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A sociological evaluation of Telemedicine in north- west Russia

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06.03.00

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Users' attitudes to the telemedicine network in Arkhangelsk

Executive summary

The project "Telemedicine in North- West Russia" is working to establish a telemedicine network in the Arkhangelsk region. The network has now been evaluated in terms of users' satisfaction and as a result this report focuses on health care workers' attitudes and levels of confidentiality in the context of telemedicine. Attention has been drawn to some of the challenges connected with long- distance collaboration between central and local telemedicine site. The report will also emphasise health professionals' opinions and prognoses on the improvement of telemedicine services in the Arkhangelsk region. The evaluation process has been administrated from Tromsø by Gunn-Hilde Rotvold, though all interviewes and administration of the questionnaire have been carried out by the Arkhangelsk researcher; Elena Kudrisjova. The report is the product of a 1- year process that has given both of us important knowledge about transnational collaboration.

1.0 Introduction

Telemedicine in north-west Russia is a joint project between the National Centre of Telemedicine at the University Hospital of Tromsø and the Regional Hospital of Arkhangelsk (RHA). The telemedicine project was established in 1994, with the RHA delivering specialist care to patients in local hospitals using telemedicine. This service has partly been financed by the National Centre of Telemedicine and the Health Department of the Arkhangelsk Regional Administration. The project has also received considerable financial support from the Norwegian Ministry of Foreign Affairs, the Barents Euro-Arctic Region and the Inter-Reg Barents Programme.

One of the main tasks of the project "Telemedicine in North West Russia" was to use telemedicine in providing health care services from the RHA to patients in local hospitals in the region. By using specially equipped studios, trained personnel, suitable software and communication lines, the ambition was to offer a twenty-four-hour still image transmission service.

1.1 The Arkhangelsk region

The Arkhangelsk region is located in the north-western part of European Russia and covers an area larger than France, almost 600 000 sq. km. The population, only 1,5 million, is mainly concentrated in the cities of Arkhangelsk, Severodvinsk and Novodvinsk. The rural population comes to 26% of the total, or about 390 000. The long distances between cities and villages - as in other northern regions - mean that communication is poor. During the long winter, transportation is especially difficult. Many settlements have year-round transportation by air only. Distance is a problem in providing satisfactory health services to the population (Sørensen, Rundhovde, Kozlov 1999).

The health care system consists of three levels. The first level includes primary health care centres and rural hospitals, which provide health care services to chronic invalids, social and aged patients. Most primary health care centres have poorly skilled health care personnel and high labour fluidity. In most cases the local level does not offer patients specialised medical care. The second level is where patients receive intensive treatment and specialised care in district hospitals. This level is very important in the networking between the first and third levels of the health care system. The third level provides highly specialised medical care. Health care institutions at this level consist of a network of specialised hospitals organised under the Health Department of the Arkhangelsk Regional Administration. The network includes the Regional Hospital of Arkhangelsk (RHA), the Regional Children's Hospital, two mental hospitals, and a number of dispensaries, skin-venereal, cancer, TB, alcohol and drug abuse prophylactic centres.

The Health Insurance Fund (HIF) and public budgets are the main financial sources for the public health services. HIF is funded by prepaid monthly insurance contributions made by businesses, institutions and other legal entities in the region (2,5% of the monthly salary of all employees is paid as a premium to the HIF). The HIF covers both in- and outpatient costs at the hospitals (including drugs) and all health care personnel costs. Travel to hospitals and health care clinics is paid for by the patients, regardless of the distance. As a consequence, people in rural areas have to bear high travel expenses if they need to see a specialist at the RHA.

1.2 Challenges for the Russian health services

The economic crisis in Russia started in the middle of August 1998, and affected health care services as well as the rest of the Russian economy. Out-of-control inflation created a massive increase in health care costs without any increased transfer of funds to cover these costs. As a consequence of tight budgets there has been no investment in modernisation of the rural health institutions, so they remain poorly equipped. Evidently, the quality of health care for remote populations has been poor. The Arkhangelsk region is also facing health care challenges due to the ecological problems caused by i) pollution from the pulp, paper and timber industries in Arkhangelsk, Novodvinsk and Koryazhma, and ii) the centre of the nuclear submarine industry in Severodvinsk and the cosmodrome "Plesetsk". As a result, the rates of cancer, skin diseases, asthma and TB are the highest in the Russian Federation.

Still, public health care authorities in the region provide high quality health care given the great distances, sparse population, considerable number of remote settlements and the lack of means of communication and transportation. All these challenges, including the marginal economic situation, make telemedicine applications possible means of improvement. In this perspective, the implementation of telemedicine is considered important with particular reference to quality, safety and cost-effectiveness.

1.3 The telemedicine network in Arkhangelsk

Teleconsultations in the Arkhangelsk region have been used for a variety of medical purposes. The demography of the Arkhangelsk region, with its scattered population creates many challenges in emergency situations at the remote sites. Many of the local communities do not have roads or railways linking them to the outside world. Air transport is used all year round, while sea and river transport is a possible option only during summer and autumn. This situation require a special emergency centre in order to co-ordinate the need for emergency transfers of patients and health care personnel. The Regional Emergency Centre (REC), which is a department of the Regional Hospital of Arkhangelsk (RHA), was established to fulfil this need.

A telemedicine workstation was set up at the Regional Emergency Centre in 1995. Telemedicine consultations between the RHA and local hospitals began with Kotlas in 1996, then five other sites followed (tab1).

Table 1. Six local telemedicine sites participate in the still image network

District	Population	Distance from RHA	Established
Kotlas	110 000	650 km	03.96.
Velsk	70 000	500 km	01.97.
Koryazhma	40 000	700 km	02.98.
Nyandoma	40 000	400 km	05.98.
Severodvinsk	245 000	50 km	05.98.
Onega	45 000	400 km	12.98.

The local hospitals were selected for the telemedicine network based on both their financial status and the human resources available, as well as the size of the local population and the presence and frequency of specific diseases which could benefit from teleconsultations. It was expected that this network would not only increase the

volume of teleconsultations, but also provide more knowledge about the effects of telemedicine in general, as well as improved quality and efficiency.

The telemedicine service is a still image network. The use of specially equipped studios, trained personnel, suitable software and communication lines makes daily transmission of still images from the local sites to the central telemedicine studio at the RHA possible. The transmitted images might be x-rays, ECG print-outs, images of skin lesions, etc. Specialists at the RHA make diagnoses based on still images and additional written information, work out treatment plans and, if necessary recommend more diagnostic tests. A physician at the local hospital is then able to provide qualified medical care in the shortest possible time with assistance from a senior specialist in Arkhangelsk.

Table 2. Number of teleconsultations and patients involved (1996-1999)

Hospitals	1996	1996	1997	1997	1998	1998	1999	1999	Total	Total
	Cons.	Pat.	Cons.	Pat.	Cons.	Pat.	Cons.	Pat.	Cons.	Pat.
KOTLAS	12	9	49	21	20	18	35	33	116	81
VELSK			10	10	7	6	6	6	23	22
KORJAZMA					11	11	9	8	20	19
SEVERO-DVINSK					3	3	8	7	11	10
NJANDOMA					8	4	14	9	22	13
ONEGA					3	3	10	10	13	13
TOTAL	12	9	59	31	52	45	82	73	205	158

205 teleconsultations had been carried out in the region by the end of 1999. The number of patients involved was 158 which indicates that some patients have generated more than one teleconsultation.

The telemedicine activities are based on simple, low-cost technology: a PC, camera and the VIDA-system. The VIDEO image acquisition and Analysing system VIDA, is a Windows PC-based system for collection, storage and transmission of still images using the telecommunications network. The software is built up around the consultation concept, with each case consisting of a number of images and textual patient information. The VIDA system makes it possible to capture, add text to and send still images from one site to another using modem links. VIDA was originally developed by Telenor R&D in Tromsø and is now a freeware application (<http://www.telenor.no/fou/english/freeware/vida/>).

1.4 Alternative methods of providing health care services

Telemedicine services have so far been a supplement to the traditional methods of health care provision in the Arkhangelsk region. It is still important to focus on the traditional methods, both to improve routines and to establish whether telemedicine is a suitable supplement to health care provision or not.

Patient travel to specialist on referral from local doctors

Patients in remote areas often have to spend a lot of time and money travelling to Arkhangelsk for health care. Most of the patients travel by train. Today practically all travel expenses are paid by patients. Patients travel to the RHA for examination on

referral from a local physician. Children and patients in need of assistance are accompanied by health care personnel or a guardian, but usually patients travel alone. Using telemedicine, some patients might avoid a journey, saving both time and money.

Specialists travel to see the patients.

The Regional Emergency Centre (REC) organises emergency services in the region. The REC decides whether patients need emergency transfer to the RHA or not. In cases where there is no real danger to the patient's health, consulting specialists travel by car, train or plane, depending on the seriousness of the case (table 3). The REC also co-ordinates journeys to local clinics. Travel costs are not a critical aspect and are therefore considered relatively moderate for regular transport, with the exception of leasing air transport, which is expensive. A more critical aspect are the considerable losses of specialist resources at the central hospital where patients also need specialist care. For the RHA, this means losing specialist resources in a variety of medical fields: traumatic surgeons, neuro-surgeons, anaesthetists, haematologists, etc.

Table 3. Specialist travel to outlying districts 1996-98.

means of transportation	1996		1997		1998	
	number of calls	%	number of calls	%	number of calls	%
by air ambulance	349	39,1	338	39,7	329	39,1
by plane	271	30,4	256	30,1	234	27,8
by train	68	7,6	54	6,3	73	8,7
by car	204	22,9	203	23,9	205	24,4
Total	892	100,0	851	100,0	841	100,0

The scattered population and long distances between cities and villages in the Arkhangelsk region also mean that communication is poor. Many settlements have year-round transportation only by air. The Regional Emergency Centre organises air ambulances for transferring emergency patients and/or specialists; this is often the only practical option. In 1997 there were 338 flights and 329 in 1998. Some of these emergency transfers have now been replaced by teleconsultations (table 4).

Table 4. The share of teleconsultations compared to the total workload at REC in 1996-98.

	1996		1997		1998	
	Number of calls	%	Number of calls	%	Number of calls	%
Number of calls	892	98,6 %	851	93,5 %	841	94,2 %
Number of teleconsultations	12	1,4%	59	6,5 %	52	5,8 %
Total	892	100 %	910	100 %	893	100 %

1.5 Methodological approach

The evaluation process has been carried out as a collaboration between two sociologists from Arkhangelsk and Tromsø. Both agree that there have been interesting challenges during the process, some of them similar to telemedicine challenges. We have tried to maintain a regular dialogue, keeping each other

updated by e-mail, phone and videoconferences. All these communication lines have given us opportunities to keep the dialogue going. Still it's important to highlight the fact that we have different preferences due to cultures, languages, research tradition and previous experience. We have been very aware of these aspects during this process, and in spite of the fact that technology has made distant communication possible, it has been of utmost importance that we have met physically three times, once in Arkhangelsk and twice in Tromsø, each of these meetings lasting a week. These face- to- face meetings have been very fruitful and have built a strong foundation for confidence and successful collaboration.

The main objective of the sociological evaluation is to focus on the users and their experiences of and attitudes to telemedicine. The discussion will especially emphasise the importance of confidence and challenges experienced in collaboration between local and central telemedicine sites as expressed by the users in the project. Users in this context are health care professionals. The focus is on the users' levels of confidence in

- 1) the technology in the telemedicine context,
- 2) their colleagues at the distant site, and
- 3) the telemedicine network.

We will take into consideration the users' organisational positions, gender and age. The users' organisational position is important to analyse, as it may illustrate the health organisation's motivation to use telemedicine.

Gender is interesting because traditionally health professions in Russia are dominated by females. It's in this context interesting whether telemedicine can be regarded as a female area or not.

Users' age could be interesting for two reasons. First, employees in Russia retire at the age of about 50. Doctors close to retiring age are perhaps less motivated to use new methods of diagnosis than younger doctors. Secondly, it's of interest to chart whether age influences the users' degree of confidence.

Additionally, we will examine the users' opinions and prognoses on the improvement of the telemedicine health service in the Arkhangelsk region.

Patients have not been interviewed in this study. The reason for this is that telemedicine consultations are mainly carried out in the context of emergency situations. The patients are not in a position to choose. Telemedicine consultations were their only possible alternative.

The collection of data is based on sociological methods of both quantitative and qualitative approaches. We have used questionnaires combined with personal or telephone interviews. The questionnaire was sent to 36 users of telemedicine equipment at both local hospitals and the Regional Hospital of Arkhangelsk. We received 24 answers:

- 5 from the Town Hospital of Kotlas (THKS)
- 5 from the Town Hospital of Koryazma (THKA)
- 5 from the Central District Hospital of Nyandoma (CDHN)
- 3 from the Central District Hospital of Onega (CDHO), and
- 6 from the Regional Hospital of Arkhangelsk (RHA).

This means that we had a response rate on the questionnaire of 66,67%. We had to follow up with interviews and in all 15 users were interviewed either face-to-face using a tape recorder, or on two occasions, by telephone. 10 of the users have been both interviewed and answered the questionnaire. In all 29 telemedicine participants have been involved in the study.

Already at the beginning of our work we decided to exclude the telemedicine unit at Severodvinsk from our evaluation. The reason for this was mainly because the Severodvinsk studio worked ineffectively. They had only 4 consultations with RHA during a two-year period. Secondly, the station had no support from the head of the hospital administration or the hospital's medical staff. They all felt specialised enough to give qualified treatment to patients within their region. Support from the RHA was not necessary.

2.0 Results

29 users responded to our survey. First, we will present the users in terms of age, gender and organisational position. Secondly, confidence in telemedicine will be discussed in the context of distance.

People from all mature age groups are represented in the telemedicine network in Arkhangelsk.

Age group	users
21-30	2
31-40	10
41-50	12
51-60	5

The majority, a total of 22 users or 75% , are between 31-50 years old. Among the responding participants there were 19 men and 10 women. Focusing on gender, we find that 65.5% of the users are men and 34.5% are women. This includes participants from both central (RHA) and local hospitals. The majority of women involved in the project represent health professionals sited at local hospitals; only one was from the RHA. Each hospital involved has a person responsible for telemedicine activity. Looking specifically at the six persons responsible for telemedicine, only one of them is female. Other women involved have positions on the mid-level of medical management, such as heads of medical departments. Among technicians who take care of the equipment, there are no women. Our impression is that telemedicine in the Arkhangelsk region is more of a male than a female sphere of activity. Taking into consideration that in Russian society the health professions are traditionally more female dominated, this is an interesting statistic.

With reference to organisational position we found that people responsible for telemedicine had positions as organisers, doctors or technicians in their respective hospitals. Among other participants, there were technicians responsible for the technical part of the project, doctors from local hospitals and five senior doctors. Nurses are not involved in the remote consultations for two reasons:

- 1) consultations are like second- opinions which excludes nurses' participation because they don't have doctors' level of competence, and

- 2) nurses' roles at hospitals in the Arkhangelsk region don't include telemedicine involvement at the moment. Their roles are mainly to carry out physical therapy and laboratory research.

All participants in the telemedicine project noted that they got acquainted with telemedicine using two main channels of information: 1) through cooperation with the National Centre of Telemedicine at the University Hospital of Tromsø, combined with the development of a telemedicine project in the north west Russia, and 2) articles in specialist medical journals and scientific conferences.

2.1 Users' attitudes to telemedicine

The technical parts of the telemedicine project are developing parallel to the process of computerisation of Russian society and there are definitely similar problems, such as:

low computer competence among people in general, especially among the working population in contrast to e.g students

obsolete equipment, and

absence of reliable communications and infrastructure

In this context, users' attitudes to telemedicine could depend on their general knowledge and familiarisation with computer technology.

About 60% of the telemedicine project participants deal with computers more or less regularly at work (29.4% of them are women). The majority of these belong to the group aged between 21-45 years old. The other 40% of the telemedicine project participants don't use computers at all. Many of them belong to the age group between 45-60 years old. People younger than 45 years old tend to be more familiar with technical innovations than the older generation. Nevertheless, all participants in the project from local hospitals and the majority of those from the RHA feel comfortable with IT as a whole and telemedicine in particular. As one of the users expressed it:

"telemedicine equipment is very convenient and easy to use"

The project gives them the opportunity to use telemedicine equipment for video- and teleconferences and long-distance learning. Telemedicine can help to create databases for various diseases, their forms and methods of treatment. Doctors expect these databases to improve doctor's qualifications.

2.2 It's better to see once than to hear a hundred times

Most of the users are strongly motivated to use telemedicine, and local doctors explain their attitude in the following way:

"I find it a real help in making diagnoses"

"It is an effective and necessary method in urgent situations and helps us solve problems of diagnosis and treatment"

"We see effective, concrete benefit and results from telemedicine. It is a very useful and prospective method of health care".

Senior doctors from the RHA argue the necessity of telemedicine as follows:

" telemedicine saves time and money"

Only one senior doctor from the RHA feels ambivalent about telemedicine, considering that dialogue with the patient is a more effective way of making a diagnosis, and besides the telemedicine technology is not yet perfect. To understand both the enthusiasm and the sceptical attitude, we have to take into consideration the Russian situation, with bad communications and infrastructure. In many situations telemedicine has proved to be the only alternative. Before telemedicine there were situations where patients at local sites didn't get qualified treatment. Bad telephone lines were used to get advice from senior doctors at the RHA. We assume that doctors at the RHA take into consideration the less attractive alternative when they say that:

" It is better to see once, than to hear a hundred times ".

We have asked the users about the main reason for choosing telemedicine consultations. The answers at both local and central sites almost all emphasise the same aspects: time and economic necessity, and the need for emergency assistance. In addition, local doctors emphasise their need for assistance in giving advanced treatment, and they also mention their interest in telemedicine in general. All senior doctors at the RHA and other Arkhangelsk hospitals are involved in telemedicine consultations as consultants, and their frequency of participation varies from only 1 consultation up to 8 per year. By increasing the number of telemedicine consultations, patients in remote areas could get access to specialist services more cheaply and more frequently.

On the whole, all participants in the telemedicine project are optimistic about the development of telemedicine as a very effective, useful and prospective method of health care in the Arkhangelsk region. Local doctors mention the need for this method in urgent situations and think of it as a good opportunity to be on line with senior doctors from the RHA and discuss difficult situations with them. Participants from the RHA emphasise the economic aspect of the project (it saves money and time) and the objectivity of the results. This is one of the main aspects and a very important one in their consideration of the telemedicine service. Even some sceptical viewpoints do not overshadow the generally positive attitude to the telemedicine project in the region.

2.3 Confidence- a crucial aspect

Telemedicine consultations are carried out in cases where a second opinion is required and in emergency situations. The onmost frequently conditions treated so far have been:

1. Traumas of the central nervous system,
2. Difficult combinations of cranium-maxilla-facial traumas,
3. Inflammatory processes adjacent to oculist zones, and
4. Skin diseases.

The following case illustrates the kind of experience already gained by using telemedicine to which the doctors involved often refer, explaining their confidence in the telemedicine solution:

"In 1997 a nineteen-year-old woman was admitted to Kotlas town hospital with the diagnosis: twenty-five-week pregnancy, histosis, nephritis, pyogenic

haematoma of the thigh muscle, septic pneumonia, infantile cerebral palsy, respiratory insufficiency (stage 2-3), secondary infections, myocarditis. Usually such extraordinary cases are under the care of the Regional Hospital specialists, but, as the transportation of the patient was impossible, the case would have required several emergency transfers of the medical crew. Because of the very complicated diagnosis the treatment lasted 64 days; the patient was under the care of the town hospital specialists and the senior specialists from the Regional Hospital therapists, resuscitators, thoracic surgeons. During the course of treatment 21 remote consultations were carried out and 114 still images were transmitted 84 radiographs, 15 clinical analyses, 15 functional examinations of various kinds. Thanks to the possibility of remote consultations by use of telemedicine, the lives of the patient and the child were saved”.

Compared to previous years, when telemedicine was mainly used in emergency situations, in 1999 telemedicine has been used more in cases of general guidance, assessment of diagnoses, treatment and examinations. In 1997 the rates of emergency and chronic cases were 82% and 18% respectively, while in 1999 the situation was 35% emergency and 65% chronic cases (Annual Report 1999). Expansion of the application illustrates that telemedicine is chosen not only as the only alternative, but also as an improved solution. Has confidence perhaps grown parallel with experience?

“We feel secure, because at any time we can receive the help of senior doctors from the RHA”

“It is a good opportunity to discuss difficult situations with highly qualified specialists from Arkhangelsk”

These opinions are expressed by local doctors and illustrate a very high level of confidence in senior doctors at the RHA.

Confidence between local and central sites is crucial to achieve and maintain a fruitful dialogue. Exchanging essential medical information between distant partners requires a minimum of confidence in professional know-how between both sites. At the Regional Emergency Centre, the x-ray photos, results of analyses, the report of the treating doctor and still-images of the patient are transferred. This information plays a major role in deciding the diagnosis. However, low technological equipment means that the materials submitted are of poor quality (especially x-rays). Often it's difficult to state the diagnosis from the first information transferred, and additional information is required. To achieve greater efficiency in consultations, further technical perfection of telemedicine is necessary to give a dynamic image of the patient or actions concerning the patient (e.g. surgical operations), that will allow doctors to quickly make a precise diagnosis.

Three of the doctors say that confidence in information technology grows through using telemedicine. As one of the doctors responsible for the telemedicine project encouragingly remarked:

“Telemedicine makes us certain of making the right diagnosis “

"We are working together and achieving positive (good) results, which is our main objective in developing the Telemedicine project in our region".

2.4 Critical conditions

Senior doctors at the RHA stressed the fact that low technological equipment at local hospitals creates bottlenecks in their work because local sites are not equipped to broadcast examinations of patients. RHA doctors were strongly concerned that equipment at local hospitals was not good enough to make safe diagnoses at a distance. In some cases the specialists felt it was crucial to meet the patient face-to-face. Senior doctors at the RHA were more critical towards telemedicine than physicians at local hospitals. Small local hospitals have very old X-ray or electrocardiogram equipment, which results in very poor quality still images. This situation puts the doctor at the RHA in a very difficult situation in which he needs more information and repeated pictures to make the right diagnose.

Doctors at the RHA said that they sometimes doubted the professional competence of their colleagues from local hospitals. Thus senior doctors from the RHA don't doubt the professionalism of physicians at local hospitals in general. An episode with infectious meningitis (woman, age 25-27 years) was cited as a very notable case:

"In 1997 a fifteen/sixteen-year-old girl was admitted to Kotlas town hospital with the diagnosis "infectious meningitis". The girl was from Krasnoborsk in the south of the Arkhangelsk region. She had squeezed out a pustule on her nose. Sepsis developed very quickly and consequently infectious meningitis started. Physicians first kept her in Krasnoborsk for two or three days. Then she was transported to Kotlas. During one day 3 remote consultations were carried out: 14 still images were transmitted to the RHA, where 3 radiographs, 5 clinical analyses and 6 functional examinations of various kinds were carried out. Doctors could not help her in spite of a series of remote consultations."

The treating doctor had asked for advice too late, and this was fatal. In the interviews this is the only case mentioned of unprofessional action by a local doctor. In general, senior doctors estimate the degree of personnel readiness to use telemedicine methods as satisfactory.

2.5 Can telemedicine improve collaboration between doctors at local and central sites ?

Many of the telemedicine project participants note that their collaboration with other professionals is changing with the help of telemedicine.

"doctors become more open for advice from their colleagues"

"telemedicine as a whole is a very good opportunity to discuss with senior colleagues from the RHA. It helps professional growth".

Using telemedicine, doctors have to enter into equal relations with each other. Under other circumstances this is impossible, because doctors perceive the process of treatment as their deeply personal business. Many doctors say that as responsibility for making a diagnosis grows, simultaneously trust in information technology increases. These positive interpretations are also linked with their experiences of a

new way of communication with patients. Several of the users emphasise that by using telemedicine

"there are new opportunities for dialogue with the patient"

Patients are the end-users and will be affected by doctors' choice of treatment. This report doesn't include patients' opinions. All doctors involved are concerned about patients' conditions and they find telemedicine a necessary solution in remote areas.

Still there are doctors who are not satisfied with this "modern" situation. One doctor said:

"the degree of accuracy in diagnosis depends on the doctor representing the patient and his initial knowledge, and not telemedicine methods".

In their opinion, telemedicine applications reveal the need for qualified health professionals at remote sites. The most common answer among them is:

"telemedicine convinces us of the necessity to improve the professional skills of doctors at local hospitals"

This important aspect reminds us that telemedicine demands mutual confidence between the personnel involved. Distant relations and networks among health care personnel imply great challenges in building confidence within the network. Patients in remote areas are also entitled to qualified health services, and independent of telemedicine services, local physicians are expected to offer qualified treatment. Specialists at the RHA have doubt about whether their colleagues at regional hospitals are adequately qualified. The extent of mutual trust is low and needs to be focused on to be seriously considered as a priority for improvement. A further interviewed says:

"All patients are individual, therefore there is no end to perfection"

In other words, it is difficult to find certain universal cases of illnesses and methods of treatment, it is necessary to apply on individual approach to each patient.

Confidence between distant partners could be a great challenge. When people don't know one another, distances are great, and they do not depend on one another, it's difficult to achieve binding relations. Users at local hospitals have strong relations to other doctors within the local telemedicine group. These relations are among people within the same age group. Generally, all of these have known each other for a long time and some of them studied together at the Medical Academy. Moreover, they have common interests in their work. As a rule they express mutual respect and confidence and are motivated to help each other not only as telemedicine project participants but also in private. There is no reason to assume that health professionals at the RHA do not feel the same.

3.0 Conclusions.

In this report the objective has been to describe and analyse whether telemedicine has the potential to improve the health care service within the Arkhangelsk region. This has been done by focusing on the users and their confidence in such aspects as:

- 1) the technology in the telemedicine context,
- 2) their colleagues at the distant site, and

3) the telemedicine network.

3.1 Confidence in technology

For greater efficiency of consultations, in the opinion of the RHA experts, further perfection of technical telemedicine is necessary to provide dynamic images of the patient or actions concerning the patient (e.g. surgical operations), that will allow quick and objective diagnosis.

Implementing telemedicine reveals both weaknesses and strengths within the health system. On the one hand, telemedicine shows up such deficiencies as poor-quality, out-of-date equipment and the lack of qualifications among doctors in local hospitals. On the other hand, it stimulates technological modernisation of local hospitals and improvements in the professional skills of the personnel. As a result, medicine becomes more visible, and patients in remote areas are offered better health services.

Telemedicine seems to lead to a more democratic method of supplying medical care within Russian society. The status of the local hospitals rises, as they are included in the system of high information technology which has an on the whole positive influence on the life of the population.

3.2 Confidence in colleagues at distant sites

Senior doctors at the RHA (the experts) tend to be more critical of telemedicine than physicians at local hospitals. Critical attitudes from the experts are expressed in the opinion that they do not accept the quality of the material presented by the treating doctors. In their opinion, referrals by the treating doctors do not always happen on reasonable grounds. Sometimes doubt in the professional competence of the regional doctors is expressed.

Optimism on the part of the district doctors is caused by the opportunity for communication with their colleagues at the RHA. Still, this can't be taken as representative, because an estimation of the development and use of telemedicine technologies shows that not all senior doctors (apart from those who are responsible for telemedicine) use the computer. As a result they have a lack of knowledge about information technology.

Telemedicine influences the professional role of the physicians. One of the main aspects of this is that the physician becomes more open to advice from colleagues. Under other circumstances giving advice is impossible because doctors perceive the process of treatment as their own deeply personal business. Occupational pride seems to influence professional interaction, and it seems important to express mutual humility to colleagues' know-how.

3.3 Confidence in the telemedicine network

During this project telemedicine has proved to be a very fortunate and appropriate service. Health care personnel have expressed the favourable aspects of telemedicine. One of the most important advantages of telemedicine in the Arkhangelsk region is the possibility of selecting between patients who need special care with high costs of treatment, travel and accommodation in the regional hospitals, and patients who can be treated at local sites.

Remote consultations make medical advice by any specialist from the regional centre available to inhabitants of remote districts quickly. One of the advantages of the new technology is effective use of equipment in local hospitals. Increasing the quality of diagnoses shortens treatment and, consequently, leads to efficient use of hospital equipment in the framework of the program. The status of the local hospitals rises as they are included in the system of high information technology. It has an on the whole positive influence on the life of a settlement, small city or area.

The reason why it may seem difficult to express confidence over great distances, could be related to lack of routines, lack of regular procedures and finally organisational/ bureaucratic structures. The presence of all these formalities creates predictability within the organisation. Users' expectations of the telemedicine system is consolidated on previous experience. To achieve stability and confidence it is crucial to maintain regularity in procedures.

3.4 Suggestions for telemedicine improvements

We invited all users to make their recommendations on how to proceed so as to improve the telemedicine service. Users at local and central sites have made quite similar suggestions. Still, there are a few variations. The main suggestions and recommendations from the participants of the telemedicine project are as follows:

Economic improvements:

Include the monthly scheduled budget for telemedicine in local hospitals (who have telemedicine units), the RHA and the Health Department of the Administration of the Arkhangelsk region.

Technical improvements:

Improve the technological base for telemedicine, modernise telemedicine equipment and use Internet for the telemedicine network.

Increase the frequency of consultations:

Use telemedicine consultations more often, particularly for patients with skin diseases and ambulance patients; organise more tele- and video conferences.

Expand the network:

Establish telemedicine networks for second opinions with the "key" hospitals in Moscow, St. Petersburg and some other Russian towns to collect data on diseases. Establish telemedicine units in all central district hospitals in the Arkhangelsk region, or expand the area for telemedicine to Severodvinsk and Plesetsk (especially polyclinics and military hospitals). On expansion of the telemedicine network in the Arkhangelsk region opinions are divided. Some of the telemedicine project participants think that telemedicine should be distributed to all regional and local hospitals. Others believe it's more important to develop existing telemedicine networks in terms of equipment and know-how. Furthermore they want to expand the basis of existing telemedicine centres in local hospitals. In their opinion, the scattered population in remote areas would not manage to maintain enough demand for telemedicine services to make it cost efficient.

Organisational aspects:

It is necessary to define the list of indications for obligatory advice, apart from emergency needs (for example, young people suffering from heart diseases). With

the help of the telemedicine it will be possible to follow up patients treated earlier at the RHA.

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