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Trial design

Objectives and design of Russian Registry of Hypertension, Coronary Artery Disease, and Chronic Heart Failure

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Abstract: *Introduction* — Among the causes of mortality in Russia, as in most developed countries, the first position is occupied by the cardiovascular diseases (CVD). It may be caused by different reasons, including an insufficient quality of healthcare.
Methods — The Russian Registry of Hypertension, Coronary Artery Disease, and Chronic Heart Failure (RusR-Htn-CAD-CHF) is a retrospective, continuous, nationwide, web-based registry of patients with the following chronic CVD: hypertension (Htn), coronary artery disease (CAD) and chronic heart failure (CHF). Participation in the RusR-Htn-CAD-CHF is voluntary. Any health facilities that provide primary healthcare to patients with one or several of the evaluated chronic CVD (Htn, CAD, and CHF) can take part in the RusR-Htn-CAD-CHF. The RusR-Htn-CAD-CHF enrolls patients who underwent care in Russian health facilities from January 2013 to the present day. Key data elements and methods of data analysis in the RusR-Htn-CAD-CHF are presented in this paper.
Results — Up to 2016, 69 healthcare units (from small rural clinics to large regional dispensaries) from 18 regions of Russia participated in the RusR-Htn-CAD-CHF. Currently, the database contains data on more than 41,000 patients with one or several chronic CVD (Htn, CAD, and CHF) who were followed-up from 2013 to current day. However, the contribution of regions to data collection of the RusR-Htn-CAD-CHF is nonuniform. In database, the major part of participants (88.7%) is from the Ivanovo region. Current statement of promotion of RusR-Htn-CAD-CHF, some problems, and first advances are considered in the present paper.
Conclusion — The RusR-Htn-CAD-CHF is a novel project for the Russian healthcare. It has good prospects for the assessment of healthcare quality in Russian patients with Htn, CAD, and CHF.

Keywords: hypertension, coronary artery disease, chronic heart failure, registry, quality control, clinical indicators.

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Introduction

Among the causes of mortality in Russia, as in most developed countries, the first position is occupied by the cardiovascular diseases (CVD) [1]. CVD have caused 50.1% cases of total mortality in 2014 in Russia [1]. In some countries with a comparable economic level, the mortality rate is lower and life expectancy is higher than that in Russia [2]. It may be caused by different reasons, including an insufficient quality of healthcare.

In various countries, there are a number of registries that include patients with main chronic CVD, such as hypertension (Htn) [3-12], coronary artery disease (CAD) [9, 13-18], and chronic heart failure (CHF) [15, 16, 19-23]. The main goal of registries is to fill the gap between probative data of randomized controlled trials and real clinical practice [24]. The registries can also be the basis for epidemiologic studies, original studies, risk modeling, etc.

The registry is an ideal tool for studying the real clinical practice, especially when it is necessary to improve the quality of healthcare [25]. Registries of CVD can be useful for increasing the management efficiency in the healthcare system [25]. The problem of improving the quality control methods of providing healthcare to patients is very relevant [8, 26, 27], including for Russia [28]. In real practice, the use of existing Russian healthcare standards is often accompanied by various difficulties, for

example, inadequate management and funding of healthcare, low patients' compliance, and lack of qualified specialists, necessary equipment, and drugs [28-30].

The first Russian registry of Htn was created in 2006 and has been used successfully up to 2012 inclusive. The main results of this registry were published in Russian scientific journals [31-35]. In 2012, the novel registry, named the Russian Registry of Hypertension, Coronary Artery Disease, and Chronic Heart Failure (RusR-Htn-CAD-CHF), was created, which replaced the first registry of Htn. The goal of the novel registry was to collect information about the patients with one or several of the following chronic CVD: Htn, CAD, and CHF.

The aim of this paper is to describe the objectives and design of the RusR-Htn-CAD-CHF. Presented results may be interesting to a wide audience because the RusR-Htn-CAD-CHF is currently the largest registry of Russian patients with Htn, CAD, and CHF.

Description of RusR-Htn-CAD-CHF

Objectives

The main objectives of RusR-Htn-CAD-CHF are the following:

i) to create the Russian national database containing information on healthcare delivered to patients with Htn and/or CAD and/or CHF in primary care and specialized healthcare;
ii) to obtain the data on the demographic, clinical, and laboratorial characteristics of patients with Htn and/or CAD and/or CHF in the Russian healthcare;
iii) to identify the national features of associations between the characteristics of evaluated chronic CVD (Htn, CAD, and CHF) and clinical outcomes, including quality of primary care and specialized healthcare;
iv) to propose a practical guide for improving the quality and efficiency of healthcare in each health facilities participating in the RusR-Htn-CAD-CHF.

Developers

The Russian Cardiology Research and Production Complex (Moscow, Russia) was responsible for the development of the RusR-Htn-CAD-CHF and centralized the data analysis at a federal level. The RusR-Htn-CAD-CHF was established in 2011–2012 by researchers, cardiologists, and IT specialists from the Saratov Research Institute of Cardiology (Saratov, Russia). The current support of the RusR-Htn-CAD-CHF is carried out by the staff of both the above-mentioned organizations.

Participation

Participation in the RusR-Htn-CAD-CHF is voluntary and free of charge. Any health facility that provides primary care for patients with Htn, CAD, and CHF can participate in the Registry by sending a request to the technical support staff. Starting from 2013, many health facilities from different regions of Russia were invited to take part in the RusR-Htn-CAD-CHF by the Russian Cardiology Research and Production Complex (Moscow, Russia). Up to 2016, 69 healthcare units (from small rural polyclinics to large regional dispensaries) from 18 regions of Russia participated in the RusR-Htn-CAD-CHF. However, the contribution of regions to data collection of the RusR-Htn-CAD-CHF is nonuniform. The major part of participants of the RusR-Htn-CAD-CHF is from the Ivanovo region. Ivanovo region is a main participant which is now owned by a majority of patient data in database. Ivanovo region is a region in the Central Federal District of Russia. According to official data of Federal State Statistics Service of Russian Federation (http://www.gks.ru), the population of Ivanovo region was 1,036,900 people (44.9% male) in January 2015. It is 2.7% of population of the Central Federal District of Russia, and 0.7% of total Russian population (http://www.gks.ru). The main demographic characteristics of Ivanovo region are the following: the proportion of adult people is 84.4% (vs 82.4% in all-Russia), mean age of inhabitants is 41.5 years (vs 39.5 years in all-Russia), the proportion of urban people is 81.2% (vs 74.0% in all-Russia), and cardiovascular mortality among total population is 0.64% (vs 0.65% in all-Russia).

Now, 4.2% (36,424 people) of adult population (875,513 people) of Ivanovo region are registered in the RusR-Htn-CAD-CHF. In other regions of Russia, the using of RusR-Htn-CAD-CHF is only at the beginning.

Design of RusR-Htn-CAD-CHF

The RusR-Htn-CAD-CHF is a retrospective, continuous, nationwide, web-based registry operating online (URL: http://62.117.81.44/Register/login.aspx). The design of RusR-Htn-CAD-CHF is based on the national and international clinical guidelines on diagnostics and treatment of Htn, CAD, and CHF [36-42].

Access to the Registry is given to registered members. Each user has a unique identification number and password to log into the database. The web forms are designed to be interactive. They limit or exclude certain options in order to avoid the entry of conflicting or spurious data. Wherever possible, the data are entered by selection from "drop-down" lists in order to minimize the number of keyboard errors. The purpose of all the above-mentioned measures is to maximize the accuracy of data.

he web interface of RusR-Htn-CAD-CHF contains 9 web forms with the following titles:

i) Personal data of patients;
ii) Past history;
iii) Results of physical examination at visit;
iv) Results of instrumental examinations;
v) Results of laboratory tests;
vi) Non-pharmacologic treatment;
vii) Drug treatment;
viii) Invasive treatment;
ix) Diagnosis and its codes according to the International Classification of Diseases 10 (ICD-10).

Each web form can be saved unlimited number of times with different dates that allows accumulating the information about the dynamics of clinical parameters of patients over time.

Patients

The RusR-Htn-CAD-CHF enrolls patients with Htn and/or CAD and/or CHF receiving primary healthcare in Russia. The enrollment of patients started in January 2013 and is continued up to the present day.

Inclusion criteria comprise established diagnosis of Htn and/or CAD and/or CHF in patients' medical card, and age ≥18 years. The RusR-Htn-CAD-CHF has no any exclusion criteria.

Data elements

The key data elements and definitions of RusR-Htn-CAD-CHF database were developed using ACCF/AHA 2011 Key Data Elements and Definitions of the Base Cardiovascular Vocabulary for Electronic Health Records [43] and national and international clinical guidelines on diagnostics and treatment of Htn, CAD, and CHF [36-42].

Data on patients' demographics, clinical characteristics, non-pharmacologic and drug treatment, and invasive intervention are collected. The key data elements of RusR-Htn-CAD-CHF database are presented in *Appendix* A. The list of data elements recommended to filling depends on the diagnosis (Htn, CAD, or CHF) (see *Appendix* A).

For each included patient, the web form (see Design of RusR-Htn-CAD-CHF) can be saved multiple times with different dates signed by user according to the dates in patients' medical card.

Data collection

The health facilities participating in the RusR-Htn-CAD-CHF were asked to include all patients following inclusion criteria treated for Htn, CAD, and CHF. For each included patient, new data may be added to the database annually in the case of necessity. Thus, the RusR-Htn-CAD-CHF can be used not only for the retrospective study, but also for the prospective evaluation (observation). Several health facilities can enter data on the same patient, if they provided him medical care at the same time or sequentially. The source of patients' data is the patient medical card and/or the hospital chart. The design of RusR-Htn-CAD-CHF does not allow to study of mortality in patients with chronic CVD.

In each center, one or several physicians were trained to log the data of patients into the Registry. To help these physicians, a detailed user manual was developed [44]. This user manual is available on the RusR-Htn-CAD-CHF website.

Currently, the RusR-Htn-CAD-CHF contains the data on more than 41,000 patients with one or several chronic CVD (Htn, CAD, and CHF) who were followed-up in 2013-2015. As for the proportion of chronic CVD presentations included in the Registry since 2013, we have only an approximate estimation. For example, the main participant (Ivanovo region) owns 36,424 patients in the registry. That is about 4.2% of the total number of adults in this region. In other regions, this proportion is even smaller.

The health facilities are interested in accurate data collection because these data are analyzed further by experts separately for each center and used on site for healthcare quality management.

Data security

Some of the main features of database and web security issues should be mentioned briefly. As it is mentioned above, all users are assigned a unique username/password combination that is used to log on to the RusR-Htn-CAD-CHF. In this way, all transactions are recorded automatically in the web server's log.

All the data are pseudonymously entered into a web-based database protected by a password on a safe server of the Russian Cardiology Research and Production Complex (Moscow, Russia) using SSL connections. Subject identification is possible only at the local study site and participating centers are exclusively able to review and modify the patient data. The data on patients with chronic CVD can be added to the RusR-Htn-CAD-CHF and can be changed, but cannot be removed. The transmitted data are stored in the central database on the central server at the Russian Cardiology Research and Production Complex (Moscow, Russia).

The purpose of all the above-mentioned measures is to ensure the confidentiality of data.

Ethical aspects

The study protocol including patient information and consent forms has been reviewed and approved by the Ethics Commission of the Russian Cardiology Research and Production Complex (Moscow, Russia).

All patients must give informed consent before inclusion of their personal and clinical data in the RusR-Htn-CAD-CHF. The standard informed consent form is available on the RusR-Htn-CAD-CHF website. Patients gave their informed consent during their first visit to health facilities in the period of inclusion.

Personal data are coded automatically when entered into the registry. Names, addresses and other data which allows identification of a patient do not stored on the central server. Patients' personal data are available only for staff of a healthcare facility where patients are treated.

The appropriate measures are used to guarantee maximal data confidentiality.

Data analysis

Within the RusR-Htn-CAD-CHF, an analytical module was created for the assessment of guidelines implementation in patients with Htn, CAD, and CHF. The main aim of this analytical module is to implement the system analysis of clinical cases to achieve the clinical result (for example, to achieve the target blood pressure in patients with Htn).

In the RusR-Htn-CAD-CHF, the completeness of clinical guidelines performance in real healthcare is evaluated using the developed clinical indicators, which are calculated automatically by using the database query for a required cohort of patients (in primary care facilities, in regions of Russia, or in all-Russia). These indicators were developed on the basis of national and European guidelines using the ACCF/AHA methodology for the development of quality measures for cardiovascular technology [45]. The details of clinical indicators are presented in *Appendix* C.

Based on the presented clinical indicators, the quality of care in patients with chronic CVD could be compared among Russian healthcare units. This approach allows not only evaluation of the quality of care in a particular unit based on clinical guidelines, but also allows comparative evaluation of health facilities in a city, region or the whole Russia.

Discussion

Registries of diseases allow collecting data from large populations of patients. Currently, the use of RusR-Htn-CAD-CHF is local. Only one region (Ivanovo region) uses the Registry systematically. In other regions of Russia, we have only the first results of RusR-Htn-CAD-CHF using. However, these results can be employed for the evaluation of quality of healthcare in health

facilities participating in the project [46-50]. The first results of RusR-Htn-CAD-CHF caused debate among some Russian cardiologists. Some authors reported their comments and suggestions to improving this Registry [51]. Heterogeneity of quality and efficiency of secondary prevention of CVD in different regions of Russia (according to 2014 report [47]) shows relevant improvement of healthcare in these regions based on using the RusR-Htn-CAD-CHF [52]. According to S.V. Balashov [52], similar approach can be used also for primary cardiovascular prevention, which is also an urgent problem for the Russian cardiology. There is evidence of the successful use of RusR-Htn-CAD-CHF for healthcare quality control in a certain clinic [53, 54]. The basic principle of clinical indicators of RusR-Htn-CAD-CHF (see Appendix C) is the following: the quality indicator must contribute to the achievement of clinical outcome.

Since the RusR-Htn-CAD-CHF uses key data elements and definitions recommended by the American College of Cardiology and American Heart Association, the results of our study have the potential to be used for cross-country comparison of different registries in other European countries and the USA.

Currently, the data filling of RusR-Htn-CAD-CHF faced some difficulties. The use of RusR-Htn-CAD-CHF in practical healthcare meets the problem of reorganizing the workload of staff in health facilities providing care for patients with chronic CVD. Untrained users may have some difficulties with the use of RusR-Htn-CAD-CHF. To solve this problem we developed a user manual [44].

Due to the first Russian registry of Htn (2006-2012), it became possible to trace for several years the level of implementation of clinical guidelines among Russian patients with Htn. It was found out that the level of guidelines implementation is low, compared to economically developed countries [34, 35, 55, 56]. In 2008, only 22% of hypertensive patients had the goal blood pressure and/or satisfactory quality of healthcare [32]. It has been shown that primary care physicians do not conduct correction of cardiovascular risk factors and diagnosis of lesions of target organs and/or associated clinical conditions, which leads to an underestimation of cardiovascular risk and inadequate choice of treatment tactics in patients with Htn [32, 34]. In 2007, 64% of hypertensive patients had medicinal purposes in medical card [34]. At the same time, assigned antihypertensive therapy is fully consistent with the clinical status in 6.5% of total patients with Htn [34].

One of the reasons of low guidelines implementation is a set of current healthcare indicators powered by the Russian Ministry of Health. These indicators are solely organizational. They are used to calculate the average cost of treatment of a typical patient. These indices are not associated with the clinical objectives of treatment [28]. Such dissonance is a major problem in the transition of the Russian healthcare system to higher quality level. Novel registry (the RusR-Htn-CAD-CHF) will provide an objective view not only on patients with Htn, but also on patients with CAD and CHF. In the future, the RusR-Htn-CAD-CHF may provide the basis for implementing local initiatives, such as “pay for performance”. Similar projects were implemented in the US and UK [57-59].

In recent years, the attention to primary and secondary prevention of chronic CVD significantly increased in Russia and other countries [60-64]. Some authors have shown that coronary revascularization was often performed unnecessarily from the clinical point of view [65]. It is known that Russian patients with CAD are characterized by more severe clinical status compared with the same patients from other economically developed countries [66, 67]. However, the percitaneous coronary intervention (PCI) is carried out less frequently in these patients in Russia [66-68]. Soon, criteria of assessment of needs and appropriateness of coronary revascularization [69] will be added to analytical apparatus of the RusR-Htn-CAD-CHF. It is important for modern healthcare in Russia, taking into account the lack of probative data on the necessity and appropriateness of using the coronary revascularization in CAD patients in Russia. Our systematic search in database of Russian Science Citation Index gave no results.

The RusR-Htn-CAD-CHF may be also used as a basis for improving the quality of primary and secondary prevention of chronic CVD. Some Russian health facilities are already using the RusR-Htn-CAD-CHF for the assessment of quality of cardiovascular primary prevention [53].

In Russia, there are other registries of patients with Htn (RECVASA registry, local registries in Tomsk region, Tyumen region, and some other regions) [70-72], CAD (PROGNOS CHD registry and RECVASA registry) [73, 74], and CHF (RIF-CHF registry and Russian Hospital Chronic Heart Failure Registry) [75, 76]. But the RusR-Htn-CAD-CHF is currently the largest registry of Russian patients with chronic CVD.

Currently, the RusR-Htn-CAD-CHF is focused on primary care in Russia. But in the near future, we plan to expand this registry to covering secondary care facilities.

Conclusion

The RusR-Htn-CAD-CHF is a perspective project for healthcare quality assessment in patients with Htn, CAD, and CHF, living in Russia. This registry can be used for dynamic monitoring and improving the quality of primary care (and secondary care in near future) in Russia. Additionally, the RusR-Htn-CAD-CHF can be used for different epidemiologic studies in Russian patients with Htn, CAD, and CHF.

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Conflict of interest

None declared. The Russian Ministry of Health was not involved in the collection, analysis, and interpretation of data, in the manuscript preparation, or in making the decision to submit the paper. The authors have not received any financial support for the preparation of this paper.

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Appendix A. Key data elements of the database of RusR-Htn-CAD-CHF

Code	*Recommended diagnosis*	*Title of key data element*	*Type of element*	*Format of data*
1		***Personal data of patients***		
1.1	Htn, CAD, CHF	Surname	Text	Any text
1.2	Htn, CAD, CHF	First name	Text	Any text
1.3	Htn, CAD, CHF	Middle name	Text	Any text
1.4	Htn, CAD, CHF	Sex	Binary	Male Female
1.5	Htn, CAD, CHF	Date of birth	Date	DD.MM.YYYY
1.6	Htn, CAD, CHF	Date of registration in the RusR-Htn-CAD-CHF	Date	DD.MM.YYYY
1.7	Htn, CAD, CHF	Address	Text	Any text
1.8	Htn, CAD, CHF	Phone (one or more)	Text	Any text
1.9	Htn, CAD, CHF	Number of pension insurance certificate	Text	Any text
1.10	Htn, CAD, CHF	Number of health insurance policy	Text	Any text
1.11	Htn, CAD, CHF	Social category	Categorical (one of list)	Working Pensioner Disabled Other Unknown
1.12	Htn, CAD, CHF	Education	Categorical (one of list)	Primary Average Specialized secondary Incomplete higher Higher Unknown
1.13	Htn, CAD, CHF	Type of work	Categorical (one of list)	Physical Mental Not working Unknown
2		***Past history***		
2.1	Htn, CAD	Family history of coronary artery disease	Categorical (one of list)	Yes No Unknown
2.2	Htn	Family history of hypertension	Categorical (one of list)	Yes No Unknown
2.3	Htn, CAD, CHF	Smoking	Categorical (one of list)	Current smoker: <1 cigarettes/day Current smoker: 1-9 cigarettes/day Current smoker: 10-19 cigarettes/day Current smoker: 20-39 cigarettes/day Current smoker: ≥40 cigarettes/day Former smoker Never smoked Unknown
2.4	Htn, CAD, CHF	Alcohol consumption	Categorical (one of list)	Alcohol drinking: <20 g/day Alcohol drinking: 20-59 g/day Alcohol drinking: 60-139 g/day Alcohol drinking: 140-179 g/day Alcohol drinking: ≥180 g/day No alcohol drinking Unknown
2.5	Htn, CAD, CHF	The level of physical activity in lifestyle	Categorical (one of list)	Low Medium High Unknown
2.6	Htn, CAD, CHF	Balanced diet	Categorical (one of list)	Yes No Unknown
2.7	CHF	Inpatient treatment for cardiovascular diseases	Date of admission, Discharge date	DD.MM.YYYY, DD.MM.YYYY
3		***Results of physical examination at the visit***		
3.1	Htn, CAD	SBP, first measurement at visit	Numeric	000 mmHg Unknown
3.2	Htn, CAD	DBP, first measurement at the visit	Numeric	000 mmHg

Code	*Recommended diagnosis*	*Title of key data element*	*Type of element*	*Format of data*
				Unknown
3.3	Htn, CAD	SBP, second measurement at the visit	Numeric	000 mmHg Unknown
3.4	Htn, CAD	DBP, second measurement at the visit	Numeric	000 mmHg Unknown
3.5	CAD, CHF	Heart rate at the visit	Numeric	000 beats/min Unknown
3.6	CAD, CHF	Palpation	Categorical (multiple choose)	Bilateral ankle swelling Ripple of jugular veins Hepatojugular reflux Hepatomegalia
3.7	CAD, CHF	Auscultation	Categorical (multiple choose)	Rattling in the lower lung Rattling on all lung fields The third tone in heart beat
3.8	Htn, CAD	Height	Numeric	000 cm Unknown
3.9	Htn, CAD	Weight	Numeric	000 kg Unknown
3.10	Htn, CAD	Waist circumference	Numeric	000 cm Unknown
3.11	CAD	Complaints of chest pain or its equivalent	Categorical (one of list)	Yes No Unknown
3.12	CAD	Characteristics of chest pain or its equivalent	Categorical (multiple choose)	Symptom has characteristic features and duration for chest pain Chest pain or its equivalent arises during physical exertion or emotional stress Chest pain or its equivalent passes alone and/or after taking nitroglycerin Not applicable (if in element 3.11 it was selected “No” or “Unknown”)
3.13	CAD	The level of physical activity associated with chest pain or its equivalent	Categorical (one of list)	Usual daily physical activity does not cause chest pain or its equivalent Slight limitation of usual physical activity Significant limitation of usual physical activity Inability to perform any physical activity because of chest pain or its equivalent Unknown Not applicable (if in element 3.11 it was selected “No” or “Unknown”)
3.14	CAD, CHF	Complaint of dyspnea	Categorical (one of list)	Yes No Unknown
3.15	CAD, CHF	Characteristics of dyspnea (*прим.:* если в пункте «Жалобы на одышку» выбран «Имеется»)	Categorical (multiple choose)	Paroxysmal nocturnal dyspnea Dyspnea during usual physical activity Dyspnea during walking on level ground Dyspnea when climbing (uphill, stairs) Dyspnea at rest Orthopnoea Nocturnal cough Unknown Not applicable (if in element 3.14 it was selected “No” or “Unknown”)
4		***Results of instrumental examinations***		
4.1	Htn	24-hour ambulatory blood pressure monitoring	Categorical (one of list)	Yes No
4.1.1	Htn	24-hour SBP	Numeric	000 mmHg Unknown
4.1.2	Htn	24-hour DBP	Numeric	000 mmHg Unknown
4.1.3	Htn	Daytime SBP	Numeric	000 mmHg Unknown
4.1.4	Htn	Daytime DBP	Numeric	000 mmHg Unknown
4.1.5	Htn	Number of daytime measurements	Numeric	00 Unknown

Code	*Recommended diagnosis*	*Title of key data element*	*Type of element*	*Format of data*
4.2.1	Htn	Self-monitoring SBP (mean)	Numeric	000 mmHg Unknown
4.2.2	Htn	Self-monitoring DBP (mean)	Numeric	000 mmHg Unknown
4.2.3	Htn	Duration of self-monitoring blood pressure	Numeric	00 days Unknown
4.3	Htn, CAD, CHF	Echocardiography	Categorical (one of list)	Yes No
4.3.1	Htn	Left ventricular mass index	Numeric	000 g/m^2 Unknown
4.3.2	CAD, CHF	LVEF	Numeric	00 % Unknown
4.3.3	CHF	Left ventricular diastolic dysfunction	Categorical (one of list)	Yes No Unknown
4.3.4	CAD	Local contractility disorders	Categorical (one of list)	Yes No Unknown
4.3.5	CHF	Pulmonary hypertension	Categorical (one of list)	Yes No Unknown
4.4.1	Htn, CAD, CHF	ECG: conclusion	Categorical (multiple choose)	Left ventricular hypertrophy Signs of Q-wave myocardial infarction Signs of non-Q-wave myocardial infarction Tachyarrhythmia Atrioventricular block: 2 or 3 degree Atrial fibrillation or atrial flutter Other violations Normal Unknown
4.4.2	Htn	Sokolow-Lyon index	Numeric	00 mm Unknown
4.4.3	Htn	Cornell product criteria	Numeric	0000 mm*ms Unknown
4.5.1	Htn	Duplex ultrasound: Intima media thickness	Numeric	0.0 mm Unknown
4.5.2	Htn	Duplex ultrasound: Atherosclerotic plaque in great arteries	Categorical (one of list)	Yes No Unknown
4.5.3	Htn	Carotid–femoral pulse wave velocity	Numeric	00.0 m/s Unknown
4.5.4	Htn	Ankle-brachial index	Numeric	0.0 Unknown
4.6	CAD, CHF	Chest X-ray	Categorical (multiple choose)	Cardiomegaly Pleurisy Pulmonary vascular congestion or pulmonary edema None of the above Unknown
4.7	Htn	Fundus examination by ophthalmologist	Categorical (one of list)	Hypertensive retinopathy Other Unknown
4.8	Htn, CHF	Consulting with cardiologist	Categorical (one of list)	Yes No
4.9	CAD	ECG during exercise	Categorical (one of list)	Yes No
4.9.1	CAD	Results of ECG during exercise	Categorical (one of list)	Positive Negative Uncertain Unknown Not applicable (if in element 4.9 it was selected “No”)
4.9.2	CAD	ECG during exercise: The load duration	Numeric	00.0 minutes Unknown Not applicable (if in element 4.9 it was selected “No”)
4.9.3	CAD	ECG during exercise: Maximal deviation of ST segment	Numeric	00.0 mm Unknown Not applicable (if in element 4.9 it was selected “No”)

Code	*Recommended diagnosis*	*Title of key data element*	*Type of element*	*Format of data*
4.9.4	CAD	ECG during exercise: Features of chest pain	Categorical (one of list)	No angina Angina occurs, but does not stop exercise test Angina causes to stop the test Unknown Not applicable (if in element 4.9 it was selected "No")
4.9.5	CAD	ECG during exercise: METs	Numeric	00.0 METs Unknown Not applicable (if in element 4.9 it was selected "No")
4.9.6	CAD	Contraindications for exercise test	Categorical (one of list)	Yes Unknown Not applicable (if in element 4.9 it was selected "Yes")
4.10.1	CAD	Physical stress echocardiography: Minimal LVEF	Numeric	00 % Unknown
4.10.2	CAD	Physical stress echocardiography: Stress-induced violations of local contractility	Categorical (one of list)	Yes No Unknown
4.11	CAD	Dobutamine stress echocardiography: Stress-induced violations of local contractility	Categorical (one of list)	Yes No Unknown
4.12	CAD	Perfusion scintigraphy: Irreversible perfusion defect	Categorical (one of list)	Yes No Unknown
4.13.1	CAD	Computerized tomography: Agatston score	Numeric	000 HU Unknown
4.13.2	CAD	Results of coronary computed tomography angiography	Categorical (multiple choose)	Yes (Additional dataset is presented in Appendix B) Unknown
4.14	CAD	Results of coronary angiography	Categorical (multiple choose)	Yes (Additional dataset is presented in Appendix B) Unknown
5		***Results of laboratory tests***		
5.1	Htn, CAD	Blood glucose	Numeric	00.0 mmol/L 000 mg/dL Unknown
5.2	Htn, CAD	Glucose tolerance test: Blood glucose via 2 hours after glucose load	Numeric	00.0 mmol/L 000 mg/dL Unknown
5.3	Htn, CAD	Hemoglobin A1c	Numeric	00.0 % Unknown
5.4	Htn, CAD	Total cholesterol	Numeric	00.0 mmol/L 000 mg/dL Unknown
5.5	Htn, CAD	Triglycerides	Numeric	00.0 mmol/L 000 mg/dL Unknown
5.6	Htn, CAD	Low-density lipoprotein	Numeric	00.0 mmol/L 000 mg/dL Unknown
5.7	Htn, CAD	High-density lipoprotein	Numeric	00.0 mmol/L 000 mg/dL Unknown
5.8	Htn, CHF	Creatinine	Numeric	000 micromoles/L 0.00 mg/dL Unknown
5.9	Htn	Serum urea	Numeric	00.00 mmol/L Unknown
5.10	Htn	Uric acid	Numeric	000.0 µmol/L Unknown
5.11	CHF	B-type natriuretic peptide (PNB)	Numeric	000 Pg/ml 000 Pmol/ml
5.12	CHF	N-terminal of the prohormone brain natriuretic peptide (NT-proBNP)	Numeric	0000 Pg/ml 000 Pmol/ml
5.13	Htn, CAD, CHF	Serum potassium	Numeric	000.0 mmol/L Unknown
5.14	CHF	Serum sodium	Numeric	000.0 mmol/L Unknown
5.15	CHF	Serum chloride	Numeric	000.0 mmol/L

Code	*Recommended diagnosis*	*Title of key data element*	*Type of element*	*Format of data*
				Unknown
5.16	CAD	Hemoglobin	Numeric	000 g/L Unknown
5.17	Htn	Urine protein	Numeric	0.000 g/L Unknown
5.18	Htn	24-hour urine protein	Numeric	000.0 mg/day Unknown
5.19	Htn	Albumin/creatinine ratio in urine	Numeric	00 mg/g 0.0 mg/mmol
6		***Non-pharmacologic treatment***		
6.1	Htn	Subject who was trained in the School for hypertensive patients	Categorical (one of list)	Yes Unknown
6.2	CHF	Subject who was trained in the School for patients with CHF	Categorical (one of list)	Yes Unknown
6.3	Htn, CAD, CHF	Patient who received advice on the rational consumption of alcohol	Categorical (one of list)	Yes Unknown
6.4	Htn, CAD, CHF	Patient who received advice on smoking cessation	Categorical (one of list)	Yes Unknown
6.5	Htn, CAD, CHF	Patient who received advice on rational physical activity	Categorical (one of list)	Yes Unknown
6.6	Htn, CAD, CHF	Patient who received advice on rational diet	Categorical (one of list)	Yes Unknown
6.7	Htn, CAD, CHF	Patient who received advice on weight normalization	Categorical (one of list)	Yes Unknown
7		***Drug treatment***		
7.1.1	Htn, CAD, CHF	ACE-Is	Categorical (one of list)	Yes No
7.1.2	Htn, CHF	Adverse reactions to ACE-Is and/or idiosyncrasy	Categorical (one of list)	Yes Unknown
7.1.3	Htn, CAD, CHF	Angioedema	Categorical (one of list)	Yes Unknown Not applicable (if in element 7.1.2 it was selected "Unknown")
7.2.1	Htn, CAD, CHF	ARBs	Categorical (one of list)	Yes No
7.2.2	Htn, CHF	Adverse reactions to ARBs and/or idiosyncrasy	Categorical (one of list)	Yes Unknown
7.3	Htn	Direct renin inhibitors	Categorical (one of list)	Yes No
7.4.1	Htn, CAD, CHF	Beta-blockers	Categorical (one of list)	Yes No
7.4.2	Htn, CAD, CHF	Adverse reactions to beta-blockers and/or idiosyncrasy	Categorical (one of list)	Yes Unknown
7.5.1	Htn, CAD	Dihydropyridine CCBs	Categorical (one of list)	Yes No
7.5.2	Htn, CAD	Non-dihydropyridine CCBs	Categorical (one of list)	Yes No
7.5.3	Htn, CAD	Adverse reactions to CCBs and/or idiosyncrasy	Categorical (one of list)	Yes Unknown
7.6.1	Htn, CHF	Thiazide diuretics	Categorical (one of list)	Yes No
7.6.2	Htn, CHF	Potassium-sparing diuretics	Categorical (one of list)	Yes No
7.6.3	Htn, CHF	Loop diuretics	Categorical (one of list)	Yes No
7.6.4	Htn, CHF	Adverse reactions to diuretics and/or idiosyncrasy	Categorical (one of list)	Yes Unknown
7.7	Htn	Alpha-blockers	Categorical (one of list)	Yes No
7.8	Htn	Imidazoline receptor agonists	Categorical (one of list)	Yes No
7.9	Htn	Other antihypertensive drugs	Categorical (one of list)	Yes No
7.10.1	CAD, CHF	Statins	Categorical (one	Yes

Code	*Recommended diagnosis*	*Title of key data element*	*Type of element*	*Format of data*
			of list)	No
7.10.2	CAD, CHF	Adverse reactions to statins and/or idiosyncrasy	Categorical (one of list)	Yes Unknown
7.11.1	Htn, CAD, CHF	Aspirin	Categorical (one of list)	Yes No
7.11.2	Htn, CHF	Adverse reactions to aspirin and/or idiosyncrasy	Categorical (one of list)	Yes Unknown
7.12.1	Htn, CAD, CHF	Indirect-acting anticoagulants	Categorical (one of list)	Yes No
7.12.2	Htn, CHF	Adverse reactions to indirect-acting anticoagulants and/or idiosyncrasy	Categorical (one of list)	Yes Unknown
7.13.1	CAD	Clopidogrel	Categorical (one of list)	Yes No
7.13.2	CAD	Adverse reactions to clopidogrel and/or idiosyncrasy	Categorical (one of list)	Yes Unknown
7.14.1	CAD, CHF	Short-acting nitrates	Categorical (one of list)	Yes No
7.14.2	CAD, CHF	Adverse reactions to short-acting nitrates and/or idiosyncrasy	Categorical (one of list)	Yes Unknown
7.14.3	CAD, CHF	Long-acting nitrates	Categorical (one of list)	Yes No
7.14.4	CAD, CHF	Adverse reactions to long-acting nitrates and/or idiosyncrasy	Categorical (one of list)	Yes Unknown
7.14.5	CAD	Number of nitroglycerin tablets per week	Numeric	00 tablets/week
7.15	CHF	Hydralazine	Categorical (one of list)	Yes No
7.16	CHF	Digoxin	Categorical (one of list)	Yes No
8		***Invasive treatment***		
8.1.1	Htn, CAD	PCI	Categorical (one of list)	Yes No
8.1.2	CAD	Results of PCI: residual stenosis	Categorical (multiple choose)	Yes (Additional dataset is presented in Appendix B) Unknown
8.1.3	CAD	Contraindications for PCI	Categorical (one of list)	Yes Unknown
8.1.4	CAD	Number of stents	Numeric	0 Unknown
8.1.5	CAD	Type of stents	Categorical (one of list)	With drug-coated Uncovered Unknown
8.2	Htn, CAD	Surgical coronary revascularization	Categorical (one of list)	Yes No
9		***Diagnosis and its codes according to the International Classification of Diseases 10 (ICD-10)***		
9.1.1	Htn, CAD	Stable angina (I20.8)	Categorical (one of list)	Yes No
9.1.2	CAD	Angina functional class according to the Canadian Cardiovascular Society grading of angina pectoris	Categorical (one of list)	I class II class III class IV class Unknown
9.2	Htn, CAD, CHF	Old myocardial infarction (I25.2)	Categorical (one of list)	Yes No
9.3	CAD	Other forms of chronic ischemic heart disease (I25.0, I25.1, I25.3, I25.4, I25.5, I25.6, I25.8, I25.9)	Categorical (one of list)	Yes No
9.4	Htn, CAD	Essential (primary) hypertension (I10)	Categorical (one of list)	Yes No
9.5.1	Htn	Renovascular hypertension (I15.0)	Categorical (one of list)	Yes No
9.5.2	Htn, CAD	Bilateral renal artery stenosis	Categorical (one of list)	Yes No
9.6	Htn	Other secondary hypertension (I15.1, I15.2, I15.8, I15.9)	Categorical (one of list)	Yes No
9.7.1	Htn, CAD, CHF	CHF (I50)	Categorical (one of list)	Yes No

Code	*Recommended diagnosis*	*Title of key data element*	*Type of element*	*Format of data*
9.7.2	CAD, CHF	Functional class of CHF according to the New York Heart Association Functional Classification	Categorical (one of list)	I class II class III class IV class Unknown
9.8	Htn	Cerebral infarction (I63)	Categorical (one of list)	Yes No
9.9	Htn	Intracerebral haemorrhage (I60, I61, I62)	Categorical (one of list)	Yes No
9.10	Htn	Stroke, not specified as haemorrhage or infarction (I64)	Categorical (one of list)	Yes No
9.11	Htn	Atherosclerotic peripheral arterial disease (I70)	Categorical (one of list)	Yes No
9.12	Htn	Transient cerebral ischaemic attacks and related syndromes (G45)	Categorical (one of list)	Yes No
9.13	Htn	Discirculatory encephalopathy (I65, I66, I67.2, I67.3, I67.4, I67.8, F01, I69)	Categorical (one of list)	Yes No
9.14	Htn	Dissecting aortic aneurysm (I71.0)	Categorical (one of list)	Yes No
9.15	Htn, CAD	Diabetes mellitus (E10-E14)	Categorical (one of list)	Yes No
9.16.1	Htn, CAD, CHF	Chronic lower respiratory diseases (J40-J47)	Categorical (one of list)	Yes No
9.16.2	Htn, CAD	Asthma (J45)	Categorical (one of list)	Yes No
9.17	Htn	Gout (M10)	Categorical (one of list)	Yes No
9.18	Htn, CAD	Pregnancy	Categorical (one of list)	Yes No Not applicable (if in element 1.4 it was selected “Male”)
9.19	CHF	Cirrhosis of liver (K74.3-K74.6)	Categorical (one of list)	Yes No
9.20	CAD	Other deseases provoking or aggravating ischemia	Categorical (one of list)	Yes No
9.21	CAD	Other deseases provoking, aggravating, or simulating chest pain	Categorical (one of list)	Yes No

Data elements, preferred to fill in patients with Htn and/or CAD and/or CHF, signed in column “Recommended diagnosis”.
DD.MM.YYYY is day, month and year. ACE-Is, angiotensin converting enzyme inhibitors; ARBs, angiotensin II receptor blockers; CAD, coronary artery disease; CCBs, calcium channel blockers; CHF, chronic heart failure; DBP, diastolic blood pressure; ECG, electrocardiogram; Htn, hypertension; HU, Hounsfield units; LVEF, left ventricle ejection fraction; METs, metabolic equivalents of task; PCI, percitaneous coronary intervention; SBP, systolic blood pressure.

Appendix B. Addition data elements for coronary anatomy used in the RusR-Htn-CAD-CHF

Segments	*Title*	*Stenosis or residual stenosis*	*TIMI*
Segment 1	Proximal part of right coronary artery	00 %	0
Segment 2	Middle part of right coronary artery	00 %	0
Segment 3	Middle part of right coronary artery	00 %	0
Segment 4	Posterior descending (interventricular) artery	00 %	0
Segment 5	Trunk of left coronary artery	00 %	0
Segment 6	Proximal part of anterior descending (interventricular) artery	00 %	0
Segment 7	Middle part of anterior descending (interventricular) artery	00 %	0
Segment 8	Middle part of anterior descending (interventricular) artery	00 %	0
Segment 9	First diagonal branch	00 %	0
Segment 10	Second diagonal branch	00 %	0
Segment 11	Proximal part of circumflex artery	00 %	0
Segment 12	First blunt marginal branch	00 %	0
Segment 13	Middle part of circumflex artery	00 %	0
Segment 14	Other blunt segments	00 %	0
Segment 15	Right posterolateral segment and branches	00 %	0
	Bypass	00 %	0

Appendix C. Clinical indicators for assessment of quality of healthcare in patients with Htn, CAD, and CHF

Title of indicators	*Definitions*
Control of cardiovascular risk factors	
1. BP control	Numerator: [Patients with Htn and/or CAD and/or CHF who have last BP <140/90 mmHg] AND [Patients with Htn and/or CAD and/or CHF who have last BP is ≥140/90 mmHg under treatment with 2 or more antihypertensive drugs]. Denominator: Patients with Htn and/or CAD and/or CHF. Exclusion criteria: i) There are no data on BP at the last 12 months. ii) Secondary hypertension.
1A. Target BP is reached	Numerator: Patients with Htn and/or CAD and/or CHF who have last BP <140/90 mmHg. Denominator: Patients with Htn and/or CAD and/or CHF. Exclusion criteria: i) There are no data on BP at the last 12 months. ii) Secondary hypertension.
1B. Target BP is not reached, but assigned 2 or more antihypertensive drugs	Numerator: Patients with Htn and/or CAD and/or CHF who have last BP is ≥140/90 mmHg under treatment with 2 or more antihypertensive drugs. Denominator: Patients with Htn and/or CAD and/or CHF. Exclusion criteria: i) There are no data on BP at the last 12 months. ii) Secondary hypertension.
2. Control of physical activity	Numerator: [Patients with AH and/or CAD and/or CHF with optimal physical activity] AND [Patients with AH and/or CAD and/or CHF with low physical activity who received advice to increase physical activity]. Denominator: Patients with AH and/or CAD and/or CHF. Exclusion criterion: There are no data on physical activity at the last 12 months.
2A. The proportion of patients with optimal physical activity	Numerator: Patients with Htn and/or CAD and/or CHF with optimal physical activity. Denominator: Patients with Htn and/or CAD and/or CHF. Exclusion criterion: There are no data on physical activity at the last 12 months.
2B. The proportion of patients with low physical activity who received advice to increase physical activity	Numerator: Patients with Htn and/or CAD and/or CHF with low physical activity who received advice to increase physical activity. Denominator: Patients with Htn and/or CAD and/or CHF. Exclusion criterion: There are no data on physical activity at the last 12 months.
3. Smoking control	Numerator: [Non-smoking patients with Htn and/or CAD and/or CHF] AND [Smoking patients with Htn and/or CAD and/or CHF who received advice to smoking cessation]. Denominator: Patients with Htn and/or CAD and/or CHF. Exclusion criterion: There are no data on smoking (or non-smoking) at the last 12 months.
3A. The proportion of non-smoking patients	Numerator: Non-smoking patients with Htn and/or CAD and/or CHF. Denominator: Patients with Htn and/or CAD and/or CHF. Exclusion criterion: There are no data on smoking (or non-smoking) at the last 12 months.
3B. The proportion of smoking patients who received advice to smoking cessation	Numerator: Smoking patients with AH and/or CAD and/or CHF who received advice to smoking cessation. Denominator: Patients with AH and/or CAD and/or CHF. Exclusion criterion: There are no data on smoking (or non-smoking) at the last 12 months.
4. Body mass control	Numerator: [Patients with Htn and/or CAD and/or CHF who have normal body mass] AND [Patients with Htn and/or CAD and/or CHF who have excess body mass and received advice to mass loss]. Denominator: Patients with Htn and/or CAD and/or CHF. Exclusion criterion: There are no data on body mass at the last 12 months.
4A. The proportion of patients with normal body mass	Numerator: Patients with Htn and/or CAD and/or CHF who have normal body mass. Denominator: Patients with Htn and/or CAD and/or CHF. Exclusion criteria: There are no data on body mass at the last 12 months.
4B. The proportion of patients with excess body mass who received advice to mass loss	Numerator: Patients with Htn and/or CAD and/or CHF who have excess body mass and received advice to mass loss. Denominator: Patients with Htn and/or CAD and/or CHF. Exclusion criterion: There are no data on body mass at the last 12 months.
5. Diet control	Numerator: [Patients with Htn and/or CAD and/or CHF who observe a balanced diet] AND [Patients with Htn and/or CAD and/or CHF with have unhealthy diet and received advice to improve diet]. Denominator: Patients with Htn and/or CAD and/or CHF. Exclusion criterion: There are no data on compliance with a balanced diet at the last 12 months.
5A. The proportion of patients with balanced diet	Numerator: Patients with Htn and/or CAD and/or CHF who observe a balanced diet. Denominator: Patients with Htn and/or CAD and/or CHF. Exclusion criterion: There are no data on compliance with a balanced diet at the last 12 months.
5B. The proportion of patients with unhealthy diet who received advice to improve diet	Numerator: Patients with Htn and/or CAD and/or CHF with have unhealthy diet and received advice to improve diet. Denominator: Patients with Htn and/or CAD and/or CHF. Exclusion criterion: There are no data on compliance with a balanced diet at the last 12 months.
6. Blood cholesterol control	Numerator: Patients with Htn and/or CAD and/or CHF who have blood cholesterol <190 mg/dL and LDL <115 mg/dL during last 12 months. Denominator: Patients with Htn and/or CAD and/or CHF. Exclusion criterion: There are no data on blood cholesterol and/or LDL at the last 12 months.
6A. The proportion of patients with CAD and LDL <100 mg/dL during last 12 months	Numerator: Patients with CAD who have LDL <100 mg/dL during last 12 months. Denominator: Patients with CAD. Exclusion criterion: There are no data on LDL at the last 12 months.

Title of indicators	*Definitions*
Healthcare in patients with CAD	
1. The proportion of patients with CAD who received antiplatelet agents	Numerator: Patients CAD who received antiplatelet agents (aspirin or clopidogrel) at the last visit during last 12 months. Denominator: Patients with CAD. Exclusion criterion: Contraindications to aspirin and clopidogrel.
2. The proportion of patients with CAD who received statin medication	Numerator: Patients with CAD who received statin medication during last 12 months. Denominator: Patients with CAD. Exclusion criterion: Contraindications to statin medication.
2A. The proportion of patients with CAD and LDL >100 mg/dL who received statin medication	Numerator: Patients with CAD and last level of LDL >100 mg/dL who received statin medication during last 12 months. Denominator: Patients with CAD. Exclusion criteria: i) Contraindications to statin medication. ii) There are no data on LDL at the last 12 months.
3. The proportion of patients with CAD who received beta-blockers	Numerator: Patients with CAD who received beta-blockers during last 12 months. Denominator: Patients with CAD. Exclusion criterion: Absolute contraindications to beta-blockers.
3A. The proportion of patients with old myocardial infarction who received beta-blockers	Numerator: Patients with old myocardial infarction who received beta-blockers during last 12 months. Denominator: Patients with old myocardial infarction. Exclusion criterion: Absolute contraindications to beta-blockers.
3B. The proportion of patients with CAD and LVEF <40% who received beta-blockers	Numerator: Patients with CAD and LVEF <40% who received beta-blockers during last 12 months. Denominator: Patients with CAD and LVEF <40%. Exclusion criterion: Absolute contraindications to beta-blockers.
4. The proportion of patients with CAD who received ACE-Is or ARBs	Numerator: Patients with CAD who received ACE-Is or ARB during last 12 months. Denominator: Patients with CAD. Exclusion criterion: Absolute contraindications to ACE-Is and ARBs.
4A. The proportion of patients with CAD and diabetes mellitus who received ACE-Is or ARBs	Numerator: Patients with CAD and diabetes mellitus who received ACE-Is or ARB during last 12 months. Denominator: Patients with CAD and diabetes mellitus. Exclusion criterion: Absolute contraindications to ACE-Is and ARBs.
4B. The proportion of patients with CAD and LVEF <40% who received ACE-Is or ARBs	Numerator: Patients with CAD and LVEF <40% who received ACE-Is and ARBs during last 12 months. Denominator: Patients with CAD and LVEF <40%. Exclusion criterion: Absolute contraindications to ACE-Is and ARBs.
Healthcare in patients with CHF	
1. Assessment of LVEF in patients with CHF	Numerator: Patients with CHF who have at least one measurement of LVEF during last 12 months. Denominator: Patients with CHF. Exclusion criterion: none.
2. The proportion of patients with CHF who received ACE-Is or ARBs	Numerator: Patients with CHF who received ACE-Is or ARB during last 12 months. Denominator: Patients with CHF. Exclusion criterion: Absolute contraindications to ACE-Is and ARBs.
2A. The proportion of patients with CHF and LVEF <40% who received ACE-Is or ARBs	Numerator: Patients with CHF and LVEF <40% who received ACE-Is and ARBs during last 12 months. Denominator: Patients with CHF and LVEF <40%. Exclusion criterion: Absolute contraindications to ACE-Is and ARBs.
3. The proportion of patients with CHF who received beta-blockers	Numerator: Patients with CHF who received beta-blockers during last 12 months. Denominator: Patients with CHF. Exclusion criterion: Absolute contraindications to beta-blockers.
3A. The proportion of patients with CHF and LVEF <40% who received beta-blockers	Numerator: Patients with CHF and LVEF <40% who received beta-blockers during last 12 months. Denominator: Patients with CHF and LVEF <40%. Exclusion criterion: Absolute contraindications to beta-blockers.
4. The proportion of patients with CHF and atrial fibrillation (or atrial flutter) who received indirect-acting anticoagulants	Numerator: Patients with CHF and atrial fibrillation (or atrial flutter) who received indirect-acting anticoagulants during last 12 months. Denominator: Patients with CHF and atrial fibrillation (or atrial flutter). Exclusion criterion: Contraindications to indirect-acting anticoagulants.
5. The proportion of subjects who were trained in the School for patients with CHF	Numerator: Patients with CHF who were trained in the School for patients with CHF. Denominator: Patients with CHF. Exclusion criterion: none.

ACE-Is, angiotensin converting enzyme inhibitors; ARBs, angiotensin II receptor blockers; BP, blood pressure; CAD, coronary artery disease; CHF, chronic heart failure; LDL, low-density lipoprotein; LVEF, left nentricular ejection fraction; Htn, hypertension.