

REVIEW ON THE STATE OF TELEMEDICINE AND eHEALTH IN ICELAND

ABSTRACT

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This article provides an overview of telemedicine and other eHealth activities in Iceland. Several telemedicine projects, which have been running since 1996, are described. The projects include telerradiology, teleobstetrics, telepsychiatry, maritime telemedicine, telemedicine in surgery, telepathology and a project for the use of telemedicine in various consultations. The role of the Icelandic Healthnet for telemedicine, including projects for teleobstetrics and telemedicine for emergency medicine, is described with the projects included. A few other eHealth activities, including electronic patient record and information systems, are also described. (*Int J Circumpolar Health* 2004;63(4):349-355)

Keywords: telemedicine, Healthnet, eHealth

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Telemedicine and Icelandic health-care

Telemedicine in Iceland has been developed in the form of projects in various parts of the country, with the goal of developing consultation and communication systems between health centres and hospitals and between regional and university hospitals.

The Icelandic health-care organization consists of two main levels of services: 44 health centres, located in towns and villages for primary health-care, and two university hospitals, one in Reykjavik and one in Akureyri (in northern Iceland), for secondary health-care. Nine regional hospitals cover intermediate services.

Various telemedicine projects have been carried out since 1996 in several specialties and they are further described below. In one of the current projects, the goal is to establish guidelines for telemedicine. Figure 1 shows the sites that have participated in telemedicine projects in Iceland.

Telemedicine projects

Teleradiology

Equipment for film scanning and software for image viewing and transmission was installed in seven health centres during the period 1996 through 1998. The communication at that time was made by

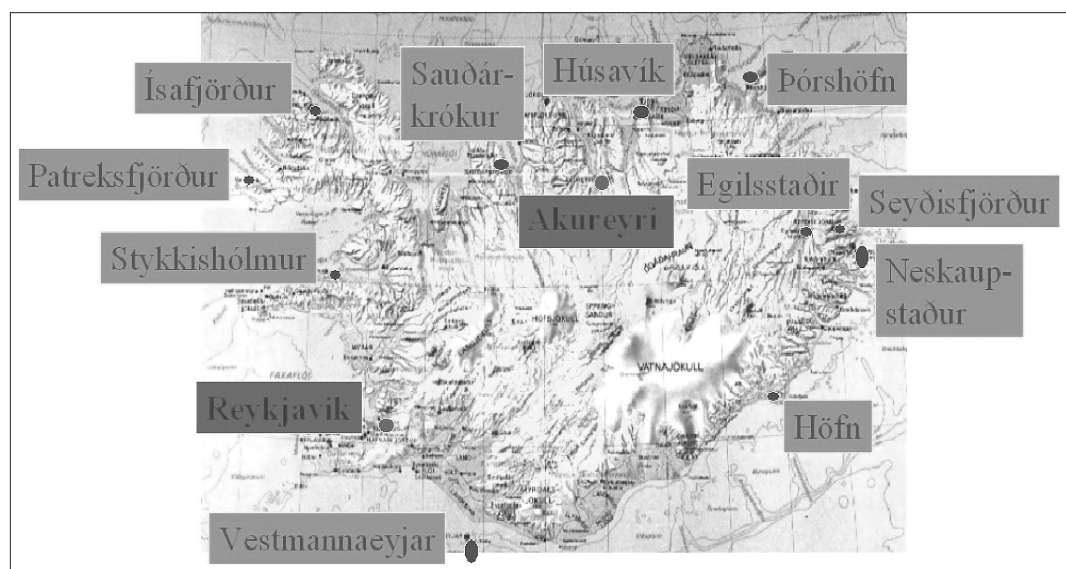


Figure 1. The sites that have participated in telemedicine projects in Iceland.

ISDN lines. The main intention was to support diagnostics for emergency cases, but services inside the hospitals was, at that time, not organized to support a continuous use. This service is now under re-organization.

Teleobstetrics

Desktop video-conferencing equipment was installed in the university hospitals and in a health centre for a trial to use specialty support for fetal ultrasound examinations. Such examinations have been done by GP's, nurses, or midwives. The project has been successful and is planned to become a regular service of the university hospitals. In addition to that, it includes training for such examination, done at the University Hospital of Iceland and eventual further training abroad. The trial project started in 1998 and the service is being planned from 2005 onwards. An evaluation of the project was carried out in 2001.

Telepsychiatry

Video-conferencing equipment was used between the University Hospital of Landspítali and two health centres to provide psychiatric consultation and interviews with health-care staff and also directly from doctor to patient. In addition, telemedicine was used in specialist visits to the health centres. The project was successful and showed the need for such a service in rural areas. Further use of the service is under discussion. The project was running from 1997 through 2000.

Maritime telemedicine

The location of Iceland makes freight transport an essential factor for life on the island. The same applies to fisheries, which are still the fundamental export industry and the largest source for export income. Large trawlers sail far from the coast in the North Atlantic ocean. Health-care for the sailors is limited under these circumstances. Apart from the basic medical knowledge and the emergency kit ("drug chest") available onboard, the sailors are dependent upon support from shore, by radio, telephone and by helicopter.

The emergency department at the University Hospital of Iceland is also a radio medical center for sailors around Iceland. The doctors there also staff the coast guard helicopter in case of emergency.

In order to improve health services, the hospital participated in an European project, called WETS (HC 4025), in the 4th Framework Program, 1997-2000. The purpose was to determine which kind of technology was suitable for telemedicine for sailors and how to establish a proper service to use it in maritime medicine. The result was a compact and versatile kit (Fig. 2) and Internet technology for communication.

One important factor concerns the registration of the information and data onboard and at the receiving hospital.



Figure 2. Telemedicine kit.

To continue the work in this important field, a Nordic project was initiated in 1999, between Iceland, the Faeroe Islands and Norway. Further technology trials were undertaken in the Faeroe Islands and Norway, in addition to those already being carried out in Iceland. The project was funded by NORA and ended in 2004. There were great expectations concerning the service, which is being explored in depth now.

Telemedicine in surgery

Video-conferencing equipment was used between the University Hospital of Iceland and a regional hospital for gastro-intestinal endoscopic examinations. Consultations were provided during the examinations and also for pre- and post-treatment. The project ran from 1998 through 1999.

Telepathology

Pathology is a highly specialized medical field in which the interpretation of tissue sample images requires a trained specialist, a high-quality microscope, a method allowing to present the images using a microscope, and display technology for tissue samples on glass slides. High-quality cameras are installed on the microscope to digitize the image for transmission. The University Hospital of Iceland has used this setup for sub-specialist consultations abroad (with the Armed Forces Institute of Pathology, AFIP, in Boston) using web-based communications.

Project for the use of telemedicine in different consultations and specialities

The main objective is to apply various kinds of consultation services for the routine use of telemedicine. The project is supported by the Icelandic research council from 2003 through 2005. The project is planned in three phases. The first phase focuses on consultations with video-conferencing, the second focuses on a store-and-forward system, and the third focuses on the use of Internet Protocol, instead of ISDN, and on expanding the service to health centers. Consultations are operational in the speciality areas of cardiology, dermatology, oto-rhino-laryngology, pediatrics, pneumology and surgery. Each aspect of the service is carefully monitored and the required organizational changes in procedures, staffing, facilities and time schedules, for example, are being assessed. Several factors are evaluated, including the technology, patient - doctor satisfaction, and procedures, in order to identify the changes necessary in the health-care organizations for establishing telemedicine service. The evaluation of the project has been carried out by web-based forms filled out after each consultation by the general practitioners and specialists concerned. Forms on paper are available for the patients. In each phase, doctors evaluate the organizational matters. The lessons learned from the project are planned to be used in establishing Guidelines for Telemedicine services in Iceland. Two of the three phases of the project are remaining up to date.

One part of this project comprised a survey on the interest of GPs in telemedicine. The results showed that at least one-third of GPs were interested in using telemedicine in their daily work. Almost two-thirds of GPs did not answer the survey.

Other projects

There are several projects providing distant education to health centres from hospitals, in the context of "Grand rounds" lectures in geriatrics and pediatrics.

Telemedicine and the Icelandic Healthnet

The technical framework for telemedicine is being developed in the Icelandic Healthnet. The Healthnet, which is under the Ministry of Health, has now been developed under the Second Action Plan, which will run from 2004 through 2006. During that period, the necessary communication technology and security mechanisms for telemedicine will be developed. There are several on-going projects under the Healthnet Action Plan and, currently, there are two telemedicine projects focusing on fetal ultrasound examination (teleobstetrics) and emergency medicine. Other projects include a request/report system for laboratory and radiology examinations, electronic prescriptions, discharge letters for electronic patient records (EPR), billing, and a data repository for the General Directorate of Health.

Teleobstetrics using the Healthnet

A special user interface was made for the desktop video-conferencing equipment already installed. The participants were the university hospitals and a health centre. By modifying the user interface (decreasing the numbers of buttons and icons and emphasizing important functions on the screen), doctors and midwives could rapidly learn how to use video-conferencing for consultations. One valuable feature is an interactive cursor that ensures that both parties are referring to the same areas of the screen image. The evaluation was performed by a web-based form. Communication was made by two-Mb/s ATM connection, using Ethernet. The project ran from 2001 through 2003.

Telemedicine for emergency medicine

This project was established to support health-care services in the North East of Iceland. Four villages with health centres are connected to the regional health centre in Husavik and to the University Hospital of Akureyri. Doctors are not always present in half of the health centers, but nurses are.

The project is developing an out-patient service for telemedicine and uses a simple "e-mail" form for consultation messages, allowing text, still images, video clips, ECG and stethoscope sounds, to be sent to the hospital.

The project is in its start-up phase and will run through years 2004 and 2005.

eHealth

A number of other projects related to eHealth are running in the Icelandic health-care system.

The most comprehensive one is that all of the health centres are routinely using the same EPR system (Saga system). There is currently very little digital communication between the centres. This same system is now being installed in the University Hospital of Iceland as an early phase for EPR development. One of the projects under the Healthnet is to provide communication between hospitals and health centres in the context of EPRs.

There are several information systems in the university hospitals, including RIS (Radiology Information System) and PACS (Picture Archiving and Communication System) in Radiology, and LIS (Laboratory Information System) for the laboratories, in-patient and out-patient registration and scheduling.

The future of Telemedicine in Iceland

The Icelandic Healthnet is being developed to create a communication platform for telemedicine. Currently, telemedicine is being developed to establish services in various clinical fields, using an "out-patient" model, but also for acute services. The main task is to organize telemedicine as a part of the health-care services and to improve the structure of the health-care system.

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