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PATIENTS' MOBILITY AND ACCESS TO INFORMATION OF MEDICAL SERVICES

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This paper deals with information systems support of the process, which is to provide medical services to patients without reference of their residence and the location of medical service centre. In conditions of increasing mobility it is necessary to find the ways of quality and efficiency improvement while providing medical services. Special attention is paid to questions, which show the index of information and services access in Latvian medical cluster. Choice of criteria and indices of telemedical project financial-economic evaluation, are being considered.

Keywords: *mobility, service, accessibility, telemedical systems, unified information zone*

1. Introduction

United Europe made it possible to change reasons of mobility and to increase some kinds of it, and what is more to form the so-called unified service market in different directions (finance, transport, telecommunication, commerce, insurance, pharmacology and medicine). Increasing people's mobility leads to vital changes in services market and makes new high demands on standards quality and speed of their provision. European market fragmentation is the objective reason which prevents from exchange of innovations and advanced experience. Taking into consideration the fact, that society is getting more and more information, service rendering operativeness increase takes place due to information- computer technologies implementation. Such categories as e-government, e-commerce, e-education are added with e-health as well.

In this connection formation and support of medical services unified market should assist the increase in all Europe's competition, as well as give movement freedom and medical services access to European citizens. On the one hand, waiting for a complete implementation of a universal European health insurance card (EHIC) should improve the situation in service access and give a wide range of possibilities to those, who are looking for medical service in other countries [1]. And on the other hand, it involves formation of a unified electronic data base platform with a wide range of opportunities to patient's European data base formation. Uneven structure of a unified medical market development in European Union countries stands in the way of services process individualization, which leads to their depersonalisation and quality decrease.

One of the main EU priorities is European citizen's health care, and public health is the primary service, provided to EU patients. It is necessary to realize the extent of responsibility for providing patient's equal access to necessary information about medical services in conditions of increasing mobility. Tendencies of growing mobility influence public health systems, but freedom of movement, given to European citizens by European agreements will only become real if patients get equivalent medical help being abroad. This fact (remark) would make the procedure of access for patients from near-to-the-border, thinly populated, insular geographic areas to highly technological medical centres and services easier. The project "Europe for patients", which is financed by FP6 EU of scientific researches, sets as its goal to find ways of solution for the mentioned problems [1].

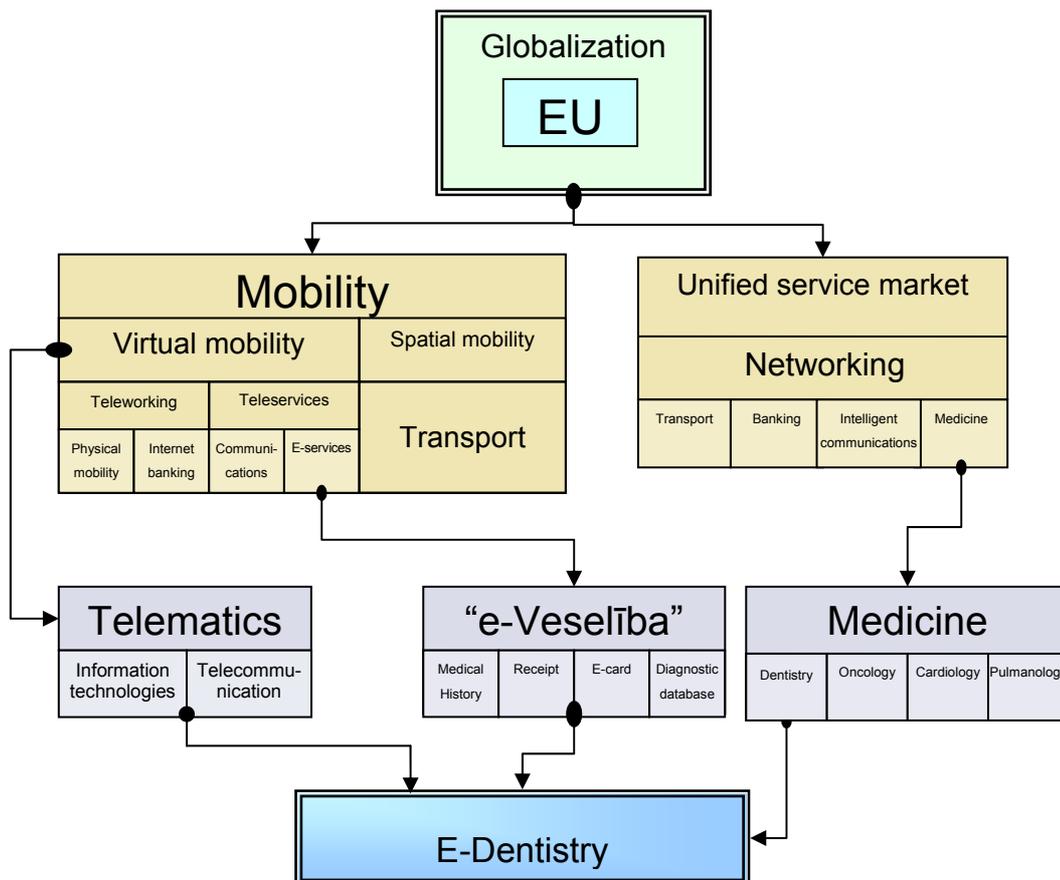


Figure 1. Place of research in a unified information zone

2. General Approach to Telematics

Each state faces the task to create some kind of a unified information zone, which could provide access to information about medical services rendering regular distant consultative-diagnostic help to various institutions and specialists, taking into consideration the fact that e-medicine is already an existing, independent, and extremely necessary sector of medicine. Specialists from different countries, who deal with public health awareness, realize the role of a unified information zone, but on the other hand they note the absence of officially accepted common principles of a unified public health information system forming and functioning. A single conception of a common health care information zone forming is needed and international standards for providing data base compatibility should be used. Main principles of a unified information zone forming and development could be the following:

- o Functional standardization (on the basis of open information system ISO-ISO/TC215 "Health Informatics") [5];
- o Identity compatibility;
- o IT solution adequacy;
- o Unification and coordination;
- o Implementation of informative – computer technologies into public health.

According to the opinion of All-European Association of Medical Telematics – EHTEL – by modernizing European public health systems, by implementing informative/computer technologies we can lot upon rationalization potential in this sphere up to 20% – without losses in quality and quantity of the provided services. For all this it is necessary to take into consideration that implementation should be carried out in an open way, in coordination, having international standards as a basis. Presumably, from 20 up to 40% of all the public health services are based on informative/computer technologies, which include getting, storing, analysis and transfer of patients' medical data. Informative/computer technologies in public health, concerning banking and industry are used in a limited and not effective way.

Medical telematics, which provides direct e-health system functioning, is presented by various data exchange services, distant diagnostics and tele-consulting.

That is why before putting forward such a service to the market (to a consumer, user) there arises a question about the necessity of telemedical systems and networks formation in order to provide the support to e-health ES areas, which have already been created and should be classified according to the types given below:

- public isolated systems;
- private isolated systems;
- corporative systems;
- national integrated systems (for example national, E-health system in Latvia is presented as a complex of autonomous systems);
- European and above-national systems.

Such kind of system and network should consolidate medical institutions of different types and sizes in order to satisfy specialists' necessities.

Type:

- accident and emergency;
- diagnostic centre;
- transplantation centre;
- special hospitals;
- insurance companies;
- medical information centre;
- archives;
- telemedical institutions;
- statistics institutions.

Size:

- data exchange services;
- tele-consulting;
- distant diagnostics;
- health state monitoring.

Scientific knowledge and technological innovations make it possible to widen continuously the range of opportunities for structuring help provision. Information technologies are becoming an integral component of service providing as an instrument that gives a possibility to store and find information about patients, as well as help in making clinical and organizational solutions with the help of "knowledge management". New knowledge is becoming accessible in the mode of nearly real time, and one can get them being present in any part of the world. Telemedicine is developing very rapidly, which allows specialists to consult their colleagues and carry out distant diagnostics.

But it is necessary to take into consideration the fact that public health awareness criterion level is not defined in all the countries, and the amount of PCs in medical institutions is not an adequate index. So, for evaluation of usage of the informative/computer technologies in European Union, two main indices are used:

- part of population, that use Internet to get medical information – for EU and America it is 80%;
- part of doctors, that use electronic medical story card – for EU it is 25% (in Denmark – 75%, in America – 17%).

There are no such indices for Latvia at present, there is only general information about access of population to Internet – it is about 50%.

Day by day diagnostic methods are becoming more perfect, increasing the possibility of earlier and more precise diagnostics, which makes new requirements and public health services have to correspond to them [2].

World and European experience of telemedicine projects' implementation demonstrates the result of using new highly effective scientific-practical direction with a great social and economic effect. This is a real opportunity to improve the quality of medical services and provide the population with wide access to information about medical services. It also gives a possibility by means of the least expenses to implement a range of measures in order to improve medical service the whole, namely:

- to change fundamentally the approach to gaining of diagnostic information about a patient;
- to improve quality of data collection and analysis, their subsequent shelving and storage;
- to improve index of accuracy while diagnosing;
- to reduce time losses on additional examination, diagnostics and further treatment planning;
- to cut down considerably expenses for diagnostics and treatment;
- to improve index of service accessibility (taking into consideration that it means patient's money and time losses);
- to improve index of provided help quality.

Aims of such projects implementation into the field are to provide fair access to services, their high quality from the point of view of technical efficiency and adequate reaction on patients' waiting, as well as affective usage of the available resources.

On August 18th, 2005, Cabinet of Ministers of Latvia accepted main e-health regulations "E-health in Latvia", which were worked out by Ministry of Health. On May 25th, 2006 "Architecture of information system in public health sphere" was approved by IT Council of Ministry of Health (see Figure 2).

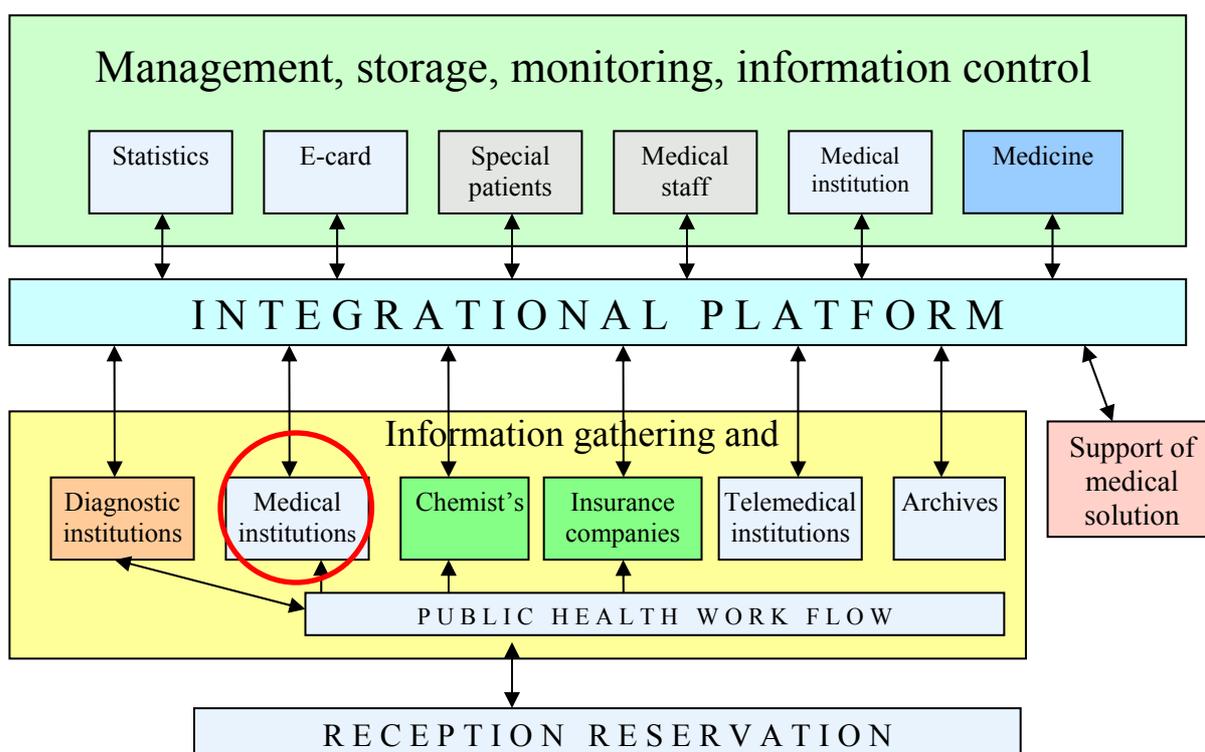


Figure 2. Latvian National Integrated System of Future Medical Service Network

The given document defines directions of information technologies strategic development for the near 10 years. The main tasks of "e-health" implementation are as follows [6]; [7]:

- to improve state of health by carrying out individual's control over their own health (providing a patient with the possibility of access to their own data base);
- to carry out effective decision making about health, increasing availability to information about sanitary events and publicising healthy lifestyle in the society;
- to increase public health effectiveness, providing quick access to medical services suppliers;
- to ensure availability of highly- qualified doctors' consultation in regions, having as a basis centralized visual- clinical diagnostic and telemedical solutions;
- to provide possibility to define, plan, realize and control public health policy on the basis of high-quality information about real situation in public health;
- to insure authenticity and reliability of public health data;
- to have a possibility to get objective statistical data.

According to the opinion of Latvian specialists in this sphere e-medicine will make it possible to regulate and improve effectiveness of public health system functioning in the country. But measures connected with improvement of effectiveness should be based on the understanding of the fact, how medical services are organized and provided in the country on the whole.

In Latvia, medical services of different types are provided by two sectors: state and private, which is necessary to take into account while carrying out the events connected with integration of e-medicine project, since absence of close links, interdisciplinary cooperation and information exchange could become a serious problem and misrepresent information about medical services which are provided and patient's data.



Figure 3. PPP – Public Private Partnership

Successful systematisation and regulation of medical process are possible on condition of complete available information from all medical services suppliers, but electronic aspect of processes makes physician's work more transparent, controlled, and effective. The above-mentioned measures create a basis for real project on telemedicine in public health of the country on the whole, turning telemedicine not into a rare experiment, but forming an independent, topical trend of medicine. Latvian telemedicine centre demonstrates some interesting experience: managers of this centre note special prospects of this system in the field of coordination and development of invasive, urgent, planned cardiology help. After implementation of this system in Latvia the centre showed its own intellectual potential and readiness to cooperate with other countries in public health sphere and it also demonstrated on a practical example advantages of telemedicine, which:

- in cases of emergency dramatically cut down the time for medical help provision;
- increase effectiveness of therapeutic measures owing to urgent electronic distant diagnostics (taking measurements – cardiograms and spirometers and this data transfer for further processing through the sound signal to telemedical centre with the help of portable device, CC7000d, using any channels of communications);
- electronic data (medical story) backlog and access to them on-line for specialists and patients through the key-word;
- getting a well-timed consultation without any physical visits to medical institution and without interrupting working process;
- evident cut-down of medical service expenses.

The given example can be a practical prototype for other branch specialists and institutions, rendering, planned, as well as urgent medical help and providing diagnostic-consulting service.

Having as a basis already existing regulations, which have been developed in the field “E-health in Latvia”, the present paper suggests to define place and typology for creating an independent module, such a cluster in public health as dentistry, as well as to evaluate the necessity of giving a ground for placing information, which is at a disposal of specialists of the indicated field – “Architecture of information system in public health sphere”, to define groups of users, who need such information, to mark the limits and access possibilities.

Analogous projects, but in a more limited range, have been developed in a real analysed dental institution “Dent”. Computer software, which has been used for a long time, makes it easier to keep, collect, search and backlog medical, financial, administrative papers, to keep statistical information, to manage personal data base, to carry out electronic paper circulation with various insurance companies in Latvia, to suggest personal optimal interface. It can be stated that computer software usage (“Dent – automation on the basis of Gain CRM”) in dental practice has become during the years an integral part of doctor's practical activity. Using of high-technology kinds of dental help, technical-diagnostic means, modern branch programme products (“Implant-assistant”, “Dolphin imaging”), personal knowledge data made it possible for dental practice to create distant diagnostics and tele-consulting services, as well as to exchange data in groups:

- doctor – patient;
- doctor – doctor;
- clinic – clinic;
- clinic – diagnostic centre, irrespective of object location.

Nevertheless, an important element for development of different kinds of telemedical networks and systems (levels – see “Types of systems classification”) is economic evaluation of telemedical project efficiency in particular. It is obvious, that necessity of reducing expenses increasing of efficiency and services accessibility forced to analyse how medical system services are organized and provided. Implementation of telemedical systems into dentistry, in contrast to other medical trends, has a range of peculiarities because of the specific character of provision of the dental help.

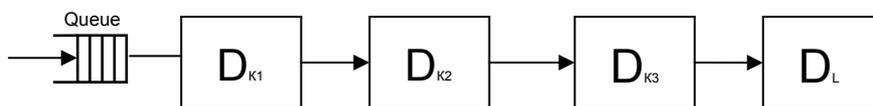


Figure 4. The scheme of analysed process
(D_K – Doctor’s consultation, D_L – Treatment)

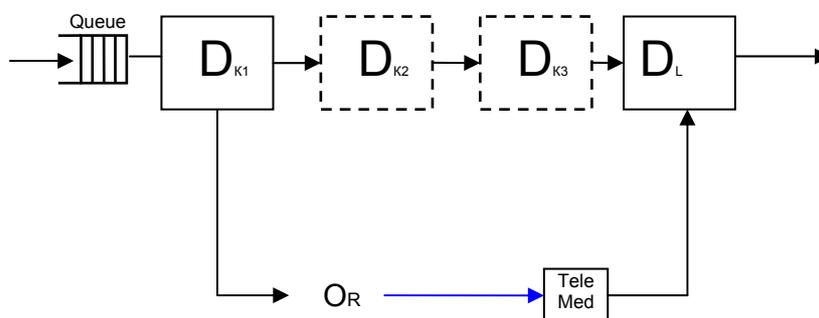


Figure 5. The scheme of projected process
(O_R – Diagnostic data collection, *TeleMed* – Telemedical centre,
→ Data transfer channel)

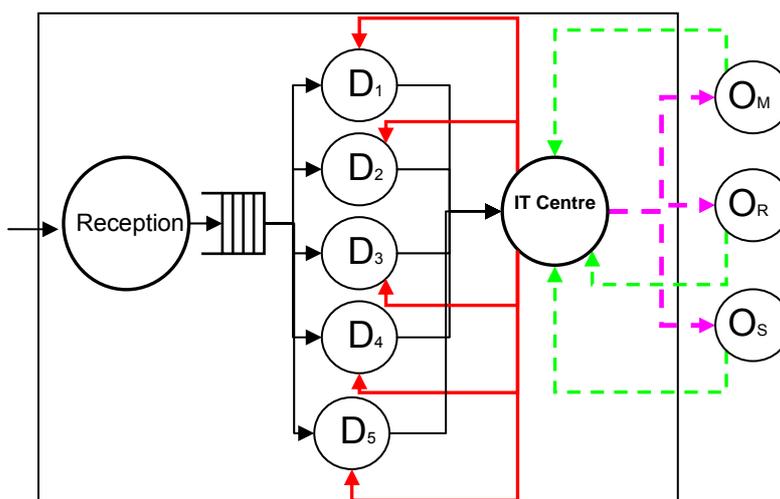


Figure 6. Distant diagnostics and tele-consulting scheme
(Conventional signs:
IT Centre – Telemedical Centre of an Institution
 O_R – Diagnostic centre
 O_S – Corresponding consulting centre
 O_M – International telemedical centre (consultant)
 $D_1 - D_5$ – Doctor)

Choice of criteria and indices of financial-economic evaluation of telemedical projects is not a simple task, as there are no formal research of cost and efficiency comparison, as well as methodologies of telemedical projects economic evaluation (due to some authors' opinion [3] and [4]).

One of the important service criteria is temporary characteristics, since, as a rule, financial and time expenses are included into the index of accessibility:

$$T_{MS} = T_W + T_{oth}$$

$$T_W = T_{OUT.F} + T_{IN.F}$$

Conventional signs:

T_{MS} – time of medical service

T_W – waiting time

$T_{OUT.F}$ – outer factor time

$T_{IN.F}$ – inner factor time

$$\Pi_{oper} = \frac{1}{T_W}$$

$$\Pi_{ass} = \frac{1}{1 - \Pi_{oper}}$$

While evaluating medical service availability, it is necessary to take into consideration time expenditure for search (through any communication channels), way to and time spent on waiting for doctor's consultation. Time losses, that precede service, exceed waste of patient's time spent on the direct contact with service performer and reach the ratio of 20:1 [4]. Evaluation of time spent on serving is seen in different ways: time losses for waiting to be served the consumer evaluates as negative, but for contact with the doctor – as positive. Losses of time while waiting for doctor's consultation can be taken into consideration in the criterion of service conditions, as well as in the criterion of service availability. This statement makes it necessary to improve the method of service provision and to search the ways of the improvement of its efficiency.

Time expenditures while calculating quality integral index can be transferred into means or the main indices of clinic work can be grouped into a model of final results, where indices of good results and defects are taken into consideration.

Index of a successful medical activity, (dental) practice – is totality of medical, economic and patients' satisfaction indices:

- number of refusals;
- the amount of the provided services;
- temporary disability duration after surgical manipulations;
- the amount of carried out well-grounded extirpations;
- appointment delay time.

Indices of good results correspond to ideal standards, taken for Figure 1, but it is a negative result if there is index of defects.

Index of defects:

- neglected cases proportion;
- incorrectly made diagnosis;
- incomplete service provision.

All indices standards cannot be achieved simultaneously in practice; accordingly, the real final estimation will always be less than Figure 1, which reduces the final index. The received integral estimation reflects medical practice effectiveness.

Such a sector of medical telematics as telematics in the field of medical services management, covering informative-communicational technologies in planning, realization, financing and quality evaluation, organizational technical level and effectiveness of service rendering and its usage, widens the limits of service availability index.

3. Conclusions

The described implemented telecommunication infrastructure can be used as a real branch prototype which provides links with other specialists and medical-diagnostic institutions. A unified information dental system implementation into “Latvian National Integrated System of Future Medical Service Network” will insure integration and interaction with outer informative systems, insurance companies, and medical organizations and will provide access to distant knowledge and ontology. It will increase availability and diagnostics quality indices and reduce time, which is spent on waiting on reception to the doctor.

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