Adherence of Elderly Patients with Chronic Limb Ischemia to Pharmacotherapy

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ABSTRACT

To research and identify patterns of adherence of elderly patients with chronic limb ischemia (CLI) to pharmacotherapy and provide recommendations. A Retrospective Observational Study. The research (2017-2024) included 615 patients with CLI, average age 76±5.8 years: group A - 513 patients with CLI stage 2b-3, with indications for surgical treatment of CLI, and group B - 102 patients with CLI stage 2A-2B without indications for surgical treatment of CLI. For research of patients' adherence to pharmacotherapy, a questionnaire was developed, including 8 questions. Adherence was compared at the stage of patient inclusion in the research and after 6, 12 and 24 months follow-up. At the initial outpatient consultation, high adherence to pharmacotherapy was established in 87.2% of patients in group A and 81.8% of patients in group B. After 6 months follow up the proportion of patients adherent to pharmacotherapy increased in group A to 98.7% and in group B to 99.9%; after 12 and 24 months - in group A 96.2% and 97.95% , in group B 99.8% and 97.6%.The incidence of limb gangrene in patients of both groups during 24 months follow up was 0%. At the stage of patient inclusion in the research adherence to pharmacotherapy was established in the majority of patients in Groups A and B, the proportion of which after 24 months follow up exceeded 95%, the incidence of limb gangrene was 0%. Factors increasing the adherence of elderly patients to pharmacotherapy regimen in both groups were deterioration of the general condition, leg pain, reduction of the pain-free walking distance and surgical treatment of CLI.

Keywords: elderly patient, chronic limb ischemia, questionnaire, adherence to pharmacotherapy.

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INTRODUCTION

Human aging and the pathogenesis of most chronic non-communicable diseases are interrelated. With increasing human age, there is an individual accumulation of chronic non-communicable diseases, a phenomenon known as polymorbidity, including the most common cardiovascular diseases. Polymorbidity of cardiovascular diseases determines the need for polypharmacy and the importance of fostering strategies to enhance patient motivation and commitment to long-term continuous pharmacotherapy[1, 12, 15, 24, 30].

Among elderly patients with cardiovascular diseases, combination of medication therapy is most often used, including statins in 50.1% of patients, antiplatelet agents - 43.0%, angiotensin-converting factor inhibitors - 30.4%, diuretics - 29.5%, angiotensin II receptor blockers - 13.2%, calcium channel blockers - 10.5% and vitamin K antagonists - 6.4%.[27].

The risk-benefit ratio of using drugs for cardiovascular diseases that have proven their effectiveness in monotherapy in patients ≥60 years of age, in elderly patients often shifts towards the risk of adverse outcomes, which is due to polypharmacy and discontinuation or violation of the pharmacotherapy regimen against the background of low adherence to medical recommendations[13, 21]. Compliance with the principles of continuity and medical supervision of patients taking drugs for cardiovascular diseases is a strategic process for reducing the risks of cardiovascular complications[9, 20, 22].

Low adherence of elderly patients to following medical recommendations is due to the developing processes of asthenia and frustration, cognitive impairment and polypharmacy, insufficient medical literacy and limited self-assessment of the effectiveness of taking drugs not in terms of increasing life expectancy, but improving the general condition and eliminating symptoms of the disease at present or in the near future[16, 18, 20, 29]. Violation of the pharmacotherapy regimen in elderly patients with chronic cardiovascular diseases causes high risks of myocardial infarction, stroke and critical ischemia of the lower extremities[4, 7, 11]. The progressive nature of chronic cardiovascular diseases increases treatment and health care costs, which may contribute to decreased patient adherence to pharmacotherapy[9].

In the Russian Federation, the problem of comprehensive organizational and economic availability of conservative therapy to increase the adherence of patients with cardiovascular diseases to pharmacotherapy is solved on the basis of Federal Laws No. 178-FZ of July 17, 1999 "On State Social Assistance" and Federal Law No. 323-FZ of November 21, 2011 "On the Fundamentals of Health Protection of Citizens in the Russian Federation". The role of the physician in the development of patients' adherence to pharmacotherapy is a priority. For each patient, the physician is a mentor in the development of medical literacy, forming a roadmap for a set of effective processes for maintaining health and life, including a pharmacotherapy regimen, motivating them to adhere to their treatment plans in a consistent manner while jointly managing the effectiveness and safety of the therapy[6, 19].

The authors of this article, in order to improve medical care to patients with cardiovascular diseases and increase patient adherence to medical recommendations, developed an organizational and technological algorithm for primary health care and a competency model of a cardiovascular surgeon at the stage of primary care. The developed clinical organizational technologies were integrated into the process of clinical management of cardiovascular diseases at the primary health care and hospital levels, which contributed to 96% survival in the group of elderly patients follow up 3 years[2, 3, 5]. Permanent analysis of adherence to pharmacotherapy different patient groups is important for assessing the effectiveness of clinical organizational processes. Patient questionnaires are an effective methods for indirectly assessing patient adherence to pharmacotherapy, for example, using the Morisky-Green questionnaire[23].

Clinical assessment of the effectiveness of patient with cardiovascular diseases, including chronic limb ischemia (CLI), adherence to pharmacotherapy, is carried out based on the analysis of the dynamics of objective and subjective indicators, such as blood pressure, heart rate, pain-free walking distance and exercise tolerance, laboratory parameters of cholesterol and its fractions, creatinine, uric acid, homocysteine, glucose and others in the blood serum[14]. Domestic and foreign scientists have proven that adherence to pharmacotherapy in patient with CLI for contributes to its stable course at all stages of medical care and reduces the risk of limb gangrene[6, 20].

The available literature does not contain the results of the research of adherence to pharmacotherapy in elderly patients with CLI

The objective - to research and identify patterns of adherence to pharmacotherapy in elderly patients with chronic limb ischemia and provide recommendations.

METHODS

The research bases – the Medical Institute of the Peoples' Friendship University of Russia named after Patrice Lumumba. The research included 615 patients with CLI stage 2A-3 st. according to the Fontaine-Pokrovsky classification, the average age was 76 ± 5.8 years. The analysis of patient adherence to pharmacotherapy was performed at the primary care stage for the period 2017-2024. The main criteria for inclusion of patients in the research were age over 65 years, established diagnosis of CLI 2A-3 st., cardiovascular diseases anamnesis ≥2 years and dispensary observation in different medical organizations ≥2 years. Patients were divided into 2 groups: group A included 513 patients with CLI 2b-3 st. with impaired quality of life against the background of pain syndrome and a short pain-free walking distance, with established indications for surgical revascularization of the lower extremities; group B included 102 patients with CLI 2A-2B st. without impaired quality of life and without indications for surgical treatment of CLI. The figure 1 shows the design-program of the research.

In order to research patients' adherence to pharmacotherapy, cardiovascular surgeons with more than 5 years of professional experience (n=3), who were experts in the research, interviewed subjects during primary consultations using a questionnaire developed at the basic departments, which included 8 questions[6]:

1. Have you forgotten to take medications prescribed by your physician?
2. Have you taken medications without following the treatment regimen recommended by your physician (taking them from time to time, with significant breaks)?
3. Have you stopped taking medications without objective reasons, without first consulting a physician?
4. Have you stopped optimal drug therapy because you felt better, healthier / because the cost of medications was too high for you / because you did not trust your physician?
5. Have you stopped taking the prescribed medications because you did not trust your doctor?
6. Have you stopped taking prescribed medications because they were too expensive for you?
7. Have you performed daily self-monitoring of your blood pressure and pulse rate, blood glucose levels (patients with diabetes), or body weight to assess the effectiveness of your pharmacotherapy? Have

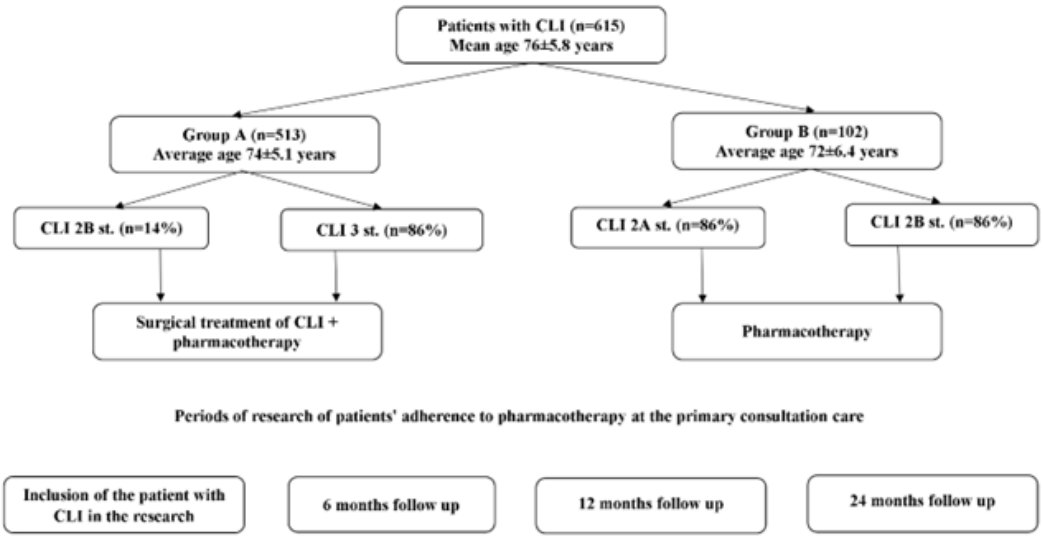

Figure 1. The design-program of the research

you kept a diary of self-monitoring of these parameters? 8. Do you consider the rate leg pain intensity, the reduction in the pain-free walking distance, and the performance of surgical treatment for CLI as motivating factors for following the recommendations of your attending physician regarding adherence to pharmacotherapy?

The following assessment criteria have been developed: a negative answer to questions 1 through 6 and a positive answer to questions 7 and 8 corresponded to +1 point. A positive answer to questions 1 through 6 and a negative answer to questions 7 and 8 corresponded to -1 point. Patients to be adherent to pharmacotherapy if they scored 7 or more points, that is, if they answered negatively to the first 6 questions of the questionnaire and positively to 7 or 8 questions.

We compared the patients' adherence to pharmacotherapy at the stage of the initial primary consultation and after 6, 12 and 24 months follow up.

The collection of statistical information and the evaluation of the research results after 6, 12 and 24 months follow up were carried out using an automated information technology for managing the dispensaryzation of patients[8].

Research methods: literature analysis, statistical, questionnaires, dynamic series, comparative analysis, expert. Mathematical processing was performed using the Microsoft Excel 2021 computer program. Comparison of the statistical significance of the differences in the results obtained in groups A and B was carried out using Student's t-test. Differences were considered statistically significant at $p < 0.05$.

RESULTS AND DISCUSSION

Medical demographic characteristics of the patients are presented in Table 1.

Group A compared to Group B includes patients with a more severe degree of CLI 2B-3 st. (according to the Fontaine-Pokrovsky classification), with impaired quality of life against the background of pain syndrome and a short pain-free walking distance of less than 100 meters, with indications for surgical treatment of CLI established during primary examination. 86% of patients in Group A were diagnosed with critical CLI 3 st. and 14% of patients with CLI 2B st., three patients (0.6%) had an aneurysm of the infrarenal abdominal aorta with indications for surgical correction.

Group B includes patients with CLI 2A-2B st. without impaired quality of life and without indications for surgical treatment of CLI. CLI 2B st. was diagnosed in 81.4% of patients.

Patients in groups A and B were compared in age and sex composition, polymorbidity of most cardiovascular diseases and risk factors of cardiovascular complications, and the proportion of patients in the group structure with a more severe stage of chronic CLI. Significant differences in groups A and B were found in the prevalence of overweight and obesity in 62.2% and 33.3% of patients, respectively ($p=0.025$), smoking for more than 30 years in 82.9% and 13%, respectively ($p=0.01$), history of cardiovascular surgery in 20.3% and 10.8% of patients, respectively ($p=0.04$), and implantation of permanent pacemakers in 5.1% and 0.9% of patients, respectively ($p=0.04$). All patients in Group A were hospitalized in the cardiovascular surgery department and underwent surgery on the arteries of the lower extremities using endovascular technology.

At the stage of the initial outpatient examination, patients in both groups were shown indications for continuous controlled pharmacotherapy with the use of 5 or more different medications per day. The results of the research of adherence to pharmacotherapy in patients (Group A) are presented in Table 2.

At the stage of the initial consultation of patients Group A high adherence to the implementation of medical recommendations in pharmacotherapy regimen was observed in the majority of patients, the proportion of which was 87.2%. This indicates the effective work of physicians at the stage of primary health care in terms of increasing adherence to pharmacotherapy before the start of this research.

The high proportion of patients in group A with critical CLI 3 st. was due to the high prevalence of risk factors for cardiovascular complications. In terms of the prevalence of overweight and obesity, and smoking for more than 30 years, patients in group A were significantly different from group B.

After 6 months of follow-up of patients in group A, after surgical endovascular correction of CLI 2B-3 st., the proportion of patients in group A who were committed to pharmacotherapy increased to 98.7%. After 12 and 24 months of follow-up, no significant changes were found in the proportion of patients in group A who were committed to pharmacotherapy - 96.2% and 97.95%, respectively.

Table 1. Medical demographic characteristics of the patients

Indicator	Patients of group A (main group, n=513)	Patients of group B (comparison group, n=102)	p
Average age, years	74±5,1	72±6,4	0,95
Proportion of males, %	502 (98%)	102 (100%)	0,95
Patients with CLI 2A st. (Fontaine-Pokrovsky classification), n (%)	0	19 (18,6%)	0,001
Patients with CLI 2B st. (Fontaine-Pokrovsky classification), with impaired quality of life due to a short pain-free walking distance, n (%)	72 (14%)	83 (81,4%)	0,001
Patients with CLI 3 st. (Fontaine-Pokrovsky classification), n (%)	441 (86%)	0	0,001
Сердечно-сосудистая операция в анамнезе, n (%)	104 (20,3%)	11 (10,8%)	0,04
Chronic ischemic heart disease with indications for surgical treatment, n (%)	211 (41,1%)	30 (29,7%)	0,766
Aneurysm of the infrarenal abdominal aorta more than 5.5 cm in diameter with indications for surgical treatment, n (%)	3(0,6%)	0	0,001
Risk symptomatic stenosis of the common/internal carotid artery >50% or asymptomatic stenosis of the common/internal carotid artery ≥70%, n (%)	89 (17,3%)*	18 (17,6%)	0,95
Non-hemodynamically significant stenotic atherosclerosis of the brachiocephalic arteries without indications for surgical treatment, n (%)	513 (100%)	102 (100%)	1
Heart rhythm and conduction disturbances after the implantation of an artificial pacemaker, n (%)	26 (5,1%)	1 (0,9%)	0,04
Type 2 diabetes, n (%)	131 (25,5%)	22 (21,6%)	0,9
Atrial fibrillation, n (%)	94 (18,3%)	11 (10,8%)	0,9
Overweight and obesity, n (%)	319 (62,2%)	34 (33,3%)	0,025
Hypertension, n (%)	513 (100%)	102 (100%)	1
Dyslipidemia, hypercholesterolemia, n (%)	493 (96,1%)	102 (100%)	0,95
Smoking, n (%)	425 (82,9%)	13 (13%)	0,01
Hypodynamia not associated with CLI, n (%)	108 (21,05%)	24 (23,5%)	0,95
History of acute myocardial infarction, n (%)	49 (9,55%)	3 (2,9%)	0,8
History of stroke, n (%)	5 (0,97%)	0	0,99
Chronic kidney disease C2-C3 st., n (%)	316 (61,6%)	79 (77,4%)	0,05
Chronic heart failure 1-2A st., n (%)	513 (100%)	102 (100%)	1

During the research periods, no significant differences were found in the indicator of structural adherence to pharmacotherapy of different groups used in the corresponding nosologies. At the stage of the initial consultation, low activity of patients in the implementation of the process of self-assessment of the effectiveness of treatment and preventive measures based on daily self-monitoring of hemodynamic parameters in hypertension (76% of patients), glycaemia levels in diabetes (34%) and body weight in obesity (0%) was established. The motivation of patients by a cardiovascular surgeons to perform the above processes daily in order to monitor the effectiveness of the pharmacotherapy used, and to make an evidence-based clinical organizational decision to correct medication treatment together with the physicians contributed to the increase in the number of patients in the research group who followed physicians recommendations and self-monitored blood pressure, pulse rate and glycaemia, and 29% of subjects who measured body weight, recording indicators in a self-monitoring diary, the share of which amounted to more than 99% of subjects.

The results of the research of adherence to physician's recommendations for pharmacotherapy in patients (Group B) are presented in Table 3. At the stage of the initial primary consultation, high adherence to medical recommendations for pharmacotherapy was established in 81.8% of patients in Group B. After 6 months follow up, the proportion of patients adherent to pharmacotherapy, regardless of the degree of CLI 2A and 2B st., increased and amounted to 99.9%. After 12 and 24 months of follow-up, no reliable changes in the proportion of patient's adherent to pharmacotherapy in Group B were established - 99.8% and 97.6%, respectively.

At the stage of the initial consultation, low patient's adherence to statin medications for the correction of dyslipidemia / hypercholesterolemia was revealed in Group B, the proportion of which in the group was 62.55%. It is noteworthy the proportion of patient's adherent to taking antihypertensive drugs for the correction of arterial hypertension, established at the stage of the initial primary consultation, which amounted to 81.8%. The main reasons for stopping taking cholesterol-lowering drugs were the high cost of statins (13.3%) and satisfactory well-being (26.4%). Patients rated the effectiveness of this group of medications for the prevention of cardiovascular diseases as low consequently made an independent decision to stop taking them. The main reasons for refusing antihypertensive therapy were the stabilization of blood pressure and subjectively good well-being during treatment (17.8%). Patients believed that stabilization of blood pressure during antihypertensive therapy corresponded to a cure for the disease, so they refused to continue taking medications of this group.

During the initial primary consultation, low activity of patients in Group B in the implementation of the process of self-assessment of the effectiveness of treatment and preventive measures based on daily self-monitoring of hemodynamic parameters in hypertension (16.7% of patients), glycaemia levels in diabetes (18%) and body weight in obesity (0%) was established. Satisfactory, relatively stable general condition, and the absence of impairment of quality of life against the background of chronic course of CLI and other cardiovascular diseases, patients subjectively assessed as a process that does not require self-monitoring in terms of assessing the above indicators, and in some cases, as a reason for stopping taking medications. Motivation of patients by a cardiovascular surgeons to perform the above control

Table 2. Results of the research of adherence to pharmacotherapy in patients (Group A)

Question	Evaluation period	Analysis of general and structural patients adherence to pharmacotherapy (proportion of positive patient responses to questionnaire questions, (%)					
		Comprehensive assessment of patients' adherence to physicians recommendation and pharmacotherapy	Adherence to antihypertensive therapy in hypertension	Adherence to lipid-lowering therapy in dyslipidemia/ hypercholesterolemia	Adherence to dual antiplatelet therapy after endovascular stenting procedures	Adherence to anticoagulant therapy in atrial fibrillation	Adherence to hypoglycemic therapy in diabetes mellitus
1. Have you forgotten to take medications prescribed by your physician?	Initial consultation	6,34%	8,7%	8,4%	3,6%	9%	2%%
	6 months follow up	0,28%	0	0	0,15%	0,15%	0,1%
	12 months follow up	0	0	0	0	0	0
	24 months follow up	0	3,8%	3,6%	0	0	0
2. Have you taken medications without following the treatment regimen recommended by your physician (taking them from time to time, with significant breaks)?	Initial consultation	6,14%	1,8%	14%	0,7%	7,4%	2,5%
	6 months follow up	0	0	0	0	0	0
	12 months follow up	0	0	0	0	0	0
	24 months follow up	2%	0	2%	0	0	
3. Have you stopped taking medications without objective reasons, without first consulting a physician?	Initial consultation	8,6%	8,8%	8,4%	5,8	11,6%	0
	6 months follow up	0	0	0	0	0	0
	12 months follow up	0	0	0	0	0	0
	24 months follow up	3,7%	3,8%	3,4%	0	0	0
4. Have you stopped optimal drug therapy because you felt better, healthier / because the cost of medications was too high for you / because you did not trust your physician?	Initial consultation	19,7% / 7,6% / 0	19,7% / 2,5% / 0	0 / 10,7% / 0	0	0	0
	6 months follow up	0,4% / 0 / 0	0,4% / 0 / 0	0	0	0	0
	12 months follow up	3,8% / 6,7% / 0	3,8% / 0,1% /0	0 / 6,7% / 0	0	0	0
	24 months follow up	4,1% / 4,9% /0	4,1% / 0 / 0	0 / 4,9% / 0	0	0	0
5-7 In terms of following your physician's recommendations, have you carried out self-monitoring of your blood pressure and pulse rate/glycaemia body weight to assess the effectiveness of optimal pharmacotherapy?	Initial consultation	76% / 34% / 0					
	6 months follow up	99% / 99% / 11%					
	12 months follow up	99,9% / 99,9% / 23%					
	24 months follow up	93% / 99% / 29%					
8. Do you consider the rate leg pain intensity, the reduction in the pain-free walking distance, and the performance of surgical treatment for CLI as motivating factors for following the recommendations of your attending physician, regarding adherence to pharmacotherapy?	Initial consultation	100%					
	6 months follow up	100%					
	12 months follow up	100%					
	24 months follow up	100%					
Evaluation of general and structural adherence of patients to pharmacotherapy							
Proportion of patients adherent to optimal pharmacotherapy, %	Initial consultation	87,2%	89,1%	87,5%	96,4%	90,1%	98%
	6 months follow up	98,74%	99,96%	100%	99,95%	98,%%	99,95%
	12 months follow up	96,2%	99,2%	93,3%	100%	100%	100%
	24 months follow up	97,95%	96,1%	96,5%	100%	100%	100%

processes daily, in order to assess the effectiveness of continuously used pharmacotherapy and make an evidence-based clinical organizational decision together with the physicians to adjust the dose or select other medications, contributed to the growth in the dynamics of the proportion of adherent patients to pharmacotherapy in the research group. After 6 and 12 months of follow-up, the proportion of patients in Group B who performed daily self-monitoring of blood pressure and pulse rate was 91% and 93%, glycaemia - 91% and 99%, body weight - 16% and 29%, with recording of indicators in the self-monitoring diary. After 6 months of follow-up, the structural adherence to pharmacotherapy in patients group B for all research groups of medications was found to be high and did not change significantly over 24 months.

The severity of the course of CLI before the start of the research, during the period of dispensary observation in third-party medical organizations, was not a factor in reducing the adherence of patients to pharmacotherapy. At the stage of the initial primary consultation, the proportion of adherent patients to pharmacotherapy in groups A and B was 87.2% and 81.9%. However, the deterioration in the quality of life of patients against the background of CLI included in group A became the reason for patients to seek alternative advice from a cardiovascular surgeon. At the stage of inclusion of patients in groups A and B in the research, during the initial primary consultation, the cardiovascular surgeon explained the importance of continuous use of complex pharmacotherapy for CLI based on the principle of achieving long-term treatment effectiveness. It was recommended to cancel or adjust pharmacotherapy only in conjunction with the attending physician.

Patients of groups A and B at all stages of the research during 24 months follow up answered equally positively to question 8 of the questionnaire "Do you assess the deterioration of the general condition, leg pain, reduction in pain-free walking distance, the performance of surgical treatment of chronic ischemia of the lower extremities and other vascular pools?". Deterioration in the quality of life of patients with CLI and indications for surgical prevention of the development of gangrene were assessed as factors increasing the adherence of elderly patients to pharmacotherapy, regardless of the stage of CLI, which was the reason to seek advice from a cardiovascular surgeon.

The authors believe that the established high proportion of elderly patients with CLI who are adherent to pharmacotherapy, more than 80%, both at the stage of the initial primary consultation and during two-year follow up, is the result of the use of technology for clinical management of health preservation and self-preservation processes[20, 22].

Most available publications highlight the problem of low patient adherence to pharmacotherapy. A meta-analysis of 20 clinical researches include of 376 thousand patients with chronic cardiovascular diseases (2017) showed that during one year follow up after the appointment of optimal pharmacotherapy, 43% of respondents remain adherent to taking medications[26]. Another study (2011) found that only 50% of patients with cardiovascular diseases continuously take medications as prescribed by their physicians[27]. According to several authors, after endovascular surgery care to patients with CLI, no more than 40% of patients continuously take all prescribed medications during the

Table 3. Results of the research of adherence to pharmacotherapy in patients (Group B)

Question	Evaluation period	Analysis of general and structural patients adherence to pharmacotherapy (proportion of positive patient responses to questionnaire questions, (%)					
		Comprehensive assessment of patients' adherence to physicians recommendation and pharmacotherapy	Adherence to antihypertensive therapy in hypertension	Adherence to lipid-lowering therapy in dyslipidemia/ hypercholesterolemia	Adherence to dual antiplatelet therapy after endovascular stenting procedures	Adherence to anticoagulant therapy in atrial fibrillation	Adherence to hypoglycemic therapy in diabetes mellitus
1. Have you forgotten to take medications prescribed by your physician?	Initial consultation	3,2%	3,6%	3,1%	0,1%	0	0,15%
	6 months follow up	0,1%	0	0	0,1%	0,1%	0,1%
	12 months follow up	0	0	0	0	0	0
	24 months follow up	0,1	0	0,1%	0	0	0
2. Have you taken medications without following the treatment regimen recommended by your physician (taking them from time to time, with significant breaks)?	Initial consultation	1,5%	2,2%	16%	1,5%	9%	2%
	6 months follow up	0	0	0	0	0	0
	12 months follow up	0	0	0	0	0	0
	24 months follow up	1,8%	0	1,8%	0	0	
3. Have you stopped taking medications without objective reasons, without first consulting a physician?	Initial consultation	18,9%	15,7%	22,1%	0	3,4%	0
	6 months follow up	0	0	0	0	0	0
	12 months follow up	0	0	0	0	0	0
	24 months follow up	2,4%	2,9%	1,6%	0	0	0
4. Have you stopped optimal drug therapy because you felt better, healthier / because the cost of medications was too high for you / because you did not trust your physician?	Initial consultation	17,8% / 2,5% / 0	17,8% / 2,5% / 0	26,4% / 13,3% / 0	0	0	0
	6 months follow up	0,1% / 0 / 0	0,1% / 0 / 0	0	0	0	0
	12 months follow up	0,3% / 0,1% / 0	0,3% / 0,1% / 0	0 / 0 / 0	0	0	0
	24 months follow up	5,9% / 1,6% /0	5,9% / 0 /0	0 / 1,6% / 0	0	0	0
5-7 In terms of following your physician's recommendations, have you carried out self-monitoring of your blood pressure and pulse rate/ glycaemia/body weight to assess the effectiveness of optimal pharmacotherapy?	Initial consultation	16,7% / 18% / 0					
	6 months follow up	91% / 91% / 16%					
	12 months follow up	94% / 98% / 18%					
	24 months follow up	93% / 99% / 29%					
8. Do you consider the rate leg pain intensity, the reduction in the pain-free walking distance, and the performance of surgical treatment for CLI as motivating factors for following the recommendations of your attending physician regarding adherence to pharmacotherapy?	Initial consultation	100%					
	6 months follow up	100%					
	12 months follow up	100%					
	24 months follow up	100%					
Evaluation of general and structural adherence of patients to pharmacotherapy							
Proportion of patients adherent to optimal pharmacotherapy, %	Initial consultation	81,8%	81,8%	62,55%	99,15%	93,8%	98,9%
	6 months follow up	99,9%	99,9%	100%	99,9%	93,8%	99,9%
	12 months follow up	99,8%	99,8%	100%	100%	100%	100%
	24 months follow up	97,6%	95,6%	98,7%	100%	100%	100%

first year, which causes a high risk of recurrence of acute ischemic complication[28].

The results of a comprehensive medical social research of adherence to continuous pharmacotherapy in a group of 218,047 patients with post-infarction cardiosclerosis (2013) indicate that more than 50% of respondents do not follow physician's recommendations for compliance with the pharmacotherapy regimen[29]. Predictors of patients' conscious non-compliance to physicians recommendations regarding continuous long-term use of medications have been established, the main ones being satisfactory health, the desire to cope with the disease independently without a physician or belief in self-efficacy, disagreement with physicians or low level of trust in them, as well as receiving insufficient medical information[30].

Results of development and maintenance of adherence to pharmacotherapy for 24 months in more than 95% of subjects, which differ from literature data, were achieved in a group of patients with CLI, characterized by high risks of developing gangrene, with polymorbidity of chronic cardiovascular diseases with high risks of developing heart attack and stroke, with indications (group A) and predicted indications (group B) for a risky method of treatment - surgery. These factors, in the process of competent interaction at the stage of primary and hospital care with a cardiovascular surgeon interested in preserving the health and life of patients with a risky disease against the background of polymorbidity, became the basis for the development and maintenance of adherence to pharmacotherapy in most patients during two years follow up.

CONCLUSION

Adherence of elderly patients with CLI to pharmacotherapy contributes to the safe course of the CLI and reduces the risk of gangrene development. Despite the decrease of elderly patient's adherence to most medical recommendations against the background of increasing age due to asthenia and frustration, the author's research established processes of increasing compliance. Independent factors for increasing the adherence of elderly patients to pharmacotherapy were a deterioration in the general condition, leg pain, a reduction in the pain-free walking distance, and surgical treatment of CLI. At the initial primary consultation stage, the majority of patients were found to be adherent to pharmacotherapy – 87.2% in Group A (patients with indications for surgical treatment of CLI) and 81.8% in Group B (patients with indications for conservative treatment of CLI), regardless of the stage of the disease, which indicates effective communication in the physicians-patient system before this research. During 24 months follow up, an increase adherence of patients to pharmacotherapy was noted in both groups, more than 95% of whom conscientiously followed the physician's recommendations for compliance with the pharmacotherapy regimen against the background of polypharmacy and self-monitored the effectiveness of pharmacotherapy. An assessment of the strength of the correlation between factors increasing the adherence of patients with CLI to pharmacotherapy, including complicated course of the disease and the need to perform a risk surgical method of treatment, and the involvement of patients in the process of preserving life and health based on the implementation of medical recommendations for adherence to pharmacotherapy regimen, requires further analysis and will be presented in the author's publications. In the research, in order to increase of elderly patient's adherence with CLI to pharmacotherapy, the technology of clinical management based on the processes of continuity, succession, involvement and application of the best clinical organizational practices was used[20,22,31]. A competency model was implemented in the practice of cardiovascular surgeons. The authors recommend using the technology of clinical management and the competency model of a cardiovascular surgeon in the practice of improving medical care for patients with cardiovascular diseases and chronic limb ischemia.

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