

GEOGRAPHIC INFORMATION SYSTEMS AS A TOOL OF OPTIMIZATION OF MEDICINAL MAINTENANCE OF THE POPULATION AND MEDICAL INSTITUTIONS ANALGESIC DRUGS

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This article considers the possibility of using geographic information systems to optimize drug provision of medical organizations and the population analgesic drugs. The system will be developed on a client-server architecture based on using map services. These services provide an interactive map that will indicate the location of the medical and pharmaceutical organizations, as well as places of residence of patients in need of pain relief. Based on these data, the road map will be constructed, reflecting the availability of pain therapy. It is further contemplated implementation the data processing unit using a random pattern to form a timber for drugs needs.

Keywords: Geographic Information System, analgesic drugs, drug provision

The problem of pain should be recognized as a global priority for public health, because the adequate treatment of pain is a right of every human being, and the duty of any health care system to ensure it [2]. Currently, most of the federal funding for health care is on the computerization of the industry. In 2011, it was approved by the concept of creating a unified state health information system (USHIS) in health care [6]. Also as part of the Strategy of drug provision of the population of the Russian Federation for the period till 2025 and the plan of its implementation, namely in the framework of solving the problem 3 “Ensuring the safety, efficacy and quality of drugs for medical use”, provides the formation of a unified information system in the field of drug supply [5]. Informatization process is aimed at improving management efficiency in the health, quality of care and awareness of specialists and population [4]. One way to improve the level of information of any industry is the creation of (GIS) Geographic Information Systems.

Geographic information system – information system providing data collection, storage, processing, access, display, and dissemination of spatial-coordinated data. GIS are designed to solve scientific and applied problems of inventory, analysis, assessment, modeling, forecasting, and environmental management and territorial organization of society [1].

GIS has the following subsystems:

1. The data processing subsystem that collects carries out pre-processing and data entry.

2. Data storage and analysis subsystem, organizing spatial data analysis for the purpose of sampling, updating and editing.

3. Subsystem manipulation (use) of the data and analysis, which performs different tasks on the basis of these data, and separates them includes, sets parameters and constraints, and performs modeling functions.

4. Subsystem management and output, which displays the entire database or a part of it in a table, chart or map form.

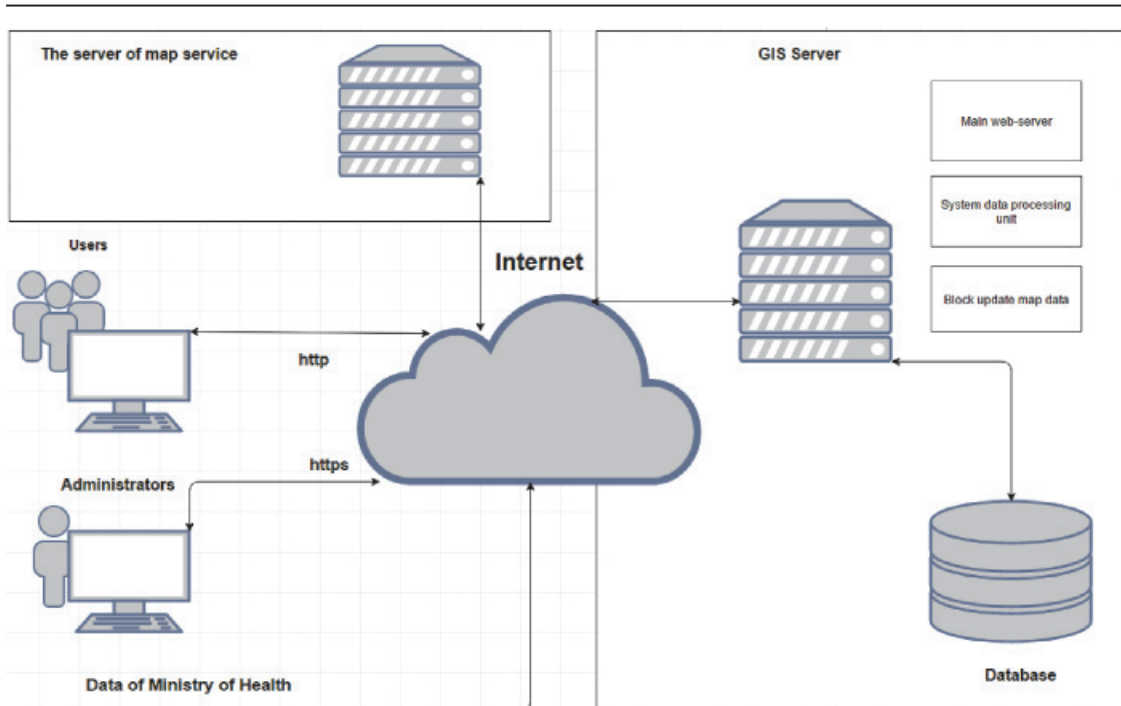
Used at the time of GIS to support management decision-making in health care are both independent systems and subsystems into larger.

The GIS is used to optimize health and health management (including medical institutions and pharmacies); spatio-temporal distribution of the forecast demographic and health characteristics of the population and the epidemiological situation; improve the quality and accessibility of medical services; the links between health outcomes and environmental factors, and other more specific tasks (personal monitoring and forecasting activities, etc.).

In this article we will examine the possibility of the use of GIS in the optimization of medicinal maintenance of the population and medical institutions analgesic drugs.

In our view, to ensure the availability of anesthesia to the entire population, you must create a system of organization providing funds for anesthesia, including the following tasks:

- Formation of assortment and adequate planning needs in medicines used to relieve pain (including narcotic drugs and psychotropic drugs).



GIS Scheme for the optimization of medicinal maintenance

- The inclusion of medications for the relief of pain in the regulated lists, including minimum range of medicines required for medical care, the list of vital and essential drugs list of drugs, the sale of which may be carried out by medical organizations that have a license for pharmaceutical activity, and their separate subdivisions (outpatient clinics, medical assistant and obstetric units, centers (offices) general (family) practice), located in rural areas, where there is no pharmacy organizations.

- Development of the range of drugs to form the home kit of patients in need of pain relief, etc.

- Creation of an extensive, covering the whole territory of the system cabinets pain therapy and outreach nursing service.

To solve these problems, the development of GIS is supposed to the client-server architecture based on using map services. These services provide an interactive map that will indicate the location of the medical and pharmaceutical organizations, and also places of residence of patients in need of pain relief. Figure shows a diagram of the system.

The system is designed to collect and process data, such as coordinates of the medical and pharmaceutical organizations,

information on residues of medicines, information on medicines sold, data on patients who need pain relief, information on transport accessibility of medical and pharmaceutical organizations.

Data entry is performed only once when creating a system based on Ministry of Health data. Then, the addition of data and its support up to date is performed by the operator of the system, with the right to transfer and data changes. Map data update is performed automatically based on information received from the map service servers.

For the formation of assortment and planning drugs demand is supposed to implement the data processing unit. Based on these data are implemented algorithms for machine learning, for example, an algorithm using a random forest model [3]. The result of machine learning algorithms will be a forecast of a target value, which depends on the amount of data and their current status. The accuracy of prediction is achieved by pretreatment of data, quality of learning algorithm and test the results of his work (methods of cross-validation).

Predicted value (which may be the number of drugs required in medical institutions, the intensity at regions of diseases, the need

for medicines, etc.) are displayed on the client side of the system are displayed on the interactive map. On the basis of these values is based plan for drugs, and there is a rapid response to possible deviations from the plan.

Based on the coordinates of the medical and pharmaceutical organizations is expected to build a road map of the region, which will display the availability of medical and pharmaceutical care. Optimization of the roadmap is executed in the data processing unit, and is achieved by implementation of the algorithm for solving the transport task. Transport task allows you to get the best plan for the delivery of drugs at a certain time and place with a minimum total of manpower, material and financial resources costs [7].

Thus, the introduction of practical health care like GIS will improve the availability of pain therapy, particularly in remote, inaccessible and rural areas.

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