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# Chronic hemodialysis patients at Fresenius Dialysis Centers from the Kuyavian-Pomeranian Voivodeship as primary health care and outpatient specialist care recipients – pilot study

## Pacjenci przewlekle hemodializowani w Stacjach Dializ Fresenius w województwie kujawsko-pomorskim jako świadczeniobiorcy podstawowej opieki zdrowotnej oraz ambulatoryjnej opieki specjalistycznej – badanie pilotażowe

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**STRESZCZENIE**

**PACJENCI PRZEWLEKLE HEMODIALIZOWANI W STACJACH DIALIZ FRESENIUS W WOJEWÓDZTWIE KUJAWSKO-POMORSKIM JAKO ŚWIADCZENIOBIORCY PODSTAWOWEJ OPIEKI ZDROWOTNEJ ORAZ AMBULATORYJNEJ OPIEKI SPECJALISTYCZNEJ – BADANIE PILOTAŻOWE**

**Wprowadzenie.** W zależności od stadium i progresji choroby pacjenci z przewlekłą chorobą nerek (PChN) otrzymują opiekę na różnych poziomach polskiego systemu opieki zdrowotnej, w tym w zespołach podstawowej opieki zdrowotnej (POZ), przychodniach specjalistycznych (AOS), szpitalach, a także centrach dializ i transplantacji. Celem pracy była analiza korzystania z usług POZ i AOS przez pacjentów poddawanych hemodializie leczonych w Stacjach Dializ Fresenius z województwa kujawsko-pomorskiego..

**Materiał i metody.** Badania przeprowadzono na podstawie ankiety oraz kwestionariusza Acceptance of Illness Scale (AIS). W badaniu wzięło udział 159 pacjentów. W badaniu wykorzystano dane pozyskane z Wojewódzkiego Oddziału Narodowego Funduszu Zdrowia na temat korzystania z usług POZ w latach 2015, 2016 i 2017 przez pacjentów poddawanych hemodializie.

**Wyniki.** Średni wiek respondentów wynosił 67,1±13,1 lat. Prawie wszyscy pacjenci poddawani hemodializie (98,7%) wymagali dodatkowego leczenia z powodu chorób współistniejących CKD. W ciągu ostatniego roku poprzedzającego badanie 5,7% respondentów korzystało z usług pielęgniarskich POZ, a żadna kobieta nie korzystała z usług położnych POZ. Udział w programie POZ „Leki 75+" wskazało 37,3% uprawnionych. W omawianym okresie z usług AOS korzystało 66,7% badanych, w tym większy odsetek mieszkańców miast niż wsi (71,1% vs 58%; p <0,05).

**Wnioski.** Wielokrotna zachorowalność i wysoki odsetek pacjentów korzystających ze świadczeń AOS w analizowanym okresie wskazują na potrzebę zapewnienia pacjentom poddawanym hemodializie skoordynowanej opieki pod nadzorem lekarza stacji dializ. Wykonywanie zadań POZ przez takich lekarzy sugeruje potrzebę zwiększenia ich liczby i poprawy finansowania terapii nerkozastępczej.

**Słowa kluczowe:** system opieki zdrowotnej, podstawowa opieka zdrowotna , specjalistyczna opieka zdrowotna, hemodializa, pacjent

**ABSTRACT**

**CHRONIC HEMODIALYSIS PATIENTS AT FRESENIUS DIALYSIS CENTERS FROM THE KUYAVIAN-POMERANIAN VOIVODESHIP AS PRIMARY HEALTH CARE AND OUTPATIENT SPECIALIST CARE RECIPIENTS – PILOT STUDY**

**Introduction.** Depending on the stage and progression of the disease, patients with chronic kidney disease (Przewlekła Choroba Nerek ) – CKD receive care at various levels of the Polish healthcare system, including primary care (Podstawowa Opieka Zdrowotna) – PHC teams, specialist clinics (Ambulatoryjna Opieka Specjalistyczna) – AOS, hospitals, as well as dialysis and transplant centers. The study aimed at analyzing the use of PHC and AOS services by hemodialysis patients treated in Fresenius Dialysis Centers from Poland.

**Material and methods.** The study was based on a questionnaire survey and the Acceptance of Illness Scale questionnaire (Skala Akceptacji Choroby) – AIS. The total number of 159 patients participated in the study. The data was obtained from the Voivodeship Department of the National Health Fund on the use of PHC services in 2015, 2016 and 2017 by hemodialysis patients.

**Results.** The mean age of the respondents was 67.1±13.1 years. Almost all hemodialysis patients (98.7%) required additional treatment for CKD comorbidities. Over the last year before the survey, 5.7% of the respondents used PHC nursing services and no woman used PHC midwifery services. Participation in "Leki 75+" PHC program was indicated by 37.3% of those eligible. In the said period, AOS services were used by 66.7% of the respondents, including a greater percentage of urban rather than rural inhabitants (71.1% vs 58%; $p<0.05$).

**Conclusions.** Multiple morbidity and a high percentage of patients receiving AOS services in the analyzed period indicate the need to provide hemodialysis patients with coordinated care supervised by a dialysis center physician. Fulfilling PHC tasks by such physicians suggests the need to increase their numbers and to improve the financing of renal replacement therapy.

**Key words:** health care system, primary health care, specialist health care, hemodialysis, patient



## INTRODUCTION

Chronic kidney disease (CKD) is a disease syndrome, which, due to its high incidence and morbidity rates, as well as high treatment costs and unfavorable prognosis, is a global health problem. In Poland, there may be more than 4 million people in various stages of CKD [1]. Due to the progressive nature of chronic kidney disease, renal replacement therapy is necessary. The most common method of this treatment is hemodialysis therapy (HD) [2,3].

In Poland, hemodialysis procedures are performed only in dialysis centers which are public and non-public healthcare entities. Public healthcare entities are often units being a part of the structure of a hospital, while non-public healthcare entities usually function as autonomous healthcare entities independent of a hospital. The cost of hemodialysis treatment includes the hemodialysis procedure and transporting the patient [4,5]. The costs are financed by the budget of the National Health Fund (Narodowy Fundusz Zdrowia) – NFZ, the main payer of healthcare services.

The health care system in Poland is based on universal health coverage. The obligatory health insurance contribution, amounting to 9% of wages and salaries, is transferred by the Social Insurance Institution (Zakład Ubezpieczeń Społecznych) – ZUS to the NFZ, which finances health services provided to the insured and reimburses drugs. Health care is provided at the level of primary health care (PHC), specialized and highly specialized level, on an outpatient and inpatient basis (units of hospitals) [6]. For each patient, and thus also with CKD, the fundamental contact with the health care system is the primary health care. Depending on the stage and progression of the disease, patients with chronic kidney disease receive care at various levels of the health care system, including the primary care team, specialist clinics, hospitals, dialysis centers as well as transplant centers. A hemodialysis patient requires care due to the primal disease, which is CKD, as well as complications related to a highly specialized treatment, which is hemodialysis therapy. Hemodialysis is usually performed 3 times a week, every other day. After each hemodialysis the patient returns to his natural environment –home. Primary health care physician, due to his broad medical competences, may become a coordinator of the work of professionals who take care for a hemodialysis patient. His cooperation with a nephrologist, as part of outpatient specialist care (ASO), is effective thanks to the progress of computerization and information flow, and the development of a uniform e-documentation for the patient. The difficulty in taking care of the hemodialysis patient of PHC/AOS is not the lack of competences or qualifications, but the shortage of personnel, especially specialists at the primary health care level, as well as the rigid principle of financing healthcare services adopted by the NFZ (one healthcare provider and one beneficiary).

Benefits in the field of PHC are provided from Monday to Friday from 8.00 am to 6.00 pm, whereas after 6.00 pm until 8.00 am and on public holidays this care is provided as part of holiday and night health care [7]. The direct provider of this fundamental health care is the primary care team consisting of a GP, a nurse and a midwife [8]. The scope of guaranteed benefits offered by individual members of the PHC team is determined by the Regulation of the Minister of Health of October 31, 2019 amending the regulation on guaranteed benefits in the field of primary health care [7]. The scope of their tasks is also regulated by law [9]. It is worth noting that as of September 1, 2016, the primary health care physician and the primary health care nurse gained additional competences in terms of access to free medicines, foodstuffs for particular nutritional uses and medical devices under the Leki 75 plus project [10, 11]. The program grants everyone who is 75 years of age and older, regardless of their material status, the right to free medicines, foodstuffs for particular nutritional uses and medical devices listed in the register announced by the Minister of Health [11, 12].

## AIM

The aim of the study was to analyze the use of primary health care and outpatient specialist care services by hemodialysis patients treated in Fresenius Dialysis Centers from Poland and to identify socio-demographic factors determining that use.

## MATERIALS AND METHODS

The study was conducted from February to June 2018 at the Fresenius Dialysis Center, Dialysis Center No. 10 in Bydgoszcz, Dialysis Centers No. 64 and 58 in Toruń.

Criteria for inclusion in the study were as follows:

- minimum age of 18 years,
- consent to voluntary participation.
- hemodialysis treatment received for at least 6 months,
- verbal contact with the patient.

An original questionnaire and the Acceptance of Illness Scale (AIS, authors: Felton et al., Polish adaptation by Zygfryd Juczyński) [13] were used for the study. The self-written questionnaire contained 42 open and closed questions. Paper questionnaires were handed out to respondents personally and completed in the presence of the author.

The AIS scale includes eight statements describing the negative consequences of poor health: problems with adapting to the limitations imposed by the disease, limitations in performing favorite activities, feeling of uselessness, sense of dependence, feeling of being a burden to loved ones, reduced self-esteem, limited self-sufficiency, feeling embarrassed about the disease among others. The answers are given on a 5-point Likert scale, where 1 stands for bad adaptation to the disease, and 5 – full acceptance of the disease. The total score is in the range of 8-40.

For the purposes of this study, the study population was divided into three groups, depending on the degree of disease acceptance: group I – lack of acceptance of the disease (8-18 points), group II – moderate level of disease acceptance (19-29 points), group III – good level of disease acceptance (30-40 points).

The study used data obtained from the Kuyavian-Pomeranian Voivodeship Department of the National Health Fund on the use of the services of a primary care physician in 2015, 2016 and 2017 (until November 2nd) by hemodialysis patients.

A total of 159 patients, including 74 women (46.5%) and 85 men (53.5%), participated in the study. The mean age of the respondents was 67.1±13.1 years. Five age groups were distinguished: up to 40 years old, 41-56 years old, 57-65 years old, 66-74 years old and 75 years old and more. The most numerous group were those aged ≥ 75 years (32.1%). Tab. 1. shows the sociodemographic characteristics of the patients.

The respondents answered questions concerning household members, marking several statements. A total of 176 responses were recorded. The highest percentage of patients (57.2%) declared living with their spouse. Every fourth respondent (23.9%) lived with a child, and 17.6% lived alone.

The most numerous group of hemodialysis patients lived on retirement benefits (64.2%) or disability benefits (26.4%). Professional work was an additional source of income for only one retired person.

Causes of CKD development in the study group were as follows: diabetic kidney disease (n=49; 30.8%), hypertensive nephropathy (n=30; 18.9%), glomerulonephritis (n=28; 17.6%), polycystic kidney disease (n=13; 8.2%), gout nephropathy (n=2; 1.3%), neoplastic processes (n=12; 7.5%), obstructive nephropathy (n=8; 5.3%), vasculitis (n=6; 3.8%), ischemic nephropathy (n=3; 1.9%), congenital abnormalities of the urinary system (n=1; 0.63%). In seven cases (4.4%) the cause was undetermined.

Almost all of the hemodialysis patients (98.7%) required additional treatment due to CKD comorbidities. The respondents indicated diseases for which they were treated from the following list: heart diseases, hypertension, diabetes, chronic obstructive pulmonary disease (COPD)/asthma, thyroid/parathyroid diseases, joint diseases, neurological diseases (stroke, Parkinson's disease), genital/prostate diseases, neoplastic diseases. The most common diseases which required treatment were hypertension (76.1%), heart disease (57.9%), diabetes (36.5%), thyroid/parathyroid diseases (28.3%), joint diseases (30.2%) and neurological diseases (18.9%). The smallest number of respondents indicated treatment of genital/prostate diseases (11.3%), COPD/asthma (15.1%) and neoplastic diseases (16.3%).

The largest percentage of patients (27%) was treated for two disease entities apart from CKD. Every fourth hemodialysis patient (24.5%) required therapy for three comorbidities. Among the respondents, 18.9% required treatment for four

Tab. 1. Sociodemographic characteristics of the study population

| Variables | | Total | |
|---|---|---|---|
| | | number | % |
| age group | up to 40 years | 5 | 3.1 |
| | 41-56 years | 28 | 17.6 |
| | 57-65 years | 30 | 18.9 |
| | 66-74 years | 45 | 28.3 |
| | ≥ 75 years | 51 | 32.1 |
| sex | female | 74 | 46.5 |
| | male | 85 | 53.5 |
| education | primary | 32 | 20.1 |
| | vocational | 56 | 35.2 |
| | secondary | 57 | 35.9 |
| | higher | 14 | 8.8 |
| marital status | single | 12 | 7.5 |
| | married | 89 | 56 |
| | widower/widow | 38 | 23.9 |
| | divorced | 18 | 11.3 |
| | informal relationship | 2 | 1.3 |
| professional activity | employment | 10 | 6.3 |
| | retirement | 102 | 64.2 |
| | disability pension | 42 | 26.4 |
| | social benefit | 5 | 3.1 |
| place of residence | country | 38 | 23.9 |
| | city | 121 | 76.1 |
| level of acceptance of illness (AIS) | no acceptance | 15 | 9.4 |
| | moderate acceptance | 76 | 47.8 |
| | high acceptance | 68 | 42.8 |

comorbidities, 15.7% for one comorbid disease, and 1.9% of the respondents required therapy for six diseases.

The median of the time since diagnosis of CKD in the study population was 63 (7-390) months. The median of the duration of dialysis therapy was 51.5 (7-298) months. Among the patients, 9.4% received peritoneal dialysis treatments before being included in the hemodialysis therapy program, while 10.7% underwent kidney transplantation but had to continue hemodialysis due to failure of the transplanted kidney.

Treatment with hemodialysis (HD) requires vascular access. Arteriovenous fistula constituted vascular access for HD in 71.1% of the patients, and a permanent vascular catheter – in 24.5% of the patients. Four patients had a temporary vascular catheter and two patients had an arteriovenous fistula created from artificial vessels. Six patients had two vascular accesses at the same time (two had a temporary catheter and an arteriovenous fistula from own vessels, and four had a permanent vascular catheter and an arteriovenous fistula from own vessels during the „maturation" process).

The study was carried out in accordance with the Declaration of Helsinki. The protocol of the study was approved by the Bioethics Committee of the Nicolaus Copernicus University in Toruń at the Ludwik Rydygier Collegium Medicum in Bydgoszcz (decision no. 68/2018). Patients' informed consent was obtained.

Statistical analysis was performed using the Statistica v. 10 software and the Excel spreadsheet (StatSoft, Poland, Kraków). Basic qualitative (nominal) data were presented as the population size (n) and percentage (%). The significance of correlations between qualitative variables was verified using the Pearson's chi-square test at the level of $p<0.05$. Measurable (quantitative) variables were presented as mean and standard deviation (M±SD). For variables with non-normal distribution, the median and range were given. Analysis of variance was used to determine the significance of differences between more than two groups.

## RESULTS

The study included 159 hemodialysis patients treated at Fresenius Dialysis Centers from Poland: Dialysis Center No. 10 in Bydgoszcz, Dialysis Centers No. 64 and 58 in Toruń. Out of 228 hemodialysis patients, 50 did not consent to participate in the study, 18 underwent hemodialysis for less than 6 months, and 4 were unable to respond to verbal contact.

Half of the respondents (57.2%) did not remember the name of their PHC physician and 39% of the patients did not use the services of a PHC physician in the last 6 months before the survey. Among those who did, every fourth patient (25.2%) declared using the services of a primary care physician once and 2-4 times (Figure 1.). Sex, age, place of residence, number of comorbidities, time since diagnosis of CKD and duration of hemodialysis were not significant in relation to the use of PHC physician services. Among hemodialyzed patients treated at the Dialysis Center in Bydgoszcz, statistically significant negative correlations were found between the use of a primary care physician services within 6 months before the survey and the following parameters: time of diagnosis of CKD (r= -0.28; p=0.03), duration of renal replacement therapy (r= -0.30; p=0.021), AIS level (r= -0.27; p=0.041).

The vast majority of respondents (91.2%) stated that they had not been visited by a primary care physician during the last year before the survey. For 9 out of 13 patients, who declared receiving a home visit, the doctor's visit included a physical examination and a medical interview.

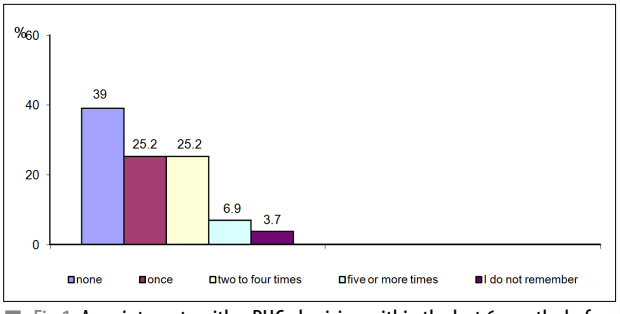


Fig 1. Appointments with a PHC physician within the last 6 months before the survey

Among the respondents, 74.8% indicated the need to make an appointment with a primary care physician in advance. Every tenth hemodialyzed patient (10.7%) declared that he/she never had to make an appointment beforehand, and every seventh (14.5%) – only sometimes. For 62.3% of the hemodialyzed patients, it was always easy to get an appointment with a PHC physician. Every fifth respondent (22.8%) declared that it was sometimes easy and sometimes not to get an appointment with a primary care physician. The opinion that it was not easy to get an appointment with a primary care physician was expressed by 8.2% of the patients.

According to data obtained from the Kuyavian-Pomeranian Voivodeship Department of NFZ, among the population of chronic hemodialysis patients, 40.5% received at least one PHC service in 2015, 46.6% – in 2016, and 46.3% – in 2017 (from January to November 2nd).

A two-to-seven-day period of waiting for an appointment with a primary care physician was declared by 45.3% of the respondents. Every fifth patient (22%) declared having to wait one day. Only for 26.4% of the respondents, medical visits were carried out on a no-wait basis, on the day of reporting. Longer times of waiting for an appointment with a primary care physician were reported in the group of city residents ($p<0.020$) (Fig. 2.).

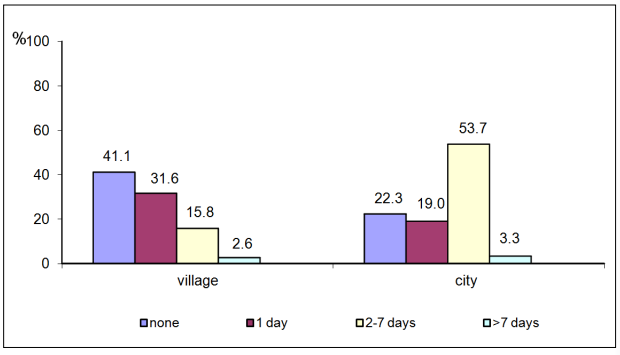


Fig 2. Waiting time for an appointment with a PHC physician in relation to place of residence

The vast majority of the respondents (87.4%) needed less than 40 minutes to reach the PHC facility, and 6.9% of the patients needed 40-60 minutes. Only 5.7% of the patients required more than 1 hour to reach a primary health care facility.

Hemodialysis patients were asked about medical examinations carried out by a PHC physician during visits that took place after enrollment in the dialysis program. Most of the patients (75.5%) declared that these were subjective examinations, i.e. a medical interview, a conversation. Only 20.1% of the patients indicated that the interview was completed along with a physical examination. Among the respondents, 44% said that since the commencement of hemodialysis, the GP did not issue prescriptions for chronic medications, 60.4% of the patients did not receive referrals for laboratory tests, and 82.4% of the respondents had not receive a referral for radiological examinations from the primary care physician since the start of hemodialysis. The analysis of the collected material showed that the age, duration of HD, and the number of comorbidities did not determine obtaining a referral for laboratory tests nor a prescription for chronic drugs from a primary care physician.

As part of primary health care, patients may use night and holiday health care services from 6.00 p.m. to 8.00 a.m. the next day and on days off work. A vast majority of the respondents (91.2%) had not used such services in the last twelve months before the survey.

As part of PHC services, patients over 75 years of age can receive free medicines under the Leki 75 plus program. Among 51 patients eligible, 37.3% declared participation in the said program.

Only 9 (5.7%) patients declared using the services of a primary care nurse, while no woman used the services of a primary care midwife.

Among the respondents, 37.1% declared that a relative or a household member visited a primary care physician on their behalf. Such help was most often indicated by patients aged over 75 (40.7%).

Only 3.8% of the patients declared that they had unlimited access to the services of a primary care physician. When answering the question about the reasons for not using the services of a primary care physician, patients marked several statements. There were 184 responses in total. Most of the respondents indicated that they did not feel the need to use such services, as the doctor was available at a dialysis station. This was declared by 115 respondents, which accounted for 62.5% of all the answers (Fig. 3.).

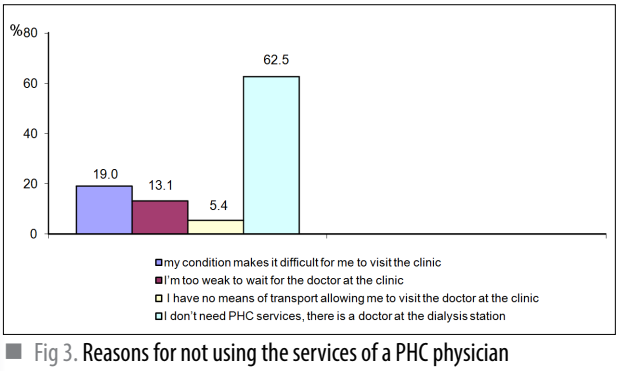


Fig 3. Reasons for not using the services of a PHC physician

Among the respondents, 66.7% declared using outpatient specialist care (AOS) in the last year before the survey. In this group, 39.5% used the services of one specialist clinic, 27.4% – of two, 19.8% – of three, and 6.3% of the respondents – of four. Age, sex, education, duration of dialysis and the time of diagnosis of CKD were not related to the use of AOS services. The analysis showed that people living alone statistically significantly less frequently underwent medical consultations within AOS services (p=0.003). A greater percentage of inhabitants of urban areas declared using AOS services as compared to residents of rural areas (71.1% vs 58%; p<0.05). Most of the patients received health care services in cardiology (58.5%) and diabetes (30.2%) clinics (Figure 4.). When asked about other clinics, the majority of the respondents indicated ophthalmology (26.2%), urology (18.5%), oncology (15.4%), hematology (13.8%) and endocrinology (6.2%).

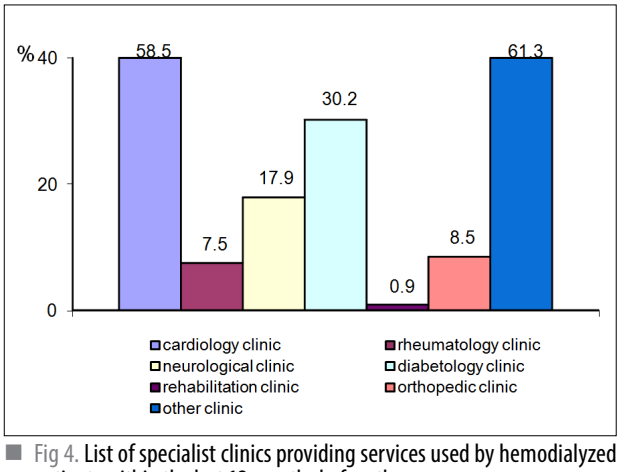


Fig 4. List of specialist clinics providing services used by hemodialyzed patients within the last 12 months before the survey

Patients' HD treatments were performed in dialysis stations. Among the respondents, 65.4% lived within 10 km from their dialysis stations, and 34% lived within 11-50 km. One patient undergoing HD treatments had to travel more than 50 km. The HD procedure might involve transporting the patient from their place of residence to the HD unit and their return. Such transport was always used by 80.5% of the respondents, and every tenth patient (10.1%) used it only occasionally. Only 9.4% of the respondents (9 men and 7 women) declared traveling to the dialysis station and returning to their place of residence on their own.

During the HD procedure, patients are under the care of a doctor and a dialysis nurse. As many as 93.7% of the respondents declared that they received prescriptions for chronic medications from a doctor at a dialysis station in the last 6 months before the survey, while half of the respondents (50%) received referrals to specialist doctors from a physician at a dialysis center in the same period. The analysis showed a statistically significant positive correlation between receiving prescriptions for chronic drugs from a dialysis center physician and the patient's age (r=0.45; p=0.02). A negative correlation was found between obtaining a referral to another specialist from a doctor at a dialysis station within the last 6 months

before the survey and the patient's age (r= -0.24; p=0.012). In the group of patients undergoing dialysis in the Bydgoszcz center, the number of comorbidities determined the receipt of a referral to another specialist issued by a doctor at a dialysis station (r=0.35; p=0.007).

## DISCUSSION

Renal replacement therapy involves not only hemodialysis or peritoneal dialysis, but also comprehensive care for a patient with stage 5 CKD, including the diagnosis and treatment of comorbidities, prevention, dietary treatment, rehabilitation, and education.

Due to the chronic course of the disease process in hemodialysis patients, continuous care is of key importance. In Poland, the main pillar of the health care system is primary health care, one of the tasks of which is to coordinate health care services over the recipient [6]. This coordination seems to be inadequate with regard to patients undergoing hemodialysis, since the authors' own research has shown a limited use of services provided within this healthcare subsystem. When it comes to 39% of the respondents, they had not used the services of a primary care physician in the last 6 months before the survey. Doctor's home visits within the last year before the survey were reported by 8.2% of the patients. Patients sporadically (5.7%) used the services of a primary health care nurse in the last 12 months before the survey, and no woman in the analyzed period of 12 months asked for the help of a primary care midwife. The patients definitely did not use the services (91.2%) provided by night and holiday health care in the last 12 months before the survey.

An interesting discovery in the present study was the lack of a significant correlation between the use of PHC services in the last 6 months before the survey and the age of patients, despite the implementation of the Leki 75 plus program dedicated to seniors at the primary health care level. Out of 51 patients who were over 75 years of age, only 37.3% took advantage of the program. The demonstrated relationship between receiving prescriptions for chronic medications from doctors at dialysis centers and the age of the patient (r=0.45; p=0.02) indicated that tasks assigned to primary care physicians were in fact performed at the dialysis station. The fulfillment of PHC tasks at the dialysis center is also indicated by a large, 93.7% percentage of patients who had obtained prescriptions for chronic medications in the last 6 months before the survey from a dialysis station physician, despite the existence of a special program for seniors providing free medications. Limited participation in the Leki 75 plus program can be explained by the health condition and reduced functional capacity of those patients, as well as the need for social support.

The analysis showed that within the last 6 months before the survey, 50% of the respondents had beed referred to specialist clinics by a doctor from a dialysis station. This is related to the preparation of patients for kidney transplantation, which was demonstrated by a negative correlation between the patient's age and obtaining a referral from a dialysis station physician to other specialists (r=-0.24; p=0.012). Upon entering the hemodialysis program, due to constant, frequent contact with the medical staff of dialysis centers, usually 3 times a week for 4-5 hours, it is them that patients with CKD turn to for assistance, which, in turn, makes those patients use the PHC doctor's services to a limited extent.

Due to comorbidities, hemodialysis patients require specialist care. This care is most often provided on an outpatient basis in specialist clinics. The availability of AOS services is greater in the urban environment [14,15]. In the last year before the survey, 66.7% of the respondents had used AOS services. In this group, 39.5% had received care at one specialist clinic, 27.4% – at two, 19.8% – at three, and 6.3% of the respondents – at four such clinics. A higher percentage of patients living in urban areas declared using AOS services as compared to rural residents (71.1% vs 58%; p<0.05). All this indicates the need to develop a model of coordinated care for a hemodialysis patient supervised by a dialysis center doctor.

In Poland, there is currently no system of coordinated care for a diagnosed patient. The problem of the lack of coordination of treatment and the fragmentary nature of therapeutic processes in the Polish health care system was highlighted by the Supreme Audit Office (NIK) in the 2018 report on the health care system in Poland [16]. In order to be effective and permanent, coordination of care must take place at all levels of the system. The need to cover CKD patients with coordinated care in the Polish system was emphasized by the report on nephrological patients: Coordinated care for a patient with chronic kidney disease [17], as well as the report: Access to nephrological services in Poland – 2019 [18]. Both documents mentioned the nephrologist as the physician who should take care of the renal patient and coordinate the treatment of all their diseases. The results of the presented study confirm such a role of dialysis station physicians. The key role of coordinated care over this group of patients was also noticed by the authors of the atlas of kidney diseases in the world both in 2017 [19] and 2019 [20]. This model of care was presented as one of the options for reducing kidney disease progression and treatment costs. The Portuguese experience with coordinated care provided to patients with CKD showed a shift in responsibility for treatment outcomes to service providers, which contributed to the reduction of dialysis and hospitalization costs despite the increase in the number of dialysis patients, as well as improvement of treatment outcomes and patient satisfaction [21,22].

Coordinated health care is needed by the patient, the health care provider, the payer himself, as well as government institutions. Thanks to this form of care, everyone involved can experience an improvement in the quality of medical services, especially in the case of chronic diseases, including those requiring hemodialysis.

Taking into account the ongoing monitoring of the clinical condition of hemodialysis patients, who require consultations with specialists for the treatment of diseases other than CKD, the dialysis center physician seems to be the most capable and competent person to take the role of a care coordinator, which may be further facilitated by

their access to e-records of patients. This is especially evident in recent times, during the Covid-19 epidemic. The epidemiological situation has contributed to a change in the organization of patient visits in primary care and specialist clinics. It has forced an interest in information systems focused on medicine and made telephone and video counseling more common. The increasing age of patients starting treatment, a high percentage of patients over 65 years of age (60.4%), multi-morbidity, and limited functioning associated with the development of the disease process may reduce the possibility of using such IT systems.

## SUMMARY

Chronic kidney disease (CKD) is a disease syndrome whose scale is a global health problem. Due to its progressive nature, it leads to the need for renal replacement therapy, the most common method of which is hemodialysis. For each patient, and thus also with CKD, the fundamental contact with the health care system is the primary health care. Depending on the stage and progression of the disease, patients with chronic kidney disease receive care at various levels of the health care system, including the primary care team, specialist clinics, hospitals, dialysis centers as well as transplant centers. A hemodialysis patient requires care due to the primal disease, which is CKD, as well as complications related to a highly specialized treatment, which is hemodialysis therapy.

Due to the constant and systematic contact with the doctor during hemodialysis (3 times a week for 4-5 hours), patients most often report all their health problems to him, thus limiting the use of health care services.

Currently, in Poland there are no mechanisms to regulate the management and coordination of care for patients with CKD.

## CONCLUSIONS

1. Multiple diseases and a large percentage of patients using AOS services in the last 12 months before the study indicates the need to provide hemodialysis patients with coordinated care supervised by a dialysis center physician.

2. The fulfilment of primary care tasks by doctors at dialysis centers may indicate the need to increase the number of medical staff of dialysis centers and to modify the financing of renal replacement therapy.

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