

**ANNOTATION
of doctoral dissertation**

Theme: Evaluation of medical-organizational effectiveness of using information systems on the example of patients with arterial hypertension

UDC: 614.2:616.12-008.331.1-052

Specialty: 6D110200 «Public Healthcare»

Scientific supervisor:

Candidate of medical sciences

Yermukhanova L.S.

Scientific foreign consultant:

Chukmaitov A.S., MD, PhD, Associate Professor

Higher medical school of the University of

Virginia Commonwealth University, USA.

Performer: Abdikadirova I.T.

Time for completion: 2015-2018 y.y

Karaganda, 2020 y.

Relevance. The actual problem of modern healthcare is informational support, aimed at formation and developing information infrastructure, the key importance in which are control and analytical information systems created on the basis of computer equipment, computer networks and information technologies. Improving health information systems is a global priority in health system strengthening.

One of the current trends in the development of the country and the health system of the Republic of Kazakhstan is intensive informational support and automation.

Currently, on the basis of the Unified National Health System, the Unified Health Information System is being implemented, designed to improve the quality of provided medical care. The introduction of information systems in the healthcare of Kazakhstan is a necessary process, since it automates the workplaces of medical staff, helps save time for medical personnel, increases the coverage of early detection and dynamic observation of patients, thereby contributing to the quality of the clinical examination of the population.

Cardiovascular diseases remain one of the main problems of modern healthcare, being one of the leading causes of morbidity throughout the world, including in the Republic of Kazakhstan. Among them, the most common is arterial hypertension, which constitutes the bulk of the most important medical and social problems in the development of cardiovascular complications and degeneration of the quality of life.

Within the framework of the State Programme for the Development of Healthcare of the Republic of Kazakhstan for 2016-2019, “Densaulyk”, the Disease Management Programme (DMP) was introduced. The introduction of DMP is a component of modernization and priority development of primary healthcare to improve the quality and increase the lifespan of patients with chronic diseases (arterial hypertension, diabetes, chronic heart failure), by self-management and increasing shared responsibility for maintaining and strengthening health.

The high prevalence of arterial hypertension exposes the urgency of this problem and indicates the need to improve the management and monitoring of patients with arterial hypertension, using introduced information systems in the healthcare of the Republic of Kazakhstan.

Aim of research: To evaluate the medical and organizational effectiveness of the use of information systems in outpatient-polyclinic institutions in monitoring patients with arterial hypertension.

Objectives of research:

1. Assess the dynamics and monitor the incidence and complications of dispensary patients (from 18 to 63 years of age) with arterial hypertension according to information systems (AIS “Polyclinic”, “Electronic register of dispensary patients”) in outpatient-polyclinic institutions of Aktobe city for the period of 2011-2016.
2. To analyze the medical, organizational and social effectiveness of the use of information systems with the help of a survey (questioning, interviewing) of medical staff, patients and conducting time studies.
3. To study the effectiveness of the use of information systems (AIS “Polyclinic”, Electronic register of dispensary patients) in outpatient-polyclinic institutions of Aktobe city.
4. To develop recommendations for improving information systems in outpatient-polyclinic institutions (using the example of studying information systems of the AIS “Polyclinic”, “Electronic register of dispensary patients”).

Scientific novelty of the work

For the first time, the evaluation of medical and organizational efficiency of information systems of the AIS “Polyclinic”, “Electronic register of dispensary patients” in outpatient-polyclinic institutions of Aktobe city was carried out using the example of monitoring of dispensary patients with arterial hypertension;

The scientific and practical significance of this work lies in the fact that the study on the assessment of information systems at the level of primary healthcare will contribute to the improvement of dynamic observation of patients in general, and in particular with arterial hypertension, through early and full coverage.

The practical significance of the work:

The use of information systems allows to reduce the number of cases of complications of diseases and allows patients together with medical staff to manage their disease and prevent complications.

And the training of students in the development of information systems in healthcare in Internet classes will allow bringing theory closer to practice.

Based on the study of the use of information systems of the AIS "Polyclinic", " Electronic register of dispensary patients", methodological recommendations were introduced to improve other information systems in outpatient-polyclinic institutions, as well as ways to accelerate the transition to digitalisation of the healthcare system.

The main provisions of the thesis submitted for the defense:

1. The transition of outpatient-polyclinic institutions to the use of information systems determined on the basis of evaluation and analysis of the medical and organizational effectiveness of their use in follow-up monitoring of patients with arterial hypertension.
2. Further implementation of EISZ in APO needs to be improved in the following main areas: improvement of MIS (including a single information platform for all databases and MIS, elimination of duplication in data entry, system of computer remote counseling and training of outpatient patients) and further organization of work on AIS in APO (improvement of resource provision and computer literacy of health workers).

Materials and research methods:

1. Retrospective analysis of data from information systems for dispensary cases with arterial hypertension (AIS "Polyclinic", ERDP) for the period from 2011 to 2016
2. Sociological research methods (questioning, interviewing) and time studies.
3. Statistical methods (morbidity trend analysis, regression and correlation analyzes).
4. Expert assessment and SWOT analysis

Table 1 - Stages of the study

Stages		Aim	The object and volume of the study	Methods of research
1		2	3	4
I	Literature review	Set according to literary data the relevance and novelty of the topic.	Normative legal acts of the Republic of Kazakhstan, scientific works of domestic and foreign scientists; Electronic databases: Web of Science (Thomson Reuters), Elsevier Scopus, Cochrane Library, PubMed, Springer Link, eLibrary (n = 132)	Bibliographic; Information - analytical
II	Retrospective analysis (2011-2016 y.y)	To study the morbidity and complications (myocardial infarction, stroke) of arterial hypertension among adult patients	Reporting Forms: <ul style="list-style-type: none"> - form No 278 / y – Journal of registration of outpatients (n=24); - form No 025 / y – Medical card of the outpatient patient (n=11186); - form No 8-18 – Journal of dispensary patients (n=24); - form No 030/y – Control card of dispensary patients (n=15089); - form No 12/y – Report on the sickness rate registered in - patients living in the area of the medical organization - service and contingents of patients under dispensary supervision (n=24); Data from portals: <ul style="list-style-type: none"> - Automated information system (AIS) «Policlinic»; - Electronic register of dispensary patients (ERDP) 	A copy of the data; Analytical; Statistical
III	Sociological survey (questionnaire, interview)	To study the opinions of medical staff and patients on issues of health information support	Medical staff of city polyclinics (heads of departments, doctors) (No 1,2,3,4) (questionnaire, n=358)	Questioning
			Patients being under regular medical check-up with hypertension in city clinics (questionnaire, n=881)	Questioning
			Medical staff (local doctors, medical statisticians and care staff) of city polyclinics (interview, n=16)	Interviewing
			Patients being under regular medical check-up with hypertension in city polyclinics (interview, n=12)	Interviewing
IV	Timing studies	Compare time taken to complete paper and electronic medical records	General practitioners of the city polyclinic No 1 (n=16)	Timekeeping

V	Expert assessment and SWOT analysis		Experts; 40 doctors of 4 polyclinics of Aktobe in the ratio: 15 representatives of administrative and managerial personnel (chief doctors and their deputies, heads of medical statistics offices and organizational and methodological offices, internal audit service) and 25 GP (n = 40)	
---	-------------------------------------	--	---	--

Evaluation and implementation of research results

The main provisions of the thesis were reported and discussed:

- at the LVI scientific conference of young scientists of WKSMU with international participation, dedicated to the 25th anniversary of Independence of the Republic of Kazakhstan, Aktobe, 2016;
- V Annual International Conference "Medicine Pressing Questions", Baku, Azerbaijan, 2016.
- 6th International Interdisciplinary Scientific Conference "Society. Health. Welfare", Latvia, 2016;
- at the LVII scientific conference of young scientists with international participation, dedicated to the 60th anniversary of the West Kazakhstan Marat Ospanov State Medical University, Aktobe, 2017;
- at the XIII scientific-practical conference of young scientists of the TSMU named after Abuali Ibn Sina with international participation "Medical science: new opportunities", Dushanbe, Tajikistan, 2018
- at the Interregional scientific-practical conference of young scientists with international participation "Problems of Medicine and Biology", Kemerovo, 2018.

The volume and structure of the thesis

The dissertation consists of introduction, review of literature, description of materials and methods, results of own research, conclusion, including findings, practical recommendations, list of references and applications. The total volume is 130 pages, including 27 figures, 31 tables and 10 formulas. The bibliographic index includes 135 sources, 73 of them are foreign.

Publications on the thesis topic

15 publications were published on the topic of the thesis, 2 of them in journals indexed in the Web of Sciences information database (Tomson Reuters): in the SHS Web of Conferences magazine and indexed in the Scopus database: in the "Drug Invention Today" journal; 4 - in journals recommended by the Committee on the Control of Education and Science of the MES RK, 6 - in the materials of international scientific conferences; methodical recommendation "Evaluation of the effectiveness of information systems in outpatient-polyclinic institutions" was developed.

2 certificates of state registration of rights to the copyright object were received.

Research results:

Through information systems (Automated Information System (AIS) "Policinika", the Electronic register of dispensary patients (ERDP) we carried out monitoring of the incidence rates and complications of arterial hypertension in city polyclinics (No 1,2,3,4). To achieve the goals, a retrospective analysis of the incidence of arterial hypertension in the structure of dispensary patients of city polyclinics of Aktobe for 2011-2016 was made on the basis of the "Electronic register of dispensary patients".

In the space of a few years 6 years in the outpatient institutions of Aktobe portal AIS "Polyclinic" registered 89902 (from 18 to 63 years) cases of complaints about hypertension, of which the dispensary portal ERDP – 58973 people, with the first time diagnosed hypertension in their life – 11186 people are on record.

In dynamics, there is an increase in the total ($T_{gr} = 6.8\%$) and primary incidence of hypertension ($T_{gr} = 1.2\%$) in city clinics for the period of 2011-2016. There is also an increase in the incidence of hypertension among dispensary patients ($T_{gr} = 54.4\%$).

The most common and formidable complications of hypertension are myocardial infarction, stroke, and circulatory failure.

Numerous large-scale studies have found that hypertension is a major risk factor for stroke. According to the stroke register of the Scientific Center for Neurology of the Russian Academy of Medical Sciences, hypertension is diagnosed in 78.2% of patients who have suffered from acute cerebrovascular accident (CVA). The negative effect of hypertension on the development and course of coronary heart disease, myocardial infarction (MI), and LDCs has been proven; she is an

independent predictor of heart failure, cerebral strokes, and sudden cardiac death. In addition, hypertensive crises and cardiac arrhythmias that unexpectedly occur against the background of hypertension are often the cause of life-threatening conditions - disturbances in coronary myocardial infarction, cerebral blood circulation and sudden cardiac mortality.

In the form of the above, the most frequent and serious complications of arterial hypertension — heart attack and stroke — are taken as medical indicators of the effectiveness of implementing information systems in the work of an outpatient clinic.

According to the monitoring of the information system of the AIS "Polyclinic", the index of complications of myocardial infarction has a tendency to decrease by 2.3 times (2011 - 280.0, 2016 - 113.2 per 100,000 population), and the incidence rate of stroke has decreased in dynamics by 3.6 times (2011 – 204.3, 2016 – 53.2 per 100,000 population). The study of monitoring the incidence and complications of patients with hypertension shows that the implemented information systems of the AIS "Polyclinic" and ERDP contribute to the early and full coverage of regular monitoring of patients with hypertension by improving the registration of both newly diagnosed patients and those previously registered, increasing control over the regularity of observation, thereby reducing the incidence of complications.

At the next stage of the study, a sociological survey (questioning, interviewing) among medical staff and patients of city polyclinics on healthcare informational support was conducted. The author of the questionnaire is L.V. Danilova (Orenburg, 2014). 1233 people were interviewed, of which 352 medical staff and 881 dispensary cases with arterial hypertension.

Statistical analysis was conducted in the statistical programming language R version 3.5.1 and Statistica 10.0. The database was created in an Excel file.

Correlation: In this regard, the correlation was performed by the Kendall Tau correlation coefficient (nonparametric correlation coefficient) to measure the correlations between the variations, which should not assume the normal nature of the distribution. Conducted correlation analysis ($\tau = -0.81$, $p < 0.05$) suggests that with increasing age of medical staff, self-assessment of the level of computer knowledge decreases. The Tau value, which corresponds to the correlation coefficient and statistical values, is presented in the angle angle of each graph with a 95% confidence interval.

According to the statistical data of the respondents' questionnaires, it can be concluded that the mobility of the organization of the medical institution's work and the improvement of the continuity of medical care are increasing, which is ensured by facilitating the interpretation of digital information as opposed to documents filled with handwritten text.

To assess the effectiveness of the use of information systems, individual interviews were conducted among medical staff and patients in city clinics. 28 respondents took part in the interviews, of which 16 medical personnel (district doctors, statisticians and nurses) working with the information programmes AIS (Automated Information System) "Polyclinic", ERDP (Electronic register of dispensary patients) and 12 patients, consisting at the dispensary in the portal ERDP with arterial hypertension.

Based on interviews with medical workers and patients, the main factors that affect the work of medical workers in outpatient organizations were identified:

- insufficient level of knowledge of programs (ERDB, AIS "Clinic") by medical workers (83.3% of respondents);
- Duplication of data in the AIS "Clinic" and the Electronic register of dispensary patients (ERDB) programs (100%);
- lack of full control of the effectiveness of the clinical examination (100%);
- low level of proficiency in PC patients (75%).

Also, to assess the organizational effectiveness of using the ERDP information system, a time study was conducted on the basis of the city polyclinic No 1 of the Aktobe city, in order to compare the time spent on filling out paper and electronic medical records. The timekeeping was carried out according to the methodical recommendation "Methodology for the development of standards of time and load of medical personnel", recommended by the "Central research Institute of organization and

informational support of healthcare of the Ministry of healthcare of the Russian Federation" (Moscow, 2013). 6 GP specialists took part in the time study for 2 weeks.

According to the results of the study, filling out paper document took 21.3 ± 1.3 minutes, and filling out electronic documentation – 4.2 ± 0.5 minutes ($p < 0.05$).

Characteristic features identified during timing:

1. Since there is still no unified position of the Ministry of Health of the Republic of Kazakhstan in matters of canceling the written form of medical documentation and, therefore, in many medical organizations at the same time filling out the patient's Melitsin card in both written form and in electronic format is required. Therefore, actually 1 patient actually takes more time to fill out the documentation - on average, 25.7 ± 1.8 minutes

2. The time spent on filling out the medical documentation of one patient with hypertension varies depending on the age of the doctors: documents that are 30-39 year old fill out faster, and older than 50 years slower. Dependence of the speed of filling documentation on the category of doctors has not been established.

The third task is devoted to the study of the effectiveness of the use of AIS "Clinic", the Electronic register of dispensary patients (ERDB). The study of these programs revealed the following advantages: all the information on dispensary patients is provided in the programs, which allows you to control and ensure completeness of coverage, date of taking and deregistration, regularity of observation, reasons for withdrawal, patient's health group, as well as quick reporting.

But the disadvantage of these programs is that in the AIS "Clinic" and the Electronic Register of Dispensary Patients (ERDB), the data is duplicated. The reason for this may be the human factor, when one patient can be entered into the program twice with a different disease code or in view of an error in the patient's personal data. In addition, the AIS does not provide options for the transition of the dispensary patient according to the outcome of the disease from one health group to another, that is, it becomes impossible to monitor the effectiveness of the clinical examination.

Expert assessment and SWOT analysis.

Based on the interviewing of experts, a SWOT analysis was carried out to identify the features of the use of information systems in outpatient organizations.

At the first stage of the analysis, the experts determined the factors characterizing the peculiarities of the implementation of MIS in the clinics of Aktobe.

SWOT-analysis of the features of the implementation of MIS in the clinics of Aktobe

<i>S - advantages (strengths):</i>	<i>O - problem solving options (opportunities):</i>
1. Storage of patient data; 2. Early and full coverage of dispensary patients; 3. Regular monitoring; 4. Save time when filling out medical records; 5. Accelerated issuance to the patient of a referral to specialized specialists and to MSEC; 6. Rapid reporting; 7. Reduced patient lines; 8. Reduction of time for patient care.	1. Improving the level of ownership of information programs of medical workers; 2. Automated database in medical organizations, including the automated information system "Clinic"; 3. Integration into a single platform of the database in medical organizations, in particular AIS "Clinic" and the Electronic Register of Dispensary Patients (ERDB); 4. Remote patient counseling; 5. Introduction of the electronic medical record of the patient; 6. The electronic schedule of doctors; 7. Improving the web portal of each clinic; 8. Development and implementation of mobile applications for dispensary patients.
<i>W - disadvantages (weaknesses):</i>	<i>T - threat of deterioration (Threats):</i>

1. Inadequate level of ownership of programs (ERDB, AIS "Clinic") by medical professionals;
2. Duplication and mismatch of data in the AIS "Clinic" and the Electronic register of dispensary patients (ERDB);
3. The lack of full control of the effectiveness of the clinical examination;
4. The ongoing "manual" issuance of sick leave, namely the need to run around the offices to collect signatures of administrative persons;
5. The results of laboratory tests are not automated;
6. The lack of the possibility of electronic appointments directly to the doctor;
7. Weak strength of Internet connection and frequent database freezes.

1. The influence of the human factor (violation of attentiveness when filling out);
2. Material and technical risks, including frequent breakdowns of computer equipment;
3. Change in the policy of the Ministry of Health (for example, prohibition or change of platforms and types of MIS);
4. The threat of hacking MIS and hacker violations of the confidentiality of medical information;
5. An increase in the amount of patient information that will have to be entered and analyzed in the MIS.

The work of the statistical office is automated, the need for manual calculation of data for reporting is eliminated.

As a result of the expert assessment, it was found that most experts ($90.0 \pm 6.8\%$) are confident that it is necessary to improve the computerization of the clinic. Most experts ($64.7 \pm 6.5\%$) believe that outpatient medical organizations need further technical equipment.

More than half of the experts ($63.0 \pm 6.6\%$) are sure that remote patient counseling, including in health schools, to the greatest extent can improve the quality of care. Also, $57.4 \pm 6.7\%$ of experts believe that the introduction of information technology in the organization of Health Schools will also improve the quality of medical care. Most experts are sure that both patients ($61.1 \pm 6.6\%$) and doctors ($68.5 \pm 6.3\%$) are ready for remote counseling.

As a result of the expert assessment, based on a point ranking, the following qualitative indicators of the effectiveness of IS implementation in the APO were identified: in the 1st place - improved administrative control, in the 2nd - registration and movement of medical documentation, in the 3rd - statistical reporting and the results of processes (studies, consultations, etc.), on the 4th - the costs of working time of employees. It should be noted that all experts noted that the reduction of financial costs (non-manufacturing costs) did not occur, namely in terms of the cost of copying, the delivery of information in paper form, on technical equipment, on paper. Patient satisfaction also improved slightly.

Further, the experts evaluated the technical indicators of IS implementation in the APO. The most significant (but negative) indicator was the need for duplication of data, in 2nd place - the speed of data entry and analysis, and the speed of deployment of the program, in 3rd place - ease of use of the program and the provision of workstations with computers, in 4th place - integration IP (the interconnection of several programs), the convenience of the interface, the possibility of remote administration and downtime ("freezing" of the program).

At the third stage of the analysis, the experts developed proposals for improving the functioning of MIS in the clinic.

A. Measures to improve MIS:

1. Inclusion in the MIS "Clinic" of the section "Immunization".
2. Inclusion in the MIS "Clinic" of the possibility of attaching scanned documents (extracts from the hospital, expert opinion, analyzes, etc.).
3. The exception of entering duplicate data.

B. Measures to improve the organization of work on the AIS in the APO:

1. Organization of remote patient counseling via the Internet, incl. inclusion in the Web portal of the clinic of a special section.
2. Development of a mobile application for dispensary patients, including for dispensary patients with hypertension.

C. Activities to improve the skills of health professionals:

1. Further development of computer literacy and the use of Internet resources for professional purposes.
2. Further enhancement of medical ethics and deontology skills, incl. in connection with the use of Internet resources.
3. Development of affordable technologies for distance learning courses for health workers.
4. Providing medical professionals with relevant professional information (regulatory documents, pharmacopeias, medical news, scientific articles) on a regular basis; exchange of information within the industry.

Thus, the SWOT analysis showed that outpatient medical organizations are currently equipped with computer equipment and programs that provide access to medical information, which allow for more rapid implementation of activities for various types of activities of the medical organization, and there is a need for continuous training, conducting effective scientific research, active professional interaction with medical workers in order to optimize the use of information systems.

The introduction of distance counseling in the preventive work of an outpatient medical organization increases the patient's ability to receive the necessary information from the local GP's therapist through the Internet to his questions on methods for the prevention of chronic noncommunicable diseases and risk factors for their development.

According to the fourth task, a methodical recommendation "Evaluation of the effectiveness of information systems in outpatient clinics" was developed for medical workers. The methodological recommendations provide prospects for the development of information systems and ways of accelerating the transition of outpatient organizations to digitalization.

The introduction of the discipline "Information Systems in Health Care" made it possible to introduce dual education in the educational process for students on this issue. This contributed to the further adaptation of the graduate in practical health care.

Conclusions:

1. Monitoring the morbidity and complications of patients with arterial hypertension through information systems (AIS "Polyclinic", ERDP) contributes to reliable accounting, early and full coverage of dispensary patients, which allows timely make effective management decisions on the development and improvement of proper medical care for patients with arterial hypertension. So, according to the results of our study, in the dynamics, there is an increase in the incidence of arterial hypertension over the period 2011-2016 ($T_{gr} = 6.8\%$), as well as those recorded in the "D" account ($T_{gr}=54.4\%$) due to early coverage and detectability, and the rate of complications of myocardial infarction tends to decrease by 2.3 times (in 2011 - 280.0, in 2016 - 113.2 per 100,000 population), and the incidence rate of stroke decreased by 3.6 times (in 2011 - 204.3, in 2016 - 53.2 per 100,000 population) ($p < 0.05$).
2. The results of a sociological survey and timing studies revealed the strengths of the implemented information systems: the use of information programs facilitates access to information, helps save time for medical personnel and increase the efficiency of dynamic monitoring of patients. After the introduction of information systems in health care organizations, the organization of medical care improved (70.4% of respondents); the waiting time for patients in the queue was reduced (74%). Also, 29% of employees rated their satisfaction with their work at 5 points, and 63% rated it on a 4-point scale.

As a result of interviewing medical workers and patients, the main factors affecting the work of medical workers in outpatient organizations were identified:

- insufficient level of knowledge of programs (ERDB, AIS "Clinic") by medical workers (83.3% of respondents);

- Duplication of data in the AIS "Clinic" and the Electronic register of dispensary patients (ERDB) programs (100%);
- lack of full control of the effectiveness of the clinical examination (100%);
- low level of proficiency in PC patients (75%).

It was found that with an increase in the age and experience of medical workers, the level of PC ownership decreases ($\tau = -0.81$, $\tau = -0.74$, $p < 0.05$).

The average time for entering information when using paper media is 21.3 ± 1.3 , and when using the information program - 4.2 ± 0.5 minutes ($p < 0.05$). But at the same time, in many medical organizations at the same time filling out a patient's medical record both in writing and in electronic format is required. Therefore, in fact, more time is actually spent on 1 patient to fill out the documentation - on average, 25.7 ± 1.8 . The time spent on filling out the medical documentation of one patient with hypertension varies depending on the age of the doctors: documents that are 30-39-year-old fill out faster, and older than 50 years slower. Dependence of the speed of filling documentation on the category of doctors has not been established.

3. A study of existing information systems revealed duplication of data from AIS "Clinic" and the Electronic Register of Dispensary Patients (ERDB), in connection with this, it is proposed to integrate them and include in the system graphs to track the effectiveness of the clinical examination (according to health groups). At the same time, these programs contribute to early detection and coverage, regular monitoring of dispensary patients with arterial hypertension, thereby reducing complication rates.

As a result of an expert assessment based on a point ranking, the following functional indicators were identified for the medical and organizational effectiveness of IP implementation in the APS: in 1st place - improved administrative control (weight ratio - 36.3%), in 2nd - registration and movement of medical documentation (33.5%), on the 3rd - statistical reporting and the results of processes (research, consultations, etc.; 12.5%), on the 4th - the costs of working time of employees (6.2%). It should be noted that the reduction of financial costs (non-manufacturing costs) did not occur, namely in terms of the cost of copying, delivery of information in paper form, on technical equipment, on paper. Patient satisfaction also improved slightly.

In the expert evaluation of technical indicators of IP implementation in the APO, the most significant (but negative) indicator was the need for data duplication (weight coefficient - 17.9%), in second place - the speed of data input and analysis and the speed of program deployment (14.3 each) %, in 3rd place - ease of use of the program and the provision of workstations with computers (10.7% each), in 4th place - integration of IP (interconnection of several programs), user-friendly interface, the possibility of remote administration and downtime ("freezing" Programs) - 7.1% each.

To improve the implementation of IP in the work of the APO as a result of expert evaluation, the following activities were identified in the following areas:

- 1) improvement of MIS;
 - 2) further organization of work on the AIS in the APO;
 - 3) advanced training of medical workers.
4. The developed methodological recommendations made it possible to integrate the research results into the activities of outpatient organizations and into the educational process of medical higher educational institutions.