MEDICAL AND SOCIAL CONSEQUENCES OF INTRODUCING INFORMATION TECHNOLOGY IN YAKUTIA

Article presents the available data on the problems of medical care organization to residents of Northern and Arctic regions of Yakutia. This task is still the most socially significant for the authorities and has a great load of negative experience, stereotypes and scientific-methodological errors.

An anonymous survey of parents and medical staff of the Northern and Arctic regions of Yakutia about the quality of medical care was conducted. 1415 parents and 322 health specialists were interviewed in the period 2011-2012.

Results of the anonymous survey reveals that in the Northern and Arctic regions of Yakutia there are a few qualified specialists, unsatisfactory condition of infrastructure in hospitals, and low income of medical personnel and the whole population. Authors suggest development and active implementation of informational technologies to improve the quality of medical services in remote settlements of Yakutia.

Keywords: Children, health examinations, automated systems

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Introduction

The negative consequences of socio-economic changes of the last decades had an impact primarily on the livelihood of the rural population and the destruction of the main principles of medical care organization of this social group. The reduction by one third in the number of district hospitals, uncompensated by adequate development of outpatient care and worsening shortage of doctors in rural clinics have led to reduced availability of primary care. Specialized medical assistance in regional and national hospitals has also become less accessible to the rural population due to the high cost of travel (Lisitsyn, 1973; Modestov, Kosov, Bondar, Nevolin, Fedotkin, 2013; Yakovleva, Ivanov, Modestov, 2011). The number of doctors related to the number of inhabitants in rural areas is less than 3.4 times the number of doctors in urban areas, and nurses - 1.6 times. In this regard, the burden and responsibility for rural health care workers have become much higher.

Yakutia (Republic of Sakha (Yakutia)) is the largest area of the Russian Federation; its territory is one-fifth of Russia. Yakutia is one of the coldest regions in the world. The cold pole of the Northern Hemisphere is in Yakutia. The annual amplitude of air temperature is over 100 degrees. It has a population of 958,000 (14.10.2010) and correspondingly low population density (0.3 persons per km²). More than 40% of the country is above the Arctic Circle, where only 7% of the population lives, including the indigenous peoples of the North, living the traditional nomadic way of life. All this has a definite impact on the medical care organization to the population.

Nowadays Yakutia consists of 36 municipalities, including 34 municipal regions, 2 urban districts, 55 urban settlements, and 586 rural settlements (Gorokhov and Fedotov, 2012). In the Republic, 50% of 676 settlements belong to the category of sparsely populated, and 44% to the category of hard-to-reach and remote. Twelve districts have a population below 10,000. One third of the population lives in rural areas.
91.8% of the Republic’s territory is in the area of seasonal transport service, communication is mainly by air, water and road service (seasonal). Thus 76% of 34 districts do not have reliable transport links with the center of the republic and surrounding regions. The most remote village is situated at a distance of 3,189 km from Yakutsk, and there the distances from medical centers to the Central district hospital are up to 400 km in the absence of year-round traffic. Almost 90% of local roads do not meet regulatory requirements.

All over the republic there are 580 health agencies, including 20 agencies in Yakutsk. Currently, the situation for medical personnel in Yakutia as in many regions of the Russian Federation is instable. 825 doctors and 3,146 nursing staff work in health care facilities serving the rural population. 292 of the nursing staff work in the medical stations. During 2012 the number of doctors decreased by 38 people (0.8%) and nursing staff by 103 people (0.9%).

The ratio of the number of posts units is "doctor: nurses" - 1:2.2 (2011 - 1:2) (Russian Federation - 1:2.1). The coefficient of secondary occupations: doctors - 1.4 (2011 - 1.4) nursing staff - 1.3 (2011 - 1.2). The total number of posts: doctors - 5614, nurses - 12014. In the health care system 131.25 posts of doctors and 114.5 posts of nursing staff are free. The main problem which should be noted is the low staffing of medical personnel in the Arctic regions.

Thus, in some regions of the Arctic zone this data does not reach 50%: in Allaikhovskiy - 49%, Verhojansk - 49.4%, Lower Kolyma - 48%, in Oymyakon - 47.8%, and in Ust-Yana 46.6%. Increased migration of the population and outflow of specialists affect very negatively on the provision of medical institutions with medical personnel. In recent years, the number of retired doctors is approximately equal to the number received to work in health institutions. So, in 2012, 627 doctors were eliminated, including: the natural decline of doctors was 115 (13.7% of the number of departed doctors), at his/her own request and transfer 428 doctors and 589 doctors arrived.

The present situation with staff shortages and low capacity of medical institutions lead to the lower quality of medical care in remote and inaccessible locations of Yakutia.

Materials and methods

With the aim to determine factors influencing the quality of medical care in remote settlements of Yakutia we conducted an anonymous survey of parents living in 16 districts: Upper Kolyma, Lenskiy, Tomponskiy, Srednekolymskiy, Amginskiy, Verhnevilujskiy, Neryungrinskiy, Ust-Yanskiy, Ust-Mayskiy, Verkhoyanskiy, Aldanskiy, Olekminskiy, Suntarskiy, Ust-Aldaniy, Namskiy, Megino-Kangalasskiy. 1415 questionnaires were filled. Also an anonymous survey of medical workers of the Republic on the state of rural health, living in 17 districts of the Republic of Sakha (Yakutia): Mirniy, Khangalasskiy, Zhiganskiy, Abyiskiy, Aldanskiy, Amginskiy, Neryungrinskiy, Namskiy, Suntarskiy, Kobyaevski, Olekminskiy, Verhnevilujskiy, Olenekski, the Upper Kolyma, Ust-Mayskiy, Verkhoyanskiy, and Yakutsk was conducted. 322 questionnaires were filled.

A pilot project on the implementation of automated medical examinations (ACE - automated clinical examination) was presented to improve the quality of medical examination of children in the districts of Yakutia, for example, Olenek region.

Results and discussion

The results of data analysis of questionnaires were unexpected: at the average 88.3% of the respondents (rural residents) are not satisfied with the number of local medical services. With regard to the settlements’ remoteness: 63.5% of respondents - residents of the nearest to the district center settlements, 73.3% - inhabitants of distant settlements, and 92.8% - residents of remote settlements.
The respondents believe that the main reasons of low quality of medical care are the following:

- Absence Of Qualified Specialists (88.2%);
- Insufficiently Equipped Local Medical And Prophylactic Institutions (71.7%);
- Inadequacy Of Material And Technical Base Of Medical Institutions (65.7%);
- Lack Of Necessary Medicines (60.2%);
- Absence Of A Qualified Physician (39.8%);
- Expensive Drugs (36.6%);
- Insufficient Laboratory Studies (16.3%);
- Poor Organizational - methodical management of Central region hospitals (11.%).

One of the problems of rural health care in Yakutia is the problem of availability of specialized and high-tech medical care. According to the respondents, there are several problems: in particular, patients are unable to attend an examination or treatment in the district hospital in the spring and autumn due to the lack of roads, or due to poor road conditions in the summer (36.2%), lack of money for travel (34%), duration of travel to the district center, about 8-10h (23.7%), and lack of transport (61%).

There was the question: "How often do you visit a doctor to get advice about your health?" 60% of respondents answered "rarely", 36.4% - "always", and 3.6% of them do not apply to a doctor. To the question: "What is aim of your visit a doctor?" 71.2% of respondents say that they do it mainly for the treatment, 16.7% - examination, 4.5% - prophylactic medical examination, 1.7% - preventive examinations. People in these regions need such specialists as a cardiologist, a neurologist, an ophthalmologist, and an otolaryngologist.

In recent years in Yakutsk there is organisation of scheduled doctors' visits to the regions to survey the population. However, respondents note that most of them are not able to show the child to all necessary health care services due to the following reasons: experts are available in these regions for a few days (52.0%), and too long waiting lists to see specialists (20.0%).

An anonymous survey of health staff working in the pediatric service of Yakutia revealed a number of negative health and social factors: health workers are not fully satisfied with the quality of care in their health care setting (80.6%).

According to the respondents the following factors influence to work in a health care setting, such as:

- Shortage of specialists -71.5%;
- Unsatisfactory condition of the material-technical base of - 59%;
- Lack of necessary need medicines - 41.6%;
- Level of incompleteness of doctor staff - 40.1%;
- Level of incompleteness of nursing staff -19.7%.

Some difficulties occur during the prophylactic medical examinations of children: lack of specialists - 54.3%, the parents have no time to go for a medical check - 43.7%, and children do not want to miss classes at school - 21%.

Most medical professionals answer that more time is spent on recording outpatient cards (85.9%) rather than on the examination of the child. Almost all medical staff in the districts and the city of Yakutsk (89.7%) unanimously think that over the years the work is only getting worse.

Every day 70.4% of respondents do not fill dispensary log and a form No.30, because they are rebooted by the other paper work, and there is no continuity between specialists and workers of the school-preschool departments and between the qualified specialists.
Processing is affected by the following factors: a lot of paperwork (84.3%), a lot of different checks (39.7%), and rebooted areas (20.8%). In addition, they consider that the work of specialists is organized irrationally, which leads to unjustified visiting of children and congestion of physician by patients (according to the respondents in 41.2% of cases).

Many of them believe that if there was continuity between local doctors, school-preschool doctors and specialists' congestion would reduce and the medical examinations of children would improve (67.8%).

There is a high level of interchangeability among physicians due to the following factors: doctors and nurses are mainly women (many of them go to the maternity leave), child care and interchangeability during the holidays.

According to the respondents during the last 5 years health care system in the districts became worse - 12.5%; has not changed 48.5%; became better - 39%. 39.8% of health staff is satisfied with their work, while the 60.2% of them are not fully satisfied. The majority of health professionals are not completely satisfied with their work due to lack of time for self-education, low wages (especially among nurses), poor equipment in hospitals and medical clinics, absence of pediatricians in district hospitals, and because of regular violation of the diet and sleep.

Based on the foregoing we together with the Ministry of health of Yakutia introduced the ACE (Automated Clinical Examination) technology by the pilot project in 10 districts of Yakutia.

In the Olenek region the population is 4028 residents. 2679 of them are adults, and 1349 of them are children. The Olenek region consists of the village Olenek (central district hospital), the village of Jilinda (rural district Hospital) distance from center (320 km), village Ayik (rural district hospital) distance from center (550 km), and village Haryalah (3km). One purchased device of Automated Dispensary Examinations (ADE) is sent to villages of Olenek region on queue or schedule. So, a trained physician teaches the nurses or medical assistants at pre-school department in Olenek. Then he trains the health workers (doctors or nurses or paramedics) of distant villages on choosing who is good at a computer. In the village of Jilinda (rural district Hospital) (207 children) there is one family doctor and 4 paramedical workers.

### Table 1. Frequency pathology by pathology profiles in Olenek region

<table>
<thead>
<tr>
<th>Name</th>
<th>All the children</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Abs.</td>
<td>boys</td>
<td>girls</td>
</tr>
<tr>
<td>All surveyed</td>
<td>166</td>
<td>82</td>
<td>84</td>
</tr>
<tr>
<td>Only healthy children</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>All children with pathology</td>
<td>164</td>
<td>82</td>
<td>82</td>
</tr>
<tr>
<td>cardiology</td>
<td>% 92.8</td>
<td>92.7</td>
<td>92.9</td>
</tr>
<tr>
<td>endocrinology</td>
<td>% 51.2</td>
<td>56.1</td>
<td>46.4</td>
</tr>
<tr>
<td>ophthalmology</td>
<td>% 40.4</td>
<td>36.6</td>
<td>44.0</td>
</tr>
<tr>
<td>dentistry</td>
<td>% 36.7</td>
<td>36.6</td>
<td>36.9</td>
</tr>
<tr>
<td>pulmonology</td>
<td>% 21.1</td>
<td>24.4</td>
<td>17.9</td>
</tr>
<tr>
<td>neuropathology</td>
<td>% 20.5</td>
<td>26.8</td>
<td>14</td>
</tr>
<tr>
<td>allergy</td>
<td>% 13.3</td>
<td>14.6</td>
<td>11.9</td>
</tr>
<tr>
<td>orthopedics</td>
<td>% 12.0</td>
<td>18.3</td>
<td>6.0</td>
</tr>
<tr>
<td>otolaryngology</td>
<td>% 11.4</td>
<td>13.4</td>
<td>9.5</td>
</tr>
<tr>
<td>gastroenterology</td>
<td>% 7.2</td>
<td>7.3</td>
<td>7.1</td>
</tr>
</tbody>
</table>

The physician can be responsible and nurses help him/her. 207 children should be examined. If on average 10 children are examined a day, 207 children should be examined for 21 days. On average it is possible to visit one village for 1 month. In the village Aik
(rural district Hospital) (124 children), there is 1 family physician, 4 paramedical workers; it means that on average it is possible to examine all children for 13 days. In the village Haryalah (rural health Clinic) (286 children), there is 1 doctor and 4 paramedical workers. In Olenek (Central District Hospital) (732 children) there are 2 pediatricians and 15 paramedical workers. In the Central District Hospital the doctor Automated Dispensary Examinations (ADE) should teach nurses and paramedical workers. Ten children per day is an average number for the first year, then it becomes easier to work and the number can increase up to 30 children. Then the ADE conclusions will be transferred from large and small villages to the Central District Hospital to the doctor responsible for ADE. ADE is voted as the most convenient for health care facilities with a small number of specialists to conduct the combined screening-diagnostic functions of the first stage. The second stage is a visit of the Pediatric center specialist to provide diagnostic and therapeutic services taking into account the identified pathology profiles. The third stage is arranged outing of the equipped mobile medical team of surgery to provide specialized medical care (the Ministry of health order No.01-8/4-378, 07.03.2012) (Samsonova, 2012).

As shown in Table 1, at the first place by the pathology profile is cardio rheumatology (92.8%), then endocrinology (50.3%), ophthalmology (40.8%), dentistry (36.7%), pulmonology and otolaryngology pathology. By V.G. Chasnik’s existing definition of the pathology profiles the most frequently reported children pathology is recognized as a population-significant one requiring the major investments for prevention and treatment.

The use of this technology in the regions has allowed revealing the following issue that Olenek district actually has 2 pediatricians who are responsible for work with ADE technology. The time required for one child survey makes 20-25 minutes on average. Therefore, in our opinion, it is advisable to use this technology in district medical centers and it is necessary to involve health staff in the school by the nurse or doctor, in the villages the doctor or paramedic should be responsible. Only a comprehensive joint inspection will be able to introduce the automated systems of screening diagnosis. A doctor of ADE trains his/her healthcare professionals from the region (doctors, nurses, medical assistants) working in other villages.

As far as the dictionary of the child's state description in the terms of ADE includes complaints and symptoms recorded even on the first level, we suggest as appropriate the using these descriptions in the assumption of the widespread using of nursing staff in the examination of children living in small villages.

**Conclusion**

At present, in remote and isolated settlements of Yakutia the development of information technology allows to implement ADE technology. The elaboration of the concept of the profound medical examination of a large number of children in a short period of time, in particular limited by the ability to attract highly qualified professionals only for a short period, leads to the need for prequalification flows with the purpose of rational planning of the inspection procedures (Buortseva, Tomski, Verbitskaya, Kanaeva, Chasnik et al., 2008).

Implementation of the screening diagnostics approaches in preventive medicine would give the possibility for resolution of weak points in distant localities in Yakutia. This will increase the detection efficiency in children and teenagers’ diseases in the early stages and, as a result, the efficiency of conducting all clinical work (Vorontsov, Shapovalov, and Sherstyuk, 2006). Also, this process will lead to: organisation the standardized monitoring of children's health; improved monitoring of effectiveness of therapeutic activity in medical institutions; allocation of limited health care resources appropriately and objectively; guiding the development of health care system structure appropriately and efficiently.
References


Lisitsyn Y.P., 1973. Social hygiene and organization of health care (lectures), Moscow, Medicine


Samsonova M.I., 2012. Ethnic and environmental factors in shaping the health of adolescents in the Republic of Sakha (Yakutia) in the process of their growth and development. Synopsis Dissertation
