Energy and information in assessing the quality of medical diagnostics

V.V. Smirnov
(FGU "Central Clinical Hospital of Civil Aviation ", Moscow, Russia)

Introduction

Taking into account the current level of knowledge about the human body and the variety of available medical and diagnostic services, one cannot expect that the consumer of medical services will take on faith that he is being provided with sufficient quality medical care. Therefore, modern assessments of the quality of medical services must be scientifically substantiated. Perhaps the greatest difficulty is the process of assessing the quality of medical diagnostics, since it often only precedes the process of treatment, i.e. is carried out at stages when it is still impossible to say whether the diagnosis and the treatment prescribed on its basis led to a noticeable improvement in the patient's health. In other words, if treatment procedures can be assessed both by analyzing the treatment process itself and by the results of this process, i.e. to change the patient's condition, then diagnostic studies can be assessed only by direct analysis of the correctness of the execution of the process of diagnostic examination of the patient. This paper discusses some of the features of assessing the quality of medical diagnostic services using qualimetry.

Qualimetry concepts

Qualimetry is a scientific discipline that studies the methodology and problems of quantitative assessment of the quality of any objects (objects, processes, phenomena, events, artificial or natural, living and nonliving, products of labor or products of nature) [1].

In qualimetry, quality is understood as the totality of all those and only those properties that characterize the results obtained when consuming an object (both desirable - positive, and undesirable - negative), but which do not include costs (usually we are talking about the cost of money) for its creation and consumption. Also in qualimetry, the concept of integralquality, which means a property of an object that characterizes its totalityquality and efficiency [2].

Efficiency is a combination of those properties of an object that characterizeresources used in the processes of its creation and consumption.

One of the main ideas on which qualimetry is based is to bring together, within the framework of a complex quality indicator, various criteria that characterize the various properties of the object being evaluated. The complex quality indicator is usually defined as the weighted arithmetic average of the indicators of individual properties of the object and the corresponding weight factors. The purpose of qualimetry is to quantify quality or integral quality. This is a process, the output of which is quantitative information about the quality of an object, taking into account not individual, but simultaneously all of its properties [3].

When constructing integral quality indicators in qualimetry,property trees that, withon the one hand, reflect subordination,
interdependence (hierarchy) of the properties of activity as a complex hierarchical system, and on the other - are a way to visualize information about

frameworks for quantitative assessments of quality. The degree of branching (segmentation)property trees are determined, first of all, by the goals and possibilities of researchobjects [4].

With the use of modern means of automated support for the provision of medical services, the possibilities for assessing their quality are broader due to the functions of storing and processing information about the medical and diagnostic procedures performed. It is important to note that qualimetry includes formalized methods for assessing quality, so it not only allows you to form a reasonable assessment of the quality of medical services, but also simplifies the tasks of automating the processes of preparing such an assessment. Below we consider the features of the automated construction of qualimetric trees of properties in the process of assessing the quality of medical diagnostics.

Energy and information in assessments of the quality of medical diagnostics

From the point of view of qualimetry, everything that satisfies the needs of people is expressed by a combination of elements of four basic types: products, services, information, energy [2]. It should be noted that this set does not includea substance that can be difficult to understand, since in medicine there is a largeattention is paid to metabolism. However, it should be taken into account that, from the standpoint of modern scientific knowledge, matter has a dual nature [5], as a result of which it can be considered as a special case of energy.

Assessing the quality of medical diagnostics in this work, it is proposed to distinguish between the processes of obtaining, storing, transferring and processing energy occurring in the human body.

Under the processes of obtaining substances or energy at the level of the organism as a whole, it is proposed to understand the processes of receipt of substances and energy from the environment, at the level of individual organs and tissues - this is the supply of substances and energy to a specific organ or tissue from other organs or tissues, at the level of cells - the supply energy and substances from other cells or intercellular space.

Under the processes of transfer of substances or energy at the level of the organism as a whole, it is proposed to understand the processes of transfer of substances and energy from the environment through some organs or tissues to other organs or tissues, at the level of individual organs and tissues - this is the transfer of substances and energy from one organ (tissue) to the other (other) through some intermediary organs (messenger tissues), at the cell level - the transfer of energy and substances from one cells to other cells through intermediary cells or the intercellular space.

Under the processes of storing substances or energy, it is proposed to understand the processes of storing substances or energy in organs, tissues or cells unchanged for a sufficiently long time.

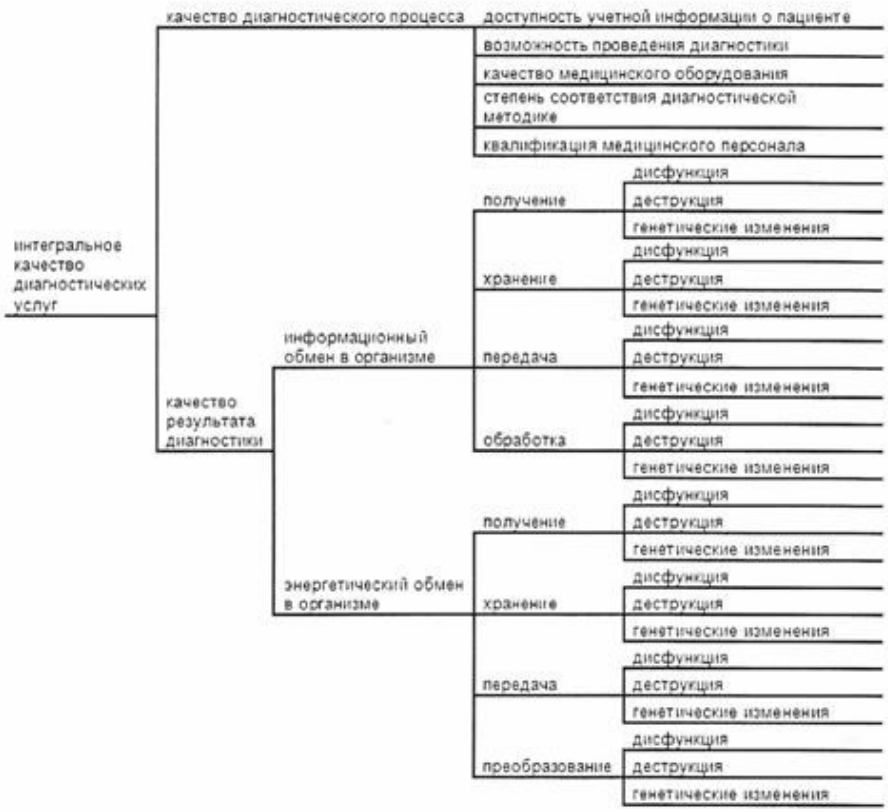
It is proposed to understand the processes of processing as the processes of catabolism and anabolism of substances and energy.

It is important to note that the boundaries between the four basic types of qualimetric elements, i.e. products, services, information and energy are rather arbitrary. In this regard, in this work, the assessment of the quality of medical diagnostics services is understood as an integral quality, which includes the quality of the results of medical studies of energy and information processes in the patient's body, as well as the quality of the diagnostic process itself.

Taking into account that the processes of receiving, storing, transmitting and processing information in the human body occur with the use of energy, information processes in this work are understood as such changes in the human body, in the process of diagnostics of which one can abstract from the energy costs associated with them. Examples of such processes are the processes occurring in the nervous and endocrine systems. Information processes in this work also include processes that allow diagnosing violations in the human body by measuring electrical resistance [6], temperature [7], heat sensitivity [8], electrical potential [9], etc. [10, 11] at acupuncture points on the human body, located on the so-called energy channels (meridians). One of the popular methods of such diagnostics is R. Voll's method [12]. A feature of using this method is the complexity of the medical interpretation of its results, therefore, assessing the quality of diagnostics using this method is especially relevant.

It is convenient to divide the diagnosed violations of information or energy processes in the human body into three groups, sorted by the importance of their detection: dysfunction, destruction, genetic changes [13]. Thus, the integral quality of diagnostic services can be represented in the form of a tree (Fig. 1), which simultaneously reflects the energy-informational assessment of the quality and the group of disorders in the functioning of the human body. Such a representation is especially convenient in the case of using automation tools for assessing the quality of medical diagnostics, since it largely corresponds to the main types of information processes characteristic of any cybernetic systems.

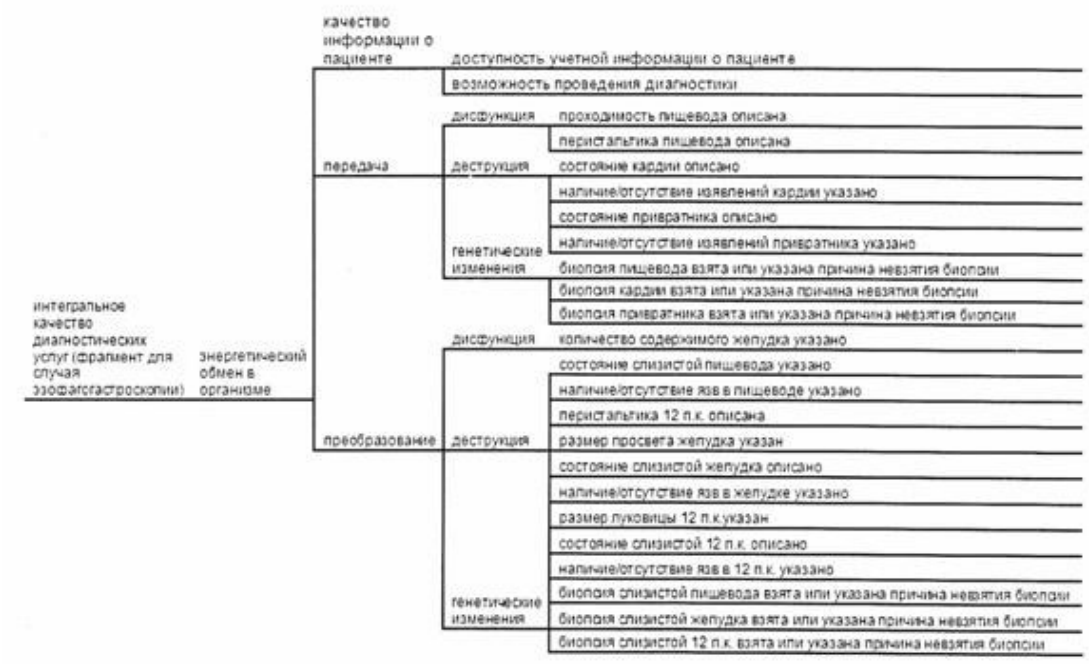
Below are examples of constructing property trees used to assess the quality of the results of endoscopy, ultrasound and diagnostics by the method of R. Voll.



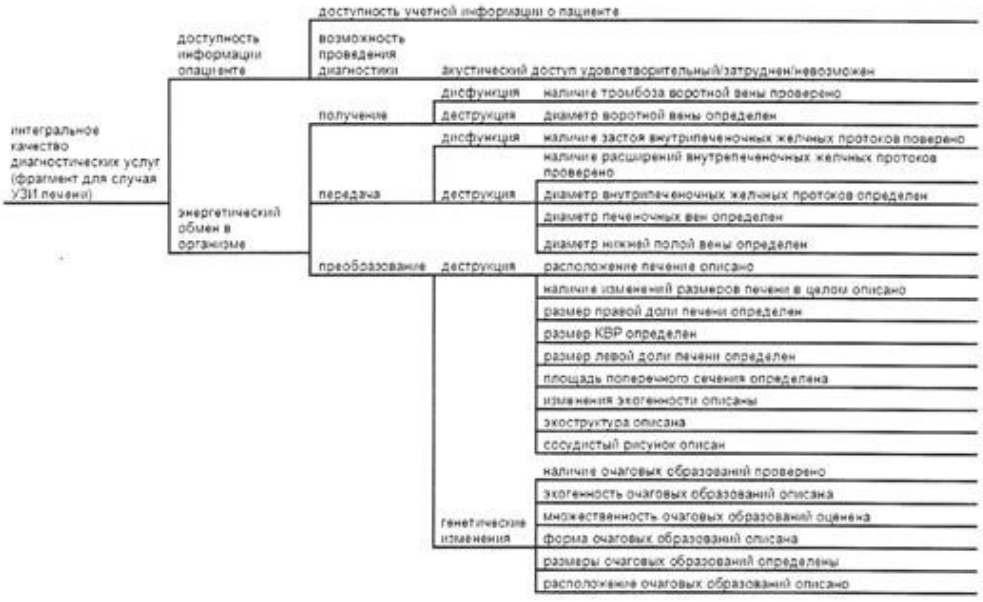
Rice. 1. General structure of the integral quality of diagnostic services.

Examples of constructing property trees for assessing the quality of medical diagnostics

In fig. Figures 2 and 3 show examples of property trees for assessing the quality of endoscopic examinations and ultrasound examinations, respectively. Similar property trees, corresponding to a different set of services provided in the process of endoscopy and ultrasound, can be built on the basis of clinical guidelines, based on the experience of experts in the field of endoscopy, or using analysis of databases containing research protocols, as well as using other sources of information.



Rice. 2. Fragment of the property tree for assessing the quality of endoscopic examinations



Rice. 3. Fragment of the properties tree for assessing the quality of ultrasound

In fig. 4 shows a fragment of the tree of properties for assessing the quality of liver diagnostics by the method of R. Voll, using biologically active points located on the liver meridian. The course of the liver meridian in the diagnosis according to R. Voll coincides with the classical Chinese meridian. Deviations from the normal values of the measured parameters for points on the meridian can be associated not only with liver pathology, but also with pathology of the veins of the lower extremities, knee joint and gonads [12]. Degenerative processes correspond to cases where the measured values are below normal, and inflammatory processes correspond to cases where the measured values

above the norm.

Rice. 4. Fragment of the tree of properties for assessing the quality of diagnostics by the method of R. Voll

Conclusion

The paper considers the features of the automated construction of indicators of the quality of medical diagnostic services, based on qualimetric points of view on the concepts of energy and information. The position of the author presented in this paper is based on the experience of automated assessment of the quality of medical services, obtained in the process of using the Protocol Editor program in Russian medical institutions of various profiles.

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