Annual Statistical Report

on dialysis and transplantation treatment in the Czech Republic

2024

Version 2

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Content:

1.1. RDP Board

The board of the Registry of Dialysis Patients (RDP) is a body of the Czech Society of Nephrology (CSN) with primary responsibility to manage registration activities of the Kidney replacement therapy (KRT) in the Czech Republic. In its activities, the RDP Board is accountable to the CNS Executive Committee. The Board has 5 members appointed by the CNS Executive Committee. Board members may be chosen from among the ordinary or honorary CNS member only. The main task of the Board is RDP management, which includes namely:

• ensuring concordance of RDP actions with current Czech legislation in the field of personal data processing and storage, declared rules of data collection for the RDP database, and covenants between the CSN and providers of dialysis care, that convey data to the RDP

• communicating with the Prodos company, as the RDP technical administrator, and ensuring works in the frame of the contract between Prodos company and CSN

• preparing fields and proposals for the CSN Executive Committee decisions on fundamental steps in the RDP development and its financing

• continuing technical RDP development in co-operation with its technical administrator

• communication of the Board members with individual dialysis centres with the aim to maximize participation of centres on providing data for the Registry

• ensuring awareness of CSN members and wider public whenever needed about RDP aims and activities

• elaborating the RDP annual statistical reports on chronic kidney failure treatment in the Czech Republic

• taking care of the RDP website content, in co-operation with its operator and RDP technical administrator

• evaluating CSN members´ applications for projects based on RDP data and supervising direct collaboration of the project author(s) and the RDP administrator

• RDP liaison with other international, national, and regional registries

RDP Board 2024-2026

Ivan Rychlík, chair
Vladimír Tesař
Petr Táborský
Pavlína Richtrová
František Švára

1.2. Introduction

Since the establishment in 2005, the Czech Registry of Dialysis Patients (RDP) has had an Annual Statistical Report with an overview of the outcomes of treatment for end-stage kidney disease by means of kidney replacement therapy (KRT) as one of its main outputs towards the dialysis and nephrology community. In the past, the abbreviation RRT (Renal Replacement Therapy) was used in the same sense instead. In 2023, the format of this yearbook has undergone significant changes. As it will also be published in English version, it is desirable to supplement it with a brief overview of the development of the RDP and its outputs and principles of its current operations, as well as of the yearbook itself.

The RDP does not belong among the 12 registries listed in the Annex to Act No. 372/2011 Coll., the operation of which is managed and financed by the Ministry of Health of the Czech Republic. RDP has been founded by the Czech Society of Nephrology (CSN), which finances and manages its operation through the Registry Board. Its current composition has been stated in the previous paragraph.

Data on the treatment of chronic renal failure are supplied to the RDP by individual dialysis centres (DC) on a voluntary basis. Anonymized data on individual patients and performed treatment procedures are reported to the RDP on a quarterly basis. In this respect, RDP is fundamentally different from other national and international registries, which collect data mostly just once a year, usually by 31 December each year. The current set of data collected by the RDP and its structure is described in more detail below in the paragraph "Definition of basic data and reporting principles in 2023". When establishing the RDP, the CNS took advantage of the fact that at that time vast majority of dialysis centres operated using the specialized nephrology information system Nefris® developed by Prodos Company, Dobruška, Czechia. Upon request of the CNS, Prodos company equipped its system with a data interface for electronic data transfer to RDP and subsequently became the technical administrator and operator of the RDP. After the transition from the Nefris information system to the German Euclide system at the DC chain operated by Fresenius Medical Care, also Euclide system has been equipped with an interface for direct data export to the RDP. Finally, Prodos has set up an open web interface for DCs without any of the above-mentioned information systems. Such centres thus can now send the data in electronic form, too.

The first principal output from the RDP activity immediately after its startup was provision (at that time not yet public, but provided to the contributing centre only) of average values of the monitored KRT indicators at any particular centre together with national means. Since 2014, the values of the monitored indicators of all contributing DC have been publicly available on the RDP website.

After accumulating sufficiently long time series of the individual monitored parameters, results of nationwide statistical analyses (survival dependence on age, comorbidities, type of treatment, etc.) began to be published on the RDP website. This step has brought the posibility of direct comparison of the results of dialysis care in our country with similar analyses of foreign national and international registries.

RDP utility and thus also its value for contributing DCs (today, over 98 % of all DCs in Czechia) has increased significantly after the project called "Monitoring of Quality of Dialysis Treatment" had been launched in cooperation with all health insurance companies in the country, associated with premium reimbursement for performed procedures if the provider was able to demonstrate compliance with the required guideline values of selected parameters (Kt/V, predialysis phosphataemia, haemoglobin value and the percentage of patients on the waiting list or transplanted in current year). As documenting the values of the monitored parameters could best be done using the data collected in the RDP, this step led to a significant improvement of the cooperation of most DCs with the registry.

As the RDP itself, also the Annual Statistical Report has undergone its own development. It is actually a successor to the annual reports on functioning of the KRT in our country. These reports were prepared for the annual Czech Nephrology Congresses by the DC of the University Hospital in Hradec Králové (Prof. Erben) for many years and then until 2004, by Dr. Lachmanová from DC of the General University Hospital in Prague. Since 2005, the Report has been prepared from data collected in the RDP by the Prodos company under guidance of Prof. Rychlík and the Registry Board. As one of the outputs of the RDP, the Report is freely available and downloadable from the website (www.nefro.cz/o-rdp/prezentace/) for all CNS members.

Only data supplied by individual DCs to RDP for the 4th quarter of the given year is used to create the statistical Report. The aim of the current changes to the Report is mainly to unify the principles of evaluation of KRT treatment in the Czech Republic with the procedures and methods used for this purpose in the ERA Registry, to which the RDP also sends selected national data every year.

While the information on the number of DCs, their technical equipment and staffing is already a traditional part of the Report, from 2024 on, information on the demography of the the Czech Republic has been added (this will enable to standardize data on the incidence and prevalence of renal failure in the Czech Republic according to the age structure of the general population) and data on the provision of KRT at the level of individual regions. Age categories according to the ERA Registry are being consistently introduced into all analyses and data on kidney transplantation described in more details than in previous years.

1.3. Summary of principal changes in the new format of the Report

The main diference in elaborating the new yearbook compared to its format in the previous years is its character as a dynamic document based on created algorithms by means of which automatic processing of data from each calendar year as of 2023 will be done. Data sources are multiple and resulting tables and plots are created by mutual combination of them. Those sources include the data reported by DCs to the RDP, health instance data accessible for the RDP, data from the Coordinating Centre for Transplantation (KST), selected data from the Czech Statististical Institute and finally data from the ERA Registry.

In the innovated format, the Report contains an introductory block followed by 6 basic analytical blocks.

In the introductory block, definition of basic data and reporting principles has newly been included (p. 7).

The first analytical block is a newly included section of general data on demography (administrative division of the country into regions, population evolution in individual age categories nation-wide and in individual regions). Standard data parts follow with basic information on the coverage of dialysis centres in the Czech Republic (total number of dialysis centres in the Czech Republic and their distribution among individual regions, their utilisation and percentage of HDC supplying data to RDP), supplemented by an overview of only the most basic data on regular dialysis treatment (RDT) in the Czech Republic.

In the **second block**, data on the incidence of kidney failure in the Czech Republic and its association with age and gender of patients and their primary diagnosis, and data on the KRT patient prevalence (data sorted by gender and age of patients and treatment modality) is analyzed in more details and compared to data from other European countries. In a separate subblock, mortality is analyzed depending on the age and gender of the patients and the cause of death. That part also includes a separate comparison of mortality in diabetics and non-diabetics.

The third analytical block in the Report are devoted to markers of the quality of dialysis care, as established by the insurance system of quality monitoring (predialysis phosphate level, haemoglobin, the evaluation of dialysis adequacy by the Kt/V, and the percentage of patients transplanted or placed on the transplant waiting list in the given year). These indicators are particularly important for dialysis care providers, because adherence to them is associated with a premium reimbursement rate for performed procedures associated with dialysis treatment. The adherence is documented to insurance companies by data from the RDP. In a separate subblock, representation of basic types of vascular access (arteriovenous fistula AVF, synthetic vascular prosthesis AVG and permanent central venous catheter) is analyzed. This analysis is performed on nation-wide data as well as on data from individual DCs. It provides the possibility to compare local approaches to vascular accesses creation, including the choice of their type.

The **fourth block** is the traditional overview of dialysis beds and technical equipment counts of individual DCs and of their stuffing (physicians and nurses).

Two newly added parts of the Report then analyze data on kidney transplantation. First, the waiting list (WL) is analyzed, followed by selected data on counts of transplanted patiens. As the last one, the period of patients followup by a nephrologist in the predialysis period is analyzed.

1.4. Definition of basic data and reporting principles in 2024

Definition of basic data and principles of reporting in 2024

There have been no changes in principal reporting conditions and rules for 2024 compared to previous years. In the HD patiens, the limits in evaluating quality of dialysis care have remained unchanged. In the PD and HHD patiens, the same target values for Hb, P, Tx/WL have been applied. The Kt/V marker in those patiens has been considered as fulfilled regardless of its value. However, as of 1st January 2025, this marker will be reported also for them.

Summary of definitions

Most of the changes have been introduced to improve and simplify reporting, but also to institute the same methodology of reporting as used by the ERA (European Renal Association) Registry and all major national registries in EU countries. These changes include mainly:

A) Definitions according the the ERA Registry

Incidence is number of new cases during a defined time period. In the Annual Report, it corresponds to count of patients who have entered the Kidney Replacement Therapy (KRT) during the given calendar year.

Prevalence is number of cases of a specific disease in a defined population at a defined time point. In the Annual Report, it corresponds to count of patients treated in the KRT programme on 31st December.

Kidney Replacement Therapy (KRT) is a treatment used to replace normal function of patient´s biological kidneys.

Modality means the method of the KRT. The following modalities are considered: haemodialysis (HD), haemodiafiltration (HDF), haemofiltration (HF), home haemodialysis (HHD), automated peritoneal dialysis (APD), continuous ambulatory peritoneal dialysis (CAPD), and kidney transplantation (Tx). In kidney transplantation, a kidney from a living donor (LD) can be used, or Tx can be performed using a kidney from a deceased donor (DD).

Per milion population (PMP): incident or prevalent patient count in PMP is the observed count of new of already existing cases dividend by general population in the given year multiplied by 1 million.

Per million age-related population (PMARP): incident or prevalent count in PMARP is the observed count of new or already existing cases of a specified age group divided by general population in that age group and multiplied by 1 million.

Percentage coverage: Coverage of general population of the country or region of the country in a given registration activity within that territory

B) Further, specific situations and time points relevant to the RDP structures are given

1) Entry onto KRT and definition of a chronic patient

The date of entry of patients into KRT is defined according to different situations as follows:

a) Definition of a chronic HD patient:

- Entry to KRT is defined by the date of his/her first HD.
- Chronic patient undergoes regular HD continuously for at least 90 days (regardless of how many HD sessions per week are performed, regardless of whether HD is reported for health insurance companies as acute or chronic) since joining KRT, i.e. as of the first HD.
- Inclusion of a patient to RDP as a chronic patient takes place automatically right at the ProDos level. In this way, both detection of acute and/or possibly deceased patients (< 90th day from the 1st HD) as well as the uniform procedure for entering chronic patient should be ensured. This reporting method is in accordance with the ERA registry procedure.

b) Definition of a chronic PD patient – the same procedure as for an HD patient remains valid**:**

- Entry into the KRT is defined as the initiation of regular therapeutic exchanges of dialysis solution in the abdominal cavity (even if only one per 24 hours is performed) with an appropriate delay (simple flushes are not considered), the date usually differs from the date of the peritoneal catheter insertion.
- A chronic PD patient is that one who has survived at least 90 days of continuous PD treatment since entering the KRT.

c) Definition of a pre-emptively transplanted patient

- For patients preemptively transplanted, entry into the KRT is defined by the date of his/her first Tx.
- Optimally, the patient has been registered already in the RIP (Registry of patiens with advanced renal disease in pre-dialysis stage).

2) Introduction of mandatory filling-in the date and cause of death

- It is recorded in the „Course of treatment“ box - the cause of death is entered simply as one of the following 5 codes of death causes:
  - Code 1: cardiovascular disease
  - Code 2: infection
  - Code 3: malignancies
  - Code 4: other cause besides those given above
  - Code 5: unknown cause
- If there is no diagnosis known at the time of death, the date and cause „Unknown“ are filled in (it can be edited/corrected later).

3) Definition of a "late referral" patient

- The patient before entering the KRT has not been systematically followed in a pre-dialysis nephrologic department at all or has been followed there for less than 3 months prior to his/her 1st HD.
- This information is entered simultaneously with the patient´s entry onto the KRT registration.
- There are the following options of patient´s entry:
  - as a „late referral“
  - from the dialysis center own pre-dialysis department
  - from another clinic or health care facility
  - from a family physician of the patient

2. Demography of the CR

2.1. Demography - introduction

On an international scale (as well as on a regional within-country scale), the basic indicators provided by KRT – incidence and prevalence – always refer to occurence per 1 million people. Therefore, it is necessary to know the basic demographic data of the country and individual areas (regions as the official administrative units in the Czech Republic). Further, these data have to be sorted by gender and the same age categories as those used in the assessment of the incidence and prevalence of kidney failure and KRT.

2.2. Characteristics of the Regions in the Czech Republic

The Czech Republic is divided to 14 regions (including the Capital Prague region as a separate administrative unit) and 76 districts. Each region has its own specific characteristics affecting its economy, culture and life style of its inhabitants.

1. The capital Prague

Prague is the capital and the biggest city of the Czech republic. It is the 13th most densly populated city of the European Union. It is located on the Vltava river within the Central Bohemian Region, of which it is administrative center, but not a part. Prague serves as the seat of many state institutions, including the seat of the President, Parliament and government. It is also economical centre of the country playing a significant role in industry, financial services, and trade. Prague is one of the richest regions in Europe, with a GDP per capita reaching 171 % of the EU average. Economic development and a high standard of living attract both residents and investors. Prague is home to 12 universities and many corporate headquarters.

2. Central Bohemian Region

The Central Bohemian Region, regional authorities and institutions of which reside in Prague, forms a natural agglomeration with Prague connected economically, historically and culturally. It is the largest and most populous region of the Czech Republic, comprising of 12 districts: Benešov, Beroun, Kladno, Kolín, Kutná Hora, Mělník, Mladá Boleslav, Nymburk, Prague East, Prague West, Příbram and Rakovník. The northeastern part of the region is formed by the Elbe lowland with fertile soil. The southwestern part has a highland character. The region is both industrial and agricultural with a significant role for engineering, chemical, food and glass industries. The main agricultural area is the Elbe river area.

3. South Bohemian Region

The South Bohemian Region, the second largest in the Czech Republic, has its administrative center in České Budějovice. It has 7 districts: České Budějovice, Český Krumlov, Jindřichův Hradec, Písek, Prachatice, Strakonice and Tábor. The processing industry (food, beverages, machinery, textiles) and gravel mining dominate here. Wheat, sugar beet, potatoes and rapeseed are grown in agriculture; cattle breeding and fishery and pond fish culture are also important. Forests cover more than one third of the territory.

4. Plzeň Region

The Plzeň Region, the third largest in the Czech Republic, includes seven districts: Domažlice, Klatovy, Plzeň-city, Plzeň-South, Plzeň-North, Rokycany and Tachov. The administrative centre is Plzeň. The population is unevenly distributed, with small villages prevailing and medium-sized towns being less common. The region is both industrial and agricultural, with significant engineering, ceramic and food industries. It has rich deposits of kaolin, clay and limestone. The low population density is mainly due to the border districts. Economic growth has got revived during the last decade.

5. Karlovy Vary Region

The Karlovy Vary Region, the second smallest in the Czech Republic, includes three districts: Cheb, Karlovy Vary and Sokolov. The administrative centre is Karlovy Vary. The settlement structure is heterogeneous, with a high number of small villages and large cities in the basins areas. There are, however, also highland areas such as Krušné hory (Ore Mountains), Smrčiny and Slavkovský les, with the economic centre in the Sokolov Basin. The region is rich in deposits of brown coal and ceramic raw materials, especially kaolin. Industrial sectors include electricity processing, glass, ceramics and porcelain, and the traditional food, textile and engineering industries.

6. Ústí nad Labem Region

The Ústí nad Labem Region with administrative centre in Ústí nad Labem, includes seven districts: Děčín, Chomutov, Litoměřice, Louny, Most, Teplice and Ústí nad Labem. The region borders Germany and several Czech regions. Its area is characterized by industry, coal mining and manufacturing, which is, however, damaging to its environment. Geographically, it includes the Ore Mountains and the Central Bohemian Mountains. The raw material base consists of deposits of brown coal, clay and kaolin. The region has a significant heavy industry, energy and chemical industries. Agriculture is dominated by production of hops, fruit and vegetables.

7. Liberec Region

The Liberec Region, the smallest one in the Czech Republic, has its administrative center in Liberec which is also seat of the Technical University. It is an economic, commercial, cultural and tourist centre. The region includes four districts: Česká Lípa, Liberec, Jablonec nad Nisou and Semily. The landscape is mainly mountainous (Lusatian and Jizera Mountains, Giant Mountains), with a significant drinking water resources. Industry includes glassmaking, jewelry production, engineering and plastics. Agriculture is of little importance due to unfavorable climatic conditions.

8. Hradec Králové Region

The administrative centre of the Hradec Králové Region is Hradec Králové city. The region consists of five districts: Hradec Králové, Jičín, Náchod, Rychnov nad Kněžnou and Trutnov. The territory of the region is mountainous in the north and east (Krkonoše Mountains, Broumovská vrchovina, Orlické Mountains) and gradually descends to the Elbe lowland in the southwest. Mineral wealth includes glass sands and gravel sands. Industry, especially textile, engineering, rubber and food industries, dominates the economy. Agriculture includes cultivation of sugar beet, wheat, rye, barley and fodder crops. The Krkonoše Mountains are the most visited mountain area in terms of tourism.

9. Pardubice Region

The Pardubice Region, with its administrative centre in Pardubice, consists of four districts: Chrudim, Pardubice, Svitavy and Ústí nad Orlicí. The region has mainly medium-sized and smaller municipalities. The most economically important area is the fertile belt along the Elbe river – the Elbe Lowland. Industry focuses on chemistry, engineering, textiles and optics. There is an above-average number of people working in agriculture, especially in the Elbe Lowland. Important cities are Pardubice, Chrudim, Ústí nad Orlicí and Svitavy.

10. Vysočina Region

The Vysočina Region, with its administrative centre in Jihlava, includes five districts: Havlíčkův Brod, Jihlava, Pelhřimov, Třebíč and Žďár nad Sázavou. It has the second largest number of municipalities in the Czech Republic, most, however, with less than 500 inhabitants. It is located in the central part of the republic, mainly in the Bohemian-Moravian Highlands. The main rivers in the region´s aquifer are Sázava, Svratka and Jihlava. Industry is diverse, dominated by engineering and metalworking, and mining of stone and brick clay is also significant. Agriculture is concentrated on cultivation of potatoes and oilseeds.

11. South Moravian Region

The administrative centre of the South Moravian Region is Brno, the second largest city in the Czech Republic, where a third of the region's population lives. The region includes seven districts: Blansko, Brno-city, Brno-outskirt, Břeclav, Hodonín, Vyškov and Znojmo. It is located on the border of the Bohemian Highlands and the Carpathian Mountains, with fertile soil and a warm climate suitable for agriculture. Wheat, sugar beet, malting barley, thermophilic fruits, vegetables and vines are grown here. Sugar factories, canneries and wineries are important. The main rivers are Morava and Dyje.

12. Moravian-Silesian Region

With the Ostrava city as its seat, the region is of strategic importance with deep-rooted industrial traditions. Coal mining, ferrous metallurgy and engineering industry have always been the ground of this region´s economy. The region comprises mountainous areas of the Beskydy mountain chain as well as lowlands around its main river Ostravice where ecological transformations currently take place. Ostrava city hosts educational institutions and innovation parks and is a cultural centre of the whole region. Investments into modern technologies and continuing support of sustainable development changes the region from a traditional industrial centre into a region of innovative activities attracting investors and young professionals.

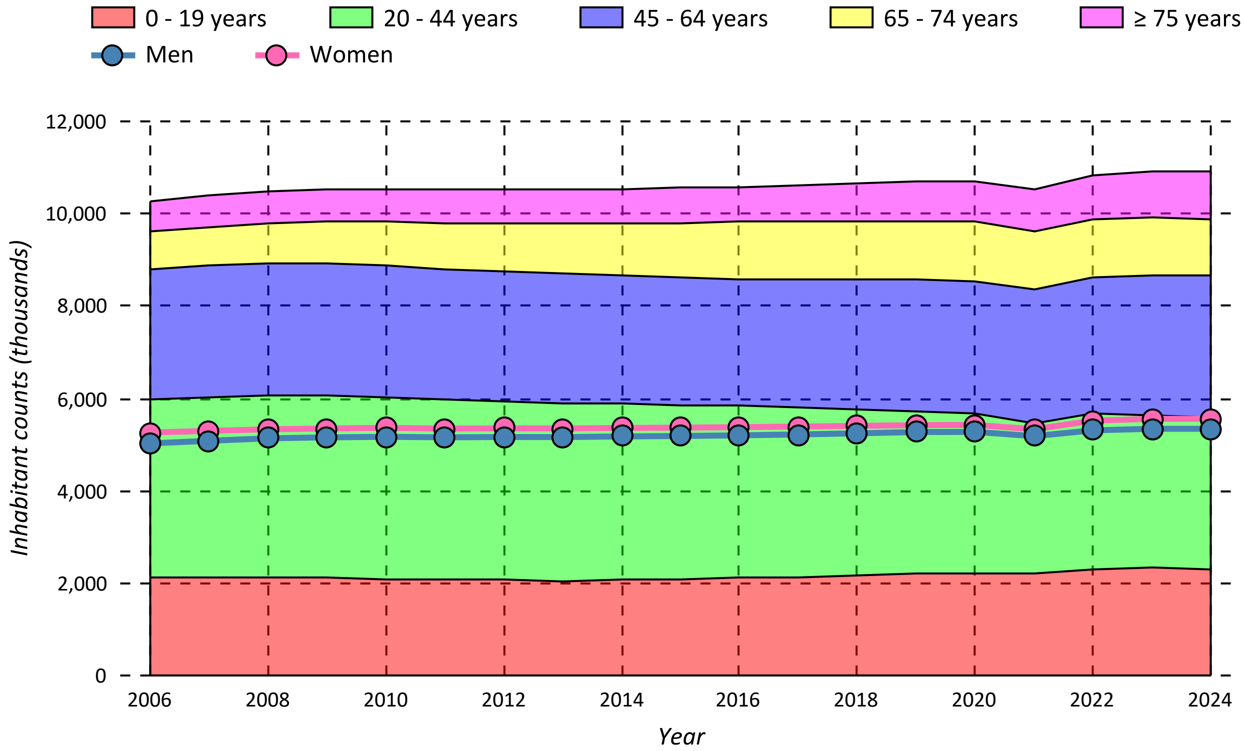
13. Zlín Region

The administrative centre of the Zlín Region is the city of Zlín. The region boasts of industrial inheritance and innovative spirit. The Zlín Region has varying natural conditions, from the lowlands in the western part (Hornomoravský and Dolnomoravský ravines) suitable for agriculture to the mountainous areas of the Carpathian mountain chain (Beskydy, Javorníky, Bílé Karpaty). Extensive net of educational institutions and cultural centres increases attrativity of the region both for investors and general population alike. Orientation on innovations together with firm traditions creates dynamic environment supporting both quality of life and new entrepreneur occations.

14. Olomouc Region

The pulsating city of Olomouc, which has given the name to the whole region, boasts of rich cultural traditions and long lasting history of industrial development. The region is appreciated not only for its historical value and as a centre of academic activities but also for its firm agrarian traditions and grocery production. Its strategic position as a traffic node of the main transport routes between the Czech Republic and Slovakia is very supportive in its modern economical growth.

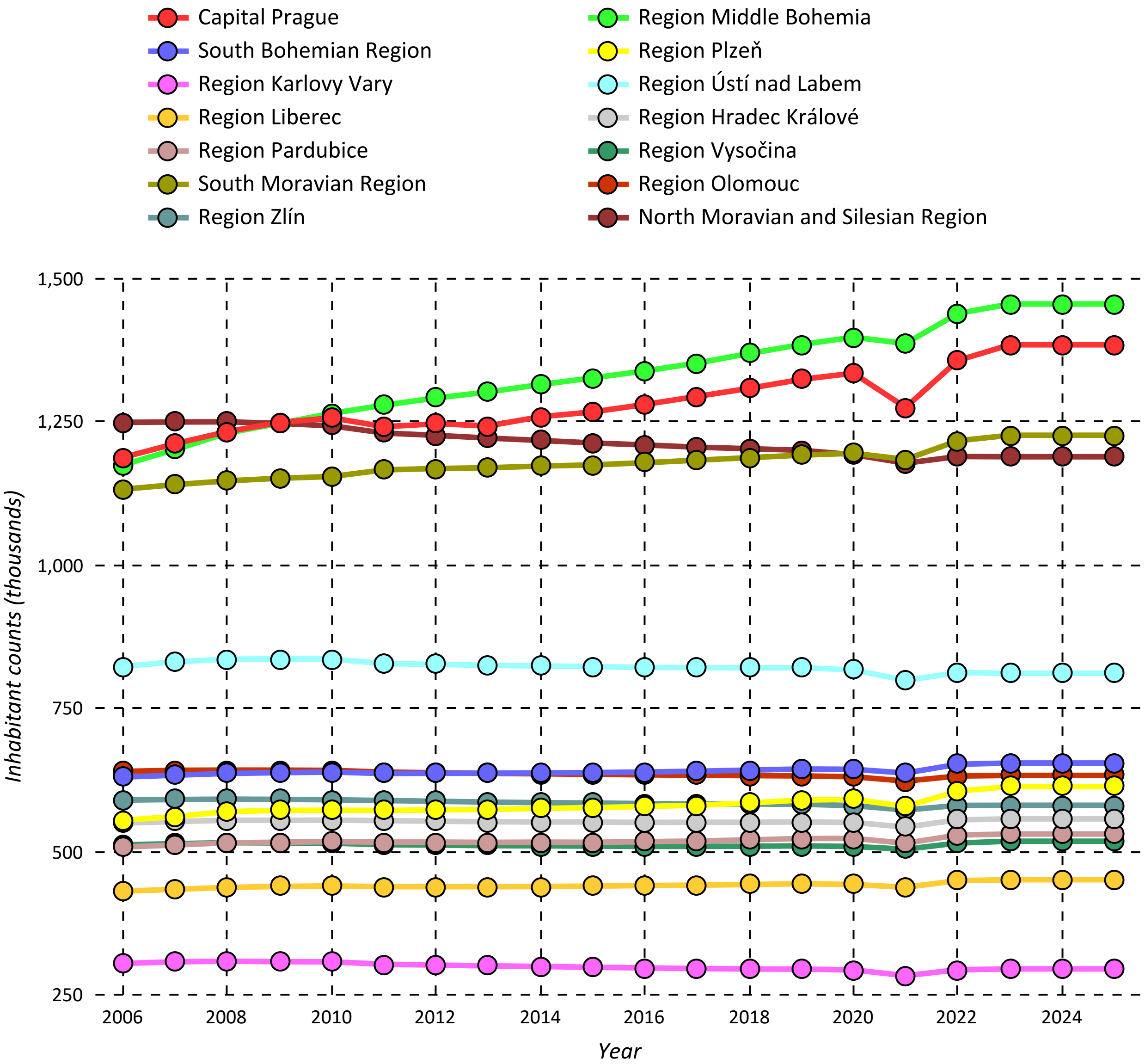
Graph 1 Evolution of inhabitant counts in the CR during 2006 - 2024, sorted by age categories



According to the Czech Statistical Office, Czech Republic had a total of 10,900,555 people on December 31, 2023. It was the highest number since the end of World War II. During 2023, the population grew by 73.0 thousand people, i.e. by 0.7 %. Population growth thus remained significantly above the average level as compared to 2019 – 2021, when it was 0.1 – 0.4 %. Nevertheless, it did not reach the increase of the year 2022 when the Czech population grew up by 3 % as a consequence of massive immigration wave from Ukraine. In the absolute number this ment an increase by 301.8 thousands people, the highest increase in our history over such short period. All the population growth in the Czech Republic in the last five years was ensured by foreign migration, as the balance of natural change was regu-larly negative. In 2023, the number of deaths exceeded the number of live births by 21.6 thousands, in previous years by 0.1 to 28.1 thousands. Females traditionally slightly outnumber men in the population of the Czech Republic. At the end of 2023, the proportion of females reached 51.0 %, i.e. the number of females exceeded the number of men by 215.3 thousands. The same pro-portion of females in total population was seen also in 2022, while it was slightly lower in 2019 - 2021 – 50.7 %.

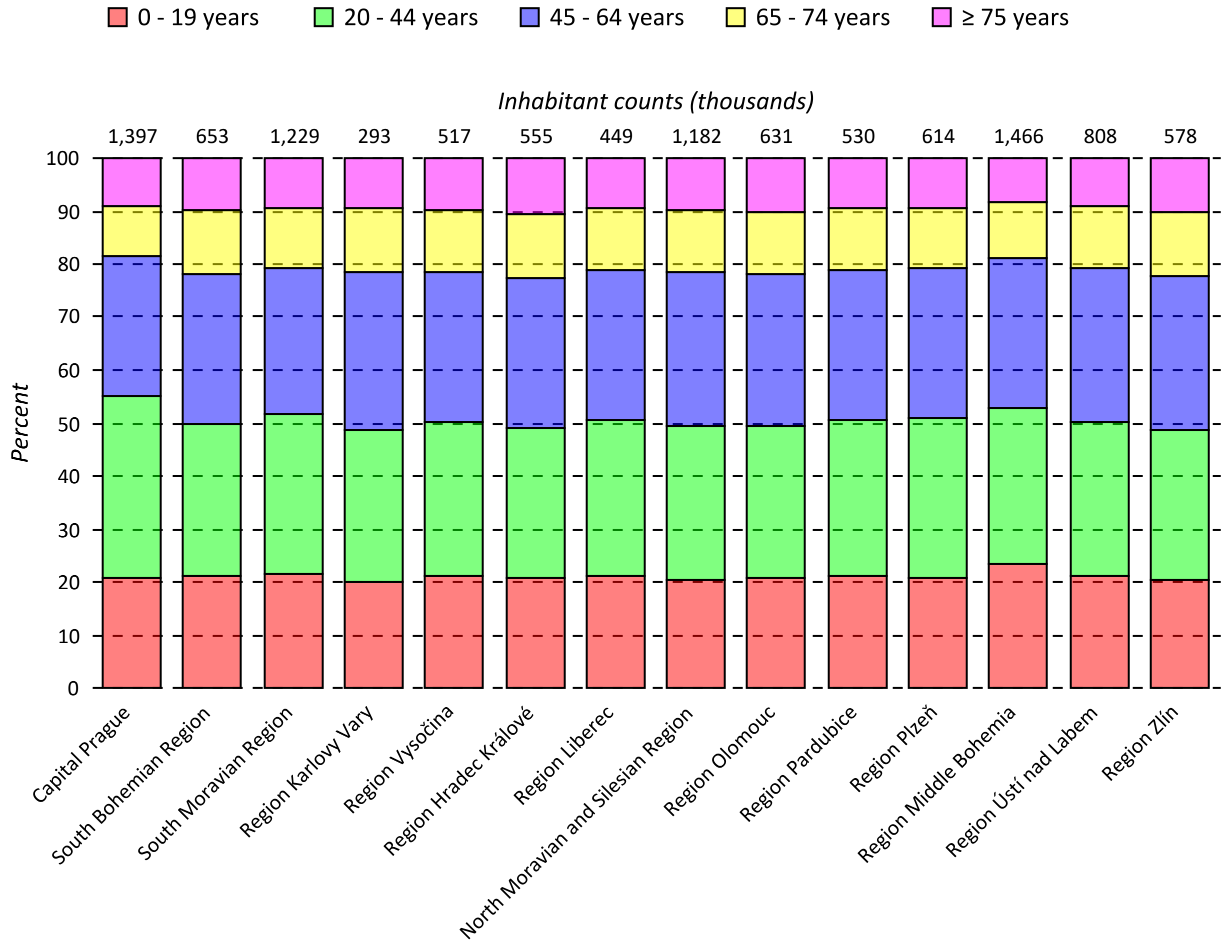
The jumpwise change in the proportion of females in the population was due to the unusually high proportion of females in the migration balance (refugee wave). The percentage of the population in “productive age” of 20 – 64 years had been gradually decreasing during 2007 to 2021. In the last two years, however, the decline apparently stopped due to the migration wave. On the other hand, the representation of the senior population (65 years and more) had been continuously increasing until 2021. This has changed in 2022. In 2023 slight growth returned (increase by 0.1 p.p.) but has not reached the 2021 figure yet. The senior category (> 65 years) is equally dividend between tne cohort of 65 - 74 years and that of > 75 years.

Graph 2 Evolution in inhabitants counts in individual regions of the CR during 2006 - 2024



Evolution of the inhabitant counts in individual regions of the CR over the same time period as in Graph 1 (whole country inhabitant count) has been without marked changes in most regions. Smaller decrease has been seen in Region Ústí nad Labem only. On the contrary, slow yet steady increase has been taking place only in Region of Central Bohemia, Capital Prague and South Moravia Region. Apparent decrease occurred during 2020 - 2021, i.e. the "Covid years". Significant increase in the above mentioned three Regions during the last two years indicate that those Regions carried the main onus of migration associated with the war in Ukraine.

Graph 3 Age structure of inhabitants in regions of the CR in 2024



The differences in the number of inhabitants of different age groups in individual regions of the Czech Republic are significantly influenced by the living conditions and economic opportunities these regions offer. For example, the Capital City of Prague, as a center of economy, education and culture, attracts the younger generation due to a wide range of job opportunities, cultural and social activities and a high quality of life in general. Prague has therefore a higher proportion of younger inhabitants compared to rural areas.

The Central Bohemian Region, which surrounds Prague, benefits from proximity of the capital and offers good living conditions, attracting both younger families looking for housing within easy reach of job opportunities in Prague and older citizens who prefer a more calm surrounding.

On the other hand, regions such as Karlovy Vary and Moravian-Silesian Regions face demographic challenges, including a higher proportion of older populations. This is often a result of historical economic structures that dominated there in the past, such as heavy industry and mining, and a relatively lower quality of life compared to economically prosperous regions. Young people from these regions often migrate to larger cities for better educational and job opportunities.

Regions with a predominance of agricultural areas, such as the Vysočina Region and the South Bohemian Region, tend to have a more balanced age structure, although some more remote rural areas may face population ageing due to the migration of younger people to urban areas for education and employment.

2.3. Dialysis centres

Processing metodology

2.3.1. Data reporting

The basic principle of the RDP is prospective anonymised (in terms of patient identification) followup of each individual patient with quarterly reporting of periodic data. Data reporting is done electronically, rarely manually, through a secure network with secure access valid only for patient´s parent DC. Data reporting can be divided into DC data (reported once a year, as of 31st of December) and periodic data (reported quarterly).

1. Data reported once a year (data on the dialysis center):

- **DC status**: type (public/private); number of beds (total, of which acute), established isolation for infectious patients, number of shifts per week
- **Instrumentation**: dialysis monitors (counts according to date of manufacture, possibility of online data collection from monitors); water treatment (treatment methods, frequency of disinfection, frequency of quality tests, established limits)
- **Staffing:** number of physicians, nurses, technicians, auxiliary staff

2. Periodic data - basic patient´s data, reported four times a year, updating the database of monitored patients in the RDP:

- **Identification** (encrypted): name and surname, personal identification number, DC, health insurance company
- **Basic information**: age, gender, primary renal diagnosis (cause of kidney failure, date of diagnosis) and other diagnosis (at the start of KRT), vaccination (type, date), date of KRT initiation and the 1st modality used
- **Vascular access** (at the start of KRT): type, location, date of access creation, date of access failure
- **Residual renal function** (at the start of KRT): residual diuresis, GFR (corrected CCr, eGFR CKD-EPI)
- **Termination of patient´s monitoring**: date, reason.

3. Periodic data of current patients - reported four times a year:

- Update of basic patient´s information: insurance company, new/additional diagnoses, parent DC, vascular access, vaccinations

Current quarterly data:

- **HD:** number of HD sesssins per week and time of one session,, prescribed QB, dialyzer (Hf/Lf, membrane material, area), urea1, 2, 3, Kt/V, PCR
- **PD:** regimen (method), cycler (yes/no), exchange volume (l per 24 hours), type of solutions used, weekly creatinine clearance, Kt/V-PD
- **Pharmacological treatment:** EPO (yes/no, weekly dose), antihypertensives, phosphate binders
- **Laboratory data:** Ca, P, PTH, Hct, Hb, HBsAg, HCV, HIV

Data return (response rate):

Reference value is number of DCs in the given year. For all these DCs, it is determined whether they reported at least one periodic record in the given year. The result is reported as ratio of the number of DCs with at least one record during the year to the total number of DCs in the given year.

2.3.2. Methodology of data collection and evaluation

1. Data from dialysis centers are uploaded and processed automatically as a part of quarterly reports to the RDP.
2. Dialysis centers that do not have automated reporting use simplified reporting conditions (see above)
3. Data is presented in the form of:

- graphs
  - values sorted consecutively by the identification number of the center
  - values sorted by results (including non-reporting centers)
- numerically in tables

4. The identification of individual dialysis centres is given by their identification number (ID) used in the RDP. It is listed in a special table (each dialysis centre thus has its uniqe individual ID, which is associated with all the reported data).

5.Reporting of the treated patiens counts:

- For the data related to performed transplantations (Tx) and to the number of patients placed on the transplantation waiting list (WL), the data from the Transplantation Coordination Center (TCTC) were used.
- For the data related to laboratory values, data on the number of patients reported to the RDP with their specified laboratory values were used.
- Principal condition for patient reporting is his/her chronic KRT lasting > 90 days

6. As the basis for **reporting of laboratory values,** the number of patients treated with HD, HHD, and PD reported to RDP was taken.

The data presentation is as follows:

- % of patients with the recommended Hb values (100 - 120 g/l)
- average Hb value in g/l in the given DC
- standard deviation of the Hb values
- % of patients with the recommended P values (1.1 - 1.78 mmol/l)
- average value of P in mmol/l for the given DC
- standard deviation of P values
- % of patients with the recommended eKtV values (> 1.2)
- average value of eKtV for the given DC
- standard deviation of eKtV values

For each DC, the number and age of patients are further listed

- number of patients from whom the resulting value was calculated
- average age of these patients

- in each graph, also the whole-country mean is indicated (shown as a horizontal dashed line in the plot)

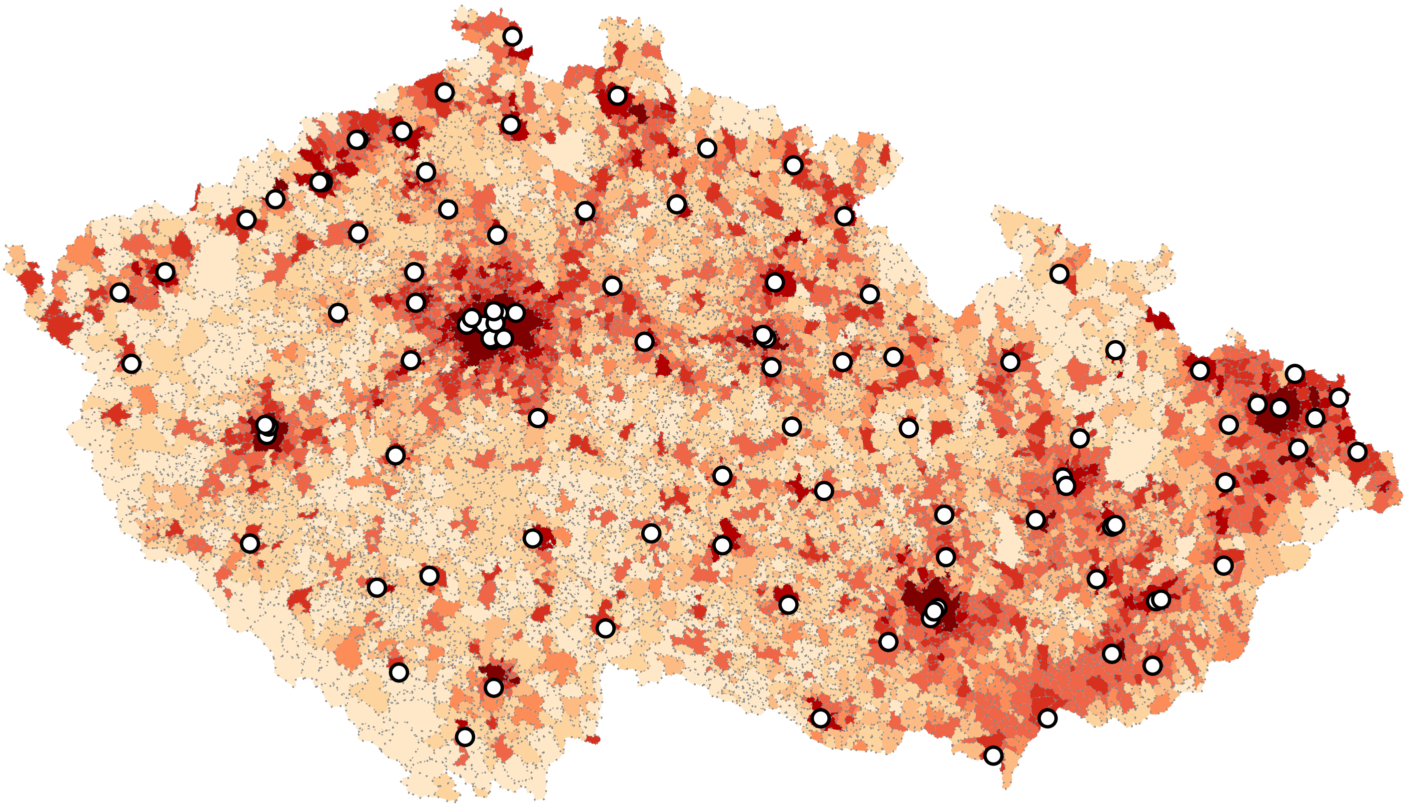
7. Reporting of the number of transplanted patients (Tx) and patients on the transplantation waiting list (WL): Data were obtained in a cooperation with the Transplantation Coordination Center (TCC). The data is reported as of the 31st December of the given year. The reference number for calculation of the above was the count of dialyzed patients as of 31st December. PD patients counts are included in the calculations of the statistics, too.

- The following data has been processed:
  1. Absolute number of patients transplanted in the given year, the number of patients in the WL (active and temporarily excluded)
  2. Total % of patients (the sum of active patients in WL + temporarily excluded)
  3. % of transplanted patients
  4. % of patients who were transplanted in the given year + the number of patients included in WL (both active and temporarily excluded)
- Each graph also includes the whole-country mean (displayed as a horizontal dashed line).

Notes on the methodology:

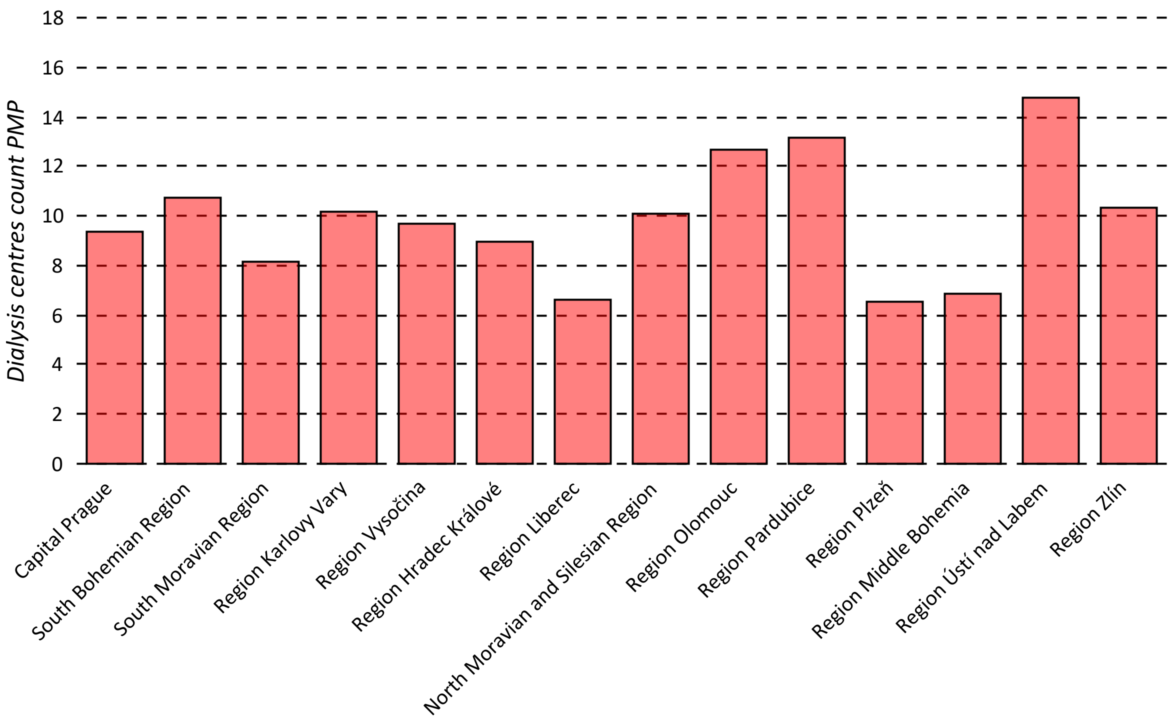
- A simple methodology was chosen based on data that is 100 % accessible and known to each DC in treatment in thein monthly overviews
- We are aware that each recommended target value has its limitations. For individual comparison of centers, we had to choose the simplest possible form. The fact that a DC does not meet the recommended values may not necessarily be caused by “insufficient” treatment. Here are some examples (more such examples could certainly be found):
  - Hb value > 120 without EPO treatment
  - eKtV value is not calculated from the mid-week value (some DCs collect samples before the first dialysis of the week in a log term; i.e. their values are not be fully comparable with those from other DCs)

Graph 4 Map of dialysis centres in the CR in 2024



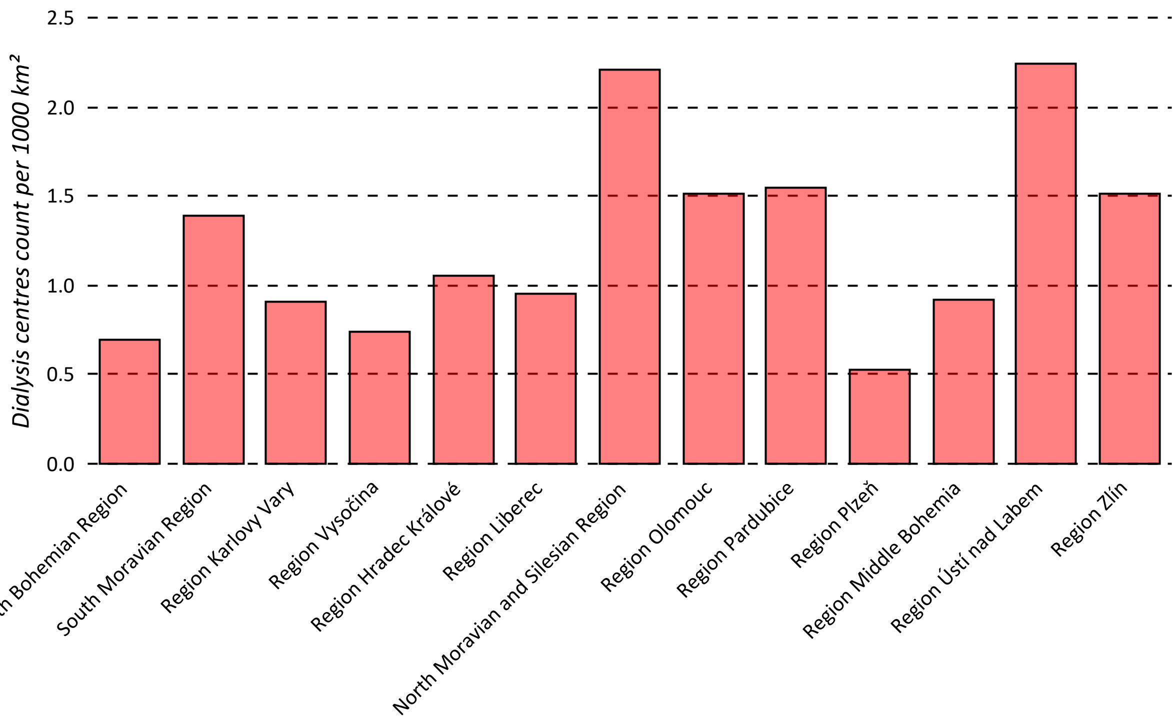
Map of the Czech Republic shows location of dialysis centres (DC) that have been in operation on 31. 12. 2024. Included are all centres, even those that do not regularly deliver their data to the RDP. Without concurrent display of population density, this picture provides information mainly on mean distance between centres and evenness (or unevenness) of their distribution over the entire territory. At the first glance, uneven coverage is obvious in Region Plzeň, middle part of Region Liberec and eastern part of South Moravian Region. In planning any development or changes in centres dislocation also size of the existing centres (number of beds and their utilisation) as well as the catchment area of the whole net which has to be considered.

Graph 5 Dialysis centres count per 1 million inhabitants



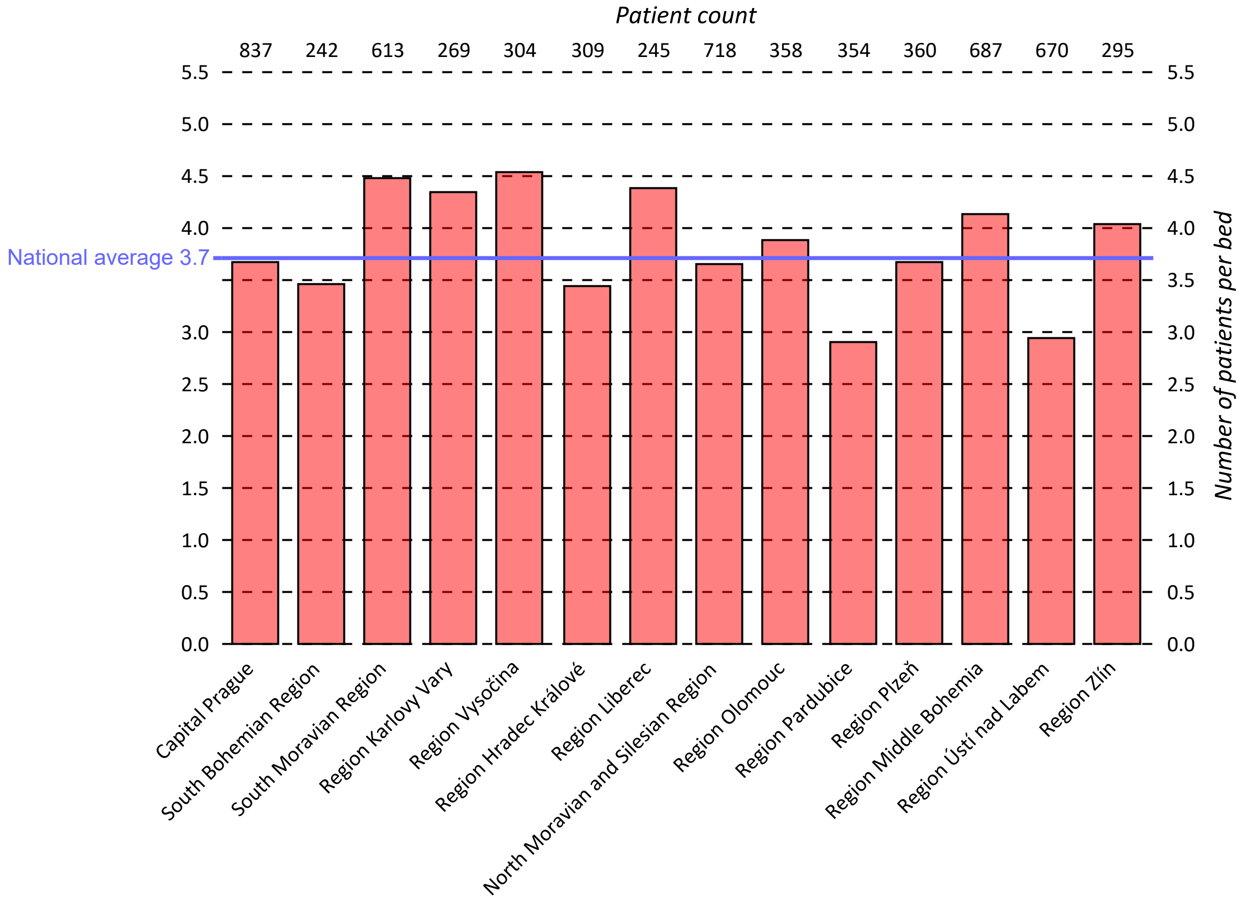
Choice of appropriate marker of coverage of dialysis centres in individual regions is neither easy nor unambiguous. This bar graph offers comparison of different regions in the CR by number of centres per million inhabitants (PMP) in each of them. Although it seems objective in that it takes into account population of each region, on the other hand it disregards size of different dialysis centres (number of dialysis beds and their real utilisation), their patient counts and travel distance distributions either. Not to speak about possible differences in incidence of chronic renal failure cases between regions. Nevertheless, even this simplified approach provides interesting figures on interregional differences – for instance 6 DCs PMP in the Plzeň Region and more than double in the Ústí nad Labem Region despite comparable population in both (about 0.6 million in the Plzeň Region and 0.8 million in the Ústí nad Labem Region).

Graph 6 Dialysis centres count per 1000 km²



This graph offers an alternative assessment of dialysis treatment needs coverage by dialysis centres counts per 1000 km2. The loosest coverage from this point of view is seen in the Plzeň Region mentioned already in the commentary to the previous graph on dialysis centres counts per million population and in the South Bohemian Region and the Vysočina Region which exhibits less that 1 DC per 1000 km2. The densest coverage is in the capital Prague (not shown in the graph) – there are 11 dialysis centres. With Prague region area slightly below 500 km2 it would give 26 DCs per 1000 km2 there. The next densest coverage are far lower figures (just over 2 DC per 1000 km2) have the Ústí nad Labem Region and the North Moravian and Silesian Region.

Graph 7 Utilisation of existing dialysis beds in different regions in the CR in 2024



Aim of this plot has been to analyze utilization of existing dialysis beds in different regions of the CR in 2024 expressed as patient/bed ratio, and provide thus objective assessment of possible needs to increase or to reduce their existing numbers where that ratio would significantly deviate from the whole-country mean. Patient counts considered in this analysis include all patients with at least one record in the RDP database in the reported year, who were alive at the end of the year (i.e. prevalent counts).

For each region, only "chronic" dialysis bed counts from all dialysis centres (DC) are included. Although there is no standard value for dialysis bed counts at present, the currently prevailing dialysis schedule with three sessions per patient per week with one "sanitary" day (with no dialysis) weekly enables to cover treatment of 4 patients on 1 dialysis bed run in two-shift operation, and three-shift operation can accommodate even 6 patients per 1 bed. Eight dialysis beds in a DC is generally considered as bottom limit for effective exploitation of the health care staff. From that data and from known incidence of chronic kidney failure, dialysis bed needs can be objectively estimated both on the whole-country level as well as on the regional one. However, this utilisation balance approach considers just the technical aspect of care management without accounting for locally available human resources (physicians and nurses). Nevertheless, it documents generally sufficient dialysis capacity in the CR – only 5 out of 14 regions have patients/bed ratio slightly above 4 (maximum value is seen is the South Bohemian Region – 4.65). On at least a part of the beds in those regions, three-shift system (3 dialysis sessions on 1 bed in a day) must thus be implemented.

3. Basic data of the KRT programme in the CR

3.1. Basic data of the KRT programme in the CR in 2024

Number of dialysis centres	**114**
Patient count on regular dialysis treatment on 31. 12. 2024	**6 005, (i.e. 551 patients PMP)**
Incident patient count during 2024	**1 561**
Count of patients deceased in 2024	**883**
Number of extracorporeal haemoelimination procedures in 2024	**832 757**
Patient count on peritoneal dialysis	**223, (i.e. 20 patients PMP)**
Patient count on home haemodialysis	**86**
Number of patients transplanted in 2024	**524, (i.e. 48 patients PMP)**
Number of transplants from living donors	**40**
Count of patients living with functioning transplant on 31. 12. 2024	**5 982, (i.e. 549 patients PMP)**
Patient count on KRT (Kidney Replacement Therapy) on 31. 12. 2024	**11 987, (i.e. 1 100 patients PMP)**
Reporting (response) rate	**92 %**

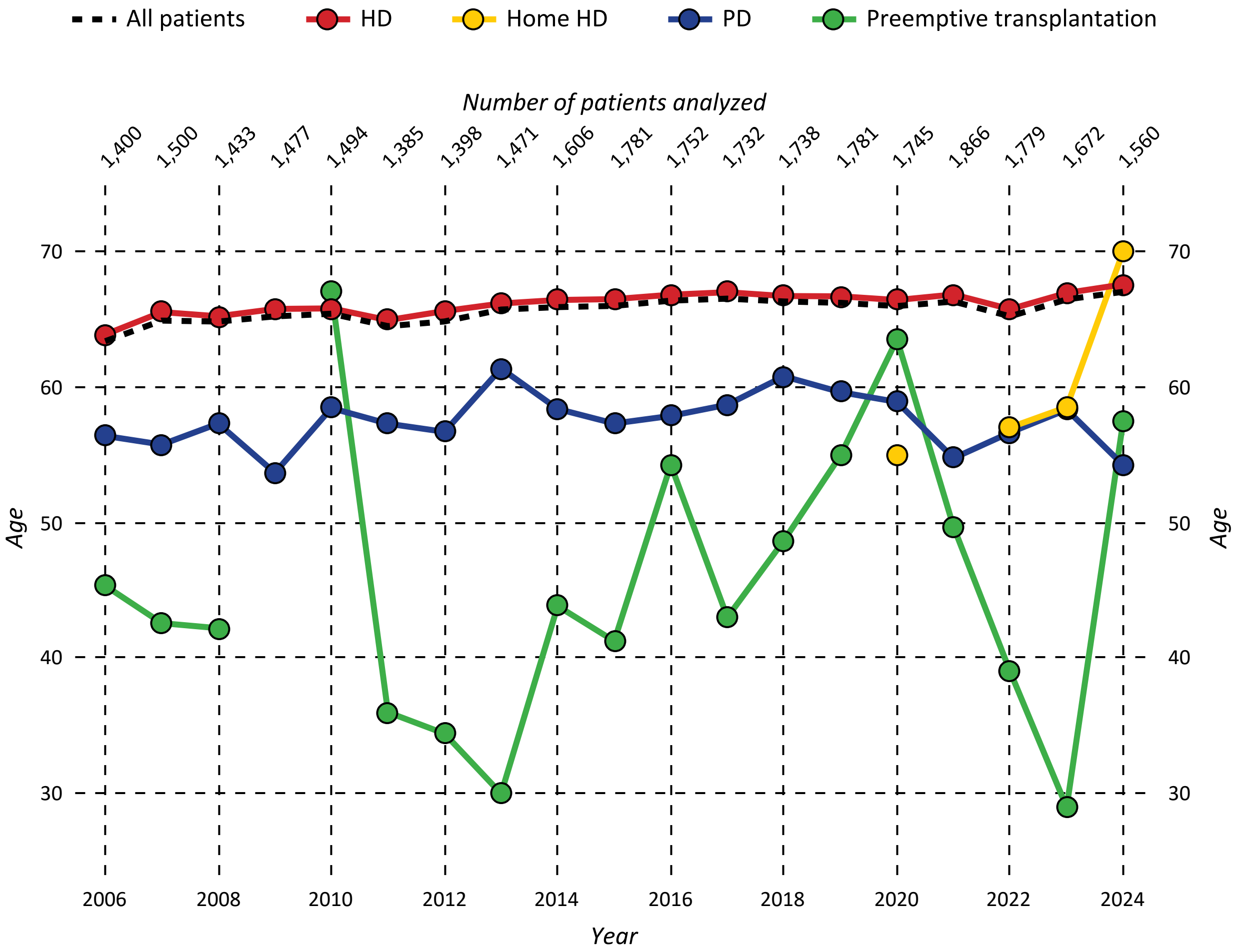
3.2. Incidence

Table 1 Evolution of the incident patient counts during 2020 - 2024, sorted by their age category and gender

Age category		Incident patient count (abs.)					Incident patient count (PMARP)				
		2020	2021	2022	2023	2024	2020	2021	2022	2023	2024
0 - 19 years	Males	3	4	5	1	4	3	4	4	1	3
	Females	1	0	3	1	0	1	0	3	1	0
	All	4	4	8	2	4	2	2	3	1	2
20 - 44 years	Males	85	90	103	86	74	48	53	60	51	44
	Females	48	54	66	52	46	29	34	40	32	29
	All	133	144	169	138	120	38	44	50	42	37
45 - 64 years	Males	332	349	320	333	309	230	241	215	219	199
	Females	162	159	176	111	107	114	112	119	74	70
	All	494	508	496	444	416	172	177	167	147	135
65 - 74 years	Males	409	427	375	351	316	697	736	651	615	562
	Females	196	219	195	182	157	277	315	283	268	236
	All	605	646	570	533	473	468	507	450	427	386
≥ 75 years	Males	279	305	320	324	317	866	916	906	869	813
	Females	223	258	213	227	229	411	460	362	369	358
	All	502	563	533	551	546	581	630	566	558	531
All	Males	1108	1175	1123	1095	1020	210	227	212	205	190
	Females	630	690	653	573	539	116	129	118	103	97
	All	1738	1865	1776	1668	1559	162	177	164	153	143

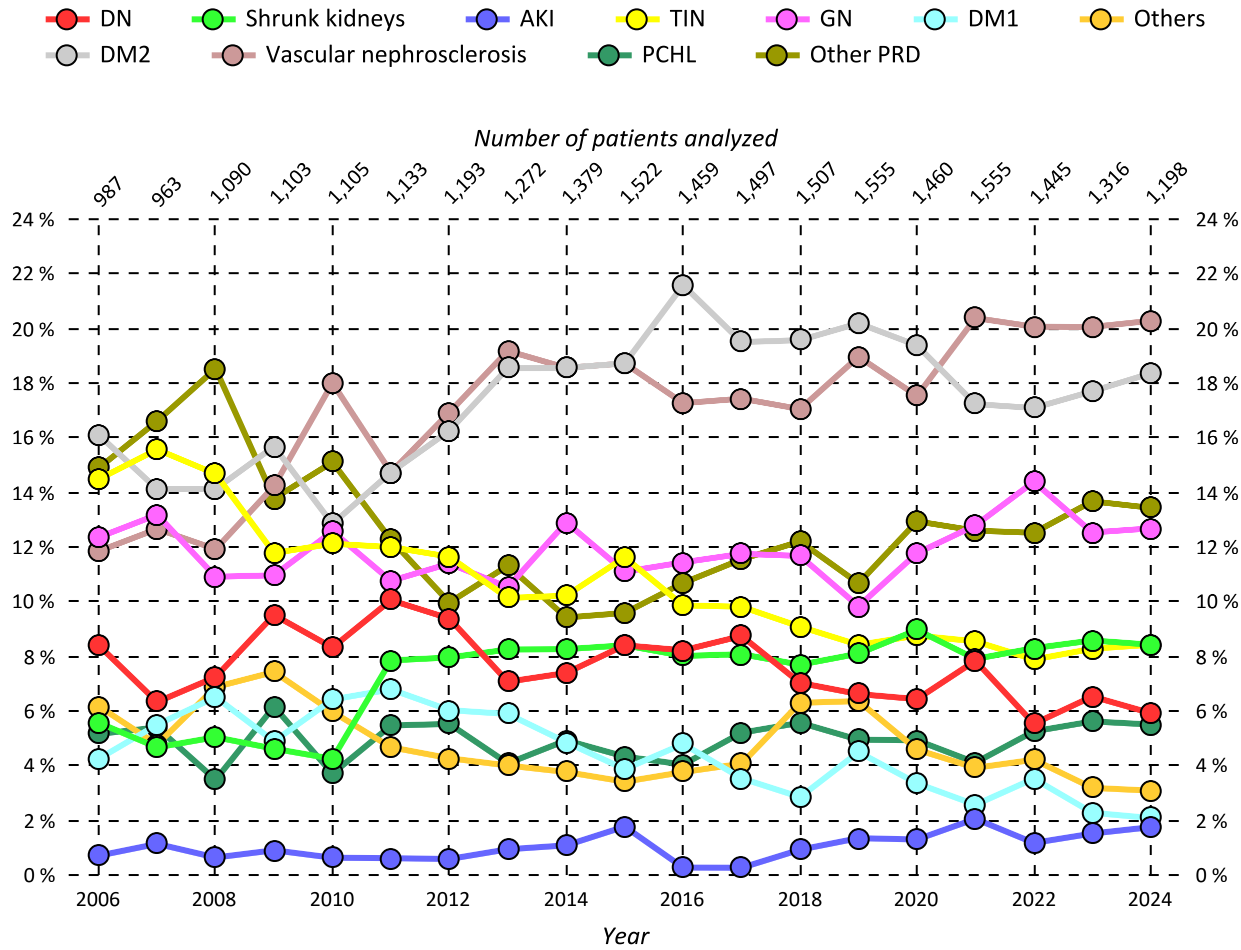
This is the first analysis of incident patient count during the last 5 years (2020 - 2024) sorted by their gender and age category. Ranges of the age categories correspond with those used in the annual statistical ERA Registry reports. The table includes all patients in whom entry into the KRT (Kidney Replacement Therapy) programme has been reported in the given year, regardless of the quarter in which this happened. The columns in the left part of the table give absolute incident patient counts sorted by gender and age category, columns in the right part are recalculated per million of age-corresponding categories in general population (PMARP – per million of age-related population). Total incident counts have remained quite stable (about 160 PMP). As a rule, higher age categories exhibit higher incidence figures, both in absolute figures and even more when expressed in PMARP. Increase in females is by one category delayed compared to males. Also the incident counts are generally significantly lower in females compared to males, although females counts in general population are significantly higher in higher age categories (see the plots in the paragraph on general demography of the country). Stable incident counts document stabilized epidemiological situation in kidney failure in the CR and also already well established methodology of reporting DC data to the RDP database.

Graph 8 Evolution of incident patient mean age at initiation of kidney replacement therapy (KRT) during 2006 - 2024



The graph shows evolution of the mean age of incident patients at the time of initiation of their KRT (Kidney Replacement Therapy) during the last two decades (2006 – 2024) sorted by the treatment modality. On the line above the plot, absolute incident patient counts in individual years are given. Modality *"HD"* includes patients treated both by haemodialysis (HD) and by haemodiafiltration (HDF). While age of the incident HD and PD patients had been slowly yet significantly increasing in the first decade of the evaluated period, it has remained already quite stable during the second one – about 67 years. Home haemodialysis (HHD) as the latest treatment modality has started to be practised in the last few years only. Currently only some 1.5 - 2 % of the total patient count in the CR are treated by HHD. Thus data on their age distribution does not enable any meaningful analysis yet. In this plot, patients have been included in the HHD group if they had HHD reported as their treatment modality in the quarter in which their entry onto the KRT had been reported. The plot displays also the mean age of pre-emptively transplanted patients in individual years of the analyzed period. Although it exhibits high fluctuations in individual years, it is definitely significantly lower than that of patients entering dialysis programme.

Graph 9 Evolution of the incident patient count in the CR during the 2006 - 2024 period, sorted by Primary Diagnosis (PRD)



Graph 9 displays evolution of the incident count of patient who entered KRT during the last two decades (2006 - 2024). They are sorted according to their primary renal diagnosis (PRD), which has lead to kidney failure. Included is only the data of patients whose primary diagnosis was specified in their reporting to the RDP. Their counts are given for each year on the top line of the plot. Sorting includes the following most frequent primary diagnoses (according to MKN-10 classification):

DM2 - E112 Diabetes mellitus type II with renal complications

DMI - E102 Diabetes mellitus type I with renal complications

DN - N083 Glomerular disorder with diabetes mellitus, i.e. diabetic glomerulo sclerosis (sy Kimmelstiel-Wilson, KSW)

GN - dg. N000 - N089 – chronic glomerulonephritis (except for N083)

Vascular nephrosclerosis – dg. I120 - hypertension kidney disease with renal failure

TIN - N119 Chronic tubulo-interstitial nephritis

PCHL – dg. Q612 autosomal dominant polycystic kidney disease

AKI – N170 - N179 – documented acute kidney failure with subsequent entry onto dialysis

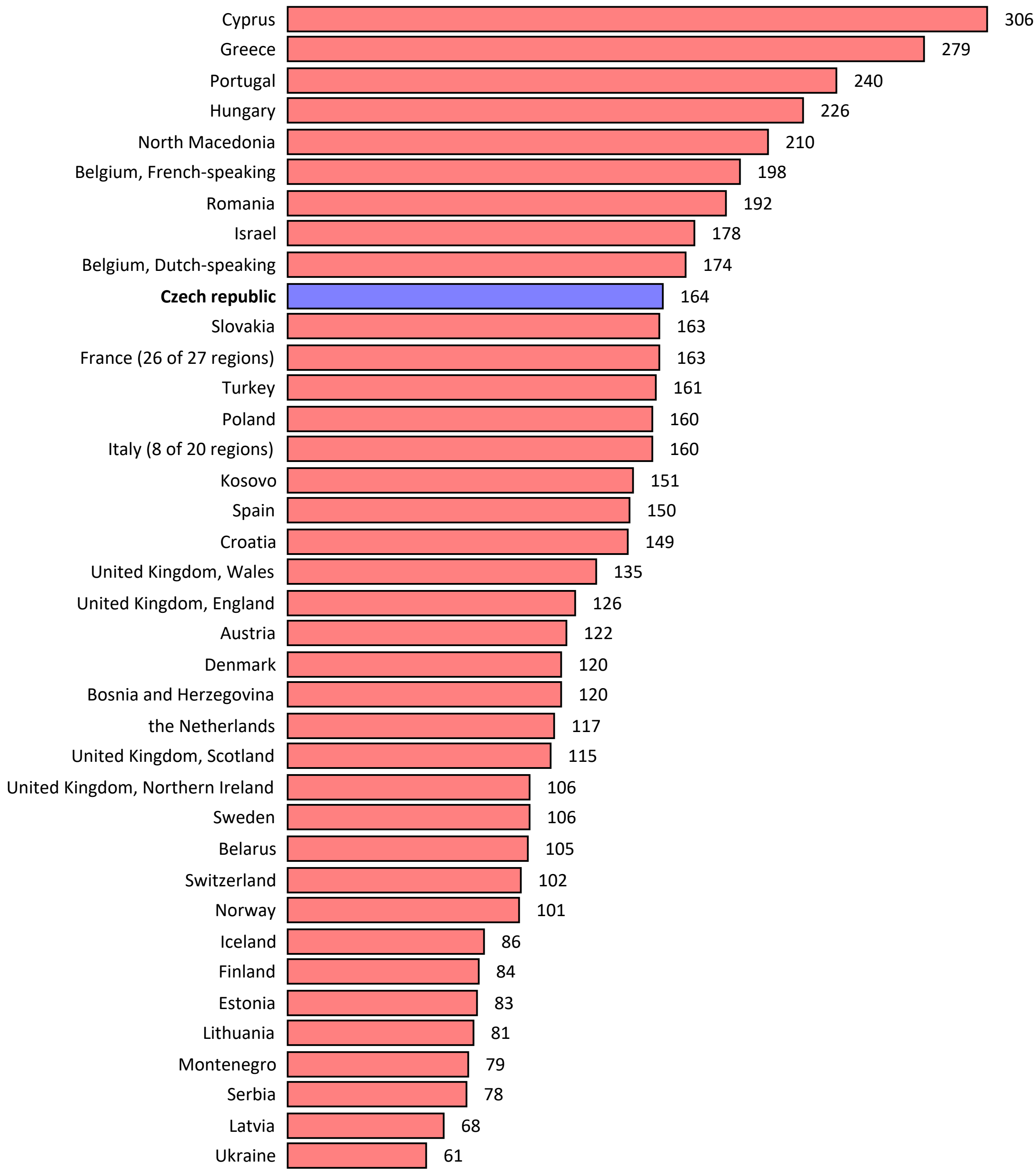
N185 – shrunken kidneys without determination of a specific primary renal diagnosis (PRD)

N189 an N19 – undetermined kidney failure

Others – other causes of chronic kidney failure (all other reported PRD codes, individual dg less frequent)

Over the whole analyzed period of nearly 2 decades, there has been an apparent dominant growth of diabetic kidney disease (DKD) and vascular nephrosclerosis as two most frequently encountered PRDs. Although the MKN-10 classification cannot be applied to the today used DKD term, one can say that classification of DKD is divided to KSW, i.e. diabetic glomerulosclerosis as a typical microvascular complication of DM (without its differentiating into DM1 and DM2) and kidney affliction in DM1 or DM2 represented by an ever-growing term “DM with CKD”, i.e. predominantly atherosclerotic kidney disease. At the same time, it is evident that about 12 - 14 % of patients are entering chronic dialysis treatment without exactly known PRD. This incidence is, however, seen in reportings to other registries, too.

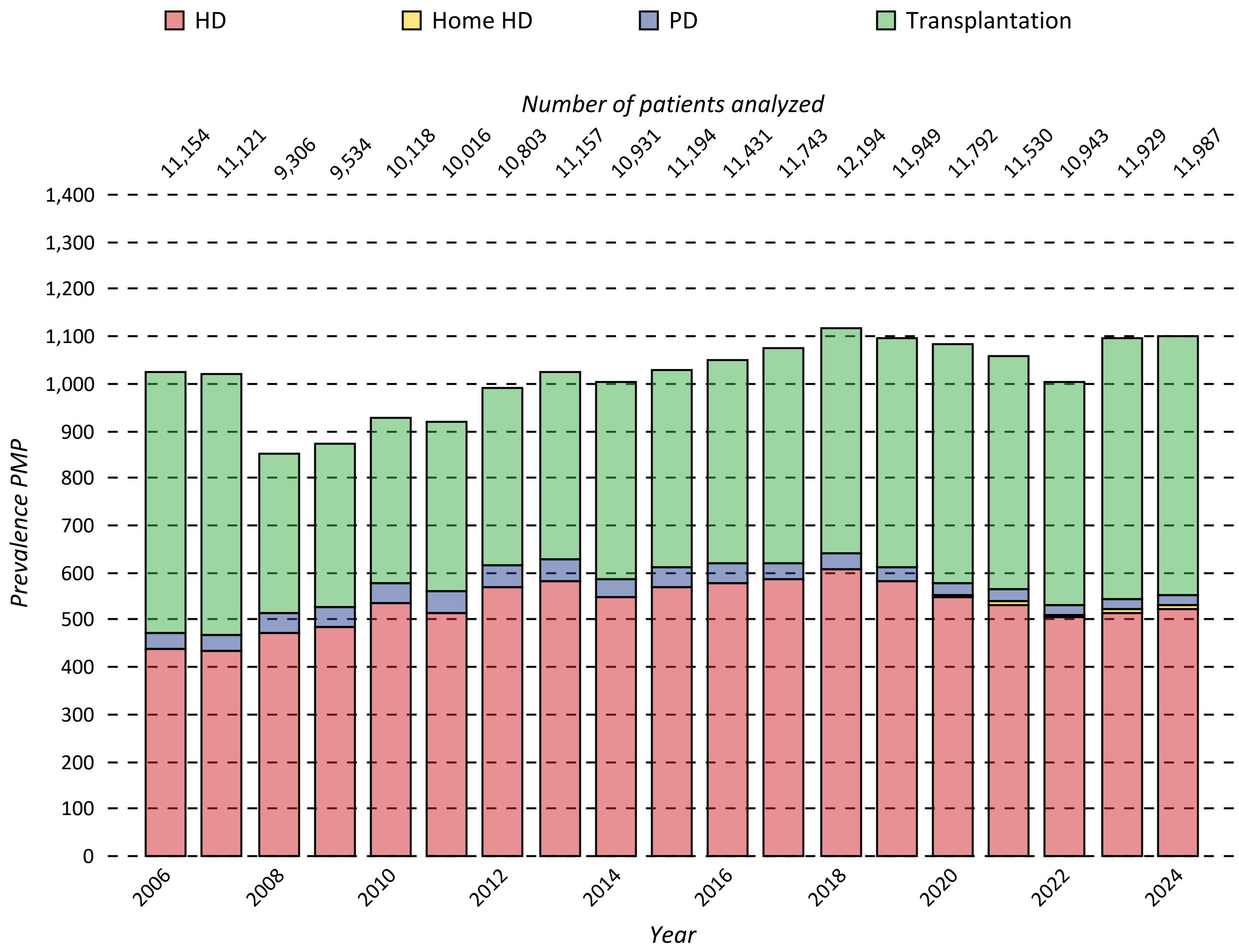
Graph 10 Incident patient counts per million population (PMP) in different European countries in 2022



The graph, which compares incidence (expressed in PMP) of kidney failure necessitating regular dialysis treatment or transplantation, includes 38 European countries and regions. The incidence counts range from 60 PMP (Ukraine) up to over 300 PMP (Cyprus). There are also minor albeit indispensable differences in different regions of the same country (e.g. 198 PMP in the French-speaking part of Belgium and only 174 PMP in the Flemish-speaking part; different incidence is likewise seen in different parts of UK – Northern Ireland – 106, Scotland – 115, England – 126, and Wales 136 PMP). Czech Republic is with its 151 PMP in the middle. It is not quite clear to which factors those quite high differences could be attributed, assuming that all countries capture all cases of kidney failure requiring regular dialysis treatment and have at least by and large the same methodology in kidney failure incidence classification. Also differences in geographical lay-out of countries do not elucidate those high and low incidence figures. Only in case of figures well below 100 PMP, one could speculate about insufficient capture of kidney failure cases in some countries. Such suspicion appears supported by the experience the Czech dialysis centres treating Ukrainian patients have made – age of those patients has been on average significantly lower than that of the Czech dialysis population.

3.3. Prevalence

Graph 11 Evolution of the prevalent KRT patient count in the CR during the 2006 - 2024 period, sorted by treatment modality



The plot is based on the same patient cohort as that one used for statistics by health insurance companies and is sorted by treatment modality – HD, PD and as of 2021 also home HD (HHD). The modality category HD includes both the patients treated by conventional haemodialysis as well as those on on-line haemodiafiltration. The plot displays prevalent patient counts over the period 2006 – 2024. Until the year 2018, there was a slow yet significant increase in prevalent count. However, during the following 4 years (2019 – 2022) the count was steadily decreasing. Change in the prevalent count in any year is always given by the sum of transplantation activity and mortality (decreasing the count as compared to the previous year) and incidence (increasing the prevalent count). The decrease in the years 2019 - 2022 was, however, not caused by increased incidence or by decreased transplantation activity either. The reason was significant increase of the mortality rate itself during the Covid period. It can be seen also in the table on mortality evolution as well as on the graph in the Mortality block. As of the year 2021, a newly introduced dialysis treatment modality – home HD – has started to be displayed as part of the prevalent count.

Table 2 Prevalent patient counts during 2020 – 2024, sorted by gender and age

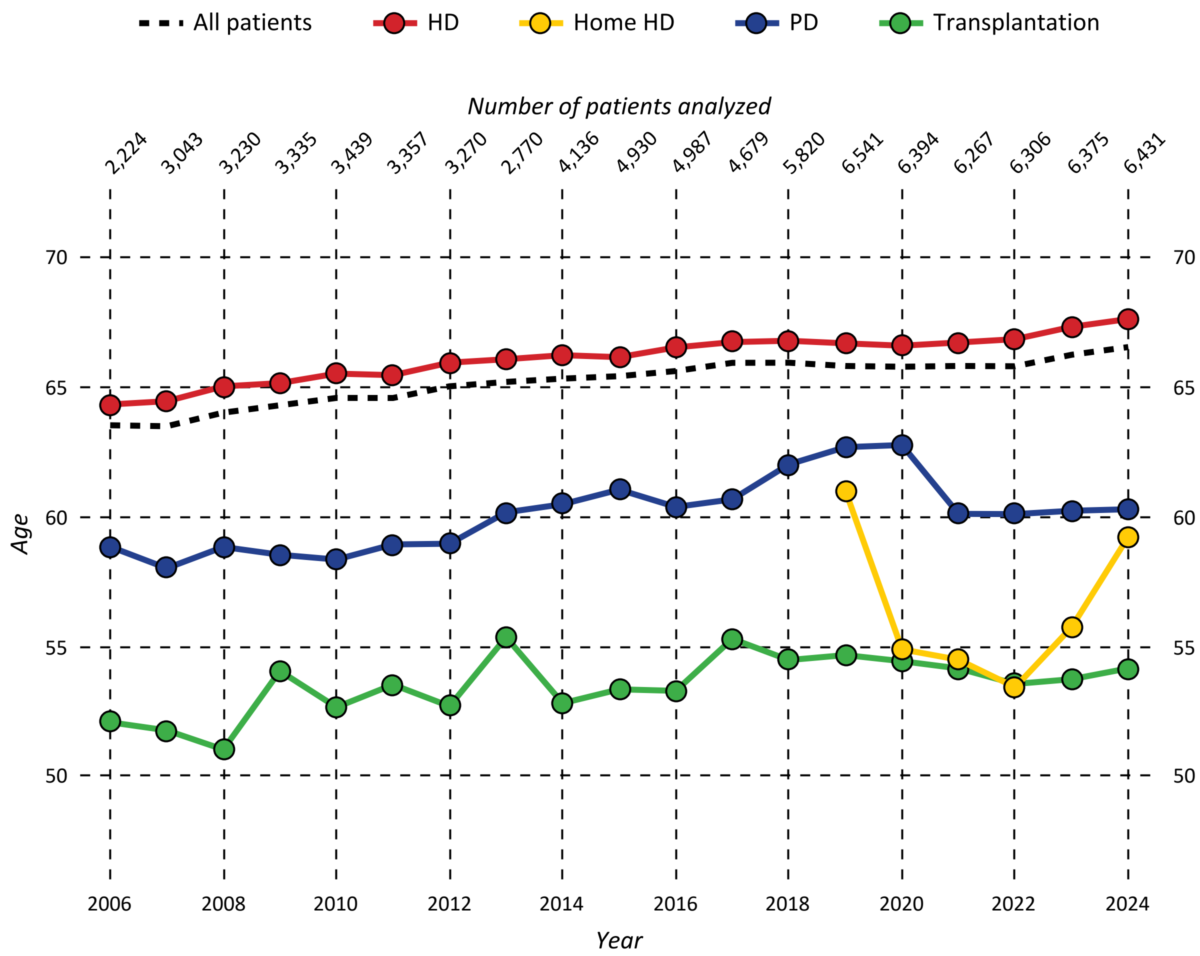
Age category		Patient count (abs.)					Patient count (PMARP)				
		2020	2021	2022	2023	2024	2020	2021	2022	2023	2024
0 - 19 years	Males	7	8	7	7	8	6	7	6	6	7
	Females	1	0	2	2	2	1	0	2	2	2
	All	8	8	9	9	10	4	4	4	4	4
20 - 44 years	Males	262	263	265	259	245	147	155	155	154	147
	Females	159	169	165	162	177	95	107	101	100	111
	All	421	432	430	421	422	122	132	128	127	129
45 - 64 years	Males	1167	1196	1132	1130	1159	807	825	760	743	748
	Females	546	535	545	511	506	384	377	370	339	330
	All	1713	1731	1677	1641	1665	597	603	566	542	540
65 - 74 years	Males	1303	1250	1230	1205	1203	2219	2156	2135	2113	2140
	Females	741	714	684	659	601	1049	1027	992	970	904
	All	2044	1964	1914	1864	1804	1580	1541	1512	1492	1470
≥ 75 years	Males	928	960	1021	1153	1214	2880	2883	2891	3094	3112
	Females	813	826	834	856	906	1499	1472	1416	1392	1418
	All	1741	1786	1855	2009	2120	2013	1997	1969	2034	2060
All	Males	3667	3677	3655	3754	3829	695	709	689	703	715
	Females	2260	2244	2230	2190	2192	416	421	404	394	395
	All	5927	5921	5885	5944	6021	554	563	544	545	552

Tab. 2 gives prevalent counts of patients on regular dialysis treatment during the last 5 years period (2020 – 2024), sorted by gender and age. Each age category has the same range as the corresponding category used in annual reports of the ERA Registry. Column in the left part of Tab. 2 give absolute values of the prevalent counts while those in the right columns give the prevalence values expressed as PMARP. The Table includes all patients with at least one valid record in the given year containing information on patient´s age in the RDP database, regardless of the quarter of the year, and were alive in the 4th quarter reporting.

Prevalent count increases with increasing age category both in males and females and reaches its highest value in the age category 65 - 74 years. In the category of 75 years and more, there is already a small decrease.

During the evaluated 5-years period, the prevalent counts in individual age categories exhibit just minor fluctuations without any apparent decreasing or increasing trend either. It suggests well stabilized situation in capturing cases of kidney failure as well as in the extent of regular dialysis treatment or KRT in general.

Graph 12 Evolution of the mean age in KRT population in 2006 - 2024

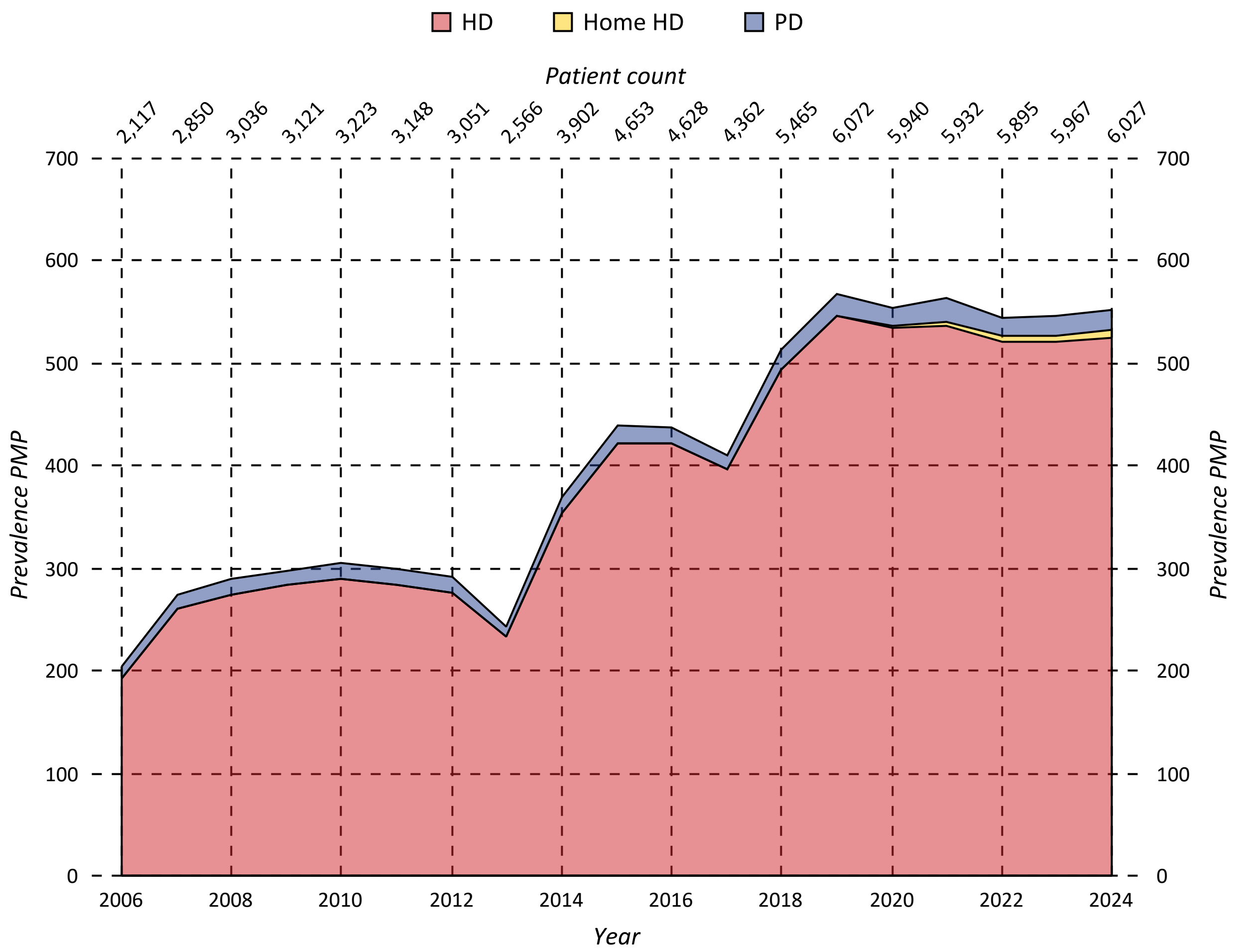


Graph 12 shows evolution of average age of prevalent patients on KRT over the last two decades (2006 - 2024) sorted according to the treatment modality. Included in this analysis are all patients registered in the RDP database, whose age has been given in at least one of the quarterly reportings in the respective year. It has not been fulfilled for all patients in the RDP database. Counts of those patients whose age has been recorded in the database are given in the line on the top of the graph. The age is always taken at the end of the year and also the treatment modality the patient was on reported in the 4th quarter of the year was considered.

The HD modality covers both patients on HD and those on on-line HDF. Patients´ average age in that category exhibits slow yet persisting increase over the years. Higher fluctuation in average age of the PD patients as compared to the HD ones can be attributed to their generally low counts. Generally, average age of the PD patients is by about 3 years lower than in the HD category. The analysis includes also patients transplanted in the respective year. Quite interesting is the long-term stability of average age of the transplanted patients over the entire evaluated time period.

A new treatment modality has appeared 3 years ago – home haemodialysis (HHD). Nation-wide count of patient treated by this modality is still rather low, about 1.5 % of the entire dialyzed population at the end of 2024.

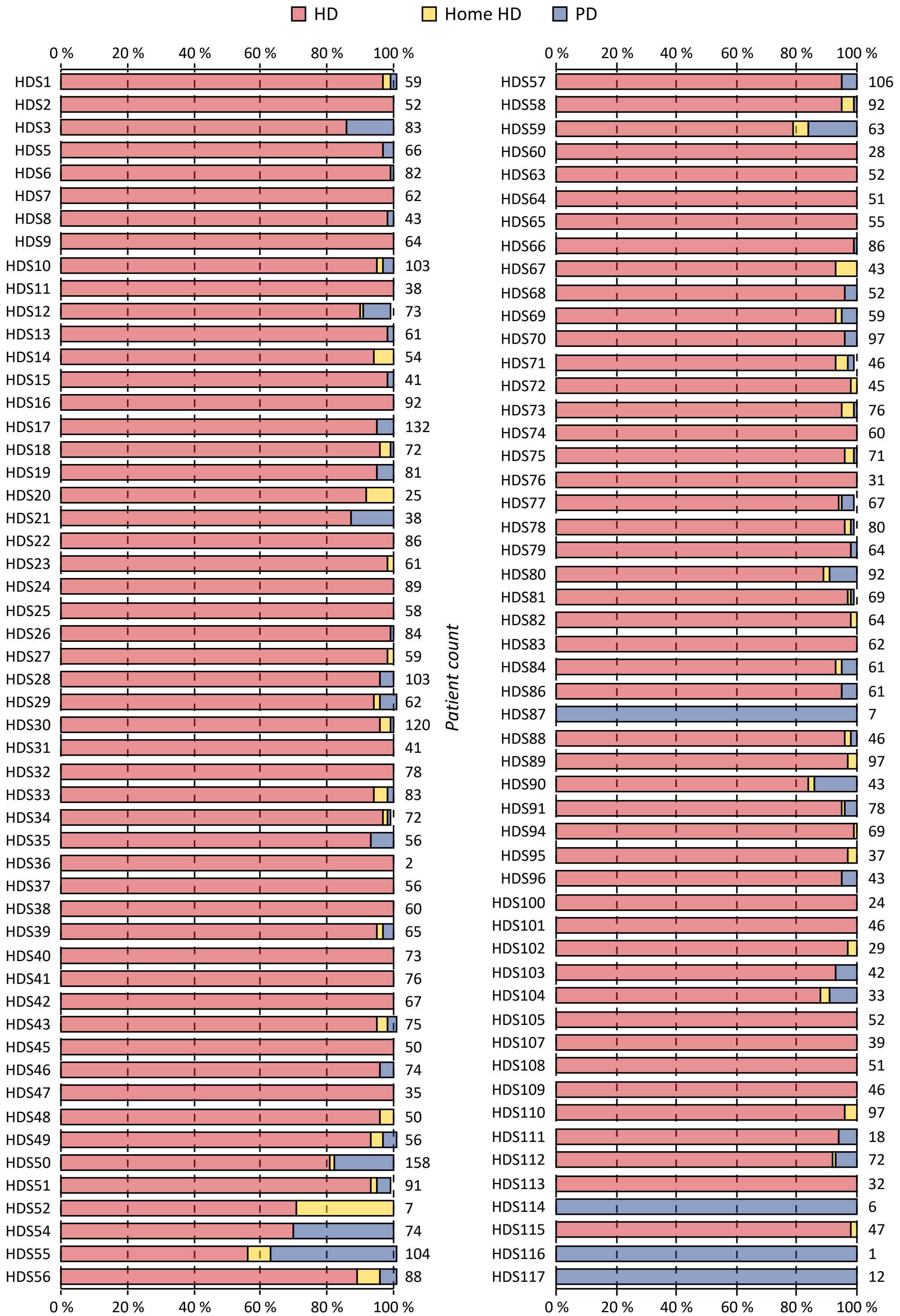
Graph 13 Evolution of prevalent dialysis patient counts during 2006 - 2024



Graph 13 documents evolution in prevalent counts of patients on regular dialysis treatment given in PMP over the last two decades (2006 - 2024), sorted by treatment modality. Included in the analysis are all patients whose treatment modality was specified in at least one quarter reporting of the respective year. This was not the case in all patients registered in the RDP database. Counts of those whose treatment modality was known are given in the top line of the plot. There are two parts of the evaluated time period where the prevalent counts significantly grew up – 2006 - 2007 and 2013 - 2019. The period of "Covid years" was characterized by stagnant or even slightly decreasing counts because of higher mortality at that time. High transplant activity surprisingly remained preserved in those years. The prevalent count is divided into only two principal modalities in kidney replacement therapy – haemodialysis HD (includes patients on both HD and HDF) and peritoneal dialysis PD.

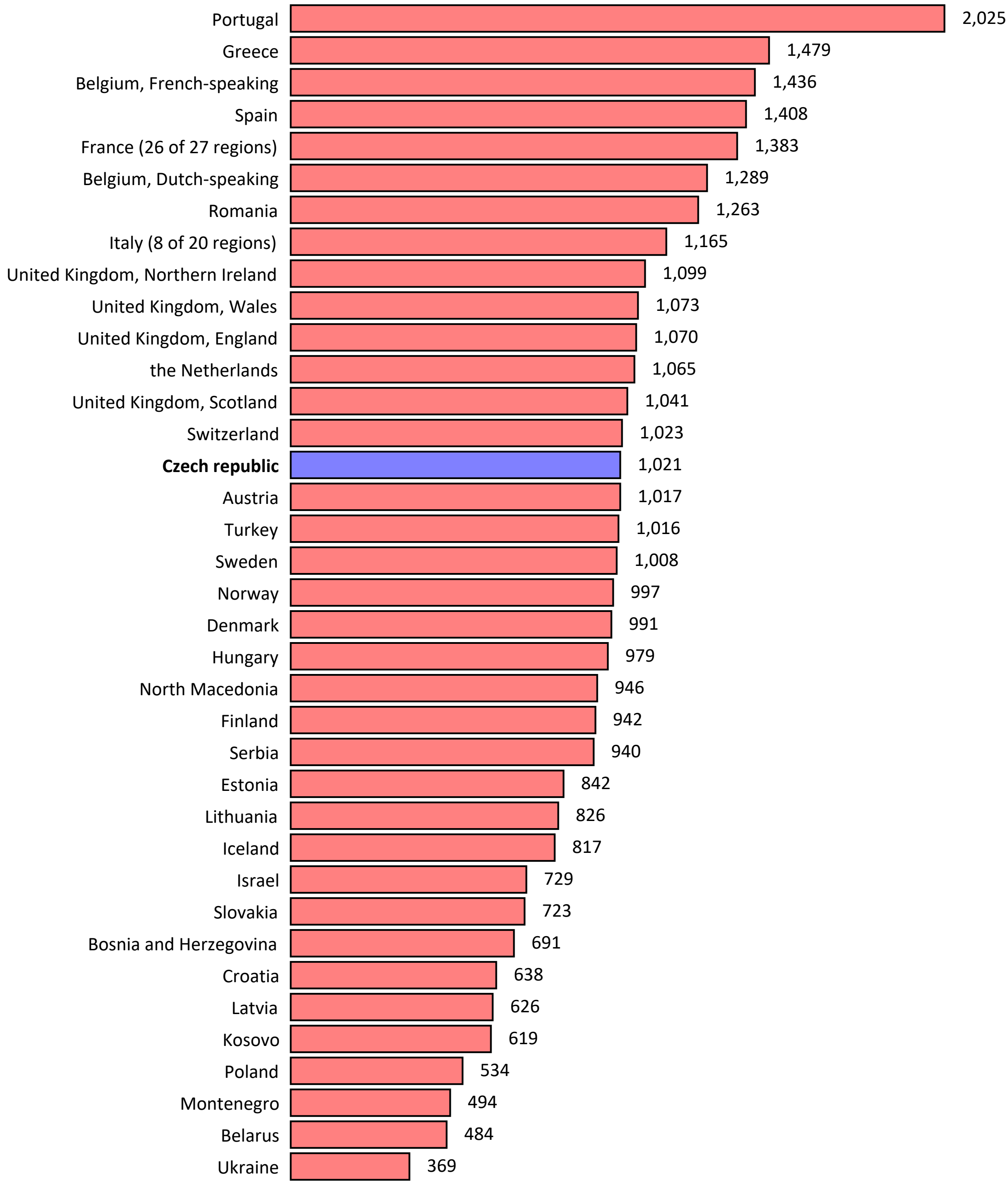
The portion of patients on PD is apparently very minor in the CR – mostly a few per cent only over the entire investigated period. A new modality appears in the last 3 years – home haemodialysis HHD. Whole-country prevalent count has represented just about 1.5 % of total dialyzed patient population, its share, however, exhibits slow increase.

Graph 14 Distribution of different regular dialysis treatment modalities in individual DCs at the end of 2024



The graph displays percentage of different dialysis treatment modalities at all 114 existing dialysis centres (DC) at the end of 2024– haemodialysis HD (included here is both the conventional haemodialysis as well as the on-line haemodiafiltration HDF, currently the most widely used modality in the Czech Republic), peritoneal dialysis PD (without distinguishing shares of the manually performed CAPD and automated APD done with a cycler) and newly introduced home haemodialysis HHD. The plot is based on data of all prevalent patients who have at least one active record in the RDP database in 2024 (regardless of the quarter of reporting). The modality reported was the one given in the 4th quarter report. Patient count included in the analysis in this way is given on the right side of the bar chart. Prevailing modality on most DC was haemodialysis (HD plus HDF), in 14 DCs, HD was even the only modality offered (not shown in the plot). On the contrary, only peritoneal dialysis was being offered by 4 DCs (DC 87, 114, 116 and 117). In centres offering both HD and PD, PD was used in just a few per cent of prevalent patients. Quite interesting data have been collected on the newly introduced home HD (besides the HHD done truly in patient homes, also treatment provided anywhere outside dialysis centre, e.g. in rest houses or hospices is included here). Although the beginning of the second wave of HHD dates back to 2020 only (in the first wave in the 80-ies and 90-ies, HHD was being offered by two Czech DS only, both based in Prague – Strahov DC with about 20 patients and Homolka DC with 2 patients), there have been already 37 centres in 2024 which offered HHD to a few of their patients. Exceptional were two centres with much higher share of HHD – DC20 had about 10 % of their patients on HHD and DC52 used it even in 5 out of their 8 patients in total in 2024.

Graph 15 Prevalent count of patiens on KRT (PMP) in different European countries and regions in 2022



The graph displays prevalent counts of patients on KRT, i.e. both the dialyzed patients and patients living with a functioning kidney transplant, in 37 European countries and regions in 2022. Similarly to incidence, also the prevalent counts are given in PMP for easy comparison. Also here, the data used in the graph is taken from the annual ERA Registry report. The counts in different countries (also in different regions of the same country – e.g. Belgium) differ widely – they range from 500 PMP up to more than 2000 PMP (Portugal). The Czech Republic ranks 15 on this list. When using the prevalent count as an KRT assessment tool, one has to realize that the figure in anyone country reflects dynamic balance between incidence of kidney failure (increasing the prevalent counts) and transplantation activity and mortality (both decreasing the prevalent counts). The count thus cannot be perceived as an ultimate marker of "the state of the art" of the KRT programme in the country.
Per se it does not say anything about general accessibility of dialysis and/or transplantation. In fact, it is the general access to dialysis and/or transplantation, which would be the right marker to provide clear evidence of status and trends in kidney failure treatment in anyone country. However, data on this marker are not specifically collected by any registry.

Table 3 Changes in patient status/treatment modality in the CR in 2024

Initial modality	N	→	Status at end	N
HD	5,684	→	HD	4,425
			Home HD	20
			PD	10
			Transplantation	241
			Exitus	748
			Lost from followup	207
			Treatment denial	11
			Renal recovery	22
Home HD	69	→	HD	5
			Home HD	43
			PD	1
			Transplantation	8
			Exitus	8
			Lost from followup	4
PD	216	→	HD	26
			Home HD	3
			PD	132
			Transplantation	33
			Exitus	9
			Lost from followup	12
			Renal recovery	1
HD	1,479	→	HD	1,190
			Home HD	7
			PD	8
			Transplantation	28
			Exitus	67
			Lost from followup	167
			Renal recovery	12
PD	63	→	HD	9
			PD	46
			Transplantation	5
			Lost from followup	3
Transplantation	2	→	Lost from followup	2

=

HD	5,655
Home HD	73
PD	197
Transplantation	315
Exitus	832
Lost from followup	395
Treatment denial	11
Renal recovery	35

A set of patients for whom we have at least one periodic record for the given and the previous year + incident patients in the given year.

Tab. 3 provides an overview information on changes in patient status during the year 2024. It is vertically divided into two parts. Patients registered in the RDP database already at the beginning of 2024 (prevalent) are in the upper part, the lower one contains data on the patients newly registered during 2024 only (incident). Both parts are further divided into two principal groups – HD and PD. In the upper part, there is also a small new cohort of home haemodialysis (HHD) patients. The table evaluates in its both parts the following changes in patient status during 2024:

- Change in the treatment modality (HD, PD, HHD)
- Transplantation
- Exitus
- Lost follow-up
- Denial of further treatment (from the patient´s side)
- Renal recovery (recovery of kidney function)

Analysis of the patient status changes during the year reveals interesting findings potentially exploitable in planning and management of different treatment modalities in KRT:

Change from HD to PD is quite scant both in the prevalent and incident patients (half per cent or less).

Change from PD to HD is already significant – nearly 12 % in the permanent cohort and over 14 % in the incident one. It documents how expedient it is to have both HD and PD available in anyone dialysis provider.

Interesting is the high preservation of PD modality in incident patients – once PD is instituted in a patient as the first modality, over 60 % of patients stay on it.

Two thirds of patients originally on HHD (17 from 51) have stayed with it throughout the year, one third has changed their treatment modality, mostly to hospital HD (17.6 %) and to transplantation (11.8 %).

Percentage of death from the prevalent count has been more than double in the HD group compared to PD (14.6 vs. 6.86 %). It corresponds with the data in the mortality graph 16.

The “Lost follow-up” change is widely due to transplantations because follow-up the transplanted patients is often taken over by the transplantation department which has performed transplantation and the patient thus stops attending his/her mother dialysis centre.

Stopping the treatment upon patient´s wish (“Denial”), in some countries already significant factor affecting prevalent counts, is currently rather low in the CR (about 0.25 %) and is seen just in the HD group.

Spontaneous recovery of kidney function which enabled to stop dialysis was seen in a few tenths of per cent of the prevalent count. However, in the incident group, it has been more that 1 %. Whatever small those figures may appear, they certainly justify regular check-ups of patients´ residual kidney function after he/she is put on dialysis.

3.4. Mortality

Table 4 Mortality rate sorted by age and gender in 2015 - 2024

Age category		Percent of deceased patients									
		2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
0 - 19 years	Males	0%	0%	0%	0%	0%	0%	11%	11%	9%	0%
	Females	25%	0%	0%	0%	0%	50%	0%	0%	0%	0%
	All	25%	0%	0%	0%	0%	11%	11%	9%	8%	0%
20 - 44 years	Males	1%	1%	3%	2%	1%	3%	5%	3%	4%	2%
	Females	1%	3%	2%	3%	4%	3%	3%	3%	4%	1%
	All	1%	2%	3%	3%	2%	3%	4%	3%	4%	2%
45 - 64 years	Males	6%	7%	8%	6%	8%	11%	8%	9%	7%	6%
	Females	5%	6%	8%	8%	6%	8%	9%	8%	8%	7%
	All	6%	7%	8%	6%	7%	10%	9%	9%	8%	7%
65 - 74 years	Males	13%	14%	14%	13%	15%	18%	19%	14%	14%	13%
	Females	11%	9%	13%	11%	14%	16%	15%	12%	14%	12%
	All	12%	12%	14%	12%	15%	17%	18%	14%	14%	13%
≥ 75 years	Males	16%	21%	19%	19%	20%	27%	23%	21%	19%	19%
	Females	16%	17%	18%	18%	19%	23%	23%	20%	20%	17%
	All	16%	19%	19%	19%	20%	25%	23%	20%	19%	18%
Total	Males	11%	12%	12%	11%	13%	17%	16%	14%	13%	12%
	Females	11%	11%	13%	12%	13%	16%	16%	13%	15%	12%
	All	11%	12%	13%	12%	13%	17%	16%	14%	13%	12%
Deaths – absolute count		585	651	679	779	1000	1285	1178	989	977	883

The Table shows annual mortality among the patients on regular dialysis treatment during the last decade (2015 - 2024) sorted by gender and by age categories identical to those in the ERA Registry Annual reports. Included in this analysis are all patients registered in the RDP database, who had been dialyzed for at least 90 days, i.e. had at least one record in the RDP database prior to their death. The death rate is calculated as percentage of prevalent patient count in the respective year according to the formula:

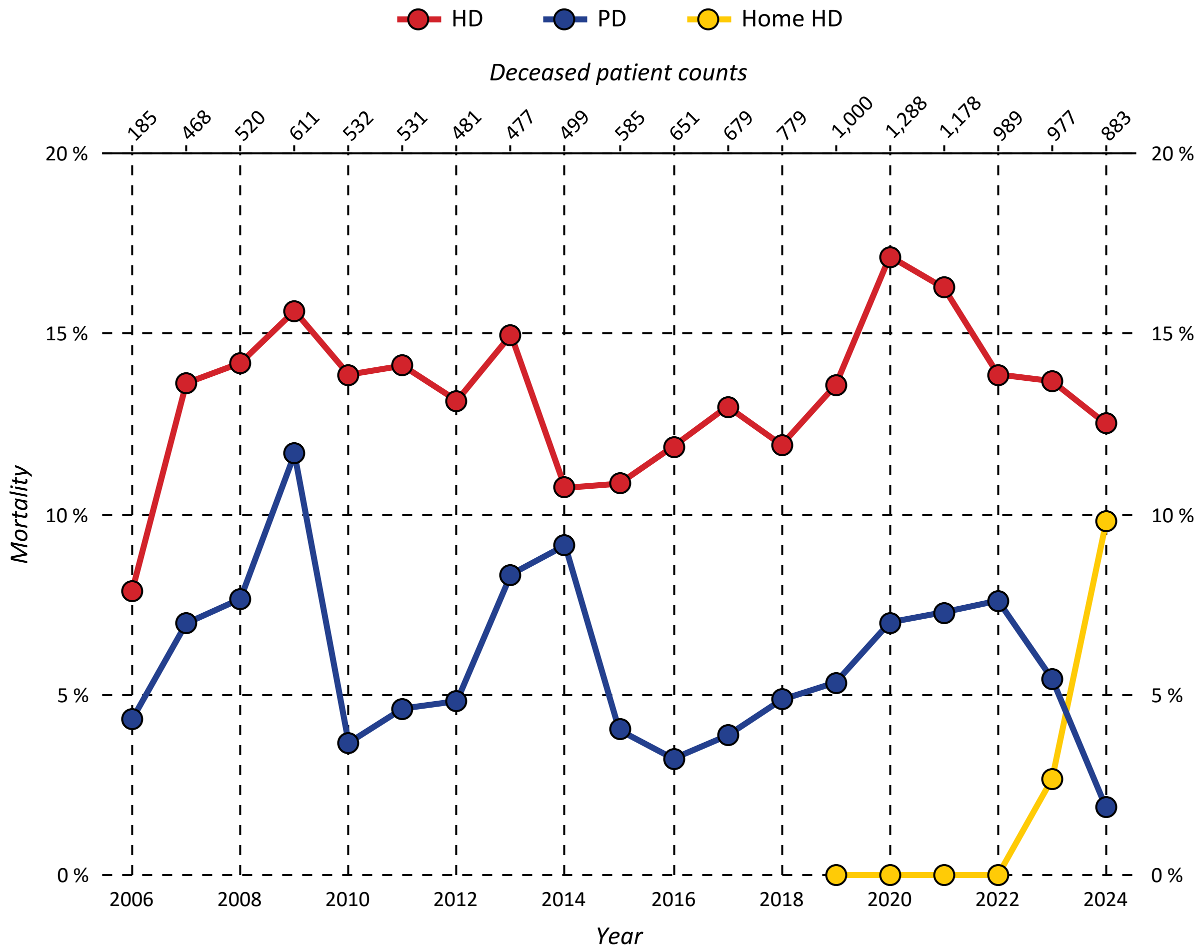
$$\text{Mortality rate} = \frac{\text{deceased}}{\text{surviving on dialysis on 31.12.} + \text{transplanted} + \text{deceased}} \times 100$$

At the bottom of the Table, there are also absolute deceased patients counts in each year.

Note: Some national registries express mortality per 1000 patient-years. Nevertheless, our approach expressing mortality as a simple percentage of the evaluated patient cohort gives the possibility of direct comparison of mortality of dialyzed patients with mortality in matched age category of the general population.

As expected, mortality increases with the age category both in males and females. However, mortality in each age category is usually by one to two percent points lower in females as compared to males. Both male and female cohort exhibited visible increase in mortality during the “Covid years” 2019 - 2022.

Graph 16 Mortality of dialyzed patients sorted by the treatment modality during 2006 - 2024



Graph 16 gives mortality rate as a percentage of the count of patients on regular dialysis treatment during the last two decades (2006 – 2024), sorted by treatment modality in 3 categories: haemodialysis HD (patients on both conventional HD and on-line HDF are included), peritoneal dialysis PD (without distinguishing patients on CAPD and automated APD with a cycler) and most recently added modality of home haemodialysis HHD (includes both patients dialyzed in their true homes as well as those dialyzed elsewhere outside regular dialysis centres – retirement homes and/or hospices). Mortality rate is expressed on the y axis as a percentage of deceased patients of the total prevalent patients count in the respective year (for calculation formula see the legend to Tab. 4). Absolute values of deceased patient counts in each year are given on the top line of the plot.

Included in this analysis had been all deceased patients who had at least one periodical record in the RDP database in the respective year and were on dialysis for at least 90 days.

Mortality rate during most years of the evaluated period was quite stable, around 15 % which corresponds to European average. Mortality rate in the PD cohort was roughly half of that of the HD cohort and its higher fluctuations can be attributed to generally low counts. Steep increase clearly visible during the “Covid years” (2019 - 2022) has started going down as of 2022. Home haemodialysis HHD has been introduced in the CR during the last three years only and mortality on this modality can thus not be reliably assessed with regard to still low patient counts.

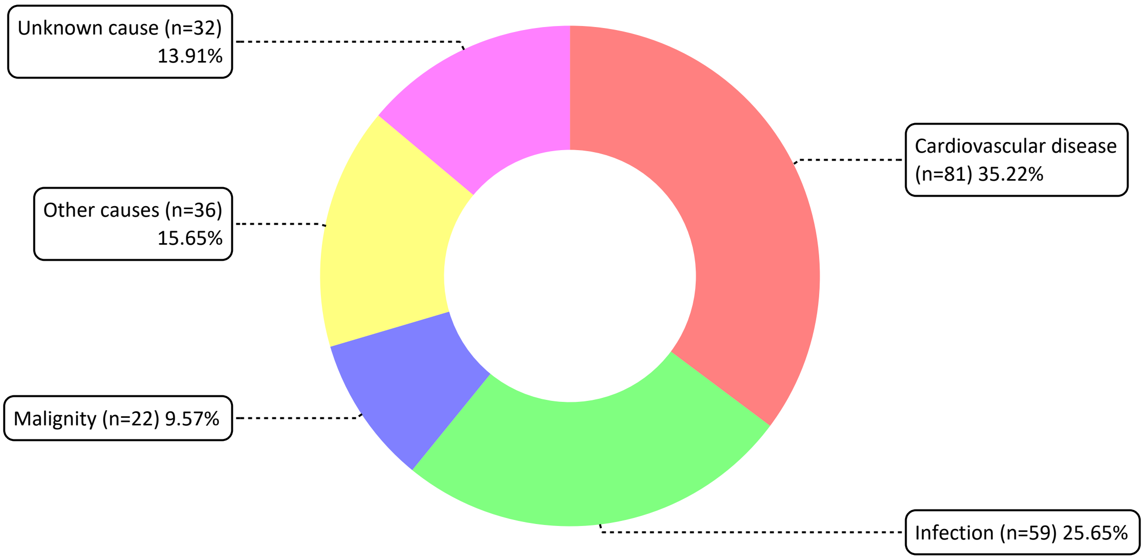
Table 5 Mortality of diabetics and non-diabetics on regular dialysis treatment during 2006 - 2024

Year	HD		PD		Deceased pat. count		All pat. count	
	DM	non-DM	DM	non-DM	HD	PD	HD	PD
2006	11 %	7 %	0 %	6 %	179	6	2272	139
2007	17 %	12 %	8 %	7 %	456	12	3345	172
2008	17 %	13 %	5 %	9 %	505	15	3559	196
2009	19 %	14 %	17 %	9 %	590	21	3774	180
2010	15 %	13 %	8 %	2 %	525	7	3786	191
2011	16 %	12 %	7 %	4 %	522	9	3698	195
2012	16 %	11 %	7 %	4 %	473	8	3598	166
2013	17 %	14 %	14 %	5 %	465	12	3106	144
2014	13 %	9 %	19 %	4 %	481	18	4483	197
2015	13 %	9 %	10 %	1 %	576	9	5311	224
2016	14 %	10 %	5 %	2 %	644	7	5421	217
2017	16 %	11 %	8 %	2 %	672	7	5175	181
2018	15 %	10 %	6 %	4 %	767	12	6435	247
2019	17 %	12 %	5 %	6 %	985	15	7254	281
2020	20 %	15 %	13 %	4 %	1270	18	7407	257
2021	20 %	14 %	14 %	5 %	1156	22	7105	302
2022	17 %	12 %	11 %	6 %	969	20	6985	263
2023	16 %	12 %	15 %	3 %	960	15	7014	276
2024	15 %	11 %	8 %	0 %	868	5	6945	269

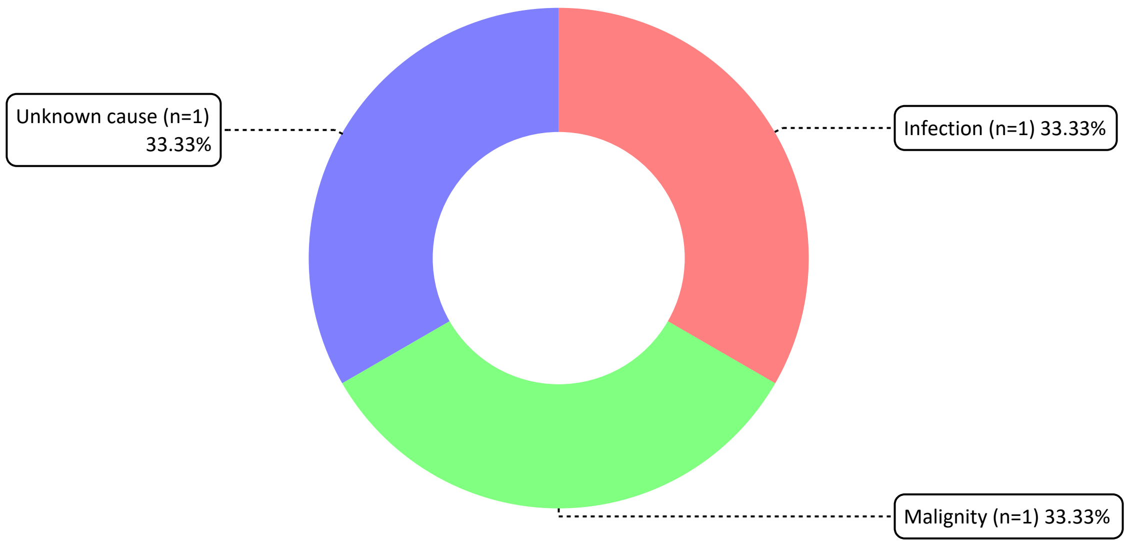
Tab. 5 shows mortality rate separately in diabetics and non-diabetics (again as a percentage of their prevalent counts) over the last two decades (2006 – 2024) both for the HD and PD patient cohorts. Included in this analysis were all patients who have had at least one periodic record in the RDP database during the year of their death and at the same time had survived on dialysis 90 days or more.

As expected, mortality in non-diabetics was by 4 to 5 per cent points lower than in diabetics during the whole evaluated period, which is a clinically highly relevant and statistically significant finding, as diabetics currently represent significant percentage of prevalent patient counts in most countries. In accordance with most national as well as international registries, mortality of HD patients is generally significantly higher than mortality in the PD cohort. However, in diabetics this difference is less pronounced than in non-diabetics.

Graph 17 Cause of death in HD patients in the CR in 2024 (N = 230)



Graph 18 Cause of death in PD patients in the CR in 2024 (N = 3)



The pair of circular graphs 17 and 18 shows percentages of the most frequent death causes in dialyzed population separately for HD and PD patients in 2024. The decisive data for any patient to be included in those graphs was specification of the death cause in the box “Exitus” in his/her record in the RDP database. Both plots, however, include only part of the entire cohort of deceased patients – those whose reporting records had a specified cause of death (including the specification “unknown cause”).

At the first glance, significantly higher percentage of death from cardiovascular reasons is seen in HD patients (over 36 %) compared to the PD cohort (20 %). Surprisingly small difference was found between both cohorts in death caused by infection (slightly below 29 % in HD patients and 28 % in PD patients). Malignity as the death cause has been relatively frequent in the HD cohort while it has not been seen at all in the PD cohort. Much higher percentage of “other causes” in PD patients (30 %) compared to HD patients (less than 16 %) has been found. One can speculate about existence of another death cause in the PD cohort not evaluated in Graph 18.

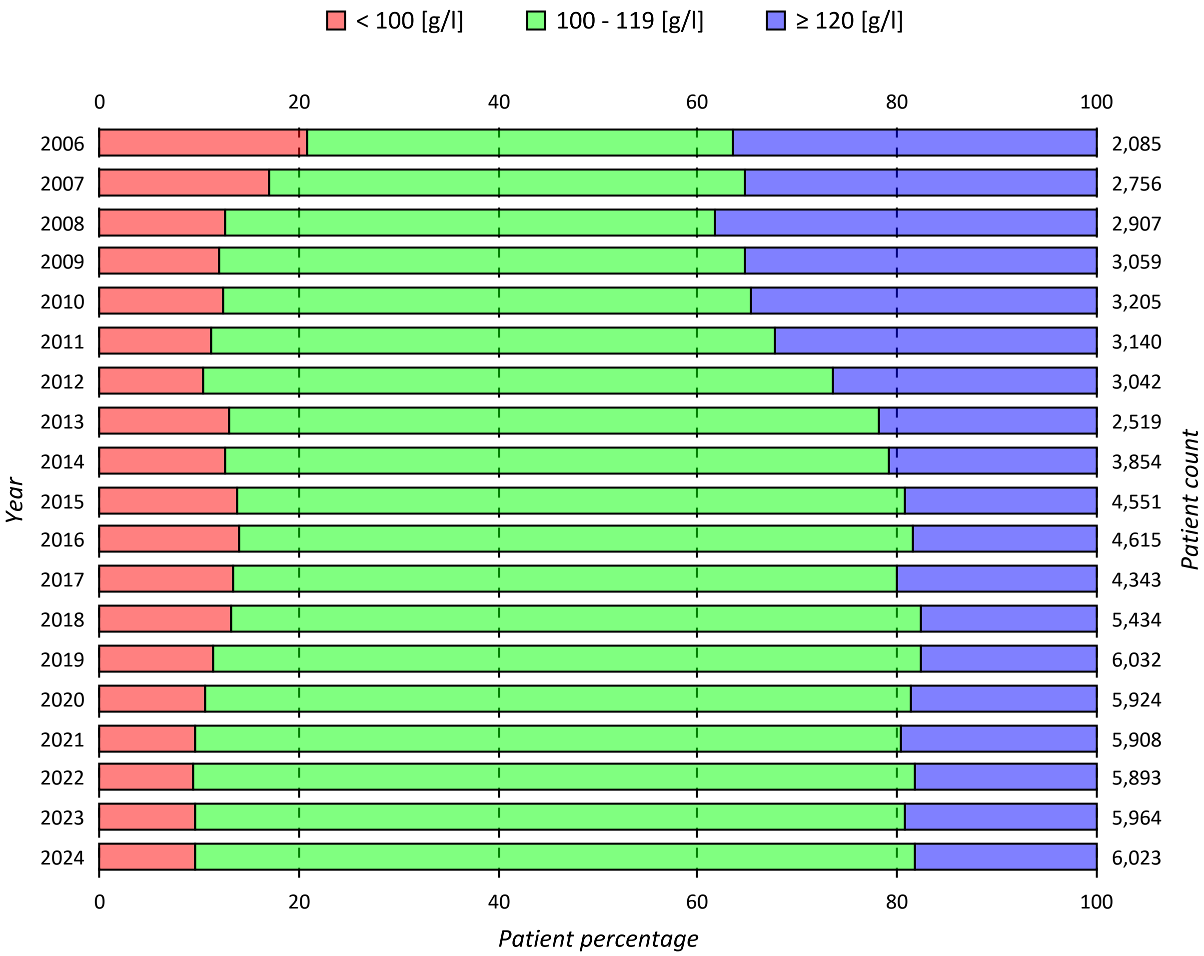
Significance of the differences in death causes distribution between the HD and PD cohort is, however, played down by rather low prevalent PD patient counts in each particular cause (absolute counts of deceased patients are given for each death cause next to its percentage on the side of each graph sector).

4. Selected markers of dialysis treatment quality

This part of the Report offers assessment of dialysis treatment quality by means of selected quality markers. First, the markers introduced in the inititative of the Czech health insurance companies “Monitoring quality of dialysis care” in 2019 are analyzed. The aim of that initiative was to instigate dialysis care providers to improve quality of provided care by awarding preferential (increased) reimbursement to those providers that would fulfil defined target values of selected markers in a defined percentage of their patients. The 4 chosen annually evaluated markers include patient haemoglobin, pre-dialysis serum phosphate, Kt/V value as a marker of dialysis efficiency and percentage of patients put by their DC on the waiting list or transplanted in the respective year. An additional part of this chapter analyzes issues of vascular access for extracorporeal haemopurification methods.

4.1. Treatment quality markers: Haemoglobin (Hb)

Graph 19 Whole-country distribution of haemoglobin (Hb) levels during the period 2006 - 2024

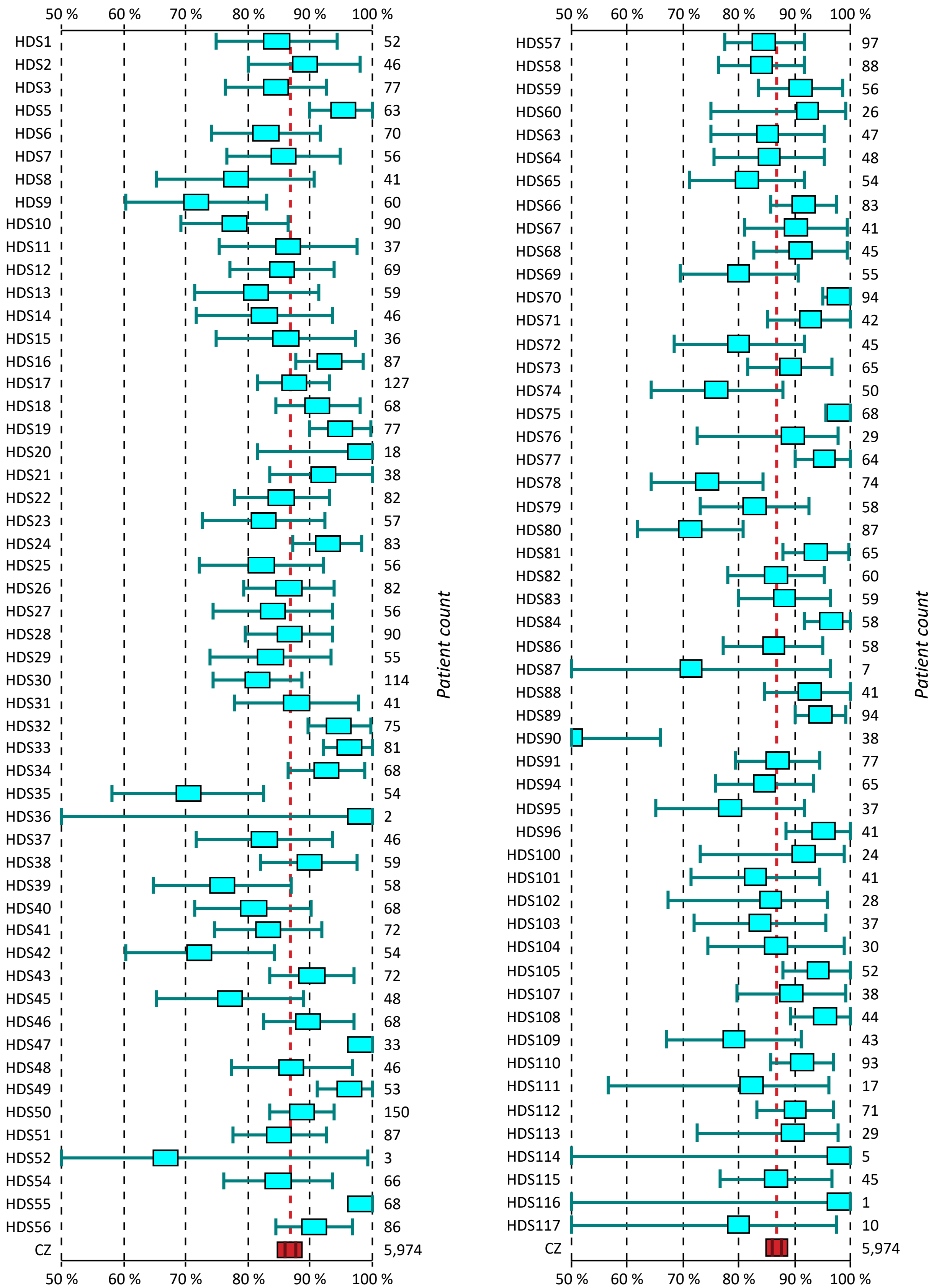


Anaemia is an important complication associated with chronic kidney disease requiring an adequate medicamentous treatment. Traditionally used marker of anaemia severity is patient´s haemoglobin level (Hb). Its target value in dialysis patients given in different national as well as international recommendations is, however, not entirely unambiguous. The insurance project "*Quality of dialysis treatment*" specifies the desirable Hb range by "> 100 g/l" and requires that it should be reached in at least 70 % of all patients of the respective dialysis provider.

The graph shows evolution of the whole-country distribution in three categories of the average Hb value (less than 100 g/l, 100 to 119 g/l, and 120 g/l or more) for the last two decades (2006 - 2024). For this analysis, Hb value of any particular patient was calculated as the mean from all his/her reports to the RDP database in each year. On the right side of the graph, total patient counts in each of the analyzed years are given.

The plot documents highly positive trend of constant improvement in attaining the above mentioned target Hb range over the entire evaluated period. Percentage of hypohaemoglobinemia (Hb below 100 g/l) has decreased from once often seen 15 - 20 % to current less than 10 %. At the same time, the high range (120 or more g/l) Hb incidence has decreased from previously seen 40 - 50 % to current less than 20 %. (It is generally accepted that too high Hb levels may contribute to hypertension and would also increase risk of coagulation). The current Hb target range (100 - 119 g/l) is nowadays fulfilled by more than 70 % of dialysis patients in the CR. The results as presented in the plot do not account for possible impact of treatment with ESA (Hb > 120 g/l without ESA prescription is also considered as appropriate).

Graph 20 Percentage of patient with their annual mean Hb value in the range 100 - 119 g/l in individual DCs in 2024

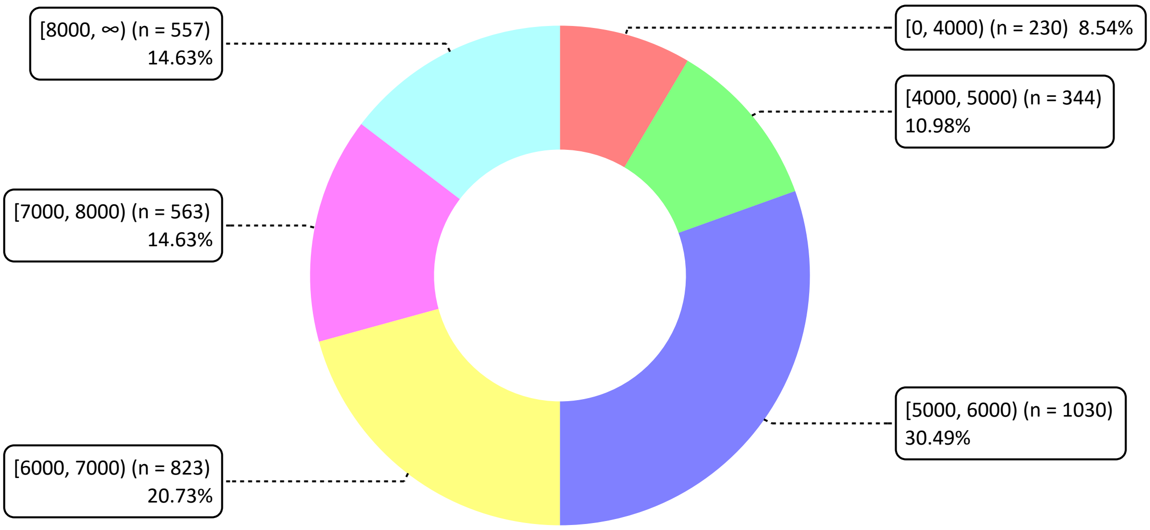


The national average is shown by the vertical red dashed line.

Graph 20 displays how was the health insurance requirement to reach the Hb target range in at least 70 % of the whole patient population in each of the 114 Czech dialysis centres fulfilled in 2024. The data used for the plot generation was taken from all patients with active status in the RDP database at the end of 2024. For each patient, his/her mean Hb value had been calculated from all his/her records during the year and then the percentage of patients who reached the target range 100 - 120 g/l was calculated. In any DC for patient counts lower than 30, the Clopper-Pearson confidence interval was evaluated, for larger cohort the normal distribution confidence interval was used. Total patients counts in each centre included in this analysis are given in the right column of both plot halves.

This merely confirms the findings in the whole-country mean Hb values plot 19 that most centres attain the target Hb range in more than 70 % of their patients.

Graph 21 Mean ESA dose [U/week/patient] in the CR in 2024(N = 3 547)



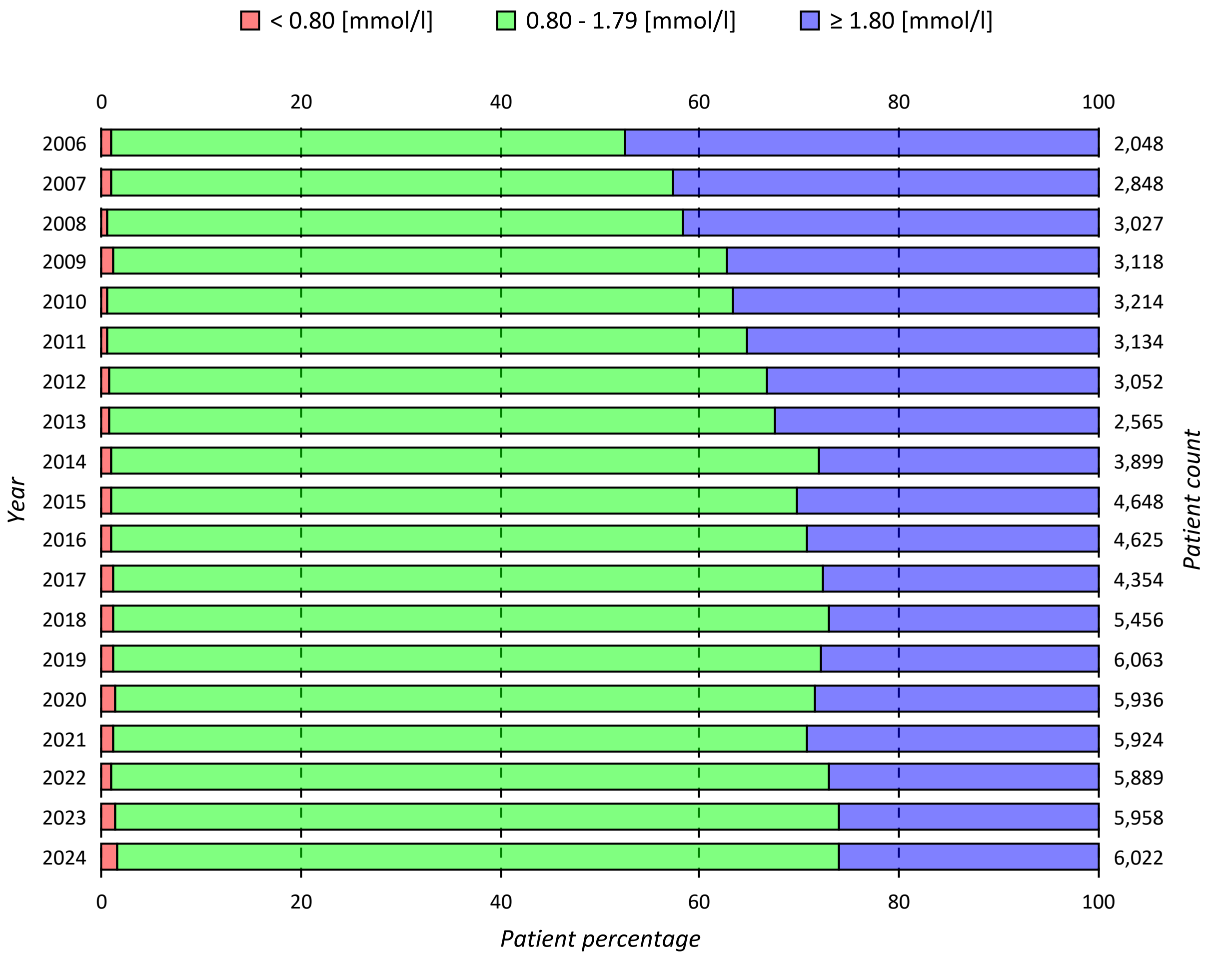
Principal pharmacological preparation in anaemia management is erythropoiesis stimulating agent (ESA) based on recombinant human erythropoietin (rhEPO). There are currently several such medicaments available on the market in the CR from different manufacturers under different trade names. Their application is often amended by Fe supplementation as needed. Biologic effect of all ESA preparations is given in units (U). One unit of the agent from any manufacturer ensures equivalent biological effect (see Jelkmann W:. Nephrol Dial Transpl 2009; 24:1366-1368). The weekly dose is usually within thousands U.

The circular graph displays percentages of total patient count with the ESA dose given in 6 ranges: 0 - 4000, 4000 - 5000, 5000 - 6000, 6000 - 7000, 7000 - 8000 and more than 8000 U/week/patient. Value for a particular patient included in the analysis has been calculated as a mean of all ESA doses registered in regular report in the RDP data base during the given year. Doses from the three lower dose categories have been used less frequently (about 10 % each), the following three categories application frequency is roughly equal (about 20 % in each category). Absolute patient counts receiving ESA in a particular category is given in the legend around the circular plot.

International recommendations on anaemia treatment in dialysis patients, such as EBPG or K/DOQI, include besides the recommended ESA doses also serum Fe (ferritin and transferrin) target values, at which ESA prescription should start. Adherence to those recommendations is, however, not assessed in this analysis in any way.

4.2. Treatment quality markers: Phosphate

Graph 22 Evolution of the whole-country pre-dialysis phosphatemia distribution during the 2006 - 2024 period



Management of phosphate balance is one of the most difficult tasks in dialysed patients, which – if not adequate – significantly increases morbidity and mortality. Recommended range of serum phosphate in the most often used American *K/DOQI guidelines for bone metabolism and disease* is 3.5 - 5.5 mg/dl, which in SI units corresponds to 1.13 - 1.79 mmol/l. Also the requirement of keeping pre-dialysis phosphatemia below 1.8 mmol/l in at least 50 % of all patients of anyone DC as given in the health insurance system of dialysis quality monitoring has been taken from the American document. Hower, no acceptable lower limit has been defined in the insurance system. In Graph 22, significantly lower level than that in the K/DOQI is used – only 0.8 mmol/l. Phosphatemia is sorted there in three categories – hypophosphatemia (< 0.8 mmol/l), normal range (0.8 - 1.8 mmol/l) and hyperphosphatemia (> 1.8 mmol/l). The plot displays percentage of the total patient count having their phosphatemia in each category over the period 2006 - 2024. The analysis includes all patients in the RDP database who have had their phosphatemia given in the report at the end of each year. As it may not be the case for all patients in a DC, true patient counts included is given in the right column of the plot.

Information emerging from the plot is entirely positive – patients counts with phosphate in the adequate range 0.8 - 1.8 mmol/l has increased from about 50 % to 70 % during the first decade of the evaluated period and essentially remained there throughout the second decade. It means that majority of the Czech DCs currently fulfils conditions of the insurance monitoring system. Percentage of hyperphosphatemia on the contrary dropped from the previously often seen 50 % down to current 25 - 30 %. One of possible reasons of this positive evolution has surely been the fact that most dialysis patients have already been dialyzed for longer time nearly exclusively on high-flux membranes, phosphate clearance of which is significantly higher than it was with low-flux materials. Unlike significant contribution of increased phosphate diffusibility in high-flux HD, massive change-over to haemodiafiltration (HDF) with increased convective component has brought only minor further increase in phosphate elimination. The reason is that phosphate as a small-molecular substance is eliminated primarily by diffusion. Hypophosphatemia incidence has been very minor throughout the evaluation period and does certainly not pose a significant problem of current haemoelimination treatment.

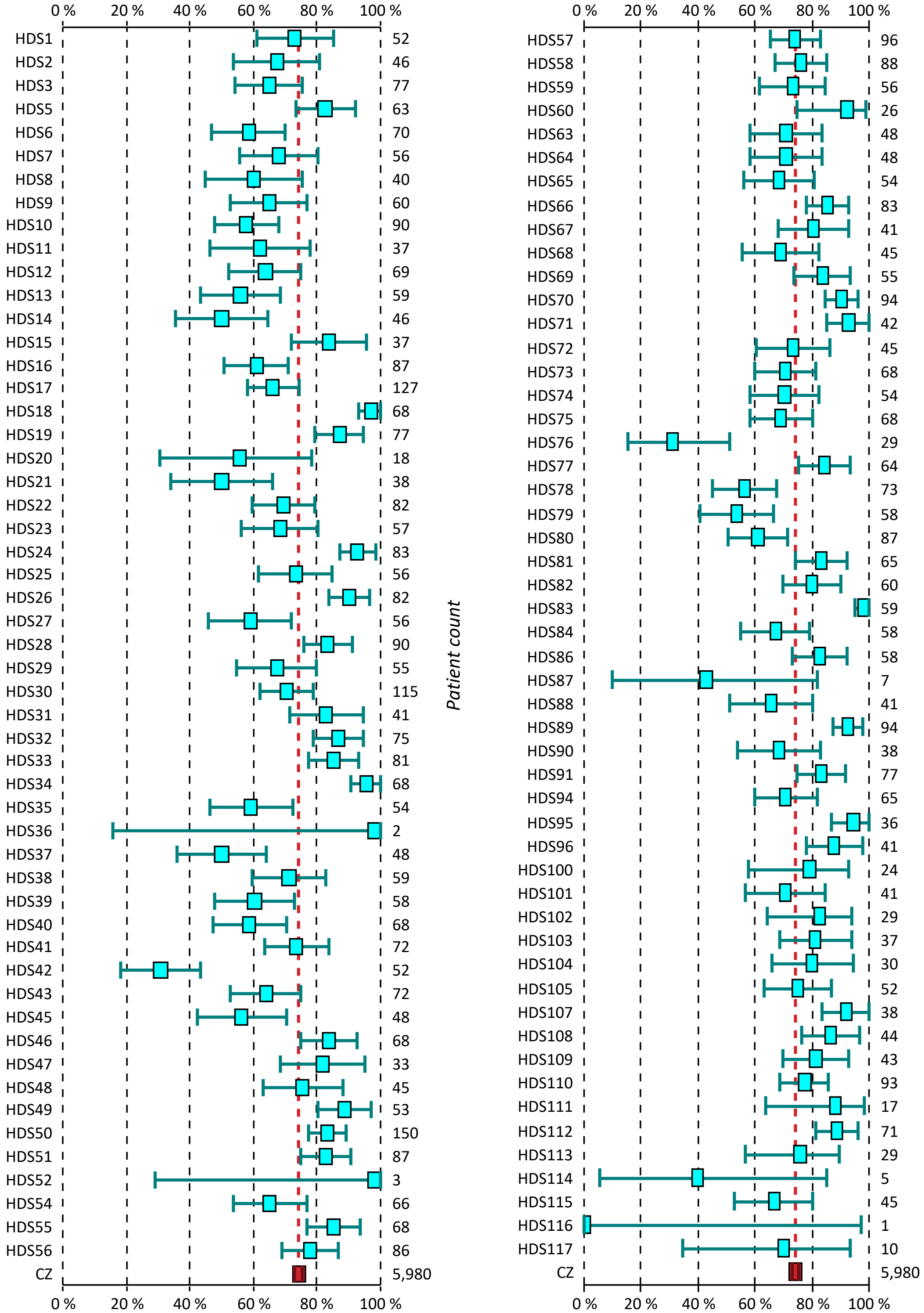
Table 6 Summary of Ca-P-PTH values distribution in 2024

Pi		Ca		PTH < 150	PTH 150 - 300	PTH > 300
Pi < 1.13	839 / 16.9 %	Ca < 2.1	173 / 3.5 %	83 / 1.7 %	68 / 1.4 %	22 / 0.4 %
		Ca 2.1 - 2.4	565 / 11.4 %	286 / 5.8 %	216 / 4.4 %	63 / 1.3 %
		Ca > 2.4	101 / 2.0 %	51 / 1.0 %	30 / 0.6 %	20 / 0.4 %
Pi 1.13 - 1.78	2,852 / 57.6 %	Ca < 2.1	477 / 9.6 %	163 / 3.3 %	194 / 3.9 %	120 / 2.4 %
		Ca 2.1 - 2.4	1,927 / 38.9 %	799 / 16.1 %	747 / 15.1 %	381 / 7.7 %
		Ca > 2.4	448 / 9.0 %	172 / 3.5 %	164 / 3.3 %	112 / 2.3 %
Pi > 1.78	1,261 / 25.5 %	Ca < 2.1	259 / 5.2 %	57 / 1.2 %	108 / 2.2 %	94 / 1.9 %
		Ca 2.1 - 2.4	722 / 14.6 %	253 / 5.1 %	231 / 4.7 %	238 / 4.8 %
		Ca > 2.4	280 / 5.7 %	110 / 2.2 %	86 / 1.7 %	84 / 1.7 %

The analysis was performed for 4952 patients based on data from 1/2024 to 4/2024.

Tab. 6 displays global distribution of reported values of the Ca-P-PTH metabolism from individual patients organized according to the range of each parameter. In 2024, those values were available from 4952 patients. Phosphate - the most important parameter – is given in the left column in 3 different ranges. Next to it, the column with reported Ca values is given, again organized in 3 different Ca ranges for each Phosphate range. And finally, in 3 top left columns, values of PTH are given, again sorted in 3 ranges for each Ca range. As can be seen from the table, normal range of all three parameters P, Ca and PTH was seen in 747 patients only, i.e. 15.1 % from the total patients count (this figure was 14.5 % in 2021). Interesting are also the values at the opposite part of the spectra – 83 patients, i.e. 1.7 % of their total count, had subnormal values of all 3 parameters, i.e. exhibited hypophosphataemia, hypocalcaemia and hypoparathyroidism (1.6 % in 2021) and 84 patients (1.7 %) had supraphysiological values of all three parameters (2.1 % in 2021).

Graph 23 Percentage of patiens with predialysis phosphate below 1.8 mmol/l in individual DCs in 2024



The national average is shown by the vertical red dashed line.

This plot further elaborates the analysis of fulfilling the requirement of health insurance re keeping mean pre-dialysis serum phosphate below 1.8 mmol/l on individual DCs of the entire 114 DCs cohort in the CR in 2024. Included from each DC are all patients with an active record from the fourth quarter of the year. The plot displays mean pre-dialysis phosphatemia in the respective DC calculated from average values of its individual patients. Besides the mean value also the lower and upper boundary values of confidence interval (95 %) are displayed. For a DC with patient count below 30, the Clopper-Pearson confidence interval was used while for counts above 30 it was the normal distribution confidence interval. Patient counts from each DC are given in the right column of both plot halves. Whole country percentage of patients with pre-dialysis phosphatemia below 1.8 mmol/l is indicated by the red dashed line.

Basically, the plot confirms conclusions shown on the previous Graph 22 regarding whole-country distribution of the three phosphatemia categories during the last two decades, namely of that "adequate" one (0.8 - 1.8 mmol/l). Out of the 114 DC included in the graph, merely 8 DCs do not fulfil the target range. Possible reasons for this highly positive situation have been discussed in detail in the commentary to Graph 22.

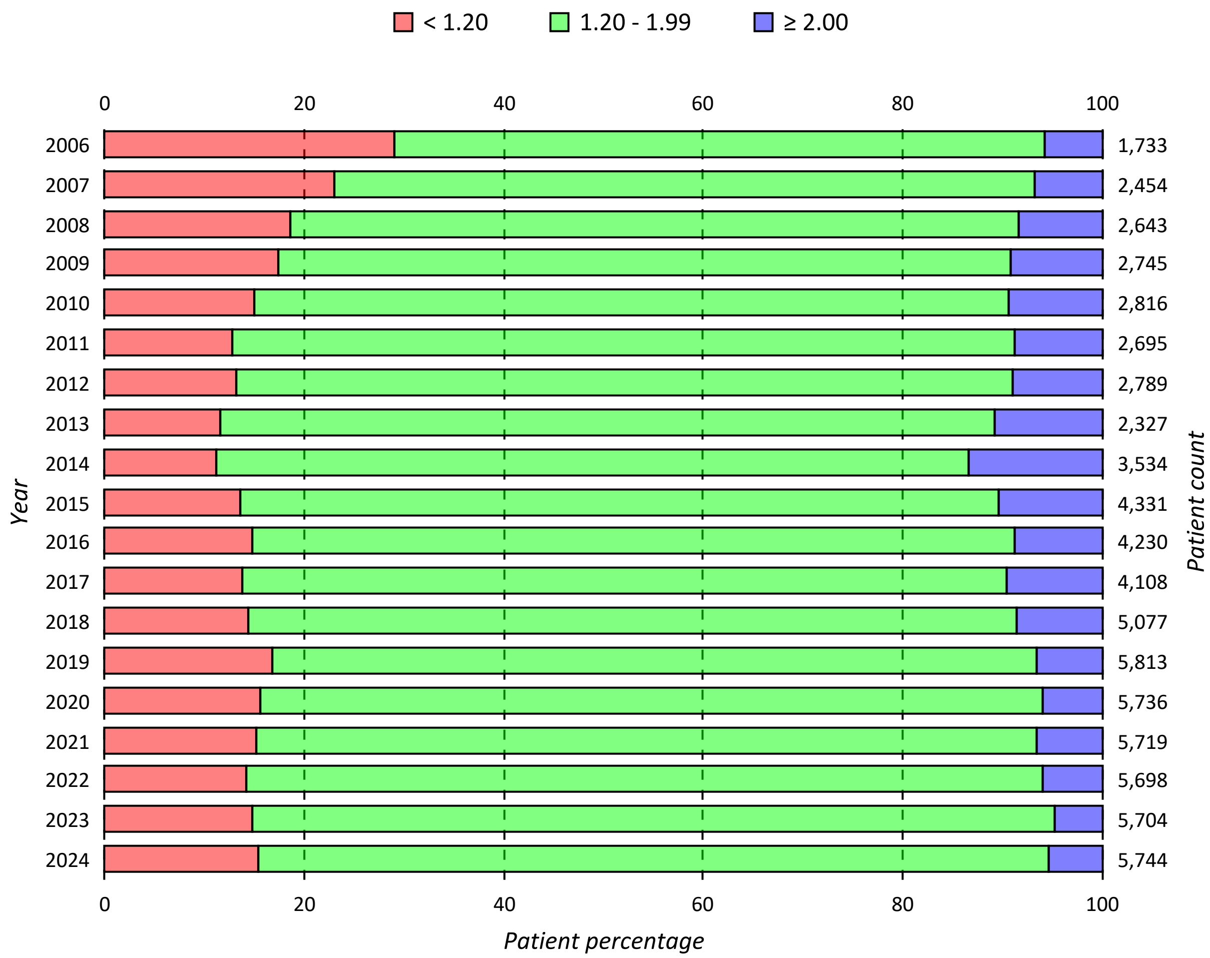
4.3. Dialysis efficiency markers: Kt/V

Since the period of the 80-ies in the 20th century, haemodialysis efficiency has been quantified by the so called relative cleared volume Kt/V, sometimes designated also as relative dialysis dose (volume of body fluids cleared from waste metabolites by dialysis related to patient´s total body water V). Eventually, simplified formulas for its calculation just from patient´s pre- and post-dialysis plasma urea levels and his/her post-dialysis body weight in a single HD session have been devised. Simpler formula calculates the so called single-pool Kt/V (spKt/V) which does not account for quick postdialysis urea rebound, the more complex one accounting for the rebound gives the equilibrated Kt/V (eKt/V). The eKt/V is always by about 0.2 lower that spKt/V. Target values for Kt/V in conventional thrice weekly dialysis schedule have been established in a multicentre international HEMO study and subsequently incorporated in the American K/DOQI guidelines (as spKt/V = 1.4) as well as in the European EBPG guidelines (as eKt/V = 1.2). The health insurance project *"Monitoring of haemodialysis treatment quality"* has included this marker and its target value into the assessment quartet and required that to obtain premium reimbursement, the eKt/V must be 1.2 or higher in at least 70 % of patient count in the assessed DC.

Note: Under the "Kt/V value" the insurance project understands the eKt/V, although it is not explicitely said in insurance document and in any other documents related to it.

There is a potential problem associated with the above Kt/V determination. It is the home haemodialysis (HHD), which is now being newly introduced mostly in so called frequent schedule (4-7 HD sessions a week) with shortened session time of about 2 - 3 hours. It is, however, not possible to reach a single session Kt/V = 1.2 with this schedule despite the fact that the frequent schedule provides with no doubt higher quality treatment than the conventional thrice weekly HD. Should a DC have more patients on that treatment modality, it could deprive it of possible premium reimbursement because of not reaching the target Kt/V in sufficiently high patient percentage. This dilemma has been *ad iterim* solved by a compromise – the insurance companies agreed in 2023 to consider any patient on the frequent HHD as having the adequate single session Kt/V regardless of its true value. Nevertheless as of 2024, the RDP database has introduced the whole-week adequacy marker, the so-called standard Kt/V (stdKt/V) applicable for any dialysis regime regardless of the number of sessions per week. The centers should strive for stdKt/V > 2.1 with target value being 2.3.

Graph 24 Evolution in whole-country mean Kt/V distribution during 2006 - 2024



Graph 24 shows evolution in distribution of the whole-country mean Kt/V divided in three categories over the last two decades: insufficient value (< 1.2), adequate (1.2 – 1.99) and „suspicious“ values (> 2.0). From each prevalent patient his/her average eKt/V value over the whole evaluated year was used. In the left column of the graph, there are absolute patient counts included in the analysis of the given year.

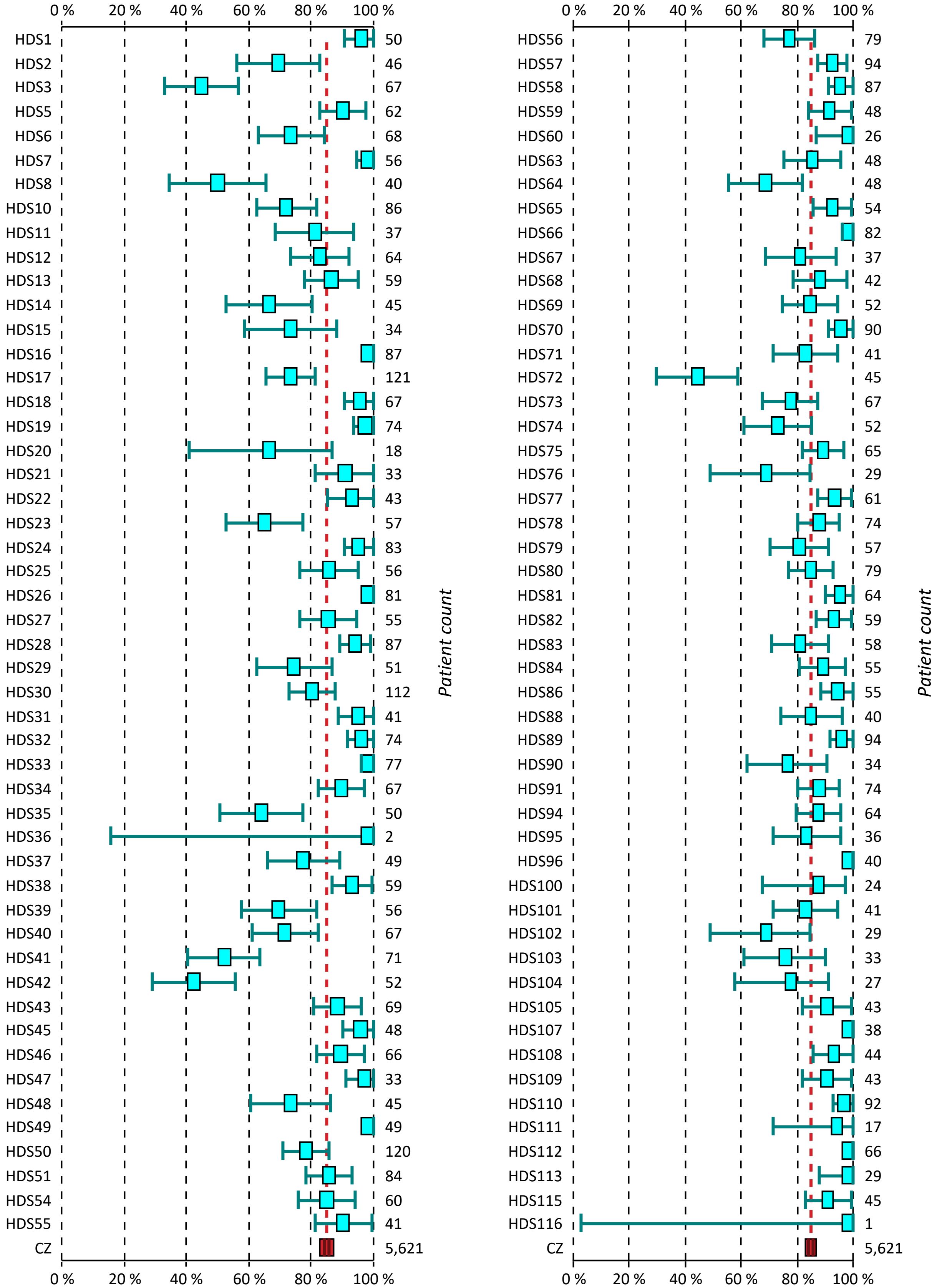
While the boundary between insufficient and adequate Kt/V is set in concordance with the EBPG document, the boundary between its adequate and "suspicious" value was chosen empirically, from practical experience:

- Kt/V over 2.0 can be obtained with well done dialysis (high extracorporeal blood flow QB and large dialyzer surface area) in small patients only (low value of total body water V). And the HEMO study has shown that Kt/V above 1.7 already does not bring any further clinical improvement in dialysis treatment results.

- Second, clearly undesirable cause of too high Kt/V may be recirculation in vascular access resulting from too high QB in relation to the access blood flow itself. In this condition, urea concentration in the arterial [illegible] of already cleaned blood being returned from the dialyzer back in the access. Unrealistically low urea in the blood sample taken at the HD end will then result in falsely elevated Kt/V. This phenomenon may be further augmented by disregarding the rule to decrease the extracorporeal blood flow to 50 - 100 ml/min during the post-HD blood sampling, which – once respected – would suppress or exclude negative impact of recirculation. Note: Use of Kt/V values obtained from the on-line Kt/V measuring systems should better be avoided. While conductometric sytems account for recirculation and give correctly lowered values, spectrofotometric systems give falsely high Kt/V in case of recirculation in vascular acces or an infusion administered during HD (see Ross, Clin Kidney J 2018; 11(3):394-399).

While the percentage of adequate Kt/V had been achieved in 60 - 65 % of all prevalent patients only in the first decade of the evaluated period, it started growing during the first half of the second decade and now it is being steadily kept at 75 - 80 %. It seems reasonable to assume that this positive trend has been at least partly caused by introduction of the health insurance system of quality monitoring.

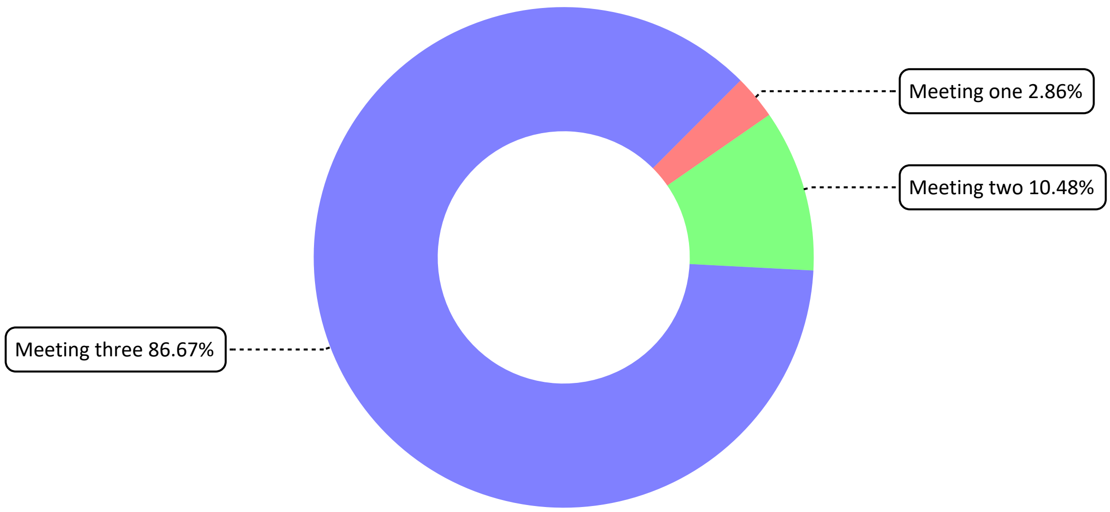
Graph 25 Percentage of prevalent patients fulfilling the requirement on Kt/V in individual DCs in 2024



The national average is shown by the vertical red dashed line. Displayed are data from reporting DCs (N=106)

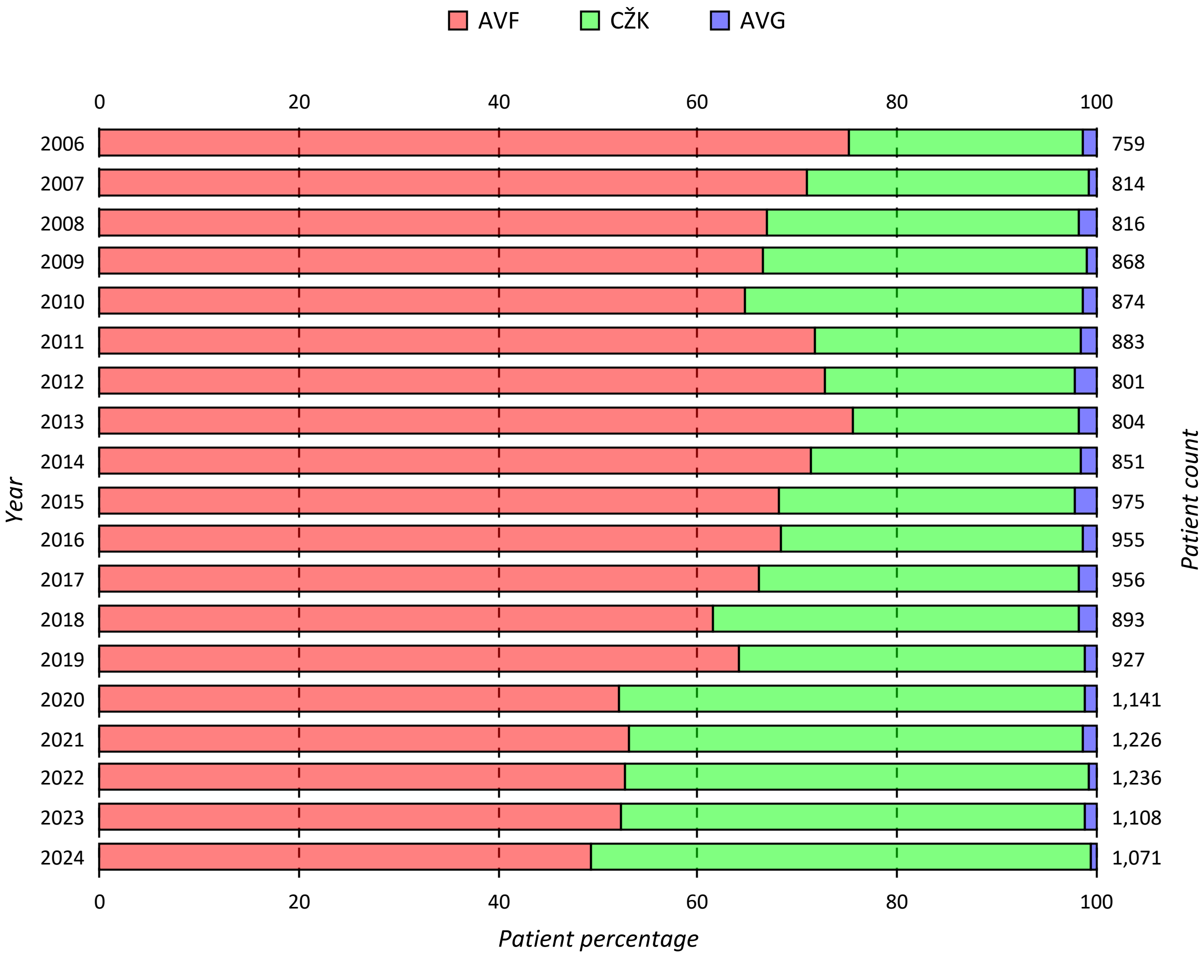
Graph 25 displays percentage of prevalent patients in individual DCs fulfilling the health insurance requirement on the Kt/V value in 2024. Also here, the Kt/V considered has been the equilibrated kT/V (eKt/V), although it is not explicitly stated. For each dialysis centre (DC), all its prevalent patients (alive at the end of the year) have been considered. In both halves of the plot, total patient count in each DC is given in the right column, and also lower and higher limits of the confidence interval of the mean Kt/V at the DC are shown. The Clopper-Pearson confidence interval is used for patient counts below 30, for larger patient counts the normal distribution confidence interval is applied. The required percentage (70 %) of patient with Kt/V > 1.2 to qualify for preferential reimbursement has been reached in majority of the Czech DCs in 2024, only 12 out of the total 114 DCs have not fulfilled it.

Graph 26 Number of centers meeting quality treatment criteria in the CR in 2024



4.4. Treatment quality markers: vascular access

Graph 27 Evolution in distribution of different vascular access types in incident dialysis patients durin 2006 - 2024



Graph 27 depicts evolution in whole-country distribution of different vascular access types used among the incident patients during the last two decades (2006 – 2024). True distribution of the access types at the moment of dialysis initiation may, however, be slightly different because the analysis works with that type of patient´s vascular access he/she has used on Dec. 31 in each particular year, i.e. not with the one he/she had used at true dialysis start.

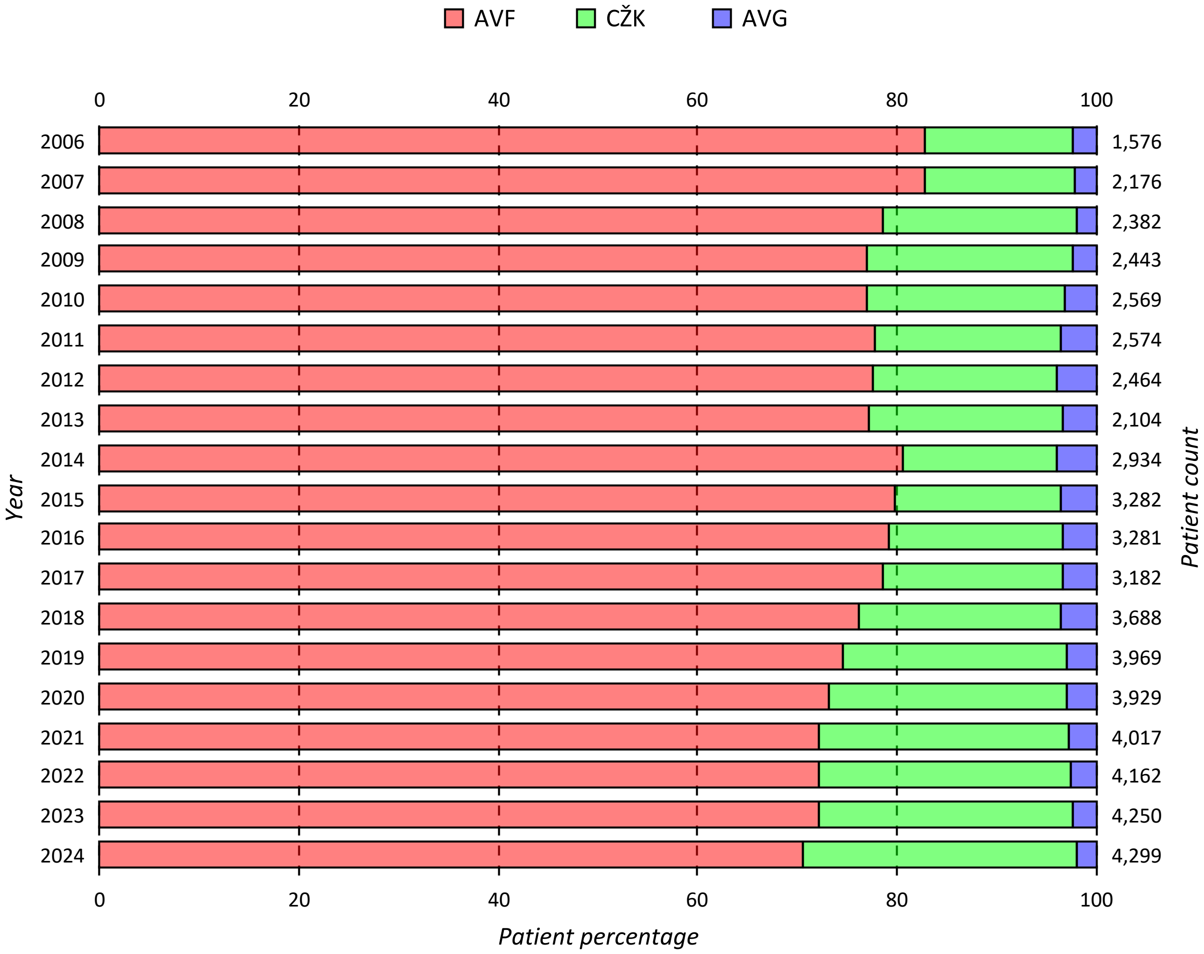
Although the prevailing type of the vascular access in patients newly entering dialysis programme is still the subcutaneous arterio-venous fistula, steady increase is seen in use of catheters. This could be caused by several factors: The first is still rather high percentage of patients entering dialysis programme as "late-referrals", i.e. without being followed by a nephrologist in the pre-dialysis period, during which a permanent subcutaneous access could be made well ahead, although this situation has been getting better in the last ten years. The second reason can be the ever-growing age of patients entering dialysis programme characterized by generally worse condition of their vascular system, namely because of atherosclerotic affliction – see Graph 8. And finally, the last reason can be slowly changing attitude of nephrological community to application and long term use of catheters which were unambiguously seen as the worst option in the past because of high risk of complications and generally lower blood flow obtainable for the extracorporeal circuit as compared to the permanent subcutaneous types. Use of synthetic vascular grafts (AVG) in incident patients is persistently very low (it fluctuates between 1.5 and 3 % over the years). It is concordant with general practice in vascular surgery to use this option only when creation of an AVF is not successful or function of an already created AVF gets bad later.

Graph 28 Percentage distribution of vascular access types in incident patients at individual DCs in 2024

Displayed is data from the reporting DCs only (N=90).

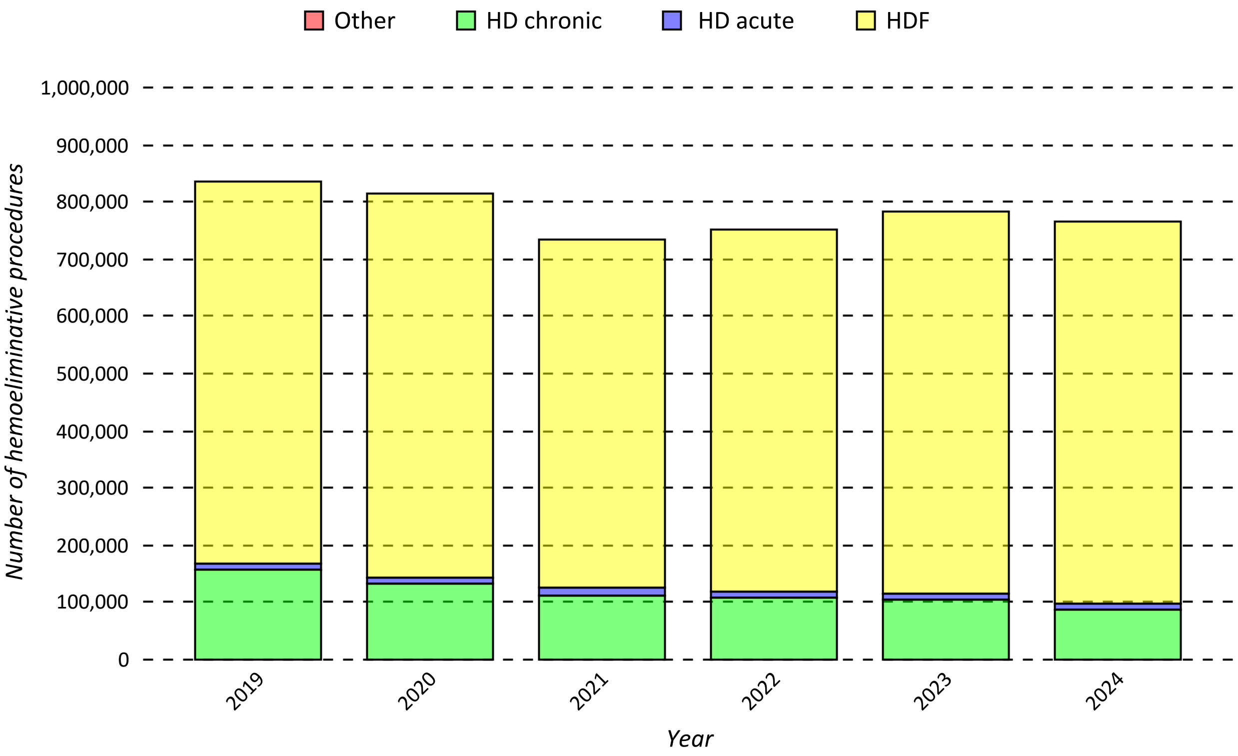
The graph displays distribution of different vascular access types (subcutaneous arterio-venous fistula (AVF), catheter (without distinguishing the permanent and acute one), and synthetic vascular prosthesis (AVG)) in incident patients who have entered chronic dialysis programme on individual DCs in 2024. True distribution of the access types may differ slightly from that shown on the plot because the plot is based on data of individual patients valid at the end of the year 2024. The distribution is also quite different between different dialysis units: Four DCs have reported only catheters in their incident patients. Contrary to this, 19 units have reported only AVFs. The AVG is the least often used type, only two DCs used it in part of their patients (5 - 25 %). Differences between DCs are so high that they cannot be explained by different anatomical differences of their patients and must therefore be given by varying approaches to access creation in general. However, one cannot exclude errors caused by small numbers – 53 out of 92 analyzed DCs (58 %) have put on HD less than 10 patients and 10 DCs (11 %) even maximum of 3 patients in 2024 only.

Graph 29 Evolution in vascular access types distribution in prevalent HD patients during 2006 - 2024



The graph shows whole-country distribution of different types of vascular access in prevalent dialysis patients during the last two decades (2005 – 2024). The prevailing access type has been the permanent subcutaneous arterio-venous fistula (AVF). Nevertheless, during the last 5 - 7 years there is a slow yet steady increase in use of central venous catheters. The plot does not distinguish between permanent and acute catheters, as this information has so far not been collected in the reports to RDP database. Synthetic graft (AVG) is included in the category “other”. AVG percentage in prevalent patients is, however, steadily low in all Czech DCs (below 5 %) despite double or triple values seen in incident patients – see Graph 27.

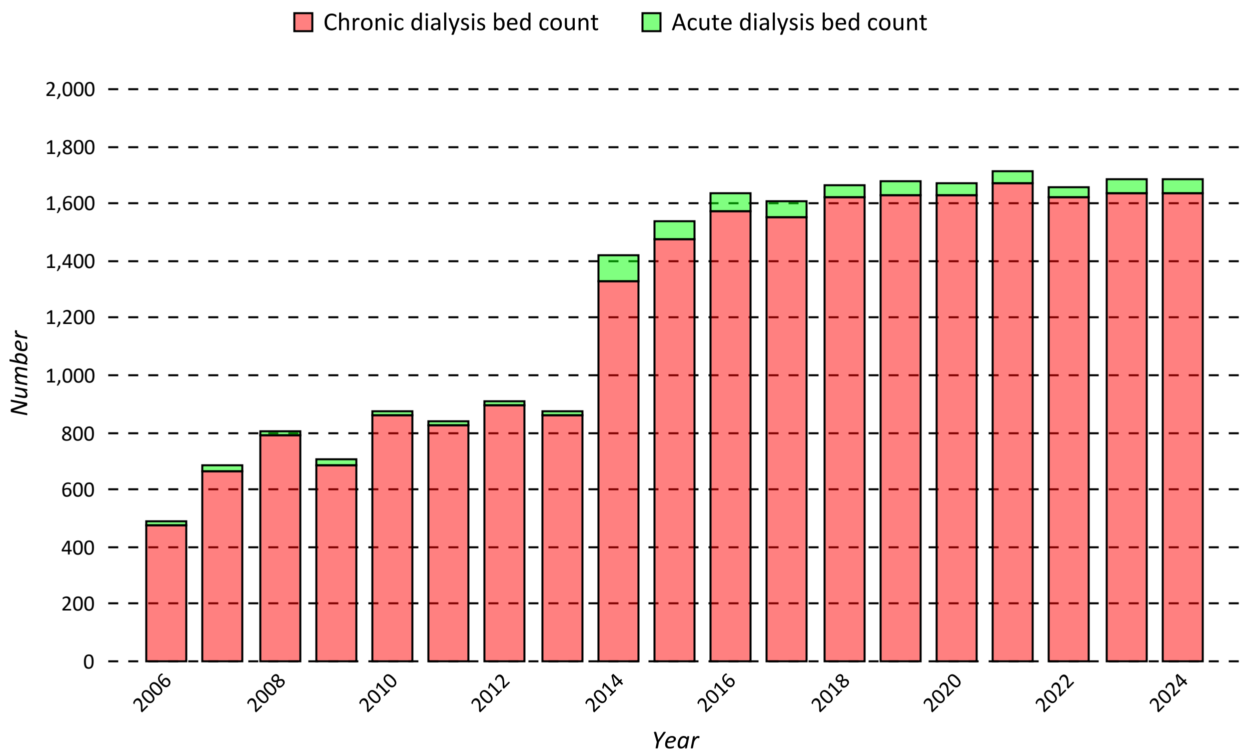
Graph 30 Different extracorporeal haemoelimination procedure counts in the last 5 years 2020 - 2024



This plot does not use data from the RDP database, instead it is based on data on performed haemoelimination procedures reported to health insurance which should be more precise. The procedures are divided in 4 principal categories, special procedures have not been included in the plot because of their insignificant counts in 2024 (acetate free biofiltration - 0, haemofiltration – 45, plasmafiltration – 0, haemoperfusion – 0). Different types of treatment are converted in the principal categories as follows: codes 8522 and 18523 are included in HD, 18521 and 18529 in acute HD, 18550 in HDF, 18570 in AFB, 18530 in HF, 18580 in PF, 18560 in HP. Especially significant feature of this plot is separate evaluation of performed HD and HDF procedures, which are in all other plots of this Report put together under one item. According to the reaction from the ERA Registry to the yearly submission of Czech data, the Czech Republic has the highest percentage of on-line HDF Europe-wide among treatment modalities used – steadily around 80 %. Counts of all other hemoelimination modalities are truly minor. To Czech nephrologists, this fact actually offers a chance for strong participation in defining and/or selection of a suitable reference anthropometrical parameter for assessment of HDF treatment efficiency in elimination of middle-molecular catabolites. Simple absolute value of the exchanged volume of substitution fluid unrelated to an anthropometrical parameter (similarly to the small-molecular efficiency parameter Kt being related to patient´s total body water V) is certainly not representative of the procedure impact in a particular patient. Such marker has not been generally agreed upon by the nephrological community so far.

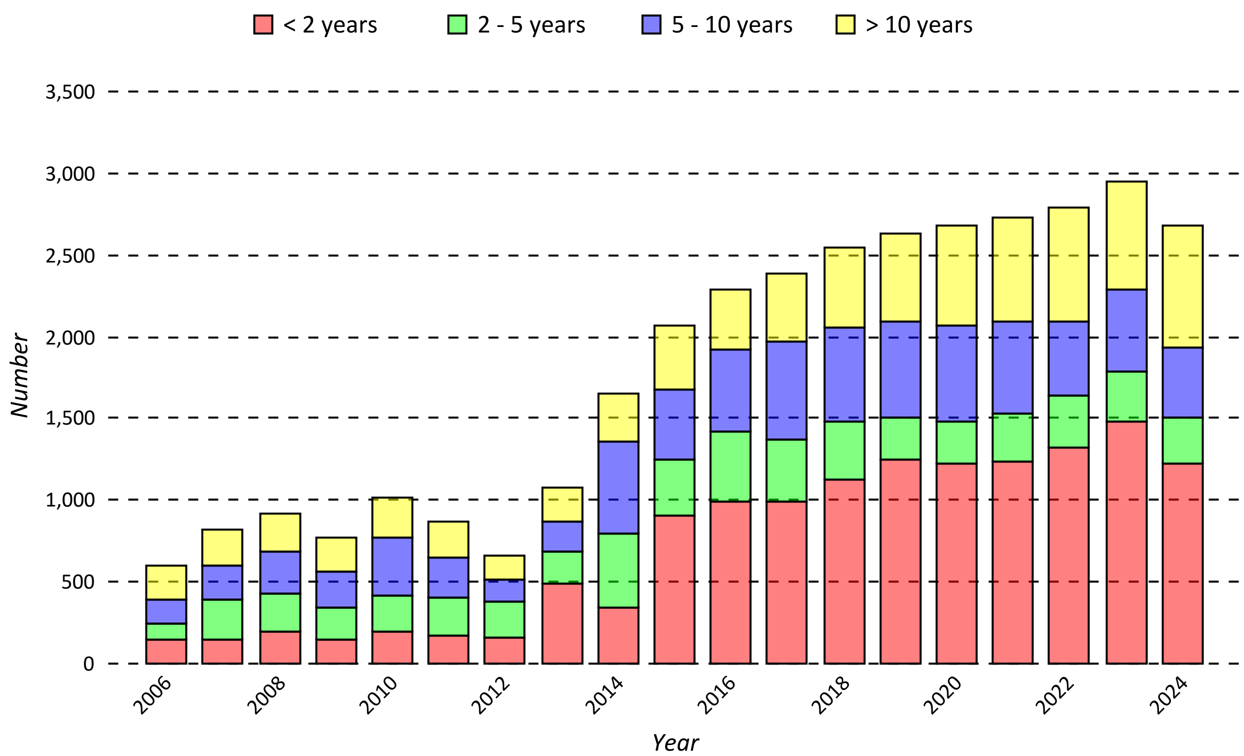
As far as the total performed procedures count is concerned, there had been a visible drop during the “Covid years” (2019 - 2022) caused by increased mortality in that time period (see also the prevalent counts Tab. 2 and mortality plot 16). Nevertheless, only minor changes in the count indicate that the Czech Republic us close to the "saturation point" when the incident count (patients newly entering chronic dialysis programme) would be equal to prevalence decreasing effect of mortality and transplantation.

Graph 31 Dialysis bed counts in 2006 - 2024



The data comes from the annual statistics of the center.

Graph 32 Haemodialysis machine count in 2006 - 2024, sorted by age



The data comes from the annual statistics of the center.

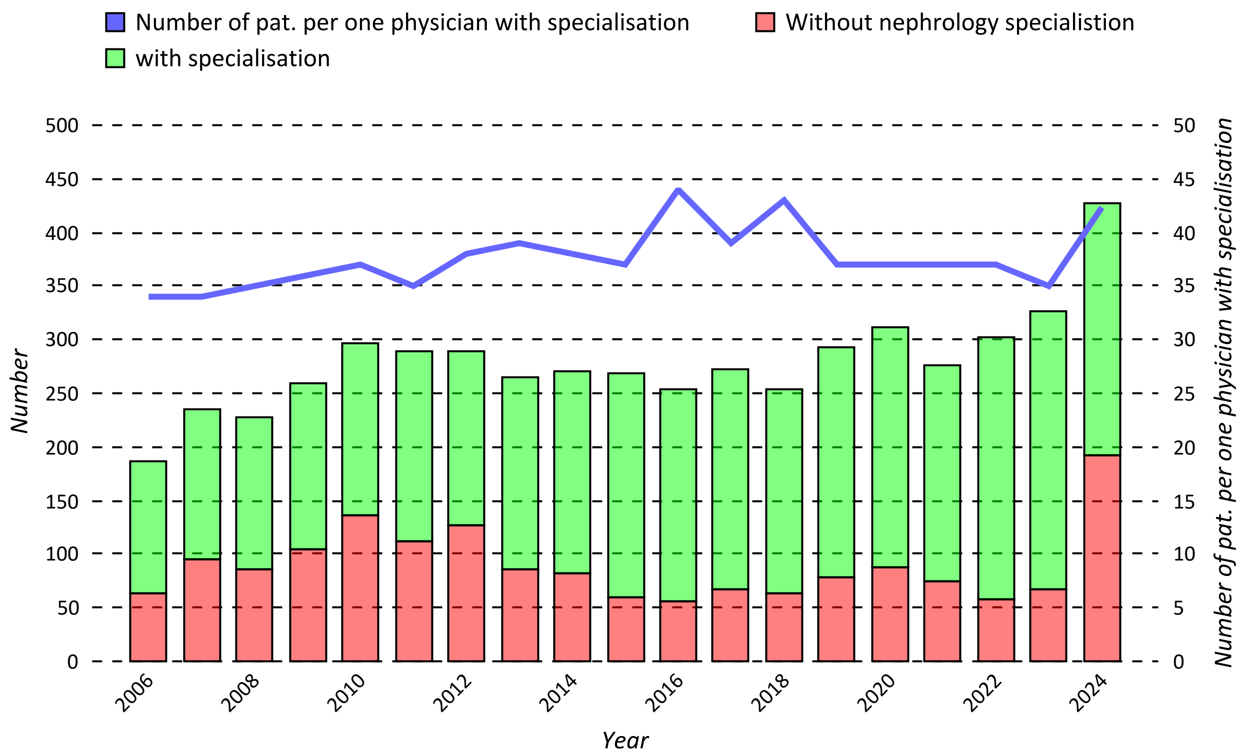
Graphs 31 and 32 provide information on how has running of the Czech dialysis centres been ensured technical-wise during the last two decades (2006 – 2024).

As shown in graph 31, number of dialysis beds had been increasing quickly (with a short “idle” period between 2011 and 2013) until 2016 and since then remains practically stable. Zero change in the last years corresponds with the information given in graph 7 on the average dialysis bed capacity utilization as assessed by number of prevalent dialysis patients per one actively used bed. This marker is just slightly below 4 patients per bed. This values enables to saturate dialysis needs by just two-shift working schedule of the DCs with no problems.

Graph 32 shows total counts of operable dialysis machines in the years of the evaluated period. This analysis appears satisfactory just partly. Operation of those roughly 1600 dialysis beds is ensured by 2950 dialysis machines of which about 1000 has been in use for less than 5 years. Running of the remaining 600 beds is thus covered by some 1500 machines older than 5 years. It means that dialysis centres operate with quite high machine reserve - 45 %. With well maintained machines, 25 % reserve should be entirely appropriate.
Legislation-wise, medical devices including dialysis machines now belong to depreciation class 2 (see enclosure 1 and §30 of the income tax act 586/1992 with amendments), while until 2020, the writing-off period had been 8 years. And there is no bylaw in force which would push dialysis centres to renew their instrumentation after the write-off period, assuming that the prescribed functional and safety check-ups are performed in due intervals with satisfactory results. High percentage of the operated machines older than the official write-off time of 5 years indicates that technical as well as “moral” lifetime of that technology is significantly longer and thus the main reason for its exchange are newly introduced technical and operation improving innovations.

Note: The Czech regulation No 92/2012 on requirements on technical equipment in health-care facilities demands one spare dialysis machine per each five dialysis places in every dialysis department.

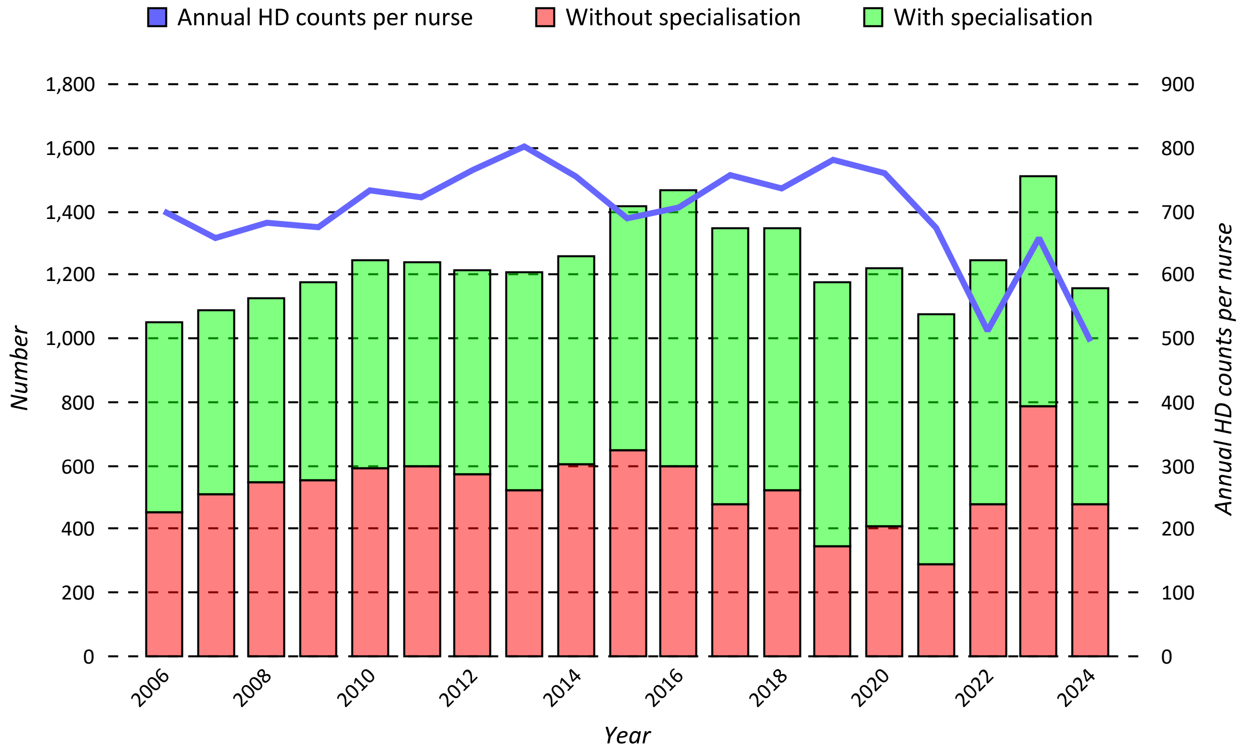
Graph 33 Physician counts during 2006 - 2024



The data comes from the annual statistics of the center. For the year 2023 and earlier, the numbers are taken from the old Yearbooks.

Graph 33 is the first of a pair showing professional personal counts on Czech dialysis centres – in this case physician counts during the last 2 decades (2006 – 2024). Physician counts luckily kept pace with increasing number of dialysis beds at the centres, namely in physicians with specialisation in nephrology. Currently nearly three quarters of all physicians have it. The plot also gives the number of patients per physician (with specialisation in nephrology) – it is the blue line with metrics given on the vertical axis on the right side of the plot. It has been by and large stable over the last 15 years – about 35 – 40. However, the plot does not account in any way for true workload of physicians in dialysis departments because most of them besides their work directly related to dialysis serve also at the predialysis outpatient wards, which are integral parts of most dialysis centres, both the hospital and the free-standing outpatient units alike. Data on predialysis patients followed in the pre-dialysis outpatient wards affiliated with the dialysis centres are not specifically collected in the RDP database.

Graph 34 Nurse counts during 2006 - 2024



The data comes from the annual statistics of the center. For the year 2023 and earlier, the numbers are taken from the old Yearbooks.

Similarly to the preceding graph, this one provides information on counts and workload of the most abundant health care staff – the nurses, during the same time period (2006 – 2024). The plot shows nurse count sorted by specialisation status – without/with. In the past, nurses had a well established specialisation of nephrology nursing, which has been later replaced by a wider one – ARIP (anaesthesiology, resuscitation and intensive care). The ratio of nurses with specialisation and without has increased in 2024 to 60% compared to 50% in the previous year. Total number of nurses in DCs has, however, significantly decreased. The blue line in the plot specifies nurses´ workload in terms of annual number of HD procedures performed per one nurse. Similarly to the previous plot, the metrics for this is given on the vertical axis on the right side of the plot. It has been quite stable throughout the whole analyzed period - 1400 ± 100 HD per year per nurse (with a visible drop during the Covid years). With roughly 230 working shifts in a year, it means 6 HDs covered by 1 nurse in each shift. However, those figures provide just a mean rough estimate of the true workload because they do not account for differences in age and co-morbid structure of the treated patient population. Higher workload can be reasonably expected in hospital based centres compared to free outpatient units.

6. Transplantation

6.1. Introduction

Transplantation activity is one of the KRT programme key factors. It significantly reduces counts of patients with chronic renal failure who need dialysis. That is why the data on number of transplantations, transplanted patient counts, and on the time the patients spend on the transplantation waiting list belongs to the report on KRT, although – unlike nephrology as a part of internal medicine – transplantation is primarily surgical speciality.

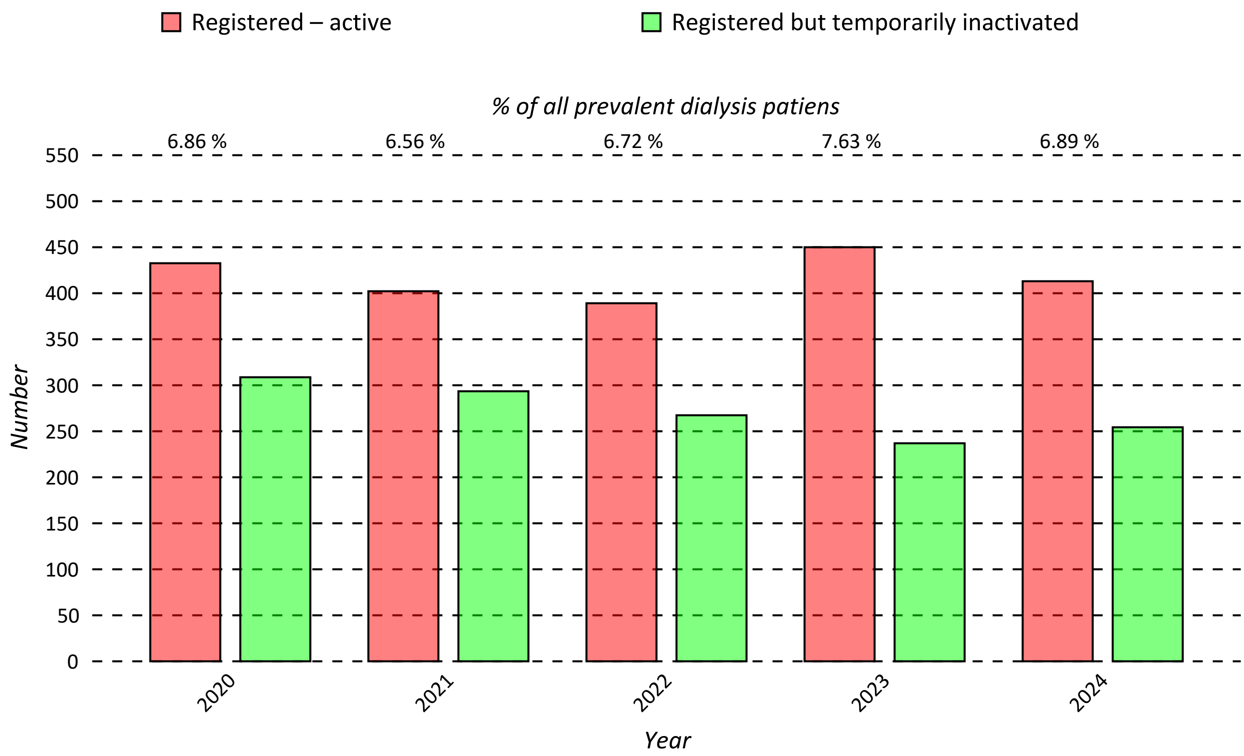
There are altogether 7 transplantation centres in the Czech Republic. Except for the two independent ones (Institute for Clinical and Experimental Medicine in Prague and the Centre for Cardiovascular and Transplantation Surgery in Brno), all are part of a university hospital (FN) – FN Motol in Prague, FN in Olomouc, FN in Ostrava FN in Hradec Kralove and FN in Plzen. In all those centres, the post of a Transplant Coordinator has been established.

The first cadaver kidney transplantation in the Czech Republic has been performed by the FN Hradec Králové in 1961 and the first transplantation from a living donor by IKEM in 1990. Also preemptive transplantations are done in the CR, however their number is still very low.

Whole-country waiting list (WL) and allocation of organs for transplantation is administered by an independent body – the Coordination Centre for Transplantations (CCT) in Prague. Patients can be put on the WL already 3 months before their expected entry onto dialysis, which enables to perform the above mentioned preemptive transplantations.

Transplantation legislation is regulated by the 28/2002 Act ("Transplant Act"). Organ collection is based on assumed consent, unless the patient did not express the opposite to the attending physician in the healthcare facility before his/her death or has not got registered in the National Registry of persons discording *post mortem* collection of organs and tissues. This Registry has been established and is administered by the Ministry of Health.

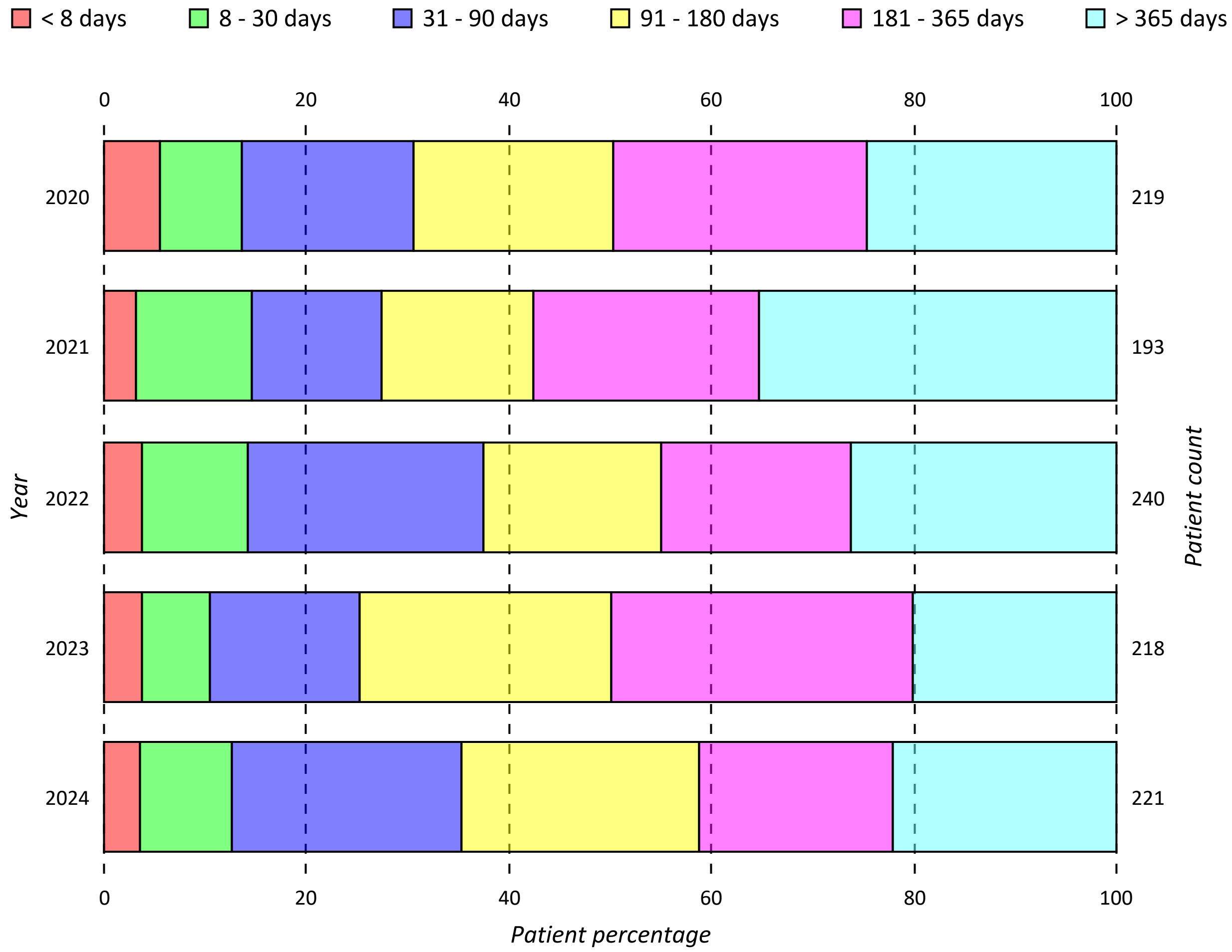
Graph 35 Number of patiens on the waiting list in the last 5 years 2020 - 2024



Graph 35 displays count of patiens registered on the Waiting List for transplantation (WL) in December each year (data source: CCT web) during the last 5 years. The red columns give absolute counts of WL patients ***active*** (i.e. able to undertake transplantation at any time upon a call). The red columns show WL patient counts temporarily ***inactived***, i.e. not able to get transplanted at that time). Temporary inactivation is done by the KST upon a request from the patient´s DC. This data is shown as of 2021 only. As the re-activation requires a re-evaluation of the patients re his/her transplantability, temporary inactivation is done only in case of serious health complications that are likely to persist for at least several months period.

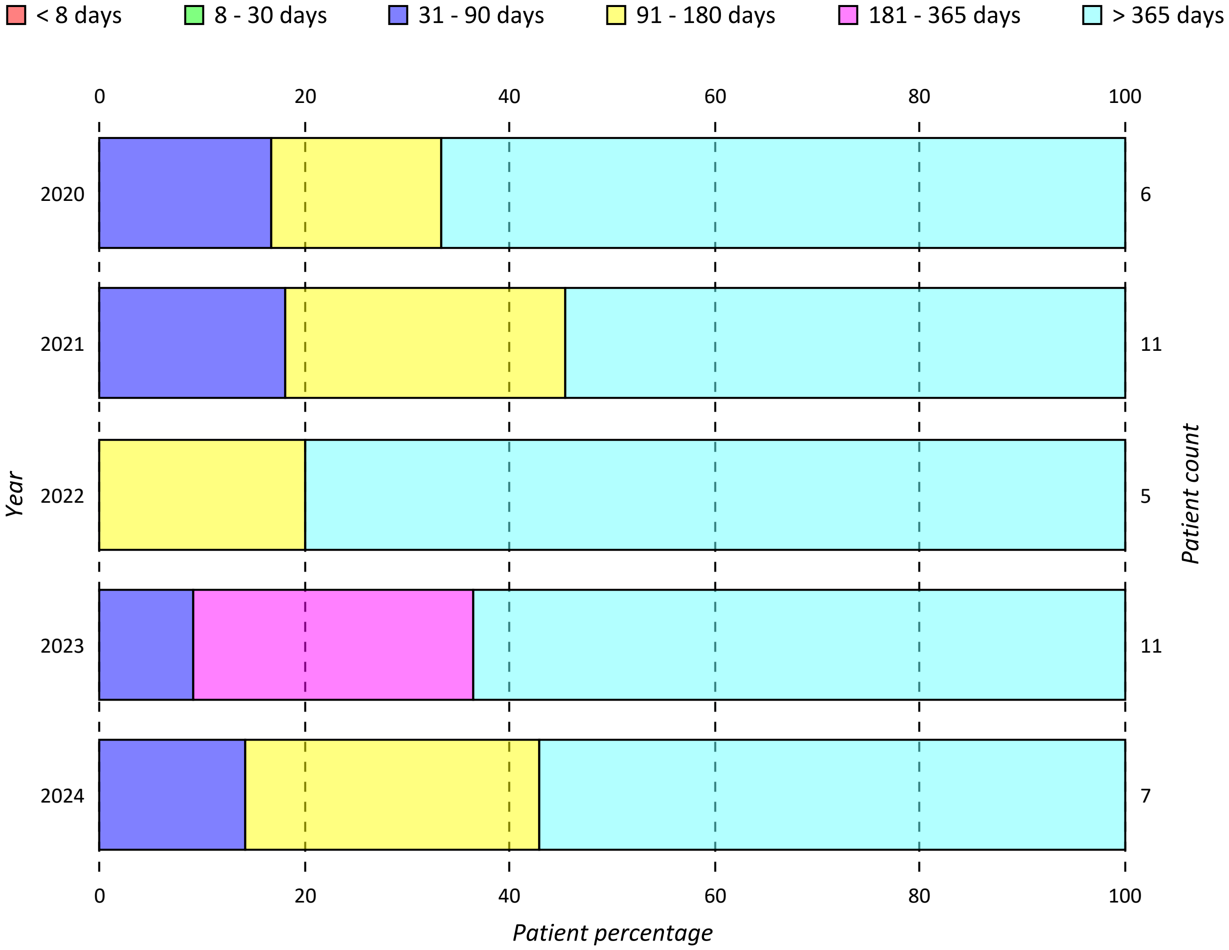
The line above the plot gives the WL active patient counts expressed as a percentage of all prevalent patients on dialysis at the respective year. This percentage is also one of the assessment markers in the insurance system of dialysis treatment quality monitoring. Except for the two "Covid years", the whole-country mean percentage has been meeting the requested 7 %. And since the active WL patient count has been roughly corresponding to number of transplants performed annually during the last years, it implies reasonably short mean waiting time for getting a transplant in the Czech Republic – on average just about 1 year (see also the graphs 36 and 37). It also means that if the incidence of kidney failure will not increase for any reason and also the current mortality in the KRT programme will stay at its current value, the waiting time for a transplant should also not change significantly in future.

Graph 36 Time spent on the waiting list prior to transplantation in a given year during 2020 - 2024, sorted by the length of the waiting period



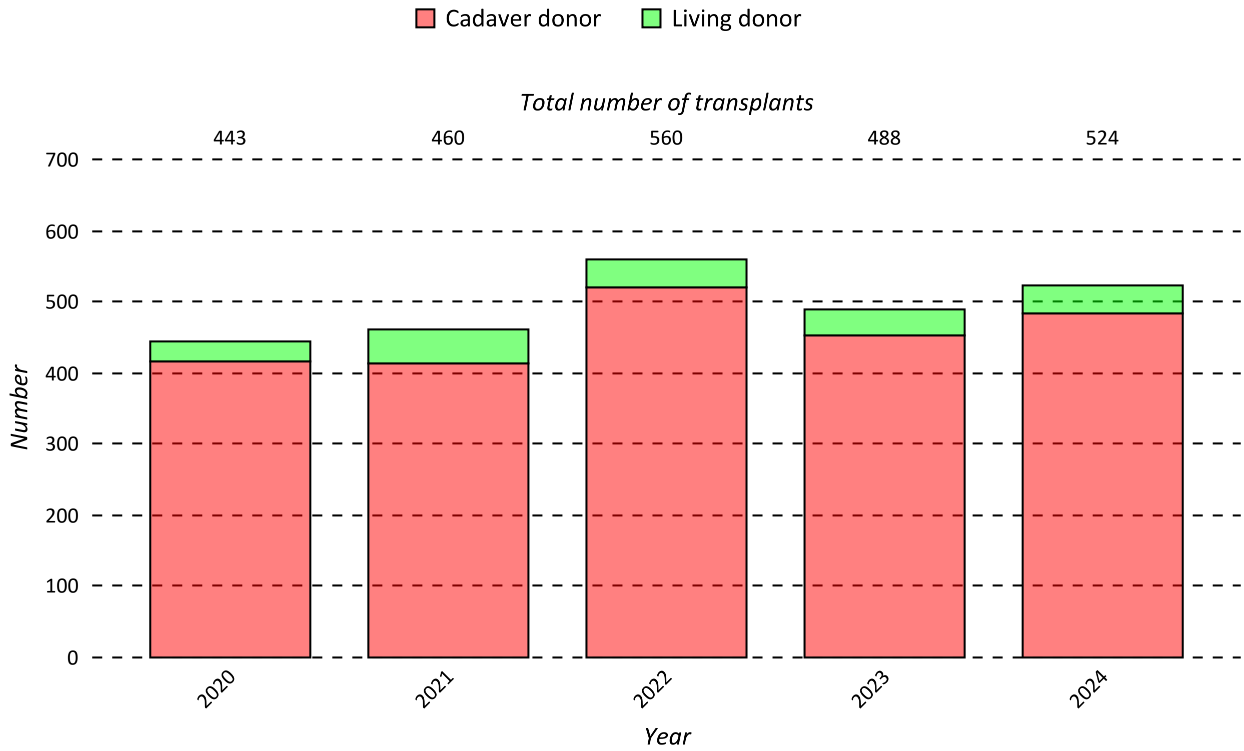
Graph 36 shows distribution of the time spent on the Wating List by patients transplanted in the respective year, i.e. it says how long the patients waited in that year for their transplant. The graph does not include patients on the WL who died during that year without having been transplanted. Those patients are processed in the next graph 37. Waiting time of all included patients is taken as of their last date of inclusion onto the WL up to the transplantation date, i.e. the time when they were temporarily taken off the WL is not considered. Number of patients transplanted in the respective year is given at the right edge of the graph (i.e. the analysis did not work with data from dialyzed patients recorded in the KST (Coordination Centre for Transplantations) registry). The patients with waiting time below 5 days represents those preemtively transplanted. The graph shows that 70 - 75 % of patients put on the WL received their transplant within a year since their entry onto the list. Regarding the time spent on the WL, policy of each transplantation centre may differ from others. But in general, the results of this analysis are thoroughly positive and document highly pro-active care in kidney transplantation field.

Graph 37 Time spent on Waiting List in patiens deceased without transplantation in a given year during 2020 - 2024, sorted by the length of the waiting period



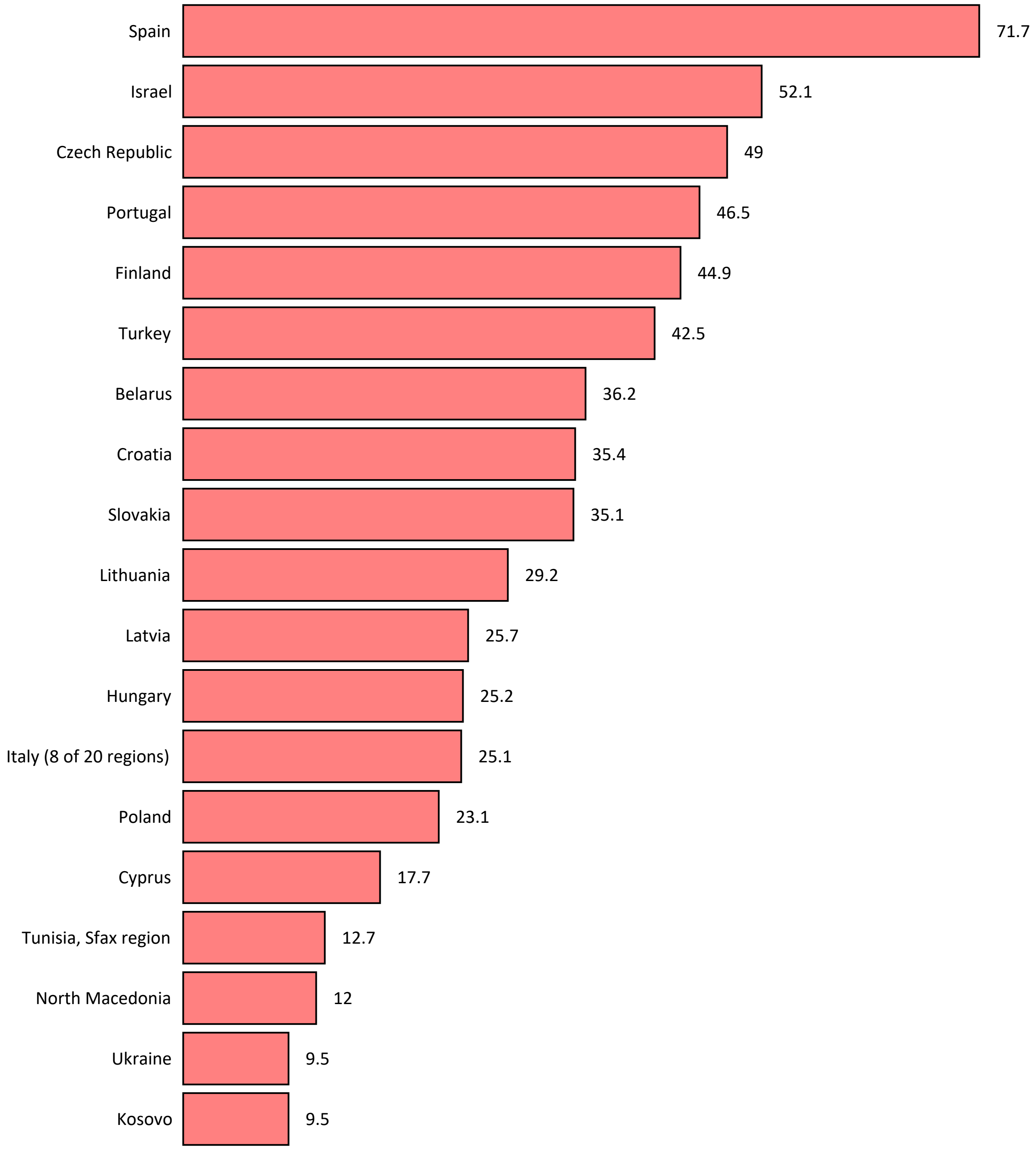
This graph shows the time spent on the WL by patients who died in a given calendar year and were registered as active patients in WL at the time of death, i.e. have not received their transplant. Again, those patients were reported in this way in the RDP. Even though the number of patients is small (indicated at the right edge of the graph in a given calendar year) and we do not know the reasons for "non-transplantation", it is certainly an interesting statistic not commonly available in registries. Among other things, the graph also shows that, understandably, majority of patients (during the last 5 years over 60 % on average) spent more than 1 year on WL as compared to patients who got transplanted. Another graphics is in preparation, which will provide information on patients, who spent some time on the WL while being dialyzed and were later removed from the list. Certainly, the analysis of the reasons for their removal from the list will be interesting. Finally, another interesting topic is the comparison of the time on the WL spent by patients temporarily removed and also analysis of what their further fate was.

Graph 38 Number of kidney transplantations performed in the last 5 years 2020 - 2024



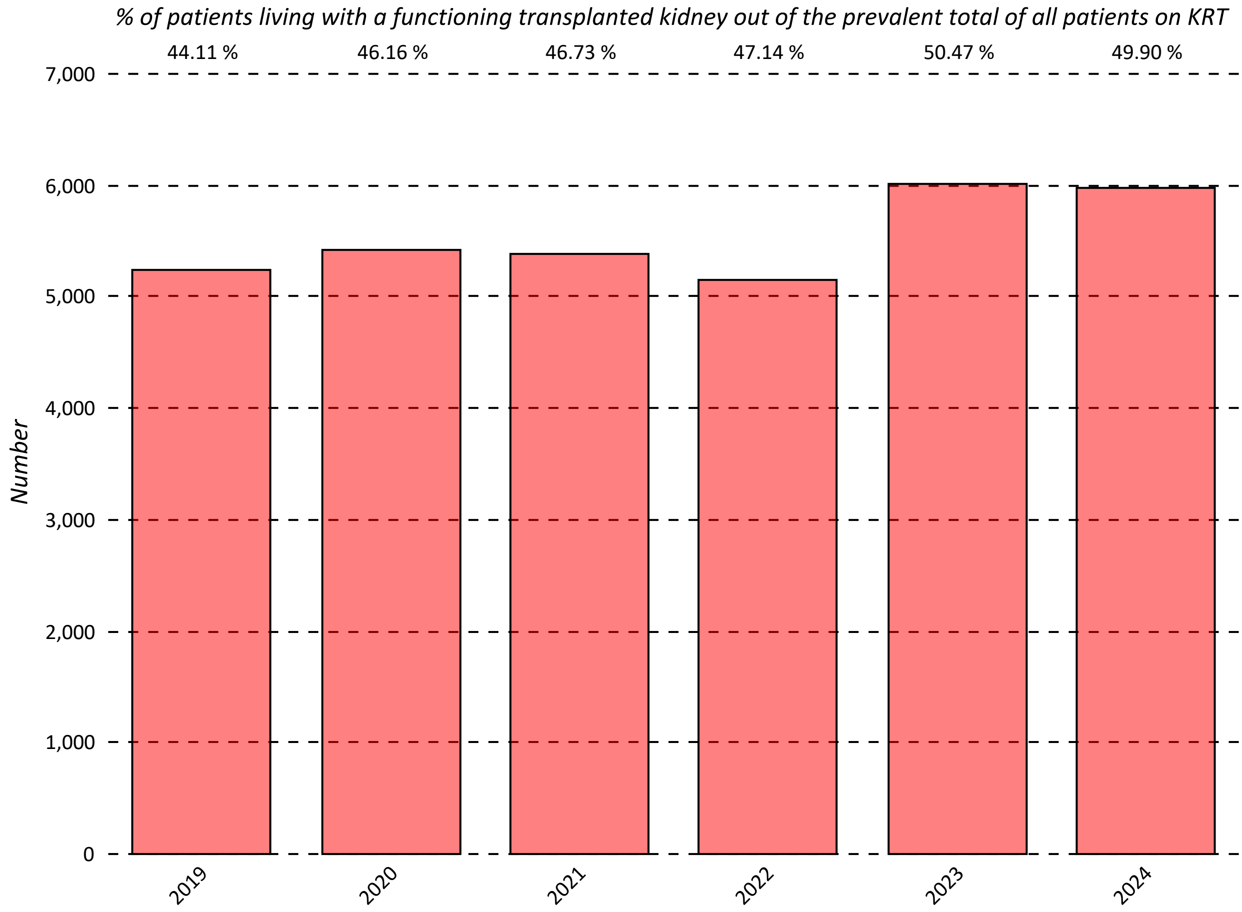
Graph 38 displays number of kidney transplants performed annually in the Czech Republic during the last 5 years. It documents steadily high transplant activity ranging between 450 and 500 operations, which when related to country´s population gives 45 to 50 operations PMP. There was a small decrease (cca 10 %) in the turbulent "Covid years" 2020 - 2021 only.
The green part of each column shows transplantations of kidneys from living donors. Their share in our country during the evaluated period ranged between 7 to 9 % of the total number of kidney transplants performed annually. Should the country manage to increase this share in future, it would undoubtedly lead to better survival of transplanted kidneys because survival of organs from living donors is as a rule significantly longer than for organs transplanted from cadavers.

Graph 39 Comparison of transplantion activity (PMP) in some European countries in 2022



The graph provides comparison of transplant activity in different European countries. It is given in PMP to eliminate influence of the country´s size. When we sort this marker roughly into 4 groups (over 50 TX MPM, 40 – 50 TX PMP, 20 – 40 TX PMP, and below 20 TX PMP), the Czech Republic appears in the second highest group with the ninth highest PMP number of transplants performed. The graph, however, gives merely bulk transplantation activity and does not provide any information on its numerous influencing factors. Significant role is played by legislation, percentage of dialyzed patients entered on the Waiting List, organisation of the organ harvest and system of organ allocation (done by the KST (CCT) in the Czech Republic), existence of a nation-wide or regional waiting list(s), collaboration of its administrator with neighbouring countries, existing post of the transplant coordinator, existing net of the transplant centres, and established run-in procedures and approaches therein, such as acceptance of “marginal” donors and organs (Scandinavia), feasibility of paired exchanges etc. Some countries may use organs from patients who decided for euthanasia (Spain), which has, however, not been approved in the Czech Republic and is thus not practised.

Graph 40 Number of patients living with a functioning transplant in the last 5 years 2020 - 2024



The last graph of the transplantation block of this Annual Report gives counts of patient living with functioning kidney transplant during the last 5 years. During that whole period, there has been just mild increasing trend, with exception of the "covid years" when both the prevalent patient counts and number of transplantations performed decreased slightly – see the graphs 13 and 38. It means that numbers of newly transplanted patients in each year slightly overweighted the numbers of patients who left the prevalent TX pool, either returning to dialysis treatment because of failed transplant or because of their death. And the fact, that prevalent dialysis patient counts and prevalent transplanted patient counts are very similar (5000 to 6000 both) while the incident counts in both groups differ widely, means that mortality in transplanted patients is significantly lower compared to patients on dialysis. This can also be seen on the upper line of the graph where the prevalent TX patient counts are given as a percentage of all KRT prevalent patient counts. That percentage is slowly growing and is currently approaching 50 %.

Success rate and long term survival (both of the transplanted organ as well as of it recipient) depends or is influenced by more factors – immunosuppressive treatment, age and general health condition of the recipient, and mainly on the transplanted organ origin (from living donor of from a cadaver). And as the share of transplants from living donors is still relatively low in the Czech Republic (see also the graph 38), there is a significant potential for improvement in survival should the country be able to increase that share.

Number of preemptive kidney transplantations in the Czech Republic, although enabled by the possibility to enter a patient on the waiting list still in the pre-dialysis stage (under reasonable assumption that regular dialysis will have to be instituted in that patient in less then 3 months), is currently quite low (1 - 2 %) and thus no meaningful analysis of survival of this transplant modality cannot be made yet.

7. Predialysis

Since 2010, the CNS has also been operating a registry for patients in predialysis stage (RIP – Registry of patients with advanced renal insufficiency). At present, about 6,000 of those patients are in the RIP and their data processing is in preparation. About half of the DCs or their predialysis ambulances actively participate in reporting to the RIP. The reporting principles are similar to those in the RDP and reporting is automated according to the serum creatinine value. The range of reported parameters is similar to that one in the RDP. In addition, initial laboratory "nephrological" findings are included.

7.1. Late referrals to RRT

7.1.1. Introduction and definition

One of the important parameters of the quality of predialysis care is the duration of monitoring of a patient with CKD in the predialysis period by a nephrologist. It is a well-known fact that in all industrialized countries, a portion of patients entering predialysis care without a sufficiently long monitoring by a nephrologist. A number of factors, both objective and subjective, contribute to this, however, the consequences of late preparation for KRT are obvious – patients are not well prepared for the most advantageous modality of KRT, proper vaccination is not carried out, the vascular access, or peritoneal catheter, is not prepared, the desired optimization of medication is not achieved, they are not included in the preemptive waiting list for kidney transplantation, etc. The result is, in addition to the above, higher mortality and morbidity of patients after entering KRT.

As a definition of patients entering KRT as "late arrivals" or late referrals, the period of observation in the nephrology outpatient clinic before the first KRT is usually shorter than 90 days.

In the past, this parameter was monitored for a long time in the ČNS data, however, it was not supported by sufficiently accurate reporting of individual data. In 2024, we used the cooperation with the National Screening Center (NSC) of Institut of health information and statistics (ÚZIS), which verified this parameter according to the data of health insurance companies, which is processed by ÚZIS.

7.1.2. Methods

A/ Methodology – definition of patients incident to regular dialysis treatment:

• In the data of the National Register of Paid Health Services (NRHZS), persons who entered PDL (HD or PD) in 2019–2023 were identified. The definition of these patients was based on the presentation of at least one of the following medical procedures or DRG markers for at least 90 days and/or at an intensity of at least 26 dialysis sessions:

• 06141: PERITONEAL DIALYSIS TREATMENT
• 06142: CHRONIC HEMODIALYSIS PERFORMED OFF A DIALYSIS CENTER
• 18513: CONTINUOUS PERITONEAL DIALYSIS (CAPD)
• 18515: AUTOMATED PERITONEAL DIALYSIS (APD)
• 18522: CHRONIC HEMODIALYSIS
• 18523: CHRONIC HEMODIALYSIS PERFORMED OFF A DIALYSIS CENTER
• 18530: HEMOFILTRATION
• 18550: HEMODIAFILTRATION

Duration dialysis therapy: was determined as the time interval between the first recorded dialysis data (the above-defined medical procedure or DRG marker) and the last available record within the monitored period.

Number of completed dialysis sessions: is determined as the sum of all reported procedures within the monitored period.

B/ Methodology – proportion of incident dialysis patients who underwent examination by a nephrologist before entering the KRT

• For patients defined in this way, the first of the above-mentioned reported procedures (i.e. initiation of dialysis) was always considered.

• For each of these patients, it was subsequently monitored whether an examination by a nephrologist was performed before the start of dialysis (i.e. before the first reported performance), which was defined based on the reporting of at least one of the following medical procedures:

• 18021: INITIAL TOTAL EXAMINATION BY A NEPHROLOGIST

• 18022: TARGETED EXAMINATION BY A NEPHROLOGIST

• 18023: FOLLOW-UP EXAMINATION BY A NEPHROLOGIST

• The proportion of patients who were examined by a nephrologist at least once before the start of dialysis was subsequently monitored.

The analysis was divided into two sub-views:

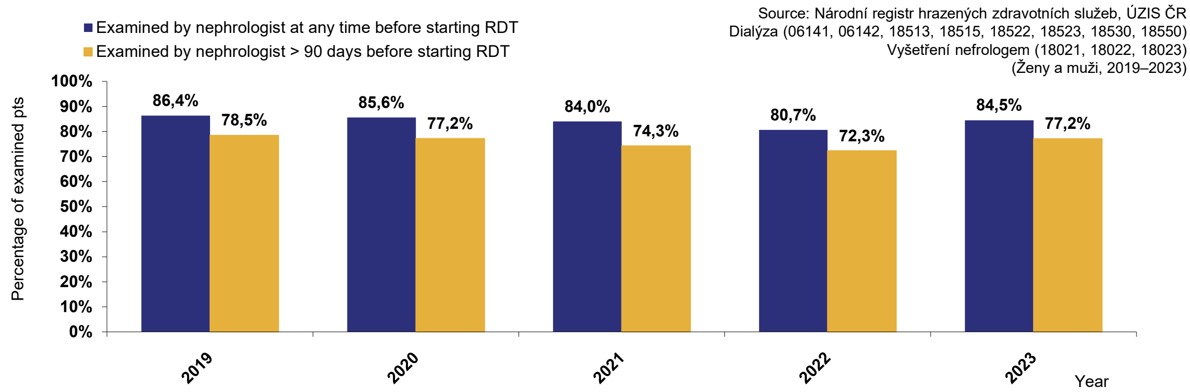
• Patients who had at least 1 visit to a nephrologist at any time before the start of dialysis.

• Patients who had at least 1 visit to a nephrologist 90 or more days before the start of dialysis.

These patients were further monitored for whether the visit took place within 365 days before dialysis or 365 or more days before dialysis.

7.1.3. Graphics

PROPORTION OF PATIENTS ON REGULAR DIALYSIS TREATMENT (RDT) WHO HAVE UNDERGONE AT LEAST ONE PREVIOUS EXAMINATION BY A NEPHROLOGIST

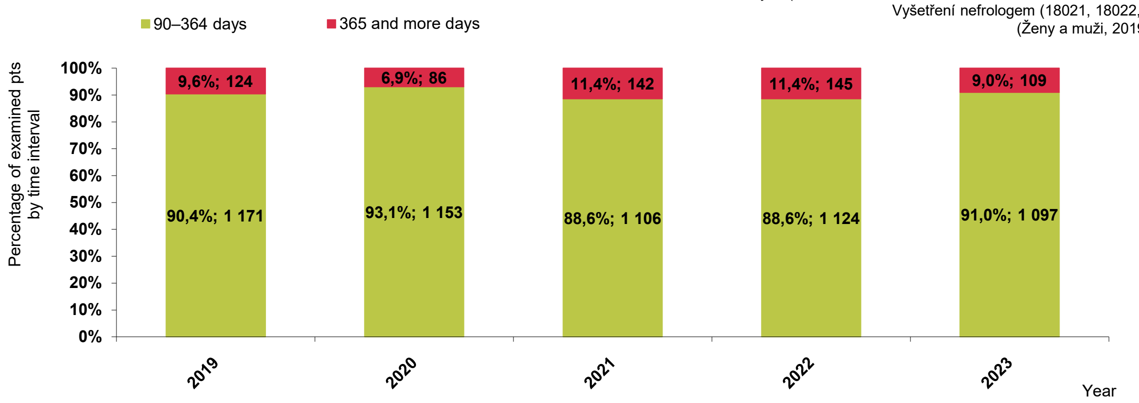


No. of pts starting RDT	1 650	1 605	1 680	1 755	1 563

The proportion of patients on RDT who have ever undergone at least one examination by a nephrologist before starting dialysis has been around 85% in recent years. When considering only patients who underwent this examination **90 or more days before starting dialysis, the proportion decreases to 77%.**

PATIENTS WHO HAVE UNDERGONE EXAMINATION BY A NEPHROLOGIST ≥90 DAYS BEFORE STARTING REGULAR DIALYSIS TREATMENT (RDT): TIME INTERVAL BETWEEN LAST NEPHROLOGIST´S EXAMINATION AND RDT START

Source: Národní registr hrazených zdravotních služeb, ÚZIS ČR
Dialýza (06141, 06142, 18513, 18515, 18522, 18523, 18530, 18550)
Vyšetření nefrologem (18021, 18022, 18023)
(Ženy a muži, 2019–2023)



The proportion of patients who underwent an examination by nephrologist ≥90 days before starting RDT has been about 77% in recent years. However, **approximately 10% of these people had their last visit ≥ 364 days before starting dialysis**.

PROPORTION OF PATIENTS WHO STARTED REGULAR DIALYSIS TREATMENT (RDT) AS LATE REFERRALS

Source: Národní registr hrazených zdravotních služeb, ÚZIS ČR
Dialýza (06141, 06142, 18513, 18515, 18522, 18523, 18530, 18550)
Vyšetření nefrologem (18021, 18022, 18023)
(Ženy a muži, 2019–2023)

	2019	2020	2021	2022	2023
No. of pts starting RDT	1 650	1 605	1 680	1 755	1 563

In recent years, **approximately 30% of patients have started RDT were late referrals**, i.e. without having undergone a nephrologist´s examination in the period 90–365 days before starting RDT.

8. Czech dialysis centres

Table 7 List of centres

Code	Name	Address	ID	Chief physician
HDS1	FMC Benešov	Máchova 400, Benešov	20112001	MUDr. Jaroslav Kopenec
HDS2	Blansko	Sadová 33, Blansko	71101229	MUDr. Zuzana Erbenová
HDS3	Brno - FNUSA	Pekařská 53, Brno	72001802	
HDS4	Brno - pediatrie	Černopolní 9, Brno	72100790	Dr. Dostálková
HDS5	FMC Brno	Tř. kpt. Jaroše 25, Brno	72916001	MUDr. Petr Vezda
HDS6	Brno - FN Bohunice	Jihlavská 20, Brno	72100528	MUDr. Jitka Řehořová
HDS7	BB Bruntál	Nádražní 27B, Bruntál	91978007	MUDr. Roman Ondraschek
HDS8	Břeclav	U nemocnice 1, Břeclav	74001881	MUDr. O.Herůfková
HDS9	Česká Lípa	Purkyňova 1849, Česká Lípa	50100032	MUDr. Peter Marchyn
HDS10	České Budějovice	B.Němcové 54, České Budějovice	32006082	MUDr. Marie Pešková
HDS11	Český Krumlov	Nemocniční 429, Český Krumlov	33100894	
HDS12	Děčín	Lužická 1358/26, Děčín	51100022	MUDr. Martin Ullrych
HDS13	Frýdek Místek	El. Krásnohorské 321, Frýdek-Místek	86101206	MUDr. Petr Buček
HDS14	Havířov	Dělnická 1132/24, Havířov Město	87004700	MUDr.Kateřina Heřmanová
HDS15	Havlíčkův Brod	Husova 2624, Havlíčkův Brod	60001128	MUDr. František Šenk
HDS16	Hodonín	Purkyňova 11, Hodonín	75001200	MUDr. Jitka Urbanová
HDS17	Hradec Králové - FN	Sokolská 581, Hradec Králové	61004012	Prof. MUDr. Sylvie Dusilová Sulková
HDS18	FMC Chomutov	Kochova 1185, Chomutov	52679001	MUDr. Abdulelah Khalaf
HDS19	FMC Chrudim	Václavská 570, Chrudim	62383001	MUDr. Libor Lhotecký
HDS20	Jeseník	Lipovská 103, Jeseník	95202002	MUDr.Bartošová Ondra
HDS21	Jičín	Bolzanova 512, Jičín	63101528	MUDr. Pavel Konopásek
HDS22	Jihlava	Vrchlického 59, Jihlava	76001013	MUDr. Alena Svobodová
HDS23	Jilemnice	Metyšova 465, Jilemnice	67102332	MUDr. Kudrnáčová Dana
HDS24	FMC Karlovy Vary	Zbrojnická 688/22, Karlovy Vary	48048003	MUDr. Dagmar Fričová
HDS25	Karvinná	Vydnuchov 399, Karvinná	87001700	MUDr. Kubatko Januš
HDS26	FMC Kladno	Vančurova 1548, Kladno	22109202	MUDr. Pavel Konopásek
HDS27	Klatovy	Plzeňská 929, Klatovy 2	43001037	MUDr. Kateřina Oulehle, MBA
HDS28	FMC Kolín	Žižkova 146, Kolín	23133406	MUDr. Soňa Režnáková
HDS29	Kroměříž	Havlíčkova 660, Kroměříž	77001005	MUDr. Martina Zelinková
HDS30	Liberec	Husova 10, Liberec	54100884	MUDr. Ryba
HDS31	BB Litoměřice	Žitenická 2084, Litoměřice	55157001	MUDr. Jana Fialová
HDS32	FMC Louny	Rybalkova 1400, Louny	56457001	MUDr. Milena Charouzová
HDS33	FMC Mariánské Lázně	Tepelská 137, Mariánské Lázně	48048004	MUDr. Martin Jirovec
HDS34	FMC Mělník	Pražská 528/29, Mělník	22109203	MUDr. Anna Plecháčková
HDS35	Mladá Boleslav	V. Klementa 147, Mladá Boleslav	26001253	Alferi Dino MUDr.
HDS36	FMC Most	J.E.Purkyně 270, Most	57259293	MUDr. Petr Machek
HDS37	Náchod	Bartoňova 951, Náchod	64001128	MUDr. Jaroslav Kubeček
HDS38	Nové Město n.Mor.	Žďárská 610, Nové Město n. Mor.	84231242	MUDr. Igor Máčel
HDS39	Nový Jičín	Purkyňova 2138/16, Nový Jičín	88001804	MUDr. Václava Honová
HDS40	Olomouc - FN	I.P.Pavlova 6, Olomouc	89301035	MUDr. Miroslav Hrubý
HDS41	Opava	Olomoucká 86, Opava	90001215	MUDr. Butela Lucia
HDS42	Ostrava - Fifejdy		91001704	MUDr. Patrik Letocha
HDS43	Ostrava - Poruba	17.listopadu 1790, Ostrava - Poruba	91009017	MUDr. Ivo Valkovský, Ph.D.
HDS44	Ostrava Poruba-dětské	17.listopadu 1790, Ostrava Poruba	91009663	Dr. Hladík M.
HDS45	BB Vítkovice	Zalužanského 15, Ostrava Vítkovice	91978001	MUDr. Iveta Dudková
HDS46	FMC Pardubice - nemocnice	Kyjevská 44, Pardubice	65385275	MUDr. Tomáš Zahradníček
HDS47	FMC Pardubice 2 - poliklinika	Masarykovo nám. 2667, Pardubice	65385611	MUDr. Tomáš Zahradníček
HDS48	Pelhřimov	Slovanského bratrstv, Pelhřimov	35001361	MUDr. Marie Musilová
HDS49	Písek	Čapkova 589, Písek	36101092	MUDr.Zdeněk Hobzek
HDS50	Plzeň - FN	Alej svobody 80, Plzeň	44101739	doc. MUDr. Jaromír Eiselt, Ph.D.
HDS51	BB Plzeň	E.Beneše 9, Plzeň	44463002	MUDr. Lada Malánová
HDS52	Praha 10 – Interní klinika – HHD a PD	Šrobárova 50, Praha 10	10002658	MUDr. Martin Havrda
HDS53	Praha 10 – Interní klinika – MOJIP	Šrobárova 50, Praha 10	10002658	MUDr. Monika Grussmannová
HDS54	Praha 2 - VFN	U nemocnice 2,, Praha 2	02004017	MUDr. Zuzana Hladinová
HDS55	Praha 4 - IKEM	Vídeňská 1958/9, Praha 4	04002398	doc. MUDr. Alena Paříková, Ph.D.
HDS56	BB Ohradní	Ohradní 1368/4, Praha 4	14075001	MUDr. Satu Pešičková PhD.
HDS57	BB Bulovka	Budínova 2464/2b, Praha 8	08458001	MUDr. Vladimír Vojanec
HDS58	FMC Kukučínova	Kukučínova 1151, Praha	14038001	MUDr. Petra Ronová
HDS59	BB Homolka	Roentgenova 2 2, Praha 5	14093001	MUDr. Jordanov Ivana
HDS60	UVN Střešovice	U vojenské nemocnice 1200, Praha 6	06051128	MUDr. Kristýna Michalíčková

Code	Name	Address	ID	Chief physician
HDS62	Praha 5 – FNM-dětské	V úvalu 84, Praha 5	05002380	Dr. Šimková E.
HDS63	Prachatice	Nebahovská 1015, Prachatice	37101203	MUDr. Pauchová E.
HDS64	Prostějov	Mathonova 291/1, Prostějov	78006160	prim. MUDr.Vojtěch Bartl
HDS65	Přerov	Dvořákova 75, Přerov	78006460	MUDr. Pavel Hejduk
HDS66	FMC Příbram	Podbrdská 269, Příbram	30547001	MUDr. Zuzana Novická
HDS67	PRIVAMED Rakovník	Dukelských hrdinů 200, 269 01 Rakovník	31002001	MUDr. Petr Vorel
HDS68	BB Rychnov n.Kn.	U Stadionu 1555, Rychnov nad Kněžnou	66205001	MUDr. Marek Mysliveček
HDS69	BB Slavkov		81462001	MUDr. J. Blaštíková
HDS70	FMC Sokolov	Slovenská 1863, Sokolov	48048001	MUDr. Jiří Vlasák
HDS71	Strakonice	Radomyšlská 336, Strakonice	38001921	MUDr.Josef Moltaš
HDS72	INMED Svitavy	U nemocnice 4, Svitavy	68042008	MUDr. Pavel Vitvar
HDS73	AGEL Šumperk	Nemocniční 1468, Šumperk	93301002	MUDr. Kateřina Bláhová
HDS74	Tábor	Kpt. Jaroše 2000, Tábor	39001169	MUDr. Eva Křížová
HDS75	BB Teplice	Duchcovská 3359, Teplice	58166750	MUDr. František Švára
HDS76	Trutnov	Gorkého 77, Trutnov, Kryblice,	69001509	MUDr. Miroslav Nývlt
HDS77	Třebíč	Purkyňovo nám. 133/2, Třebíč	79001808	MUDr. Chmelíčková
HDS78	BB Třinec	Habrová 489, Třinec	91978009	MUDr. Roman Kantor
HDS79	Uherské Hradiště	Purkyňova 365, Uherské Hradiště	80001904	MUDr. Lubomír Strnadel
HDS80	Ústí nad Labem	Pasteurova 9, Ústí n.L.	59001031	MUDr. Zuzana Bitterová
HDS81	BB Ústí nad Orlicí	Čsl.armády 1076, Ústí nad Orlicí	70022001	MUDr. Magdaléna Mokrejšová
HDS82	Vsetín	Nemocniční 955, Vsetín	94101810	MUDr.Petra Čechová
HDS83	Zlín	Havlíčkovo nábř. 600, Zlín	82001990	MUDr. Aleš Tkadlec
HDS84	Znojmo	dr.Janského 11, Znojmo	83001131	MUDr. Milouš Vyskočil
HDS85	Praha 4 -Ohradní BBraun	Ohradni 1368/4, Praha 4 - Michle	14079001	MUDr. Satu Pešičková
HDS86	FMC Vysočany	Sokolovská 304/810, Praha 9	14038005	MUDr. Petra Ronova
HDS87	PD Rumburk	Tř.9.května 10, Rumburk	51282002	MUDr. Popelka Zdeněk
HDS88	Jindřichův Hradec	U nemocnice 380/III, 377 38, Jindřichův Hradec	34001732	MUDr. Alena Doubravová
HDS89	FMC Motol	V Úvalu 84, Praha 5	14038002	MUDr. Monika Knébl Tóthová
HDS90	BB Uherský Brod	Partyzánů 2174, Uherský Brod	80819001	MUDr. Markéta Kratochvilová,Ph.D.
HDS91	FMC Vinohrady	Šrobárova 50, Praha 10	14038003	MUDr. Jana Mertová
HDS93	Havířov – MJ	Dělnická 24, Havířov		MUDr. N. Ostrochovská
HDS94	BB Beroun	Politických vězňů 40 40, Beroun	21265435	MUDr. Hana Novotná
HDS95	Šternberk	Jivavská 20, Šternberk	78006760	MUDr. Lada Janušová
HDS96	FMC Slaný	Politických vězňů 576, Slaný	22109302	MUDr. Slavoj Šlais
HDS97	Praha 5 – FNM PD	V Úvalu 84, Praha 5	05002434	Dr. Miroslava Horáčková
HDS98	Kopřivnice	Školní 890, Kopřivnice		MUDr. Zbyněk Grešák
HDS100	BB Bílovec	17.listopadu 538, Bílovec	91978003	MUDr. Rostislav Čechovský
HDS101	BB Černý Most	Generála Janouška 902/17, Praha 14	08458002	MUDr. Katarína Ročinová
HDS102	BB Olomouc	Pražská 255, Olomouc	89974002	MUDr. Marika Goluchová
HDS103	BB Ivančice	Široká 16, Ivančice	81462012	MUDr. Jakub Ševčík
HDS104	HEDICA Boskovice	Otakara Kubína 179, Boskovice	71686001	MUDr. Stanislav Šurel
HDS105	PRIVAMED Plzeň	Kotíkovská 17, Plzeň	31002002	MUDr. Wirth Jan
HDS107	FMC Kadaň	Golovinova 1559, Kadaň	52679003	MUDr. Simona Vlková
HDS108	BB Roudnice n.L.	Alej 17.listopadu 1101, Roudnice n.L.	55157002	MUDr. Ondřej Myslivec
HDS109	BB Bohumín	Slezská 441, Bohumín	91978005	MUDr. Robert Rakowski
HDS110	FMC Most 1+2	Moskevská 14, Most	57259293	MUDr. Petr Machek
HDS111	FMC Hlinsko	Husova 19, Hlinsko	62383003	MUDr. Kateřina Martinková
HDS112	FMC Nymburk	Nádražní 382/1, Nymburk	23133408	MUDr. Jana Verešová
HDS113	FMC Vysoké Mýto	Hradecká 167, Vysoké Mýto	65385002	MUDr. Lucie Zachařová
HDS114	PD Háje	Hviezdoslavova 1600, Praha 4	14153001	MUDr. Fantová Lucie
HDS115	Teplice KZCR	Duchcovská 53, Teplice	58101607	MUDr. Monika Vohradníková
HDS116	PD Zlín - Praximed sro.	Sadová 2, Zlín	82355104	MUDr. Jaromír Vašát
HDS117	PD Přerov - NAIPPO sro.	Nám. Přerov. povst. 28301/1, Přerov	81601001	MUDr. Aleš Hrubý
HDS800	FMC Motol II (UVN)	V Úvalu 84, Praha 5	14038004	MUDr. Monika Tóthová

9. References and abbreviations

9.1. References

1. RDP database
2. Czech Statistical Institute - https://vdb.czso.cz/vdbvo2/
3. ERA (data source for 2022)- https://www.era-online.org/research-education/era-registry/annual-reports/
4. Data in the Czech statistical reports from the previous years
5. KST data - www.kst.cz

9.2. List of abbreviations

ARIP – Anestesiology, resuscitation and intensive care (Anesteziologická, resuscitační a intenzívní péče)
AVF - arterio-venous fistula
AVG - arterio-venous graft
ČNS – Czech Society of Nephrology (Česká nefrologická společnost)
CR – Czech Republic (Česká republika)
DC – dialysis centre
DKD - diabetic kidney disease
DM - diabetes mellitus
ERA - European Renal Association
HD - hemodialysis
HDF - hemodiafiltration
HHD - home-hemodialysis
KRT – Kidney Replacement Therapy
KST – Transplantation coordinating centre (Koordinační středisko transplantací)
NCS - National Screening Center (Národní screeningové centrum ÚZIS)
PMP - per million population
PMARP - per million age related population
PD - peritoneal dialysis
PRD - primary renal disease
RDP – Registry of Dialysis Patients (Czech Republic)
RDT – regular dialysis treatment (pravidelné dialyzační léčení)
RIP – Registry of patients with advanced renal insufficiency (predialysis stage)
ÚZIS – Institute of Health Care Informatics and Statistics (Ústav zdravotnických informací a statistiky)
WL - waiting list

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