the year (abs.)	Number of effective donors	Change over the year (abs.)	Number of effective donors	Change over the year (abs.)	Number of effective donors	Change over the year (abs.)	Number of effective donors	Change over the year (abs.)	Number of effective donors	Change over the year (abs.)	Number of effective donors	Change over the year (abs.)	Number of effective donors	Change over the year (abs.)	Number of effective donors	Change over the year (abs.)	Number of effective donors	Change over the year (abs.)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
1	Moscow	87	126	+39	135	+9	136	+1	151	+15	135	–16	111	–24	125	+14	151	+26	142	–9	183	+41	195	+12	218	+23	277	+59	263	–14	298	+35
2	Moscow Oblast	24	45	+21	59	+14	52	–7	71	+19	82	+11	61	–21	56	–5	51	–5	44	–7	39	–5	75	+36	68	–7	41	–27	21	–20	36	+15
3	Belgorod Oblast		2	+2	3	+1	2	–1	5	+3	6	+1	3	–3	1	–2	2	+1	5	+3	4	–1	4	0	4	0	4	0	2	–2	2	0
4	Voronezh Oblast	6	2	–4	8	+6	2	–6	0	–2	1	+1	6	+5	6	0	5	–1	7	+2	4	–3	1	–3	8	+7	8	0	4	–4	3	–1
5	Tula Oblast																										2	+2	3	+1	4	+1
6	Ryazan Oblast																								2	+2	13	+11	6	–7	11	+5
7	Ivanovo Oblast																														1	+1
8	Krasnodar Krai						3	+3	39	+36	52	+13	42	–10	41	–1	23	–18	25	+2	24	–1	19	–5	20	+1	23	+3	13	–10	13	0
9	Volgograd Oblast	5	0	–5	11	+11	15	+4	16	+1	17	+1	19	+2	15	–2	18	+3	8	–10	8	0	9	+1	9	0	10	+1	10	0	10	0
10	Rostov Oblast																		1	+1	7	+6	13	+6	19	+6	21	+2	18	–3	21	+3
11	Stavropol Krai																								2	+2	3	+1	13	+10	5	–8
12	St. Petersburg	30	45	+15	47	+2	47	0	41	–6	34	–7	22	–12	13	–9	23	+10	31	+8	29	–2	31	+2	34	+3	53	+19	25	–28	25	0
13	Leningrad Oblast	12	8	–4	11	+3	11	0	13	+2	10	–3	10	0	10	0	9	–1	7	–2	12	+5	11	–1	15	+4	7	–8	11	+4	12	+1
14	Arkhangelsk Oblast																								5	+5	5	0	1	–4	1	0
15	Novosibirsk Oblast	17	11	–6	18	+7	29	+11	35	+6	25	–10	20	–4	17	–3	11	–6	14	+3	9	–5	14	+5	17	+3	23	+6	15	–8	15	0
16	Kemerovo Oblast	16	13	–3	18	+5	18	0	22	+4	12	–10	26	+14	26	0	31	+5	28	–3	34	+6	22	–12	30	+8	40	+10	27	–13	28	+1
17	Irkutsk Oblast				4	+4	6	+2	10	+4	9	–1	8	–1	6	–2	9	+3	4	–5	3	–1	2	–1	7	+5	16	+9	16	0	8	–8
18	Omsk Oblast	10	15	+5	13	–2	19	+6	19	0	14	–5	11	–3	14	+3	16	+2	11	–5	4	–7	4	0	3	–1	2	–1	2	0	0	–2

End of table 5

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
19	Altai Krai														3	+3	5	+2	4	–1	4	0	8	+4	8	0	8	0	9	+1	7	–2
20	Krasnoyarsk Krai																3	+3	6	+3	6	0	27	+9	16	Note	13	–3	10	–3	12	+2
21	Sverdlovsk Oblast	14	13	–1	12	–1	13	+1	14	+1	15	+1	14	–1	18	+4	23	+5	18	–5	15	–3	22	+7	24	+2	24	0	6	–18	14	+8
22	Chelyabinsk Oblast								6	+6	2	–4	7	+5	6	–1	10	+4	9	–1	11	+2	8	–3	4	–4	4	0	3	–1	3	0
23	Tyumen Oblast																						4	+4	13	+9	13	0	5	–8	8	+3
24	Khanty-Mansi Autonomous Okrug–Yugra																						3	+3	4	+1	5	+1	3	–2	2	–1
25	Samara Oblast	4	17	+13	24	+7	18	–6	20	+2	21	+1	19	–2	21	+2	20	–1	18	–2	26	+8	28	+2	23	–5	25	+2	24	–1	24	0
26	Saratov Oblast														4	+4	7	+3	7	0	7	0	7	0	8	+1	10	+2	0	–10	6	+6
27	Nizhny Novgorod Oblast						7	+7	11	+4	12	+1	10	–2	8	–2	12	+4	10	–2	11	+1	10	–1	12	+2	12	0	5	–7	7	+2
28	Republic of Tatarstan		3	+3	1	–2	3	+2	12	+9	16	+4	9	+7	6	–3	6	0	4	–2	1	–3	3	+2	4	+1	15	+11	21	+6	35	+14
29	Republic of Bashkortostan								2	+2	7	+5	14	+7	18	+4	19	+1	14	+5	20	+6	22	+2	20	–2	24	+4	18	–6	21	+3
30	Orenburg Oblast																		3	+3	8	+5	9	+1	8	–1	11	+3	1	–10	4	+3
31	The Republic of Sakha (Yakutia)																				2	+2	4	+2	4	0	3	–1	0	–3	0	0
32	Primorsky Krai																														3	+3
33	Federal Biomedical Agency, Moscow														6	+6	11	+5	14	+3	16	+2	9	–7	5	–4	1	–4	1	0	3	+2
34	Federal Biomedical Agency, Krasnoyarsk																								24	Note	16	–8	8	–8	10	+2
	TOTAL in the Russian Federation	**225**	**300**	**+75**	**364**	**+64**	**381**	**+17**	**487**	**+106**	**470**	**–17**	**412**	**–58**	**420**	**+8**	**465**	**+45**	**434**	**–31**	**487**	**+53**	**564**	**+78**	**639**	**+74**	**732**	**+93**	**564**	**–168**	**652**	**+88**

Note: The donor activity of the Federal Siberian Research and Clinical Center, Krasnoyarsk is presented as a separate program.

Based on this indicator, the following regions lag behind other regions: Irkutsk Oblast (68.8%), Novosibirsk Oblast (70%), and the Republic of Tatarstan (72.9%).

In 2021, the number of organ procurements from living related donors was 364 – 35.8% of the total number of procurements (1,016).

KIDNEY TRANSPLANTATION

In 2021, a total of 1,384 KT were performed (9.5 per million population). See Fig. 6.

Compared to the year 2020, the number of KT increased by 23.1% (+260).

New KT programs were launched in the Republic of Buryatia (Semashko Republican Clinical Hospital, Ulan-Ude), in Primorsky Krai (Primorsky Regional Clinical Hospital No. 1, Vladivostok), and in Ivanovo Oblast (Ivanovo Regional Clinical Hospital, Ivanovo).

There were 1,183 deceased-donor KT (8.1 per million population) in 2021, 201 (1.4 per million population) in 2020. See Fig. 6.

Table 6 and Fig. 7 show KT centers with the highest number of KT in 2021.

The rating primarily demonstrates the leadership and sustainability of transplant programs of leading transplant centers in Moscow, which in turn is a result of the effective work by the Moscow Coordinating Center for Organ Donation. The positive dynamics of transplant programs in the Republic of Tatarstan and Kemerovo Oblast, the sustainability and volume of KT programs in Samara Oblast, in the Republic of Bashkortostan and Moscow Oblast, and further development of pediatric KT program in Shumakov National Research Center (Moscow) and Russian Children's Clinical Hospital (Moscow) should be noted. Shumakov National Medical Research Center of Transplantology and Artificial Organs, Moscow (Shumakov Center) plays a leading role in the living-related KT program, performing 114 transplants (56.7% of the total number of related KT in Russia).

In 2021, 6 KT centers performed more than 50 operations during the year: Shumakov Center (311), Sklifosovsky Research Institute of Emergency Care (231), Botkin City Clinical Hospital (87), Republican Clinical Hospital, Kazan (52), Belyaev Kemerovo Regional Clinical Hospital (51), and Research Institute of Urology (51). Five transplant centers performed from 30 to 49 operations during the year; 12 centers performed from 15 to 29.

In 2021, 21 transplant centers performed related-donor KT; a total of 201 transplants were performed. The average utilization of living kidney donation in 2021 was 14.5% of the total number of KT (13.4% in 2020).

Pediatric KT in 2021 were performed at 6 centers, and a total of 122 KT were performed (121 KT in 2020). Among the institutions performing it were Shumakov Center (61), Russian Children's Clinical Hospital (40), and National Medical Research Center for Children's Health (15); see Fig. 8.

EXTRARENAL ORGAN TRANSPLANTATION

In 2021, there were 290 HT (2.0 per million population) of which 15 were pediatric transplants and 2 heart-lung transplants (Shumakov Center).

Heart transplantations were performed in 17 centers. New HT programs were launched in 2 federal subjects of the Russian Federation:

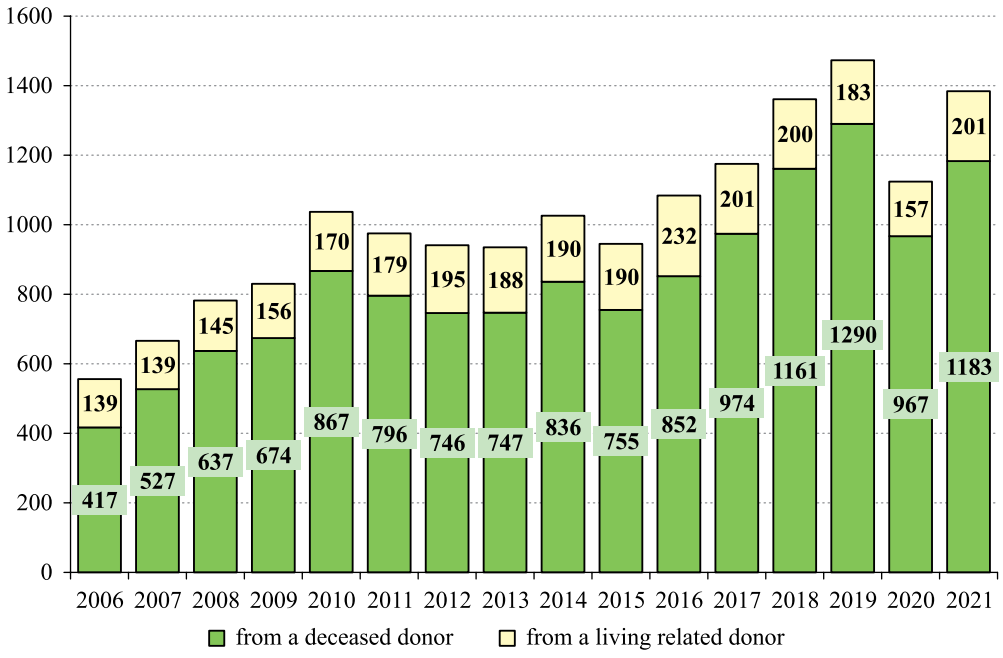

Fig. 6. Kidney transplantation in the Russian Federation in 2006–2021

– Tyumen Oblast (Regional Clinical Hospital No. 1, Tyumen),
– Khanty-Mansi Autonomous Okrug – Yugra (District Clinical Hospital, Khanty-Mansiysk).

Shumakov Center (Moscow) accounts for 72.9% (213, including 2 heart-lung transplants) of the total number of HT in the Russian Federation. The HT program in this center continues to drive the level of availability

Table 6

Leaders in terms of number of kidney transplants performed

Rank	Leaders in terms of number of kidney transplants performed	Number of kidney transplants in 2021
1	Shumakov National Medical Research Center of Transplantology and Artificial Organs, Moscow	283
2	Sklifosovsky Research Institute of Emergency Care, Moscow	231
3	Botkin City Clinical Hospital, Moscow	87
4	Republican Clinical Hospital, Kazan	52
5	Belyaev Kemerovo Regional Clinical Hospital, Kemerovo	51
6	Lopatkin Research Institute of Urology and Interventional Radiology – a branch of the National Medical Research Center for Radiology, Moscow	51
7	Samara State Medical University, Samara	47
8	Republican Clinical Hospital, Ufa	40
9	Vladimirsky Moscow Regional Research Clinical Institute, Moscow Oblast	40
10	Russian Children's Clinical Hospital, Moscow	40
	TOTAL	**922**
	66.6% of the total number of kidney transplants performed in the Russian Federation (1,384)	

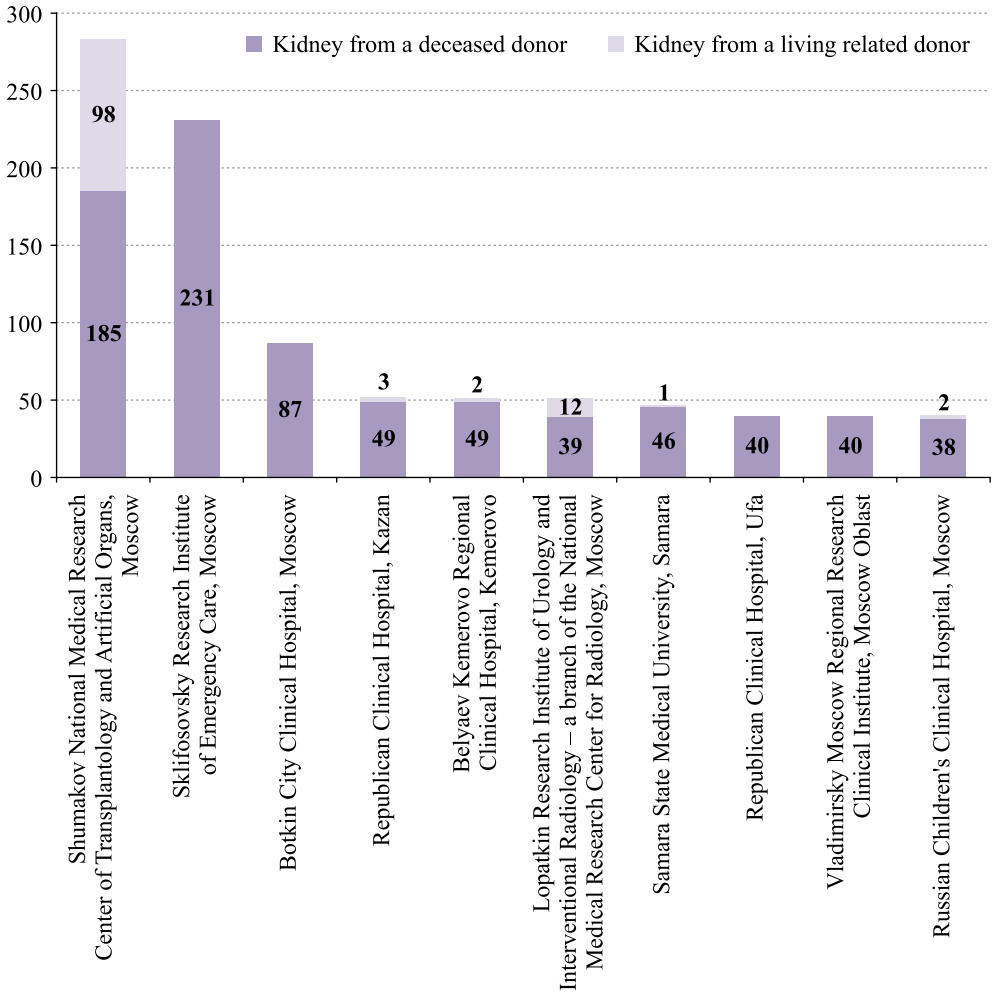

Fig. 7. Leaders in terms of number of kidney transplants performed

of this type of transplant care in the country. Apart from Shumakov Center, more than 10 HT in Russia are performed at Almazov National Medical Research Centre (22). Another 5 transplant centers performed from 5 to 8 HT: Sklifosovsky Research Institute of Emergency Care (Moscow), Ochapovsky Regional Clinical Hospital No. 1 (Krasnodar), Rostov Regional Clinical Hospital (Rostov-on-Don), Meshalkin National Medical Research Center (Novosibirsk), and Republican Clinical Hospital (Ufa). The remaining 10 (50.0%) performed less than 5 HT in the year.

LnT in 2021 were performed at 3 transplant centers. A total of 13 LnT and 2 heart-lung transplants were performed: 9 lung and 2 heart-lung transplants at Shumakov Center, 3 LnT at Sklifosovsky Research Institute of Emergency Care, and 1 LnT at Pavlov First St. Petersburg State Medical University.

Table 7 and Fig. 9 show the thoracic organ transplant centers that performed the highest number of heart-lung transplants in 2021.

In 2021, a total of 618 LiT (4.2 per million population) were performed, including 134 pediatric transplants. By comparison, there were 559 LiT (3.8 per million population) in 2020, of which 131 were pediatric transplants.

Liver transplants were performed at 29 centers. A new LiT program was launched in 2021 at Loginov Moscow

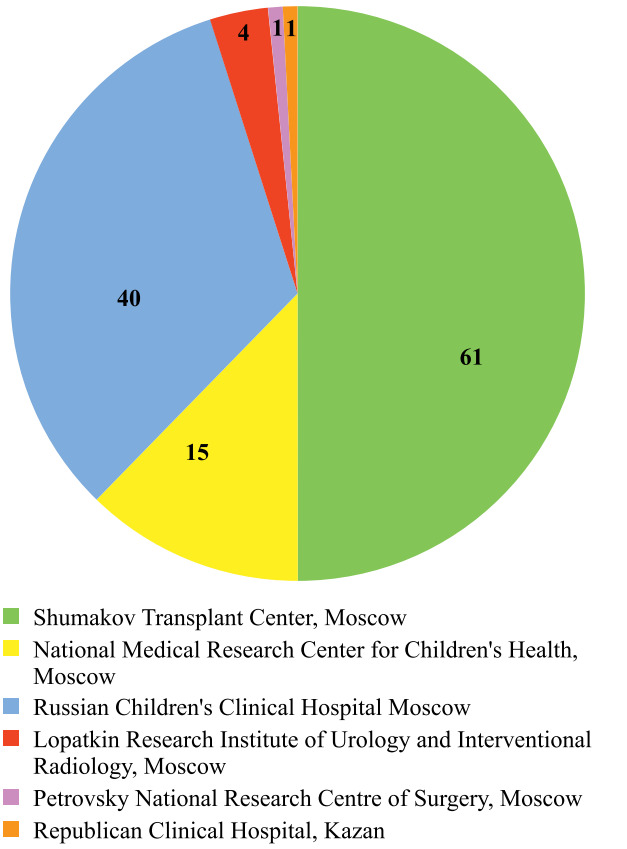

Fig. 8. Pediatric kidney transplantation in the Russian Federation in 2021

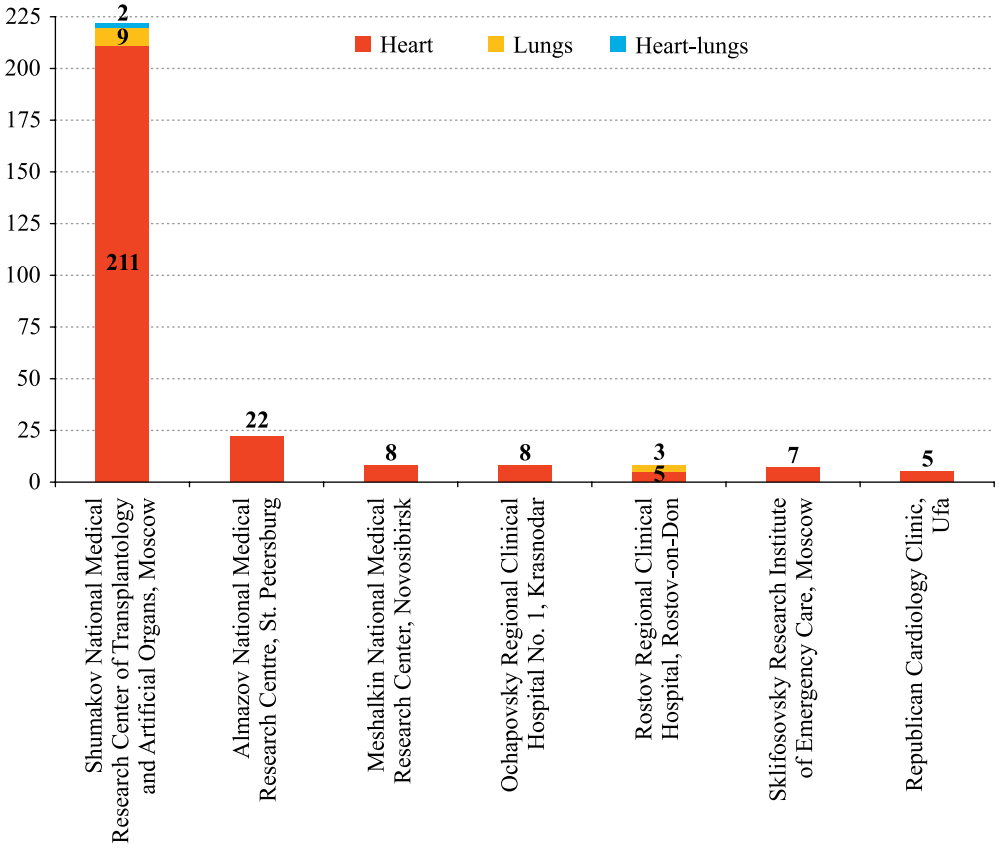

Fig. 9. Medical institutions that performed ≥5 heart transplants

Clinical Research and Practical Center, 6 deceased-donor LiT were carried out. In Republican Clinical Hospital, Kazan, the number of LiT increased to 28 (twice as many as in 2019).

In Russia, two transplant centers perform more than 100 LiT per year: the Shumakov Center (181) and the Sklifosovsky Research Institute of Emergency Care (122). Four other transplantation centers performed 20 or more LiT each: Burnazyan Federal Medical and Biophysical Center (41), State Novosibirsk Regional Clinical Hospital (47), Botkin City Clinical Hospital (40) and Republican Clinical Hospital, Kazan (28).

Transplant centers in Moscow and Moscow Oblast (8) accounted for 67.5% (417 transplants) of LiT in 2021; 69.8% (390 transplants) in 2020.

Table 8 and Fig. 10 show the LiT centers with the highest number of LiT in 2021.

The rating primarily demonstrates the leadership and sustainability of transplant programs of leading transplant centers in Moscow, which in turn is a result of the effective work by the Moscow Coordinating Center for Organ Donation and the use of living-related LiT. The positive dynamics of transplant programs in the Republic of Tatarstan and Novosibirsk Oblast, the leading role of pediatric living related LiT at Shumakov Center (Moscow), whose effectiveness (100 transplants) which exceeds the number of LiT in 8 of 10 transplant centers presented in this rating.

Related LiT were performed at 7 centers. Living-related transplants accounted for 163 surgeries (26.4%). In 2020, there were 9 centers that performed 169 related LiT (30.2%).

In 2021, 134 pediatric LiT were performed (mostly tender-age children); 131 in 2020. LiT were performed at 4 centers: Shumakov Center (119), Petrovsky National Research Centre of Surgery (8), State Novosibirsk Regional Clinical Hospital (6) and Kirov Military Medical Academy (1). This was the first time that pediatric LiT was being performed at Kirov Military Medical Academy.

Table 7

Medical institutions that performed ≥5 heart transplants

Rank	Centers that performed ≥5 heart transplants	Number of heart transplants in 2021
1	Shumakov National Medical Research Center of Transplantology and Artificial Organs, Moscow	213
2	Almazov National Medical Research Centre, St. Petersburg	22
3	Meshalkin National Medical Research Center, Novosibirsk	8
4	Ochapovsky Regional Clinical Hospital No. 1, Krasnodar	8
5	Rostov Regional Clinical Hospital, Rostov-on-Don	7
6	Sklifosovsky Research Institute of Emergency Care, Moscow	5
7	Republican Cardiology Clinic, Ufa	5
	TOTAL	**268**
	92.4% of the total number of heart transplants performed in the Russian Federation (290)	

Table 8

Leaders in terms of number of liver transplants performed

Rank	Leaders in terms of number of liver transplants performed	Number of liver transplants in 2021
1	Shumakov National Medical Research Center of Transplantology and Artificial Organs, Moscow	181
2	Sklifosovsky Research Institute of Emergency Care, Moscow	122
3	State Novosibirsk Regional Clinical Hospital, Novosibirsk	47
4	Burnazyan Federal Medical and Biophysical Center, Moscow	41
5	Botkin City Clinical Hospital, Moscow	40
6	Republican Clinical Hospital, Kazan	28
7	Vladimirsky Moscow Regional Research Clinical Institute, Moscow Oblast	19
8	Rostov Regional Clinical Hospital, Rostov-on-Don	14
9	Volga Regional Medical Center, Nizhny Novgorod,	14
10	Granov Russian Research Center of Radiology and Surgical Technologies, St. Petersburg	12
	TOTAL	**518**
	83.8% of the total number of liver transplants performed in the Russian Federation (618)	

Pancreas transplants in 2021 were performed at 3 transplant centers: Sklifosovsky Research Institute of Emergency Care (7), Shumakov Center (2), and Petrovsky National Research Centre of Surgery (1). A total of 10 pancreas transplant surgeries were performed (16 in 2020), all of them being kidney-pancreas transplants.

One small bowel transplant was performed at Sklifosovsky Research Institute of Emergency Care.

Thus, there were 934 extrarenal transplants performed in 2021 or 40.3% of the total number of 2,318 (836, 42.6% in 2020). During the follow-up period from 2006 (106), the number of extrarenal organ transplants in the Russian Federation has increased by 828 (8.8-fold); see Fig. 11. Transplant centers in Moscow and Moscow Oblast accounted for 663 extrarenal organ transplants (71.0%) in 2021, which remains decisive.

Table 9 presents information on the number of organ transplants performed in the Russia Federation from 2006 to 2021.

ORGAN TRANSPLANT RECIPIENTS

According to information from the Federal Registry, there were 20,724 organ transplant recipients in Russia as of December 2021 (141.7 per million population); see Table 10.

During 8 years of observation, the number of organ recipients in the Russian Federation increased by 12,171 (142.3%). The number of KT recipients is estimated to be 13,059 (89.3 per million population); 3,902 (26.7 per million population) received liver, while 1,725 (11.8 per million) were HT recipients.

CONCLUSION

In 2021, donor and transplant programs were still under pressure from the COVID-19 pandemic. At the same time, the experience gained by medical organizations amidst the pandemic in 2020, mass vaccination of the population and the focus on providing the population with planned medical care in accordance with the state guarantee program, made it possible not only to maintain the volume of transplant care, but also to recover significantly from the drop in 2020 and reach the level of 2019.

In Moscow, donor activity exceeded that of pre-COVID 2019 (22.0), reaching 23.7 per million population. This allowed the Moscow Coordinating Center for Organ Donation to provide donor material to 10 Moscow-based transplant centers to perform 957 transplants.

The rate of increase in the number of effective donors and the number of organ transplants in 2021 was higher than envisaged by the departmental target program “Organ Donation and Transplantation in the Russian Federation”, approved via executive order No. 365 of the Russian Ministry of Health dated June 4, 2019.

Seven new organ donation and transplant programs were launched in 2021. They are:

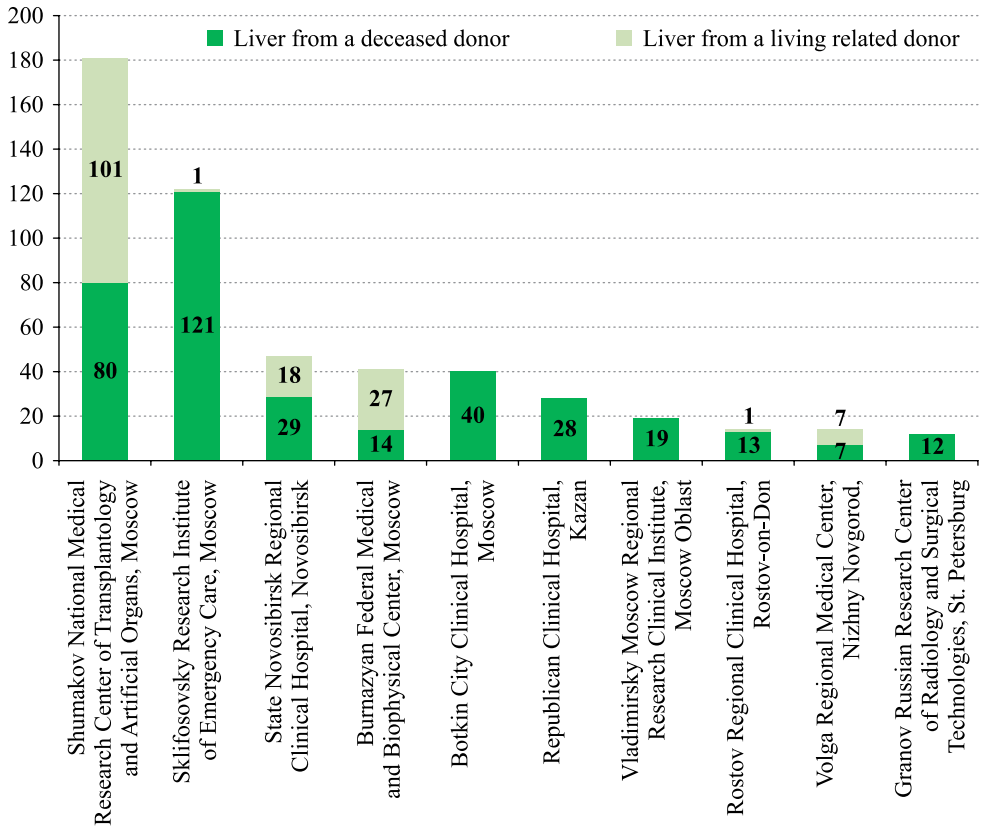

Fig. 10. Leaders in terms of number of liver transplants performed

– Semashko Republican Clinical Hospital, Ulan-Ude (living-related KT);
– Primorsky Regional Clinical Hospital No. 1, Vladivostok (deceased-donor KT);
– Ivanovo Regional Clinical Hospital, Ivanovo (deceased-donor KT);
– Loginov Moscow Clinical Research and Practical Center (LiT program);
– Regional Clinical Hospital No. 1, Tyumen (HT program);
– District Clinical Hospital, Khanty-Mansiysk (HT program);
– Kirov Military Medical Academy, St. Petersburg, (paediatric LiT program).

The number of pediatric transplants continued to increase in 2021, with 271 operations performed (227 in 2019 and 258 in 2020). The need for pediatric kidney and liver transplants is fully met; it is limited only by timely identification and referral of such patients to transplant centers for treatment; this also applies to adolescents in need of heart transplantation.

In 2021, it became possible to install an artificial left ventricle for children, including those with small anthropometric parameters, with end-stage heart failure, under the government guarantee program.

A record 618 liver transplants were performed in 2021 in the country; 163 of them were from living related donors.

The following are the prerequisites and plans for further development of donor and transplant programs in the federal subjects of the Russian Federation:

– Kemerovo Oblast, development of LiT program at Belyaev Kemerovo Regional Clinical Hospital;
– Ryazan Oblast and Tula Oblast, further development of organ donation and transplantation in the regions, interregional collaboration;
– Republic of Tatarstan, development of HT program, increasing the efficiency of donor kidneys utilization;
– Samara Oblast, implementation of liver and HT technologies in Samara State Medical University clinics, development of organ transplant program at Samara Regional Clinical Hospital;
– Novosibirsk Oblast, actualization of the regional organ donation program;
– St. Petersburg, further increase in transplantation care in accordance with the needs of the Northwestern Federal District, introduction of pediatric organ transplant program;
– Volgograd Oblast, implementation of HT technology at the Branch of Shumakov National Medical Research Center of Transplantology and Artificial Organs;
– Irkutsk Oblast, restoration of donor and transplant activity, introduction of heart transplant technology at Irkutsk Regional Clinical Hospital, increasing the efficiency of donor kidneys;
– Sverdlovsk Oblast, further increase in the volume of transplant care in accordance with the needs of the population;
– Saratov Oblast, relaunching of donor and transplant program, introduction of liver transplant technology;
– Krasnodar Oblast, restoration of donor and transplant activity in accordance with the real needs of the population and donor resource;
– Chelyabinsk Oblast, increasing donor and transplant activity;

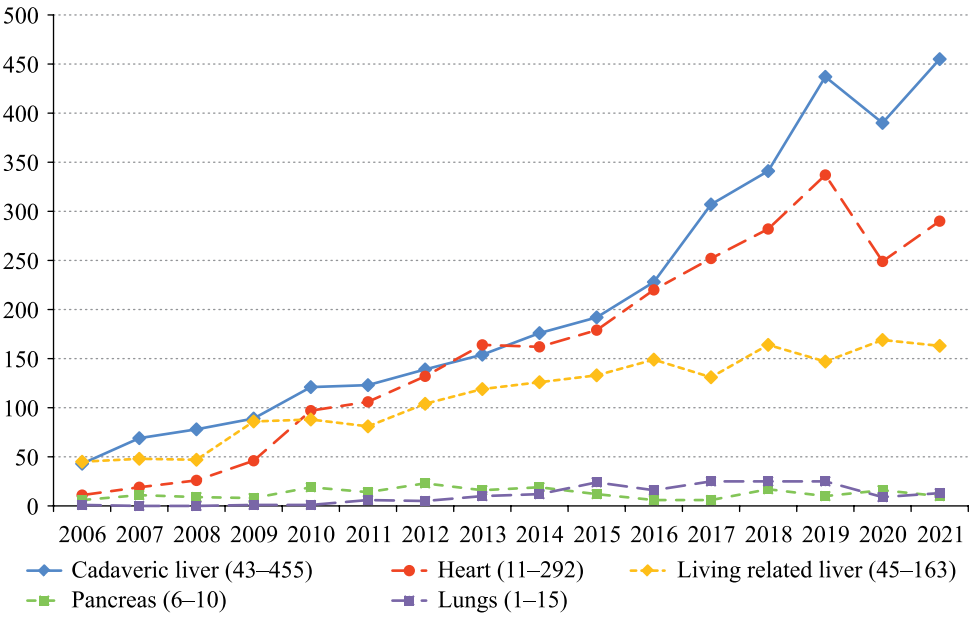

Fig. 11. Extrarenal organ transplant in 2006–2020

Table 9

Organ transplantation in the Russian Federation in 2006–2021

S/N.	Organ	2006	2007		2008		2009		2010		2011		2012		2013		2014		2015		2016		2017		2018		2019		2020		2021	
		Absolute number	Absolute number	Change over the year	Absolute number	Change over the year	Absolute number	Change over the year	Absolute number	Change over the year	Absolute number	Change over the year	Absolute number	Change over the year	Absolute number	Change over the year	Absolute number	Change over the year	Absolute number	Change over the year	Absolute number	Change over the year	Absolute number	Change over the year	Absolute number	Change over the year	Absolute number	Change over the year	Absolute number	Change over the year	Absolute number	Change over the year
1	Kidney (total)	556	666	+110	782	+116	830	+48	1037	+207	975	–62	941	–34	935	–6	1026	+91	945	–81	1084	+139	1175	+91	1361	+186	1473	+112	1124	–349	1384	+258
2	*including cadaveric*	417	527	+110	637	+110	666	+29	867	+201	796	–71	746	–50	747	+1	836	+89	755	–81	852	+97	974	+122	1161	+187	1290	+129	967	–323	1183	+216
3	*from a living related donor*	139	139	0	145	+6	156	+11	170	+14	179	+9	195	+16	188	–7	190	+2	190	0	232	+42	201	–31	200	–1	183	–17	157	–26	201	+44
4	Liver (total)	88	117	+29	125	+8	175	+50	209	+34	204	–5	243	+39	272	+29	302	+30	325	+23	378	+53	438	+60	505	+67	584	+79	559	–25	618	+59
5	*including cadaveric*	43	69	+26	78	+9	89	+11	121	+32	123	+2	139	+16	154	+15	176	+22	192	+16	229	+37	307	+78	341	+34	437	+96	390	–47	455	+65
6	*from a living related donor*	45	48	+3	47	–1	86	+39	88	+2	81	–7	104	+23	119	+15	126	+7	133	+7	149	+16	131	–18	164	+33	147	–17	169	+22	163	–6
7	Heart	11	19	+8	26	+7	46	+20	97	+51	106	+9	132	+26	164	+32	162	–2	179	+17	220	+41	252	32	282	+30	335	+53	249	–86	290	+41
8	Pancreas	6	11	+5	9	–2	8	–1	19	+11	14	–5	23	+9	14	–9	19	+5	12	–7	6	–6	6	0	17	+11	10	–7	16	+6	10	–6
9	Lungs	1	0	–1	0	0	1	+1	1	0	6	+5	5	–1	10	+5	12	+2	14	+2	16	+2	25	+9	25	0	23	–2	9	–14	13	+4
10	Heart-lung										2	+2	2	0	1	–1	0	–1	0	0	0	0	0	0	3	+3	2	–1	2	0	2	0
11	Small bowel														1	+1	1	0	0	–1	0	0	0	0	0	0	0	0	1	+1	1	0
	Total	662	813	+151	942	+129	1060	+118	1363	+303	1307	–56	1345	+38	1400	+55	1522	+122	1485	–37	1704	+219	1896	+192	2193	+297	2427	+234	1960	–467	2318	+358

Table 10

Number of organ transplant recipients in the Russian Federation in 2013–2021

ICD-10 code	Number of patients in the Registry (persons)																
	2013	2014		2015		2016		2017		2018		2019		2020		2021*	
		Absolute	Change (%)	Absolute	Change (%)	Absolute	Change (%)	Absolute	Change (%)	Absolute	Change (%)	Absolute	Change (%)	Absolute	Change (%)	Absolute	Change (%)
Z94.0 Kidney transplant status	6,651	7,502	12.8	8,164	8.8	9,063	11.0	9,658	6.6	10,851	12.4	11,880	9.5	12,563	5.7	13,059	–
Z94.1 Heart transplant status	416	520	25.0	639	22.9	803	25.7	952	18.6	1,164	22.3	1,355	16.4	1,524	12.5	1,725	–
Z94.2 Lung transplant status	2	3	50.0	4	33.3	5	25.0	8	60.0	28	250.0	26	–7.1	24	–7.7	–	–
Z94.4 Liver transplant status	1,150	1,406	22.3	1,649	17.3	1,948	18.1	2,152	10.5	2,632	22.3	3,032	15.2	3,489	15.1	3,902	–
Z94.8 Other transplanted organ and tissue status (bone marrow, intestines, pancreas)	334	467	39.8	654	40.0	808	23.5	909	12.5	1,135	24.9	1,344	18.4	1,497	11.4	–	–
TOTAL	8553	9898	15.7	11,110	12.2	12,627	13.7	13,679	8.3	15,810	15.6	17,637	11.6	19,097	8.3	20,724	8.5

* – The total number of patients with transplanted organs is provided from Register 14B3H, the number of patients with transplanted kidney, liver and heart is estimated, since it is calculated from the previous year based on the data on the number of organ transplants in 2021 and the data on the average survival of patients.

- Omsk Oblast, renewal of kidney donation and transplantation program in Omsk City Clinical Hospital No. 1.
- New organ donation and transplant programs are expected to be launched in Khabarovsk Krai, Kursk Oblast, and Yaroslavl Oblast.

The authors declare no conflict of interest.

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