

Perepech N. B., Tregubov A. V., Mikhailova I. E.

Saint-Petersburg State University, St. Petersburg, Russia

PHYSICIANS' ADHERENCE TO CLINICAL GUIDELINES ON THE CHRONIC HEART FAILURE DIAGNOSIS AND TREATMENT: CHANGES OVER 2 YEARS OF THE DOCUMENT'S EXISTENCE

<i>Aim</i>	To study how physicians' commitment to the basic provisions of clinical guidelines (CGs) for the diagnosis and treatment of chronic heart failure (CHF) has changed over the two years of the document existence.
<i>Material and methods</i>	An anonymous survey was performed for 263 physicians (204 cardiologists, 46 internists and 13 other specialists) who were trained in advanced training programs in 2022. The questionnaire included questions regarding self-assessment of the respondents' professional knowledge, their attitude to the role of CGs in everyday practice and ideas about methods for treatment of CHF.
<i>Results</i>	Respondents gave 60.6% correct answers to questions related to the treatment of CHF. More than 70% correct answers were given by 42.7% of cardiologists and 17.4% of internists. Compared to 2020, the proportion of cardiologists who gave more than 70% correct answers increased significantly ($p<0.05$). CGs were considered mandatory by 26.2% and important or sometimes useful by 71.5% of respondents. Cardiologists considered CGs mandatory more frequently than internists (29.9 and 15.2%, respectively; $p=0.04$). The mean number of correct answers was greater in the subgroup of respondents who considered CGs mandatory ($p<0.001$). More than 70% correct answers were given by only 43.8% of cardiologists, who considered themselves fully informed and able to advise colleagues on complex issues of diagnosis and treatment of CHF, and 40.6% of physicians who considered their knowledge acceptable for managing patients with CHF.
<i>Conclusion</i>	The majority of physician consider CGs an important methodological document but only a little more than 25% are aware that CGs are mandatory. Cardiologists are better informed than internists about the principal provisions of National Clinical Guidelines for the diagnosis and treatment of CHF, but the average level of physician knowledge remains low.
<i>Keywords</i>	Physician knowledge; chronic heart failure; clinical guidelines
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<i>Corresponding author</i>	Tregubov A. V. E-mail: altregubov@mail.ru

Introduction

Beginning in 2022, the Russian Federation (RF) began a gradual introduction of clinical guidelines, developed by professional medical societies, and approved by the Scientific and Practical Council of the Ministry of Health of the Russian Federation, into the practice of health care institutions. In accordance with the Order No. 785n of the Ministry of Health of the Russian Federation dated 31.07.2020 [1], from 01.01.2022, health care institutions are obliged to comply with the provisions of clinical guidelines published before 01.09.2021; clinical guidelines published before 01.06.2022 are obligatory from 01.01.2023, and clinical guidelines published before 01.06.2023 are mandatory from 01.01.2024. Clinical guidelines are reviewed every 3 years after approval, according to the Federal Law No. 489 FZ dated

25.12.2018 [2]. In addition to fulfilling the existing clinical guidelines, each health care facility is obliged to ensure internal control of the quality of medical care, i.e., assessment of compliance with the actual provided care with the existing clinical guidelines [3].

Many works by Russian authors published after 2020 noted that physicians in the Russian Federation often do not follow clinical guidelines when providing medical care [4–6]. The main reasons for this discrepancy are considered to be physicians' ignorance or rejection of relevant clinical guidelines and objective difficulties that prevent their implementation, such as inadequate material and technical equipment and drug supply of healthcare institutions and unfavorable working conditions of healthcare professionals. Factors that contribute to physicians' lack of knowledge or agreement with the content

of clinical guidelines include lack of time to study them, lack of information about updates, low accessibility of training activities, poor health, and emotional exhaustion of physicians.

In addition to studying the factors that negatively affect physicians' adherence to clinical guidelines for diagnosis and treatment of socially significant diseases, in order to identify corrective measures, it is important to understand physicians' willingness to follow individual provisions of clinical guidelines and how it changes in the face of legislation related to the quality of medical care.

Diagnosis and treatment of chronic heart failure (CHF) are regulated in the Russian Federation according to clinical guidelines published in 2020 [7]. Our analysis of the results of a survey of continuing medical students in 2020 showed that adherence to the clinical guidelines for the diagnosis and treatment of CHF is extremely low, not only among general practitioners but also among cardiologists, mainly due to a lack of knowledge [8].

Objective

Investigate how physicians' adherence to the basic clinical guidelines for the diagnosis and treatment of CHF has changed over the 2 years since this document was published.

Material and Methods

Materials for the study were the results of an anonymous survey of continuing medical students of at the Scientific Clinical and Educational Center «Cardiology» of St. Petersburg State University in 2022. All participants of in the survey signed a consent for processing of personal data.

Due to the blended training format of the training, the survey was conducted both in-person and online. The questionnaire is provided in Appendix 1. It contains two sections. The questions in the first section were used to determine the physician's

age, specialty, and length of service. The second section of the questionnaire consisted of 14 questions. The first three questions asked respondents to assess their awareness of the diagnosis and treatment of CHF, to identify the role of clinical guidelines in routine practice, and to report whether they had read clinical guidelines on the diagnosis and treatment of CHF. Questions 4–14 addressed specific provisions of the clinical guidelines for the treatment of CHF and were worded to reflect the respondents' opinions. Responses were considered correct if they were consistent with the provisions of the 2020 national clinical guidelines for the diagnosis and treatment of CHF [9]. Most of the questions in the second section of the questionnaire on the management of patients with CHF with and reduced left ventricular ejection fraction (HFrEF) were asked to physicians in a 2020 survey [10].

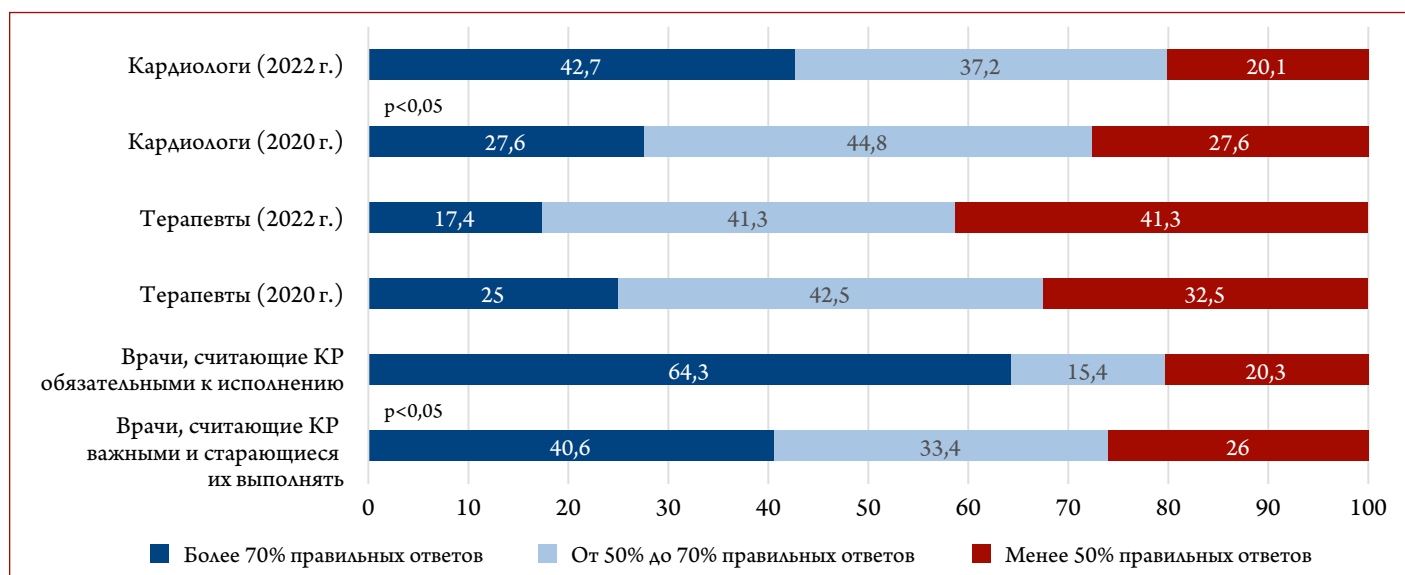
A total of 294 completed questionnaires were received during the study. The results of the survey of 263 physicians were suitable for analysis: 204 (77.6%) cardiologists, 46 (17.5%) internists and general practitioners, and 13 (4.9%) physicians in other specialties. The mean age of the respondents was 44.8 ± 10.6 years, and the length of service in current specialty was 17.3 ± 10.5 years.

The collected data were processed using Microsoft Excel 2010. Frequency analysis was used to establish the ratio of correct and incorrect responses in the group. The chi-squared test, Student's t-test and Fisher's exact test were used to assess the significance of differences between the answers given by the respondents of the study groups (cardiologists and internists). Differences were considered significant at $p < 0.05$.

Results

The distribution of answers given by physicians to the questions in the main part of the questionnaire is summarized in Table 1.

Central illustration. Main results of physician survey on treatment of CHF, %



In question 1, respondents were asked to indicate how well informed they felt they were about the diagnosis and treatment of CHF. Thus, 32 (12.2%) physicians considered themselves fully informed and able to advise colleagues on complex issues of diagnosis and treatment of CHF («A»). Moreover, 133 (50.5%) respondents indicated that they were sufficiently informed and able to provide care to patients with CHF both in outpatient settings and in specialized hospitals («B»). However, 96 (36.5%) respondents considered themselves to be generally informed and capable of managing patients with CHF in simple clinical cases, mainly in outpatient settings («C»). Only 15.7% of cardiologists considered themselves fully informed regarding CHF diagnosis and treatment. There were no such practitioners the internists, and 76.1% chose response «C». Question 2 asked respondents to identify the role of clinical guidelines in their routine practice. None of the respondents chose «D», i.e., characterized the clinical guidelines as useless documents for medical practice. One hundred and eighty-eight (71.5%) respondents believed that clinical guidelines are important and tried to follow them («B»), 69 (26.2%) believe that clinical guidelines are mandatory («A»), and 6 (2.3%) believe that clinical guidelines are sometimes useful («C»). The difference between the groups of cardiologists and internists in the percentage of physicians who chose «A» ($p = 0.04$) indicates that internists are less likely than cardiologists to consider clinical guidelines mandatory. Question 3 sought to determine the percentage of respondents who had and had not read the clinical guidelines for CHF. Fifty-five (20.9%) physicians indicated that they had not read the document.

Question 4 assessed physicians' knowledge of the indications for prescribing loop diuretics. The correct answer «A» (CHF class II–IV with signs of congestion) was given by 213 (81%), including 80.4% of cardiologists and 82.6% of internists. Question 5 asked respondents to identify the indication for prescribing the valsartan + sacubitril complex. The correct answer «C» (CHF class II–III with left ventricular ejection fraction (LVEF) <40% with stable disease and good tolerability of angiotensin-converting enzyme (ACE) inhibitors or angiotensin II receptor blockers (ARBs), but inadequate treatment efficacy – instead of these drug classes) was selected by 198 (75.3%) respondents. Question 6 focused on determining indications for prescribing mineralocorticoid receptor antagonists (MRAs). Ninety-seven (36.9%) respondents chose the correct answer «a» (LVEF < 40% regardless of the severity of CHF symptoms). Question 7 asked respondents to indicate when they would consider it necessary to prescribe dapagliflozin to CHF patients. The correct answer «A» consistent with clinical guidelines (LVEF < 40% regardless of symptom severity), was chosen by 97 (36.9%) physicians, with cardiologists being significantly more likely than internists to answer this question correctly (42.7% and 17.4%, respectively; $p < 0.01$). In question 8, physicians were asked to determine

Table 1. Answers given by respondents to the questions of the main part of the questionnaire

Question	Group	Answer, n (%)				
		A	B	C	D	E
1	Total	32 (12.2)	133 (50.5)	96 (36.5)	2 (0.8)	–
	Cardiologists	31 (15.7)	119 (58.3)	53 (26)	0	–
	Internists	0	11 (23.9)	35 (76.1)	0	–
2	Total	69 (26.2)	188 (71.5)	6 (2.3)	0	–
	Cardiologists	61 (29.9)	138 (67.7)	5 (2.4)	0	–
	Internists	7 (15.2)	39 (84.8)	0	0	–
3	Total	208 (79.1)	55 (20.9)	–	–	–
	Cardiologists	165 (80.9)	39 (19.1)	–	–	–
	Internists	34 (73.9)	12 (26.1)	–	–	–
4	Total	213 (81)	23 (8.7)	27 (10.3)	–	–
	Cardiologists	164 (80.4)	15 (7.4)	25 (12.2)	–	–
	Internists	38 (82.6)	6 (13)	2 (4.4)	–	–
5*	Total	27 (10.3)	25 (9.5)	198 (75.3)	13 (4.9)	–
	Cardiologists	19 (9.3)	16 (7.8)	164 (80.4)	5 (2.5)	–
	Internists	5 (10.9)	7 (15.2)	26 (56.5)	8 (17.4)	–
6	Total	97 (36.9)	24 (9.1)	74 (28.1)	68 (25.9)	–
	Cardiologists	80 (39.2)	16 (7.8)	53 (26)	55 (27)	–
	Internists	14 (30.4)	4 (8.7)	18 (39.1)	10 (21.8)	–
7*	Total	97 (36.9)	32 (12.1)	88 (33.5)	46 (17.5)	–
	Cardiologists	87 (42.7)	27 (13.2)	62 (30.4)	28 (13.7)	–
	Internists	8 (17.4)	4 (8.7)	22 (47.8)	12 (26.1)	–
8*	Total	26 (9.9)	176 (66.9)	44 (16.7)	5 (1.9)	12 (4.6)
	Cardiologists	21 (10.3)	147 (72.1)	21 (10.3)	5 (2.4)	10 (4.9)
	Internists	2 (4.3)	22 (47.8)	20 (43.5)	0	2 (4.4)
9**	Total	2 (0.8)	83 (31.5)	158 (60.1)	20 (7.6)	–
	Cardiologists	0	69 (33.8)	123 (60.3)	12 (5.9)	–
	Internists	0	11 (23.9)	28 (60.9)	7 (15.2)	–
10	Total	13 (4.9)	88 (33.5)	143 (54.4)	16 (6.1)	3 (1.1)
	Cardiologists	10 (4.9)	71 (34.8)	109 (53.4)	11 (5.4)	3 (1.5)
	Internists	2 (4.4)	14 (30.4)	27 (58.7)	3 (6.5)	0
11*	Total	1 (0.4)	132 (50.2)	109 (41.4)	21 (8)	–
	Cardiologists	0	112 (54.9)	82 (40.2)	10 (4.9)	–
	Internists	0	13 (28.3)	22 (47.8)	11 (23.9)	–
12	Total	0	127 (48.3)	124 (47.1)	12 (4.6)	0
	Cardiologists	0	93 (45.6)	101 (49.5)	10 (4.9)	0
	Internists	0	25 (54.3)	19 (41.3)	2 (4.4)	0
13	Total	5 (1.9)	18 (6.8)	47 (17.9)	193 (73.4)	–
	Cardiologists	2 (1)	9 (4.4)	42 (20.6)	151 (74)	–
	Internists	2 (4.3)	8 (17.4)	4 (8.7)	32 (69.6)	–
14	Total	33 (12.5)	58 (22.1)	115 (43.7)	30 (11.4)	27 (10.3)
	Cardiologists	29 (14.2)	43 (21.1)	83 (40.7)	28 (13.7)	21 (10.3)
	Internists	2 (4.3)	11 (23.9)	26 (56.6)	1 (2.2)	6 (13)

The difference between the internist and cardiologist groups is statistically significant. * $p < 0.01$; ** $p < 0.05$. Correct answers are in bold for the convenience of the reader.

Table 2. Questionnaire results according to respondents' self-assessment of their knowledge of the main provisions of clinical guidelines

Self-assessment of knowledge level by the respondents	Mean number of correct answers \pm standard deviation	More than 70 % of the correct answers, n (%)	Less than 50 % of the correct answers, n (%)
A. Fully informed	6.9 \pm 1.7	14 (43.8)	4 (12.5)
B. Sufficiently informed	6.9 \pm 1.6	54 (40.6)	25 (18.8)
C. Generally informed	6.1 \pm 1.8	28 (29.2)	36 (37.5)

the dose of spironolactone that should be used to achieve neuromodulatory effects in patients with CHF. Answer «B» (25–50 mg/day), which agrees with clinical guidelines, was selected by 176 (66.9%) respondents. Cardiologists were more likely than internists to correctly indicate the drug dose (72.1% and 47.8%, respectively; $p < 0.01$). In question 9, the respondents were asked to select a criterion for determining the optimal dose of an ACE inhibitor in patients with chronic HFrEF. Of the choices given, two of the answers were correct: «the maximum titrated dose that does not worsen well-being» or «the maximum titrated dose that does not cause critical changes in the control physiological and biochemical parameters». These answers were chosen by 241 (91.6%) respondents. Cardiologists were more likely than internists to correctly answer the question (94.1% and 84.8%, respectively; $p < 0.05$). Question 10 asked respondents to select a management tactic for increasing blood creatinine levels during ACE inhibitor up-titration. Response «C» (reduce the dose of ACE inhibitor by half) corresponded to the clinical guidelines. It was selected by 43 (54.4%) physicians. Question 11 asked what criteria physicians use to determine the optimal beta-blocker dose for treating patients with chronic HFrEF. As with question 10, there were two correct answers: «B» (the maximum titrated dose that does not worsen well-being) and «C» (the maximum titrated dose that does not cause critical changes in the control physiological and biochemical parameters). These answers were chosen by 241 (91.6%) respondents. Cardiologists were significantly more likely than internists to correctly answer (95.1% and 76.1%, respectively; $p < 0.01$). Question 12 asked to determine the management tactic when a patient is found to have asymptomatic sinus bradycardia during beta-blocker up-titration. The correct answer «C» (reduce beta-blocker dose by half) was selected by 124 (47.1%) physicians. The correct answer to Question 13 regarding indications for implanting a cardiac resynchronization therapy device in a patient with CHF – «D» (QRS complex width increased to 150 ms or more with morphology of left bundle branch block and life expectancy not less than 1 year) was chosen by 193 (73.4%) respondents. Physicians should have selected an indication for cardioverter-defibrillator implantation in CHF when answering question 14. Answer «D» consistent with clinical guidelines (Patients with CHF class II–III, LVEF \leq 35% after myocardial infarction experienced at least 40 days ago) was chosen by 30 (11.4%) respondents.

A comparison of responses to similar questions in this survey and the survey conducted two years ago showed no change in the percentage of correct responses to Questions 4, 5, 6, 8, 9, 10, 11, 13, and 14 among all respondents and in the cardiologist and internist groups. The frequency of correct answers to Question 12 increased significantly ($p < 0.01$) for both cardiologists and internists. The difference in the percentage of correct answers given by cardiologists and internists to Question 11 became significant because internists were less likely to give a correct answer in this questionnaire. The difference in the percentage of correct answers to Question 13 given by physicians in the comparison groups became insignificant because cardiologists were less likely to give correct answers in 2022.

In 2022, respondents gave a mean of 6.7 out of 11 (60.6%) correct answers to the survey questions. More than 70% of the correct answers were provided by 96 (36.5%) respondents, including 87 cardiologists and 8 internists (42.7% and 17.4%, respectively; $p < 0.005$). Less than 50% of the correct answers were given by 41 cardiologists and 19 internists (20.1% and 41.3%, respectively). In 2020, 6.2 (56.4%) correct responses were received for the same questions. More than 70% correct answers were given by 27.6% of cardiologists and 25.0% of internists, and less than 50% correct answers were given by 27.6% of cardiologists and 32.5% of internists. There was no significant change in the mean number of correct answers compared with the 2020 questionnaire results for cardiologists and internists. Analysis of changes in the distribution of respondents according to the percentage of correct answers ($\geq 70\%$, 50–70%, $< 50\%$) compared with 2020 showed no significant differences in the group of internists and a statistically significant increase in the percentage of cardiologists who gave more than 70% correct answers ($p < 0.05$).

The results of the questionnaire survey of physicians with different self-assessments of their level of awareness of the basic provisions of the clinical guidelines on CHF are presented in Table 2.

Among the respondents who chose «A» (Fully informed: I can advise my colleagues on complex issues of diagnosis and treatment of CHF) for Question 1 of the main part of the questionnaire, 6.9 (63.4%) respondents provided correct answers to the questions directly related to CHF. More than 70% of the correct answers were given by 14 physicians, and less than 50% were given by 4 physicians (43.8% and 12.5%, respectively). The results of the questionnaire were

comparable among respondents who chose «B» for Question 1 (Sufficiently informed: I can provide care to patients with CHF in both the outpatient setting and specialized hospitals). The mean number of correct answers among respondents who chose «C» (Generally informed: I am capable of managing patients with CHF in simple clinical cases, mainly in the outpatient setting) for Question 1 was 6.1 (55.9%), which was significantly lower than among physicians who chose «A» and «B» ($p < 0.01$). There were significantly fewer respondents with more than 70% of the correct answers in this subgroup than among the physicians who chose «A» and «B», and more physicians with less than 50% of the correct answers ($p < 0.05$ compared to the subgroup of physicians who chose «A» and $p < 0.01$ compared to those who chose «B»).

Questionnaire results varied according to the respondents' perceptions of the role of clinical guidelines in routine practice. Among the respondents who chose «A» (consider clinical guidelines mandatory) for Question 2 of the main part of the questionnaire, the mean number of correct answers to questions related to CHF was 7.1 (64.3%); 28 (40.6%) physicians gave more than 70% of the correct answers, and 14 (20.3%) physicians gave less than 50% of the correct answers. Among the physicians who selected other answer options for Question 2, the mean number of correct answers was 6.5 (59.3%); 68 (35.1%) physicians gave more than 70% of the correct answers, and 51 (26.0%) gave less than 50% of the correct answers. The mean number of correct answers was significantly higher among those who considered clinical guidelines mandatory ($p < 0.001$).

Discussion

The degree to which physicians adhere to current clinical guidelines is considered one of the independent factors influencing the course and outcomes of CHF [9, 10]. The results of our study show how physicians' adherence to the basic provisions of the national clinical guidelines for the medical care of patients with CHF changed over the 2 years since this document was published. They also reflect physicians' opinions about their own knowledge of the guidelines and the importance of adhering to their provisions in their routine practice.

Indications for prescribing loop diuretics were correctly answered by 81% of respondents, with cardiologists and therapists responding similarly, a slightly better result than 2 years ago when 72.4% of physicians answered correctly. This result is difficult to consider satisfactory because the algorithms of diuretic therapy in CHF have remained unchanged for a long time and have been described in detail. When asked about the indications for prescribing MRAs in CHF patients, 36.9% of respondents answered correctly, which was not significantly different from the results of the previous questionnaire. It should be noted that cardiologists and internists were equally

unlikely to give a correct answer to this question (39.2% and 30.4%, respectively; $p > 0.05$). MRAs continue to be viewed as a component of a diuretic regimen rather than as a neuromodulatory agent.

Only two-thirds of respondents correctly identified the indication for valsartan + sacubitril. The percentage of physicians who gave the correct answer did not change over the 2 years (75.3% of respondents in 2022 and 79.5% in the previous survey). Cardiologists remained significantly more aware of the indications for valsartan + sacubitril than internists (80.4% and 56.5% of the correct answers, respectively; $p < 0.01$).

The role of sodium-glucose co transporter type 2 (SGLT2) inhibitors in the treatment of CHF has changed significantly in the last 2 years since national clinical guidelines were issued. Two drugs of this class, dapagliflozin and empagliflozin, are currently recommended to improve prognosis and quality of life in all patients with chronic HFrEF without contraindications. The clinical guidelines only mention dapagliflozin, which is indicated in the absence of diabetes mellitus in patients with chronic HFrEF if therapy with renin-angiotensin-aldosterone system inhibitors, beta-blockers, and MRAs is not effective. An answer that were fully consistent with clinical guidelines was provided by 36.9% of respondents. Even cardiologists correctly indicated the indication for prescribing the drug less than half the time, and internists significantly less often (42.7% and 17.4%, respectively; $p < 0.01$).

The results obtained suggest that valsartan + sacubitril and SGLT2 are not yet considered by internists as agents to be used routinely in patients with CHF. Their prescription is mainly reserved for cardiologists.

The concept of clinical guideline-based therapy includes both the prescription of necessary drugs and their use in doses that have been proven effective in randomized clinical trials [11, 12]. Among the many reasons that prevent the prescription of target or optimal drug doses, physicians' unawareness of titration rules, treatment safety criteria, and the associated fear of side effects are considered [9, 12, 13]. In our survey, 91.6% of respondents correctly identified the criteria for determining the doses of ACE inhibitors at which to discontinue up-titration in patients with chronic HFrEF. Cardiologists were significantly more likely than internists to provide correct answers (94.1% and 84.8%, respectively; $p < 0.05$). However, only 54.4% of physicians correctly answered the question regarding dose adjustment of ACE inhibitors in patients with increasing azotemia, whereas the percentage of correct answers did not differ between the cardiologist and internist groups. Correct answers to questions about the criteria for determining ACE inhibitor doses were equally frequent in the current and previous questionnaire surveys. The dose of spironolactone that should be used for neuromodulation in CHF patients was correctly indicated by two-thirds of the respondents, which

is even slightly less than two years ago (66.9% and 79.5% of physicians, respectively). Both cardiologists and internists rarely indicated the recommended dose of spironolactone (72.1% and 47.8%, respectively; $p < 0.01$). The criteria for determining the optimal dose of beta-blockers were correctly indicated in 91.6% of cases, but internists were significantly less likely than cardiologists to correctly answer this question (76.1% and 95.1%, respectively; $p < 0.01$), and there was no statistically significant difference between the results of this and previous surveys. The percentage of physicians who correctly indicated the actions to be taken in the event of bradycardia during beta-blocker up-titration increased significantly compared with the results of the previous questionnaire: from 21.6% to 47.1% in general, from 28.4% to 49.5% in cardiologists, from 5.0% to 41.3% in internists ($p < 0.01$ for all comparisons). However, less than 50% of respondents answered this question correctly in 2022. The above figures confirm the frequently expressed opinion that not knowing the target doses, not understanding the importance of their achievement, uncertainty in determining the criteria of the best available therapy and the maximum tolerated dose of drugs are important reasons for not adhering to the provisions of clinical guidelines in routing practice [14, 15].

Indications for resynchronization therapy were correctly identified by 73.4% of physicians, with similar frequencies among cardiologists (74.0%) and internists (69.6%). Two years ago, the percentage of correct answers to this question was higher among cardiologists and slightly lower among therapists (81.9% and 67.5%, respectively), and the difference between them was statistically significant ($p < 0.05$). Physicians' awareness of the indications for implantation of a cardioverter defibrillator in CHF was very low – only 11.4% of respondents gave the correct answer, with cardiologists and therapists equally unlikely to give the correct answer. Physicians' knowledge of these treatment options for CHF has not changed in 2 years.

Both Russian and foreign authors noted the discrepancy between clinical guidelines and actual practice. For example, data from registries and studies conducted in different years and in different populations of CHF patients consistently demonstrate the discrepancy between recommended and routinely used therapy [10, 16, 17]. Traditionally, the reasons for insufficient implementation of clinical guidelines have been attributed to external barriers such as organizational and financial shortcomings of the healthcare system, low patient compliance due to various factors, and physician-related reasons [18–21]. The lack of physicians' knowledge due to time constraints, limited information resources, and the inaccessibility of clinical guidelines are also discussed [15, 22]. Less frequently mentioned reasons include mistrust and disagreement with clinical guidelines, as well as physicians' lack of experience with provisions of clinical guidelines and

the tendency to adhere to suboptimal but familiar strategies [12, 18, 19, 23]. Furthermore, the excessive number of recommendations developed by different expert communities, inconsistencies in the provisions of different documents, lack of educational programs and training aimed at developing practical skills among physicians, and imperfect regulatory and financial incentives for the implementation of clinical guidelines have been discussed as reasons for low physician adherence to clinical guidelines [15, 22].

None of the respondents expressed an aversion to clinical guidelines, and only 6 (2.3%) respondents found them to be of limited usefulness. The majority of physicians who participated in the survey considered the implementation of clinical guidelines in practice to be absolutely necessary or important (26.2% and 71.5%, respectively), which is in line with the results of other researchers [24]. According to our data, cardiologists were almost twice as likely as internists to consider clinical guidelines mandatory (29.9% and 15.2%, respectively; $p = 0.04$), which is consistent with the findings of Kenefick et al [15], who reported 70% of cardiologists and only 47% of general practitioners were willing to follow clinical guidelines.

It is clear that the success of the implementation of clinical guidelines in practice is closely related to how well physicians are familiar with their contents and the extent to which they agree with them. In our study, respondents' knowledge of and willingness to follow clinical guidelines were largely consistent. Physicians who believed that clinical guidelines were mandatory were more likely to give more than 70% correct answers to the survey questions compared to those who felt differently about their use (40.6% and 35.1%, respectively). However, cardiologists and, to an even greater extent, internists interviewed by us were not sufficiently aware of the basic provisions of the clinical guidelines for the management of CHF patients. The level of knowledge among internists has not changed much since the last survey: only 17.4% gave more than 70% of the correct answers in 2022. Among cardiologists, 42.7% of respondents gave more than 70% correct answers, which is significantly higher than 2 years ago, but the knowledge level of most respondents still does not reach the credit level of the certification exam.

The self-assessment of the respondents and the results of the comparison of the physicians' perception of their knowledge with the actual state of affairs were indicative. Only 15.7% of cardiologists (and none of internists) felt fully informed and able to advise colleagues on the complex issues of diagnosing and treating CHF. Among all respondents, only 50.5%, including 58.3% of cardiologists and 23.9% of internists, felt that they were sufficiently informed to provide care to patients with CHF in standard situations. Only 36.5% of physicians, including 26% of cardiologists and 76.1% of internists, said they were generally familiar with the diagnosis and treatment

of CHF. Of the cardiologists who considered themselves fully competent in the diagnosis and treatment of CHF, only 43.8% gave more than 70% correct answers to the survey questions. Only 40.6% of the physicians who considered their knowledge sufficient to manage patients with CHF in outpatient settings and in specialized hospitals gave more than 70% correct answers.

Physician confidence in the adequacy of their knowledge and the correctness of habitual algorithms of medical care is recognized as a significant barrier to the implementation of clinical guidelines [15, 19, 23]. The low level of knowledge found in our survey can be explained to some extent by the fact that 26.1% of internists and 19.1% of cardiologists were not familiar with the text of the clinical guidelines published 2 years before the survey. Inadequate self-assessment of professional competence supports the tendency of physicians to rely on their preconceived notions of the best available therapy and personal experience rather than on clinical guidelines when making treatment decisions. Physicians' overly optimistic view of their own knowledge, together with other negative factors [6, 25], serves as a barrier to its improvement.

As part of the measures aimed at introducing clinical guidelines for the management of patients with chronic noncommunicable diseases into routine practice, it is traditionally noted that it is necessary to increase physicians' adherence to the rules for selecting and implementing therapy, as set out in the current methodological documents [12, 25]. Changing the status of national clinical guidelines and assigning responsibility for monitoring their implementation to health care institutions will undoubtedly contribute to the successful completion of this task, and increase physicians' motivation to improve their professional knowledge. However, in addition to organizational measures, the improvement of educational technologies used to upgrade the skills of healthcare professionals should be considered an important condition

for increasing physician adherence to clinical guidelines for the diagnosis and treatment of CHF.

Limitations

The limitation of the comparative evaluation of knowledge of cardiologists and internists is related to the quantitative difference between the two groups. The comparative assessment of changes in physicians' awareness of the main provisions of clinical guidelines is limited by the different personal composition of the physician groups that participated in the 2022 and 2020 questionnaires.

Conclusion

Most physicians consider clinical guidelines to be an important methodological tool. However, only slightly more than 25% are aware that they are mandatory. Although cardiologists are better informed than internists regarding the main provisions of the national clinical guidelines for the diagnosis and treatment of chronic heart failure, the average level of physicians' knowledge remains low and has not changed significantly in the 2 years since this document was published. Inadequate self-assessment of professional competence (especially among cardiologists) is one of the most important factors preventing the improvement of knowledge needed to effectively manage patients with chronic heart failure. In addition to organizational measures, successful implementation of clinical guidelines in routine practice requires improvements in educational technologies used to improve physicians' skills.

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Perepech N. B., Tregubov A. V., Mikhailova I. E.

Saint-Petersburg State University, St. Petersburg, Russia

PHYSICIANS' ADHERENCE TO CLINICAL GUIDELINES ON THE CHRONIC HEART FAILURE DIAGNOSIS AND TREATMENT: CHANGES OVER 2 YEARS OF THE DOCUMENT'S EXISTENCE

ADDITIONAL MATERIALS

Annex 1.

The following inquiries are included in the questionnaire administered to participants of continuing medical education courses (for the convenience of the reader, the correct answers are indicated in **bold print**)

I. Respondent Information:

What is your age in full years? _____

What is your specialty?

- a. Cardiology
- b. Internal medicine/general practice
- c. Other: _____

What is the duration of your service in your current specialty (in years)? _____

II. For each of the following questions, please select

one of the suggested answers that you believe is most accurate.

1. To what extent do you consider yourself to be informed about the diagnosis and treatment of chronic heart failure (CHF)?

- a. Fully informed: I possess the knowledge and expertise to provide informed guidance to my colleagues regarding complex issues in the diagnosis and treatment of CHF;
- b. Adequately informed: I possess the knowledge and skills necessary to provide adequate care to patients with CHF in both outpatient and specialized hospital settings;
- c. Moderately informed: I am able to provide care to patients with CHF in uncomplicated clinical cases, mainly in outpatient practice;
- d. Insufficiently informed and do not plan to provide care to patients with CHF.

2. What is your opinion on the role of clinical guidelines in routine practice?

- a. Clinical guidelines are binding;
- b. Clinical guidelines are important, and I try to adhere to them;
- c. Clinical guidelines can be beneficial in certain situations;
- d. Clinical guidelines are not helpful for my daily professional activities.

3. Have you read the clinical guidelines «Chronic Heart Failure,» which were approved by the Scientific and Practical Council of the Ministry of Health of the Russian Federation and subsequently published on the Ministry of Health website on August 7, 2020?

- a. Yes, I have;
- b. No, I have not.

4. When would you consider prescribing a loop diuretic to a patient with LVEF < 40%?

- a. In the event of CHF class II-IV with signs of congestion;
- b. In CHF class III-IV, irrespective of the presence of congestion; or
- c. For all patients with LVEF < 40%, regardless of the CHF class and the presence of congestion.

5. What is the indication for sacubitril+/valsartan in cases of CHF?:

- a. Decompensation of CHF during standard treatment with ACE inhibitors/ARBs, BBs, MRAs, diuretics irrespective of CHF class and LVEF;
- b. CHF class II-IV irrespective of LVEF, in case of ACE inhibitor/ARB intolerance;;
- c. Stable CHF class II-III with LVEF < 40% subject to good tolerance of ACE inhibitor/ARB but insufficient treatment efficacy, instead of ACE inhibitor/ARB;
- d. Stable CHF class II-III with LVEF < 40% and good tolerance of ACE inhibitor/ARB but insufficient treatment efficacy, in addition to ACE inhibitor/ARB.

6. In what circumstances would you consider it necessary to prescribe an MRA to a patient with CHF (in the absence of contraindications and individual intolerance)?

- a. With LVEF < 40%, irrespective of the severity of symptoms;
- b. With LVEF < 40% and symptoms of CHF class II-IV;
- c. In the presence of symptoms of CHF class III-IV, irrespective of LVEF;
- d. With LVEF < 50%, irrespective of the severity of CHF symptoms

7. In what circumstances would you consider it necessary to prescribe dapagliflozin to a patient with CHF (in the absence of contraindications and individual intolerance)?

- a. With LVEF < 40%, irrespective of the severity of symptoms;
- b. With LVEF < 40% and symptoms of CHF class II–IV;
- c. With LVEF < 40% and symptoms of HF persisting despite treatment with ACE inhibitor/ARB/valsartan + sacubitril, BBs and aldosterone antagonists;
- d. In patients with non-insulin-dependent diabetes mellitus and LVEF < 40% along with symptoms of HF that persist despite treatment with ACE inhibitor/ARB/valsartan + sacubitril, BBs and aldosterone antagonists.

8. What dose of spironolactone do you use to achieve a neuromodulatory effect in patients with CHF?

- a. 12.5–25 mg/day;
- b. 25–50 mg/day;
- c. 50–100 mg/day;
- d. 100–200 mg/day;
- e. Maximum tolerated dose.

9. What is the optimal dosage of ACE inhibitors for the treatment of HFrEF?

- a. The maximum dose that does not deteriorate well-being after a single dose;
- b. The maximum titrated dose that does not deteriorate well-being;
- c. The maximum titrated dose that does not cause critical changes in the control physiological and biochemical parameters;
- d. The minimum recommended dose, since the fact of using an ACE inhibitor is more important than the dose of the medication.

10. What would you recommend in the event that blood levels of creatinine increase by 50% from the baseline during up-titration of the ACE inhibitor?

- a. Continue up-titration of the ACE inhibitor;
- b. Stop up-titration and continue administration of the ACE inhibitor at the previous dose;
- c. Reduce the dosage of the ACE inhibitor twofold;
- d. Cancel the ACE inhibitor;
- e. Other: _____

11. What is the optimal dosage of beta-blockers for the treatment of HFrEF?

- a. The maximum dose that does not deteriorate well-being after a single dose;
- b. The maximum titrated dose that does not deteriorate well-being;
- c. The maximum titrated dose that does not cause critical changes in the control physiological and biochemical parameters;
- d. The minimum recommended dose, since the fact of using a beta-blocker is more important than the dose of the medication.

12. What would you recommend in the event that asymptomatic sinus bradycardia at 48 bpm is observed during up-titration of the beta blocker?

- a. Continue up-titration of the beta blocker;
- b. Stop up-titration and continue administration of the beta blocker at the previous dose;
- c. Reduce the dosage of the beta blocker twofold;
- d. Cancel the beta blocker;
- e. Other: _____

13. When would you recommend implanting a resynchronization device in a patient with CHF and LVEF < 35% during the optimal drug therapy?

- a. In the event that the patient demonstrates an inability to respond to diuretics;
- b. In the event that the QRS complex duration is 150 ms or more;
- c. In the event that the QRS complex duration is 150 ms or more, along with a life expectancy of at least one year;
- d. In the event that the QRS complex duration is 150 ms or more, in conjunction with the presence of the left bundle branch block morphology and a life expectancy of at least one year.

14. In what circumstances would you recommend implanting a cardioverter-defibrillator to a patient with CHF?

- a. To all patients with CHF class II–III and LVEF ≤ 35%;
- b. To patients with CHF class II–III, LVEF ≤ 35%, and episodes of unstable ventricular tachycardia;
- c. To patients with CHF class II–III, LVEF ≤ 35%, episodes of unstable ventricular tachycardia, and contraindications to amiodarone;
- d. To patients with CHF class II–III, LVEF ≤ 35%, and myocardial infarction occurring at least 40 days prior;
- e. To patients with CHF class II–III, LVEF ≤ 35%, and myocardial infarction occurring at least 40 days prior, only if complete revascularization is unfeasible