

The Effect of Various Treatments on the Clinical Condition of Patients with Chronic Heart Failure

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Abstract In predicting the course of chronic heart failure, the effect of treatment on indicators such as the number of visits to the family polyclinic, the number of emergency medical services, the number of hospitalizations, and the reduction of death are important. The article examines the impact of various medical treatments on the clinical condition of patients and indicators of quality of life. Quality of life was assessed using the Kansas Questionnaire. The results showed a reliable positive change in the number of family clinic visits, emergency calls, and hospital admissions in patients receiving sacubitril+valsartan and dapagliflozin. It was also found that the quality of life was significantly improved in this group of patients.

Keywords Chronic heart failure, Succubitril+valsartan, Dapagliflozin, Kansas survey

1. Introduction

Chronic heart failure (CHF) is one of the urgent medical and social problems of modern medicine [18,21]. This is due to its prevalence, severe consequences, and high cost of treatment [20,4,12].

Mortality due to CHF is 4-8 times higher than in the general population, and half of patients die within 5 years of diagnosis. Its IV functional class (FS) has a half-year mortality rate of 44% [1,11,17].

According to epidemiological data, in the Russian Federation and European countries, in most cases, CHF develops as a result of arterial hypertension (95%) and ischemic heart disease (IHD) (69.7%). In our republic, the main cause of this serious complication is often the two diseases listed above [2].

Due to the increase in the life expectancy of the population, the positive results achieved in the treatment of cardiovascular diseases and the prevalence of the risk factors that cause the main diseases that cause CHF, IHD and hypertension diseases (HD), this serious complication is more and more common among the world's population [3,6]. Despite the progress made in recent years, CHF confirms that health remains a heavy financial burden on the economy of all countries around the world.

Systemic changes are observed in all organs of CHF, and remodeling processes in the heart are of particular importance [9].

It is known that a number of examination methods are

used in the diagnosis and evaluation of the effectiveness of treatment of CHF. Among them, natriuretic hormones are of particular importance as a biological marker. Currently, there are a number of its representatives, among which brain and N-pro brain sodium uretic peptides are widely used in the diagnosis and assessment of CHF.

According to P. Bettencont and co-authors, N-pro brain sodium uretic peptide can be used to predict the course of the disease in CHF. The increase of this marker in the blood of patients with CHF is a clear sign of decompensation. It is also noted that the number of deaths and hospitalizations is high in patients with high levels [5].

A.M. Richards was one of the first to use the concentration of N-prosodium uretic peptide in the blood to control the effect of treatment in patients with CHF. It observed titration of the dose of angiotensin-converting enzyme inhibitors (ACEIs) in patients diagnosed with CHF II–III FC under hormonal control and demonstrated the appropriateness of such an approach [19].

In the IMPRESS trial, which included 573 patients receiving lisinopril and omapatrilat, those with CHF and left ventricular ejection fraction less than 40% had reliable reductions in neurohormone 1-2 years after initiation of treatment in a randomized trial [7].

It is known that a reliable measure of the effectiveness of CHF treatment is the number of visits to the doctor, the number of hospitalizations, and the decrease in mortality [16,13]. It has been suggested that this process is under the control of N pro brain sodium uretic hormone.

In recent years, studies have shown that GNKT2i dapagliflozin has a positive effect on the quality of life of patients with CHF. They provide information on the positive

effect of dapagliflozin on the stability of the clinical condition of this group of patients, the number of re-hospitalizations and their duration [14,8].

The effect of different combinations of recommended standard drugs for CHF on indicators such as predicting the course of CHF and detecting them in the early stages under the control of the above-mentioned markers, as well as on indicators such as referrals to family polyclinics, calls for emergency medical care, number of hospitalizations, and mortality have not been studied. Taking this into account, we set the following goals and tasks.

2. The Purpose of the Study

Studying the effect of various treatments in chronic heart failure on the number of visits to the family polyclinic, the number of emergency medical calls and hospitalizations, as well as their quality of life.

3. Research Materials and Methods

This scientific research work was conducted in 2022 and 2023 in Fergana Public Health Medical Institute and private clinic "Farovon" in 120 patients with developed CHF on the basis of IHD and arterial hypertension (AH). They, in turn, were divided into three groups based on the treatment procedures. Each group consisted of 40 patients, 20 of which consisted of CHF II and III FC. The average age of the first group of patients was 66.1 ± 1.8 , men were 21 (52.5%) and women were 19 (47.5%). In the 1st group of patients under observation, the number of those who underwent myocardial infarction (MI) - 28 (70%), those who underwent aortic coronary bypass surgery (CBS) or stenting - 11 (27.5%), rhythm disorders and blockades were recorded - 12 (30%), AH there were 31 (77.5%), those with different degrees of obesity - 17 (42.5%), those with anemia - 21 (52.5%). This group was prescribed β -blockers + AAFIs or angiotensin receptor blockers (ARBs) + mineralocorticoid receptor antagonists (MRKA)-veroshpiron as the standard treatment for CHF. The average age of the second group of patients was 65.9 ± 1.5 , men were 24 (60%) and women were 16 (40%). In this group, the number of those who underwent MI - 25 (62.5%), those who underwent ACS or stenting - 13 (32.5%), those who had rhythm disorders and blockades - 15 (37.5%), those who had AD 27 (67.5%), those who were obese in various degrees - 16 (40%), anemia was observed - 19 (47.5%) people. They received a standard treatment consisting of β -blockers + succubitril-valsartan (yuperio) + MRKA-veroshpiron. The average age of the third group of patients was 64.7 ± 1.3 , 21 (52.5%) of them were men and 19 (47.5%) were women. In this group, the number of those who underwent MI - 27 (67.5%), those who underwent aortic coronary bypass surgery or stenting - 16 (40%), those who had rhythm disorders

and blockades - 17 (42.5%), those who had AH 25 (62.5%), of various degrees 15 (37.5%) were diagnosed with obesity, 19 (47.5%) were anemic. β -blockers + succubitril-valsartan (yuperio) + MRKA-veroshpiron + glucose-sodium co-transporter type 2 inhibitors (dapagliflozin/forsiga) were recommended to these patients.

Particular attention was paid to the same number of patients in II and III FC in each group and their representativeness.

The effect on the number of patients' referrals to the family polyclinic, calls to emergency medical services, and hospital admissions was studied before and 6 months after the start of the treatment in all subjects included in the study. Their quality of life indicators were assessed using the Kansas Questionnaire.

The Kansas questionnaire recommended by Green C.P. and Porter C.B. in 2000 was used to assess patients' quality of life [10]. The patient fills out this questionnaire based on his general condition during the last month.

Analysis and discussion of research results. We studied the clinical status of the patients involved in our study, including the number of visits to the polyclinic, the number of emergency medical calls, the number of re-hospitalizations, and the observed mortality after various treatment procedures. Table 1 below presents the results obtained during a careful prospective follow-up.

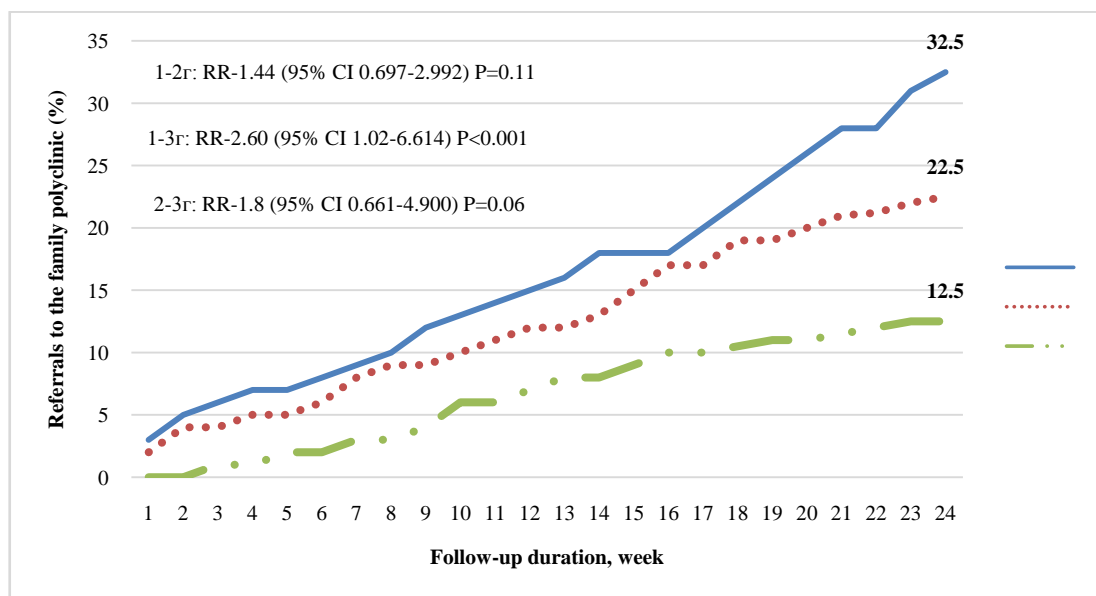
As shown in the table, 32.5% of patients of the first group involved in the study had complaints for six months and referred to the family polyclinic. This indicator was equal to 22.5% and 12.5% in the second and third groups, respectively. When the obtained results were compared between the groups, a reliable difference ($\chi^2 = 11.6$, $P < 0.001$) was found only between the first and third groups. Patient visits to the emergency room were 30%, 20%, and 7.5% between groups, respectively. When these indicators were compared, no reliable difference was noted between the first and second groups ($\chi^2 = 2.6$, $P = 0.10$). A highly reliable difference ($\chi^2 = 17.5$, $P < 0.001$) was observed between the first and third groups, and a reliable difference ($\chi^2 = 7.2$, $P < 0.01$) was observed between the second and third groups. Hospital readmissions were 22.5% in the first group of patients, 17.5% and 10% in the second and third groups, respectively. A reliable difference ($\chi^2 = 5.3$, $P < 0.05$) was found between the first and third groups when these indicators were compared. In other cases, although significant differences were observed, the differences were not reliable. During our six-month follow-up, 2 patients in the first group and 1 patient in the second group died. This situation was not observed in the third group. The state of death was directly related to the aggravation of CHF. Here we would like to emphasize that the deaths occurred in all cases in the third FC.

Figure 1 below shows the rate of outpatient referrals between patient groups.

Table 1. The effect of various treatments on the clinical condition of patients with chronic heart failure

Indicators	Group 1, n=40	Group 2, n=40	Group 3, n=40	Differences between groups 1 and 2 are reliable	Differences between groups 1 and 3 are reliable	Differences between groups 2 and 3 are reliable
Outpatient referrals	13 (32.5%)	9 (22.5%)	5 (12.5%)	$X^2=2.53$ $P=0.11$ OR-1.65 CI 95% (0.614;4.482)	$X^2=11.6$ $P<0.001$ OR-3.37 CI 95% (1.07;10.614)	$X^2=3.5$ $P=0.06$ OR-0.6 CI 95% (0.615;6.716)
Emergency medical calls	12 (30%)	8 (20%)	3 (7.5%)	$X^2=2.6$ $P=0.10$ OR-1.714 CI 95% (0.613;4.794)	$X^2=17.5$ $P<0.001$ OR-5.286 CI 95% (1.361;20.534)	$X^2=7.2$ $P<0.01$ OR-3.083 CI 95% (0.719;12.614)
Hospital readmissions	9 (22.5%)	7 (17.5%)	4 (10%)	$X^2=0.48$ $P=0.5$ OR-1.410 CI 95% (0.469;4.241)	$X^2=5.3$ $P<0.05$ OR-2.613 CI 95% (0.732;9.322)	$X^2=2.6$ $P=0.1$ OR-1.909 CI 95% (0.512;7.119)
Death	2 (5%)	1 (2.5%)	0	$X^2=0.52$ $P=0.4$ OR-2.053 CI 95% (0.179;23.59)	$X^2=5.28$ $P<0.05$	$X^2=3.05$ $P=0.08$

Note - Abbreviations are for this table and subsequent figures: Odds ratio - English - odds ratio (OR) - when the indicator is >1 , it means the relative chance that this group has a higher probability of developing the disease compared to the comparison group; Confidence interval - English - confidence interval (CI) 95% - reliability of 95%, when both indicators are higher or lower than 1, the reliability of indicators is equal to $p<0.05$; χ^2 - xi square is the chosen method for distinguishing the theoretical and practical meeting of quality marks in groups, the higher its indicator, the higher the level of meeting quality marks in practice.



Explanation: Relative risk - English - relative risk (RR) - when the indicator is >1 , it means that the probability of developing the disease is higher in this group compared to the comparison group. Confidence interval - English - confidence interval (CI) 95% - reliability of 95%, when both indicators are higher or lower than 1, the reliability of indicators is equal to $p<0.05$. Abbreviations are for Figures 1, 2, and 3.

Figure 1. The number of referrals to family polyclinics of all groups of patients during follow-up

In all three groups of patients included in the study, the number of referrals to the family polyclinic was 13 (32.5%), 9 (22.5%) and 5 (12.5%), respectively. It was found that the first group had a higher risk of outpatient referrals than the second group (RR-1.44 (95% CI 0.697-2.992)). When comparing the first and third groups of patients, it was noted that the third group of patients had a stable course of CHF and a low risk of referrals to the family polyclinic (RR -2.60 (95% CI 1.02-6.614)). When the second and third

groups of patients were compared, it was shown that outpatient visits were more frequent in the second group (RR -1.8 CI 95% (0.661;4.900)). In all cases, the low relative risk of referrals to the family polyclinic in patients receiving β -blockers + yuperio + MRKA + dapagliflozin confirms the high efficiency of the complex standard treatment of CHF containing GNKT2i.

Figure 2 below shows the number of emergency calls between groups.

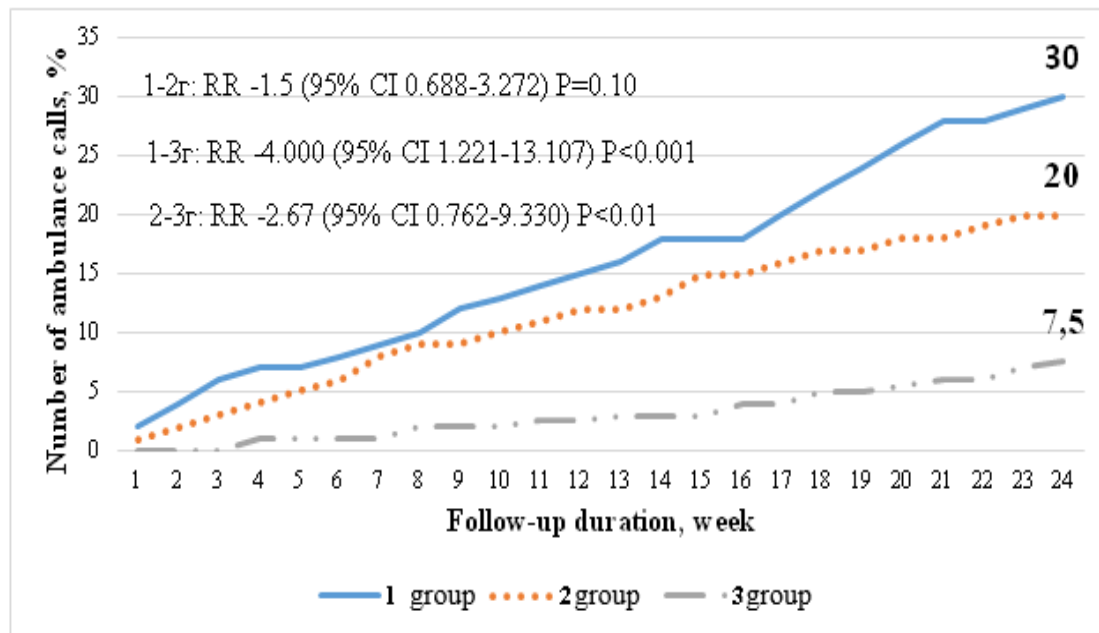


Figure 2. The number of emergency medical calls during the follow-up of patients of all groups

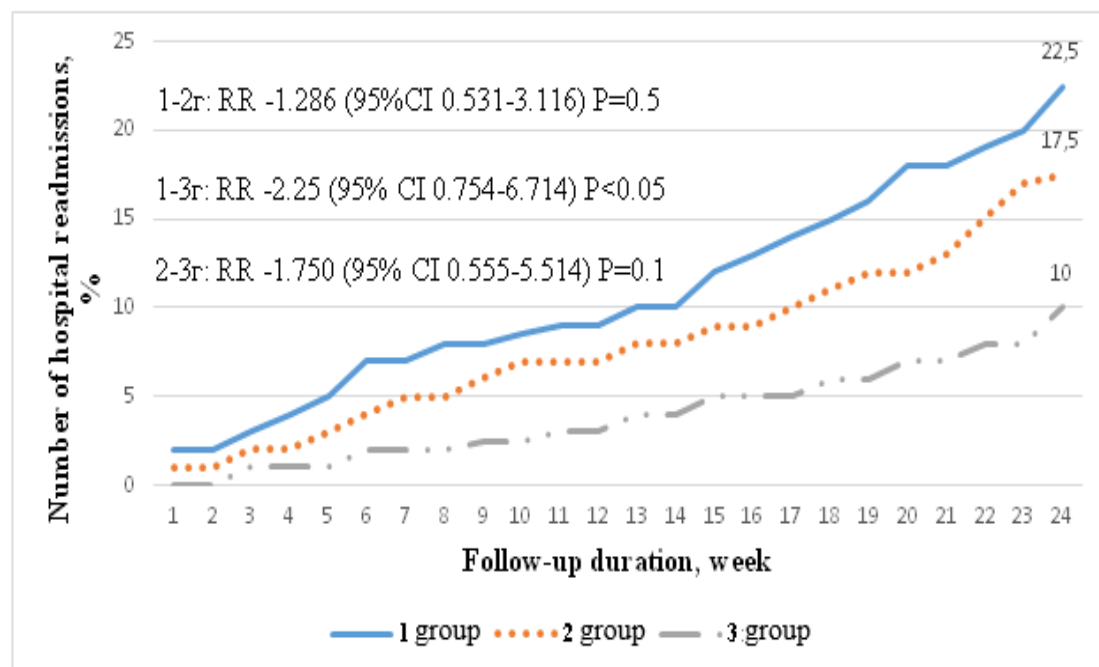


Figure 3. The number of hospital readmissions of all group patients during follow-up

The number of emergency calls was 12 (30%) in the first group, 8 (20%) in the second group, and 3 (7.5%) in the third group, and the results were compared between the groups. The analysis conducted in the third group, i.e. β -blockers + yuperio + MRKA + dapagliflozin, compared to the first (RR -4.000 CI 95% (1.221-13.107)) and the second (RR -2.67 (CI 95% 0.762-9.330)) group. showed stabilization and, as a result, the risk of emergency medical calls is low. On the other hand, in the second group, it was noted that this condition was positive compared to the first group (RR -1.5 (CI 95% 0.688-3.272)). Also, the relative risk of emergency

medical calls was reduced in patients who received standard treatment containing dapagliflozin, which in turn reduced the level of unpleasant complications. also helps in forecasting.

During prospective follow-up, the number of readmissions to the hospital was 9 (22.5%), 7 (17.5%), and 4 (10%) between groups, respectively. Among the first and second group of patients, the risk of re-hospitalization was found to be higher in the first group (RR -1.286 (CI 95% 0.531-3.116)). When comparing the first and third groups of patients, it was noted that the third group of patients had a stable course of CHF and a low number of hospital

readmissions (RR -2.25 (CI 95% 0.754-6.714)). When the second and third groups of patients were compared, the second group showed a higher risk of hospital readmissions (RR -1.750 (CI 95% 0.555-5.514)). The obtained results once again prove the high efficiency of the complex standard treatment of CHF, which contains GNKT2i, and the relatively low risk of re-hospitalization in patients receiving β -blockers + yuperio + MRKA + dapagliflozin.

In recent years, great attention has also been paid to improving the quality of life of patients with CHF through effective treatment. Nowadays, many questionnaires are used to determine the quality of life. Among them, the MOC-SF-36 (36-Item Short Form Survey) and the Minnesota questionnaire are widely used. We used the relatively new Kansas City Cardiomyopathy Questionnaire (KCCQ) in our study to determine the quality of life of patients. The patient fills out this questionnaire based on the general condition during the last month of treatment. Table 2 below shows the changes in quality of life indicators in patients before and after treatments.

As shown in the table, physical limitations in the first group of patients changed positively from 39.4 ± 4.6 points to 57.2 ± 5.2 points and a reliable difference was found ($r < 0.05$). In the second group of patients, the average reliable difference increased from 38.1 ± 4.2 to 58.3 ± 4.9 points, 1.53 times. In the third group, it was 38.4 ± 4.1 points before treatment and 63.2 ± 5.1 points after treatment, which improved 1.65 times and a high reliable difference was noted. The change of patients' complaints was equal to 36.5 ± 4.3 and 39.7 ± 4.8 points before treatment in the first two groups, respectively. After the treatments, this indicator was equal to 61.4 ± 6.4 and 63.9 ± 5.4 points, respectively, and in both cases the differences were moderately reliable ($r < 0.01$). In the third group, a highly reliable ($r < 0.001$) difference was noted, with a positive change of 40% from 40.1 ± 5.0 to 67.2 ± 4.9 points after the treatment.

Self-help improved 1.2-fold from 62.7±6.2 to 78.2±5.8 points after treatment in the first group, i.e. β-blockers +

ACEIs or ARA + MRKA, a significant difference ($R>0.05$) not identified. β -blockers + yuperio + MRKA increased 1.31 times in the group of patients prescribed 59.8 \pm 6.3 points before treatment and 78.6 \pm 5.6 points after treatment, and the difference was reliable when they were compared ($r<0.05$). it happened. β -blockers + yuperio + MRKA + dapagliflozin increased by 1.48 times from 58.6 \pm 5.7 points to 82.7 \pm 6.2 points, respectively, and a highly reliable difference ($r<0.001$) was observed. In the first group of patients, social limitation improved 1.4 times from 38.5 \pm 4.6 points to 55.1 \pm 4.8 points before and after treatment, and a reliable difference ($r<0.05$) was noted. In the second group, this change was 38.2 \pm 4.8 points before the treatment and 61.2 \pm 5.1 points after the treatment, and the average reliable difference ($r<0.01$) was determined. In the third group, this indicator was equal to 38.8 \pm 4.5 and 61.5 \pm 5.6 points, respectively, and an average reliable difference ($r<0.01$) was observed.

Quality of life indicators were equal to 40.4 ± 4.1 and 42.3 ± 4.5 points before treatment in the first and second groups, respectively. After treatments, it increased by 58.8 ± 4.6 and 62.3 ± 4.8 points, respectively, and the differences in both groups were moderately reliable ($r < 0.01$). In the third group, it was 41.8 ± 4.7 points before treatment and 67.4 ± 5.4 points after treatment, which improved by 1.6 times and a high reliable difference was noted.

Before the treatments, we can see that the quality of life indicators of the patients are somewhat low. Its average indicators were 43.4 ± 4.7 , 43.2 ± 4.9 and 43.5 ± 4.8 points between the groups, respectively. Quality of life indicators after various treatments were 61.0 ± 5.5 points ($r < 0.05$) in the first group, 63.3 ± 5.1 points ($r < 0.01$) in the second group, and 68.0 ± 5.1 points in the third group. It was equal to 3 ± 5.3 points ($r < 0.001$). Although reliable positive changes were observed in all groups after treatment, the third group receiving sacubitril valsartan + dapagliflozin had significantly higher changes ($r < 0.001$) than the other two groups. This confirms that the combined use of drugs of this group in patients leads to a reliable improvement in their quality of life.

Table 2. Changes in quality of life indicators (scores) after standard medical treatments with different components in patients with chronic heart failure

Quality of life indicators	Group 1, n=40		Group 2, n=40		Group 3, n=40	
	Before treatment	After treatment	Before treatment	After treatment	Before treatment	After treatment
Physical limitations	39,4±4,6	57,2±5,2*	38,1±4,2	58,3±4,9**	38,4±4,1	63,2±5,1***
Complaints	36,5±4,3	61,4±6,4**	39,7±4,8	63,9±5,4**	40,1±5,0	67,2±4,9***
Self help	62,7±6,2	78,2±5,8	59,8±6,3	78,6±5,6*	58,6±5,7	82,7±6,2**
Social limitation	38,5±4,6	55,1±4,8*	38,2±4,8	61,2±5,1**	38,8±4,5	61,5±5,6**
Quality of life	40,4±4,1	58,8±4,6**	42,3±4,5	62,3±4,8**	41,8±4,7	67,4±5,4***
Total score:	43,4±4,7	61,0±5,5*	43,2±4,9	63,3±5,1**	43,5±4,8	68,3±5,3***

Note: * - the reliability of the difference between indicators before and after treatment:
 * - $r < 0.05$., ** - $r < 0.01$. *** $r < 0.001$.

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* - $r < 0.05$, ** - $r < 0.01$, *** $r < 0.001$.

4. Conclusions

Based on our analysis, we can come to the following conclusions:

1. When complex treatment is prescribed to patients with chronic heart failure, the number of visits to the polyclinic, the need for emergency medical care, and the number of hospitalizations are reliably reduced;
2. Standard complex treatment of patients with chronic heart failure has a reliable positive effect on the quality of life of patients. Determining it using the Kansas questionnaire ensures the objectivity of the obtained results.

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