Assessment of knowledge of haemodialysis patients on vascular access care

(Ocena wiedzy pacjentów poddawanych hemodializie na temat pielęgnacji dostępu naczyniowego)

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Abstract – Introduction. Haemodialysis is a procedure to purify the blood of a person whose kidney functions are impaired. In order to perform haemodialysis it is necessary to have properly functioning vascular access. The durability and quality of vascular access is primarily affected by its proper care. Caring for vascular access is the responsibility not only of qualified nursing staff, but also of the patient himself.

The aim of the study. The main aim of the study is to assess the level of knowledge in the field of vascular access care that haemodialysed persons have.

Material and methods. The study included 110 adults undergoing haemodialysis procedures at two Dialysis Stations of Diaverum. A diagnostic survey was used to carry out the study, with the use of a research tool in the form of a self-reported questionnaire. Statistical analysis of the results was performed using the method of descriptive statistics. The differences between the variables were verified using the Pearson's $\chi 2$ independence test, assuming the statistical significance level $p < 0.05$.

Results. Hemodialyzed patients most often gained their knowledge about vascular access care from medical staff (mainly nurses). Among the demographic factors studied, only living alone or with a family, the duration of kidney disease and the duration of haemodialysis treatment had a statistically significant impact on the level of respondents' knowledge of the principles of vascular access care and the role of the conducted pharmacological treatment.

Results and conclusions: Hemodialyzed patients most often gained their knowledge about vascular access care from medical staff (mainly nurses).

Among the demographic factors studied, only living alone or with a family, the duration of kidney disease and the duration of haemodialysis treatment had a statistically significant impact on the level of respondents' knowledge of the principles of vascular access care and the role of the conducted pharmacological treatment.

Key words **-** hemodialysis, vascular access care, surveys.

Streszczenie – Wstęp. Hemodializa to zabieg oczyszczania krwi osoby, u której funkcje nerek są zaburzone. Do przeprowadzenia hemodializy niezbędne jest posiadanie prawidłowo funkcjonującego dostępu naczyniowego. Na trwałość i jakość dostępu naczyniowego ma wpływ przede wszystkim jego właściwa pielęgnacja. Dbanie o dostęp naczyniowy jest obowiązkiem nie tylko wykwalifikowanego personelu pielęgniarskiego, ale także samego pacjenta.

Cel pracy. Głównym celem badań jest ocena poziomu wiedzy w zakresie pielęgnacji dostępu naczyniowego jaką posiadają osoby hemodializowane.

Materiał i metody. Badaniem objęto 110 osób dorosłych, poddawanych zabiegom hemodializy na terenie dwóch Stacji Dializ Diaverum. Do zrealizowania badania zastosowano sondaż diagnostyczny, z użyciem narzędzia badawczego w postaci kwestionariusza ankiety własnego autorstwa. Analizy statystycznej wyników dokonano przy wykorzystaniu metody statystyki opisowej. Weryfikacji różnic między zmiennymi dokonano przy użyciu testu niezależności $\chi 2$ Pearsona, przyjmując poziom istotności statystycznej $p < 0,05$.

Wyniki i wnioski. Pacjenci hemodializowani swoją wiedzę na temat pielęgnacji dostępu naczyniowego najczęściej zdobywali od personelowi medycznemu (głównie pielęgniarek).

Wśród badanych czynników demograficznych tylko mieszkanie samotnie lub z rodziną, czas trwania choroby nerek i długość okresu leczenia hemodializą istotnie statystycznie wpływały na poziom wiedzy respondentów o zasadach pielęgnacji dostępu naczyniowego i roli prowadzonego leczenia farmakologicznego.

Słowa kluczowe – hemodializa, pielęgnacja dostępu naczyniowego, badania ankietowe.

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I. INTRODUCTION

We need our kidneys for life because they have some very important functions. In the course of metabolic reactions, the body takes the ingredients it needs from food and the products of metabolism are removed to the blood. Every day about 1500 litres of blood flow through the kidneys, being purified by millions of small filters, called nephrones. Most products are excreted with urine. Kidneys are the "filtering station" of our body. Kidney diseases are largely caused by damage to the nephrones, which leads to a dangerous accumulation of water and harmful metabolic products. Hemodialysis is then necessary. In the 1960s, when the first treatments were started in Poland, only a few people could benefit from them. Nowadays, every patient who requires hemodialysis has it provided. This is extremely important because these are life-saving treatments and sometimes extend them by thirty years or more. Patients undergoing haemodialysis treatments also have a greater knowledge of their dialysis itself, as well as of the results of tests, their diet and the vascular access that they need for haemodialysis. It is commonly called the 'lifeline'. Unfortunately, any vascular access carries the risk of complications. It is very important that it serves the patient for as long as possible, which is why proper care is so important. Access to information, such as television, the press and the Internet, certainly has a major impact on the knowledge of hemodialised people. Nursing staff also have a huge role in increasing patients' knowledge through training. However, the prospect of dialysis can still be a source of concern and anxiety, which is why more and more dialysis centres are providing psychological and dietary care. [1-5]

The aim of the study is to assess the level of knowledge of patients undergoing hemodialysis in the field of vascular access care.

II. MATERIAL AND METHODS

Material

The study involved 110 people aged between 18 and 80. They were patients of Diaverum Dialysis Station in Przeworsk and Jarosław. Among the respondents were 62.0% men and 38.0% women. The study was conducted in the period from 1 October to 15 December 2019.

Methodology

The test method was a diagnostic survey. The tool was an author's questionnaire, presented to the patient during his visit to the Dialysis Station. The completed questionnaires were returned directly to the interviewer. Participation in the study was anonymous and voluntary.

The distribution of answers provided was related to selected sociological features of the examined group: sex, age, gender, education, source of income, place of residence of hemodialysed persons (town/rural), living alone or with a family, duration of kidney disease, length of haemodialysis treatment.

Statistical analysis

Statistical analysis of the results was carried out using the descriptive statistics method. Differences between variables were verified using Pearson's $\chi 2$ independence test, assuming the level of statistical significance $p < 0.05$. The calculations were carried out with SPSS 25.

III. RESULTS

Characteristics of selected demographic parameters in the study group

68.2% (N=75) had higher education, the remaining 31.8% (N=35) had secondary education.

82.7% (N=91) were in retirement or disability pension, the remaining 21.3% (N=19) worked in addition to the pension benefits.

83.6% (N=92) lived in town, the remaining 26.4% (N=18) in the countryside.

64.5% (N=71) lived with their families, the remaining 35.5% (N=39) lived alone.

In most patients (N=79, i.e. 71.8%) chronic kidney failure was diagnosed more than 5 years ago. From 1 to 5 years the disease was diagnosed in 12.7% of patients (N=14), and under one year 15.5% of patients (N=17) were ill.

A group of 22.7% of patients (N=25) underwent hemodialysis in less than a year. From 1 to 5 years hemodialysis was performed in 29.1% of patients (N=32), and over 5 years hemodialysis was performed in almost half of the patients (N=53, or 48.2%).

Distribution of answers to individual survey questions

According to 74.5% of respondents (N=82), a vascular catheter is inserted when renal failure is detected too late or fistula formation is impossible. Only 3.6% of patients (N=4) believed that a vascular catheter is inserted when a patient is afraid of needle insertion. The answers were unknown to 21.8% of patients (N=24).

According to 79.1% of respondents (N=87), the most beneficial vascular access to achieve the best haemodialysis results is a fistula from own vessels. Every tenth person (N=11, i.e. 10.0%) indicated a catheter and 5.5% of respondents (N=6) replaced the vascular denture. The answers were unknown to 5.5% of people (N=6).

The majority of patients (N=79, i.e. 71.8%) considered the period of 6-8 weeks as the minimum time of arterial-venous fistula "maturation". More than 12 weeks were indicated by 14.5% of patients (N=16), and 2 weeks were indicated by 5.5% of respondents (N=6). They did not know how much the minimum time of arterial-venous fistula "maturation" is 8.2% of respondents (N=9).

Having the knowledge necessary for proper care, vascular access was declared by 80.9% of haemodialyzed patients (N=89), and 19.1% of people (N=21) admitted that they do not have such knowledge.

The most frequent source of knowledge about vascular access care was the nurse (N=61, i.e. 55.5%). 30.0% of people (N=33) obtained information in this area from a doctor. Few patients learned about vascular access care from the Internet (N=9, i.e. 8.2%), from other patients (N=5, i.e. 4.5%) or from books (N=2, i.e. 1.8%).

According to 80.0% of respondents (N=88), regular use of medicines secures the functioning of vascular access. This opinion was not shared by 5.5% of people (N=6), and they did not know if there is such a dependence of 14.5% of patients (N=16).

Anticoagulants were taken by 86.4% of respondents (N=95). 3.6% (N=4) did not take anticoagulants, and 10.0% (N=11) did not know whether they were taking such drugs.

According to 72.7% of patients (N=80), daily activities affect the quality and functioning of vascular access. One in ten respondents (N=11, i.e. 10.0%) disagreed with this statement, and 17.35% (N=19) did not know whether daily activities can affect the quality and functioning of vascular access.

A group of 75.5% (N=83) knew that in order for the fistula to function properly it is necessary to avoid wearing tight clothes, watches, bracelets and pressing your hand with the fistula while sleeping. The respondents also claimed that bathing in chlorinated water (N=10, i.e. 9.1%), cycling (N=4, i.e. 3.6%) or no answers (N=13, i.e. 11.8%) should be avoided.

According to 85.5% of patients (N=94), blood pressure cannot be measured on hands with a fistula. The remaining 14.5% of patients (N=16) did not know the answer.

According to 77.3% of people (N=85) it is not possible to carry more than 1 kg on hands with a fistula. This possibility was allowed by 8.2% of respondents (N=9), and 14.5% of people did not know the answer (N=16).

In the opinion of 72.7% of patients (N=80), the use of delicate soap and greasing creams positively influences the functioning of the fistula. After 13.6% of patients (N=15) believed that such activities are washing the hand with a sponge fistula or drying with a paper towel.

Most patients (N=77, i.e. 70.0%) wash their hands with warm soap and warm water fistula before starting hemodialysis. 4.5% of patients (N=5) did not perform such an activity and 25.5% of people (N=28) had a catheter inserted and this issue did not concern them.

According to 86.4% of people (N=95) washing their hands with a fistula just before inserting the needles will remove 60% of the bacteria on the skin and dilate the vessels, which will facilitate needle insertion. In few cases it was claimed that this activity will cause skin irritation and itching (N=9, i.e. 8.2%) or prolonged hemodialysis time (N=6, i.e. 5.5%).

60.9% of haemodialyzed patients (N=67) considered that a large increase in weight between dialyses affects the possibility of a fistula clotting. The lack of such a possibil-

ity was indicated by 6.4% of patients (N=7), and every third patient (N=36, i.e. 32.7%) did not know the answer.

Every day 65.5% of people (N=72) controlled their vascular access. Once a week vascular access was controlled by 11.8% (N=13) and once a month by 2.7% (N=3). There was no control at all over 20.0% of patients (N=22).

The majority of patients (N=99, i.e. 90.0%) have been diagnosed with excessive warming, swelling and hand pain with the fistula. Only 1.8% of respondents (N=2) mentioned fever and abdominal pain, and 8.2% (N=9) did not know the answer.

The symptoms indicating inflammation of the catheter's outlet to the haemodialysis were, in the opinion of 85.5% of people (N=94), fever, reddening, purulent contents leaking around the catheter's outlet. One person (i.e. 0.9%) mentioned malaise and diarrhoea, and 13.6% of respondents (N=15) did not know what the symptoms indicating inflammation of the catheter's estuary to haemodialysis were.

91.8% of respondents (N=101) believed that the dressing on the haemodialysis catheter should be changed by a nurse in accordance with the principles of aseptic and antiseptic. Few patients claimed that it should be done independently at home (N=3, i.e. 2.7%) or it did not matter who changed the dressing on the haemodialysis catheter (N=6, i.e. 5.5%).

The importance of selected demographic indicators in shaping the respondents' knowledge on nurturing vascular access

Among the examined demographic factors, gender, age, education, source of income, place of residence of hemodialysed persons, flats alone or with family, duration of kidney disease, duration of hemodialysis treatment only flats alone or with family, duration of kidney disease, duration of hemodialysis treatment had a statistically significant impact on the level of respondents' knowledge about the principles of vascular access care and the role of conducted pharmacological treatment.

It has been shown that people living with their families were more likely to know what to avoid for the fistula to function properly (80.0%) than respondents living alone (46.7%). The differences were statistically significant ($p=0.0088$).

The longer the duration of chronic kidney failure, the greater was the knowledge of respondents about the principles of vascular care and the appropriate pharmacological regime to prevent complications from the vascular port ($p<0.0001$).

Our own research has shown that people with chronic kidney failure ($p<0.0001$) had higher knowledge of the subject matter of the survey.

It was found that the knowledge of principles of vascular access care grows with prolongation of hemodialysis treatment ($p<0.0001$).

IV. DISCUSSION

In Poland, since 2003, renal replacement treatment has been a method available to everyone who requires such treatment and has no clinical contraindications [6]. According to the National Nephrolology Consultant in the report of 2019, 4 to 5 million people in Poland suffer from kidney disease, and 90% of them do not know about it. More than 2 million people are patients in the 3rd and 4th stage of chronic kidney disease, and more than 32 thousand patients live with dialysis. The WHO lists kidney disease among chronic non-communicable diseases as a major cause of premature death worldwide [7].

The length and quality of life of dialysis patients over the last dozen or so years has significantly improved, but still depends on the underlying disease, coexisting conditions and vascular access used [8]. Haemodialysed patients often suffer from many other coexisting diseases. They most often struggle with diabetes, hypertension, anaemia and lipid metabolism disorders. The above mentioned conditions accompanying uremia deepen the already existing immune disorders in these patients, favouring the development of infections [9]. In dialyzed patients, lymphocyte activity is also weakened, protecting especially against viral and fungal infections [10]. Most of the bacterial infections detected in these patients involve vascular access [11]. The frequency of infections increases with artificial vascular anastomoses and temporary and permanent catheters. According to Kawecka and Miłkowski [12], the risk of infection in patients with inserted haemodialysis catheters is up to 10 times higher than in patients with arteriovenous fistula. Decoupled bacteria may originate from the external and internal surface of the catheter and its tunnel in case of permanent catheters [65]. Due to the lowest risk of complications from vascular access in patients with chronic renal failure, the placement of a fistula from own vessels is preferred. Rutkowski believes that the fistula should be inserted first [13]. If this is impossible, a vascular prosthesis is fitted. For temporary vascular access, a tunnelled catheter with a cuff is recommended. According to our study, almost 3/4 of patients had developed a fistula,

of which as much as 50% were from their own vessels and only 19.1% used 50 vascular prostheses, which confirms the physicians' efforts to provide the safest and least complicated vascular access in haemodialysed patients.

The respondents surveyed showed 79.1% that the most beneficial vascular access for them is a fistula from their own vessels, and 74.5% know that a vascular catheter is inserted when renal failure is detected too late and when it is impossible to produce a fistula.

Apart from the type of vascular access used, the factors affecting the frequency of infections include the catheter material, anatomical site of its insertion, experience of a person establishing a vascular line, as well as care of the puncture site and skin around the fistula and antiseptic agents used for vascular access [12].

According to the Kidney Disease Outcomes Quality Initiative guidelines, all care activities around the site of temporary and permanent catheter insertion should be performed exclusively by dialysis nurses with appropriate experience and special training [14]. Professional nursing care of vascular access also includes keeping records and education of patients and their families. From the data presented by Fresenius Nephro Care (one of the largest non-public providers of dialysis services), the average age of patients in 2016 was 66. Over 65 years of age, 58% of patients were over 65 years of age and 30% were over 75 years of age [15]. Our own research confirms that the largest group of patients, as much as 75.5% were between 56 and 80 years old. The elderly age of patients and coexisting diseases cause that not every patient is able to assimilate all the information provided by medical personnel, that is why education of the family is also so important.

According to own research, people living with a family have more knowledge of vascular access than people living alone. A nurse takes care of the vascular access during the procedure, and it is the patient who must take care of it afterwards. The patient should know that his or her commitment to self-care vascular access often determines the ability to perform haemodialysis and thus achieve an optimal quality of life in this difficult disease. In effective education, in addition to the knowledge and skills of staff, it is also essential to ensure that the patient feels safe and gains their trust. The patient must not be afraid or ashamed to ask the same question again. The educational programme should be monitored and the patient's and his family's messages should be systematically supplemented as and when necessary. During each haemodialysis procedure, it is the nurse's duty to assess the condition of the arterio-venous fistula and the dialysis catheter, and the patient's task is to check the area around vascular access on a daily basis and to draw attention to worrying symptoms, such as inflammation. According to Pawlik, as many as 96% of respondents are able to control the operation of an arteriovenous fistula by themselves [16]. Our study shows that 65.5% of people control their vascular access daily, 11.8% once a week, 2.7% only once a month, and 20% unfortunately do not control at all. However, they showed great knowledge of the symptoms of inflammation. In the case of an arteriovenous fistula, as many as 90% of patients indicated excessive warming, swelling and hand pain with a fistula, and 85.5% know that fever, redness, and the oozing of purulent content around the mouth of the catheter are worrying symptoms that can occur in people on dialysis with a dialysis catheter. Every patient must be informed that they should immediately inform the medical staff if they see any symptoms of concern. Research carried out by Bednarek *et al.* shows that only 45% of patients reported any abnormalities, 23.3% waited for the symptoms to resolve themselves and as much as they expected the nurses to notice them. Unfortunately, 1.7% of the respondents admitted that they were ashamed to say about the ailments [17]. These results show that not every patient has confidence in the medical staff. Patient education is undoubtedly of great importance for the proper functioning of vascular access and determines the length and quality of patient's life.

According to our own research, compliance with hygiene rules, for example, by washing the hand with a fistula before each dialysis, is no hindrance to patients, as only 4.5% admitted that they do not do so. Similar results were obtained by Bednarek *et al*. where 72.5% was washing the hand with the fistula before each dialysis, 25.5% admitted that they do it sometimes, and only 2% did not care about the fistula hygiene [17]. The analysis of all questions concerning the principles of vascular access care shows that the vast majority of respondents are aware of the recommendations concerning the care of vascular access and declare compliance with them. Our research indicates that patients who have been on dialysis for longer have greater knowledge. According to Kliś, the process of care of dialyzed patients should start already at the stage of planning renal replacement treatment [11]. A similar view is held by Lange and Wojtaszek, who argue that early education can slow down the progression of kidney disease and delay the start of dialysis treatment [69]. Despite greater opportunities for information, education still plays an important role. This is confirmed by our own research, which shows that as much as 55.5% of patients received the most information on vascular access care from a nurse and 30% from a doctor, which indicates the education of patients by dialysis station staff. Despite the efforts of both the medical

staff and the patient, various complications related to vascular access still occur. According to Piechura, around 36% of dialysis hospitalisations suffer from vascular access complications. It is estimated that during the first two years of dialysis more than half of the patients are hospitalized for this reason [18]. These reports are reflected in the presented own studies, as 48.2% of the respondents had at least the second vascular access they had. Each subsequent intervention of a vascular surgeon is an additional burden on the body, therefore every effort should be made to ensure that vascular access functions properly. In the study of Białobrzeska *et al.* 70% of patients declared active search for information about their disease and care of vascular access, and 92% expressed willingness to participate in educational meetings [19]. The research carried out by Pawlik shows that as many as 98% of the respondents consider health education to be an indispensable element of renal failure therapy and only 2% are of the opinion that it does not affect the course of the disease [16].

Chronic kidney disease is a common social problem. There is a real chance that professionally conducted education can effectively improve a patient's quality of life. In accordance with the current Charter of Patients' Rights and Obligations, it is essential that the patient becomes a partner. When carrying out professional tasks, medical personnel should cooperate with the patient, not imposing their will but only proposing specific recommendations. By making informed decisions, the patient takes full responsibility for the consequences of these decisions [20]. The conducted studies show that the level of knowledge of hemodialyzed patients about vascular access care is high, but insufficient and it is advisable to continuously supplement the information. The results also indicate the willingness of patients to obtain information from medical personnel.

V. CONCLUSIONS

1. Haemodialysis patients most often acquire their knowledge about vascular access care from medical staff (mainly nurses).
2. Among the examined demographic factors, gender, age, education, source of income, place of residence of hemodialysed persons, flats alone or with family, duration of kidney disease, duration of hemodialysis treatment only flats alone or with family, duration of kidney disease, duration of hemodialysis treatment had a statistically significant impact on the level of respondents' knowledge about the principles of vascular access care and the role of conducted pharmacological treatment

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