

Ten Lessons for Successful Implementation of Telemedicine Services in North Norway

Gunnar Hartvigsen

*Medical Informatics and Telemedicine group, Department of Computer Science, University of Tromsø, Tromsø, Norway
Norwegian Centre for Integrated Care and Telemedicine, University Hospital of North Norway*

Abstract

North Norway has been a world-leading area in the use of telemedicine services. Since the first telemedicine services were established in the late 1980ies, telemedicine and e-health services have been established in many areas of specialist health care. The goal has been to provide specialist health care to people living in rural and very remote areas. Success factors for this development are summarized in ten lessons learned: (1) Strong governmental involvement through National plans; (2) Access to a secure communication infrastructure; (3) Mandatory use of standards; (4) Implementation of Electronic Health Record (EHR); (5) Laws adapted to the modern way of working; (6) Reimbursement must be in place for telemedicine services; (7) Videoconference is often the best solution; (8) Management and support is essential; (9) KISS - Keep it simple, stupid; and, (10) Electronic messages for high volumes.

Keywords:

Telemedicine, telehealth, e-health.

Introduction

North Norway has been a pioneer region for the use of telemedicine in rural areas. With a scattered population, severe weather conditions in the wintertime, and specialist health care service in two regional centres only; telemedicine services have been an important part of health care in this area. The first telemedicine services were established in the late 1980ies. These included teledermatology, telepathology, teleotorhinolaryngology and teleradiology. These were soon followed by teleophthalmology, telecardiology, teledialysis, teleobstetrics, teleemergency service, teleoncology, teleodontology, telegeriatric, teleendocrinology, telepsychiatry, maritime telemedicine, teleeducation and telecare. In the beginning, only videoconference systems were used. Gradually store and forwards solutions became the preferred communication channel. However, in recent years we have experienced an increased use of videoconferences. Electronic messages became the preferred format for referrals and discharge letters, lab reports and lab answers, and for communication between health care professionals.

Fifteen years after the first services were initiated, the Norwegian Centre for Telemedicine (NST) at University Hospital of North Norway (UNN), had become the world largest centre for telemedicine and had established telemedicine services within the most suitable areas for telemedicine. In 2002, NST was appointed as WHO collaboration centre for telemedicine. Since the majority of NST publications were published in Norwegian only, telemedicine experiences from North Norway were only available for the Scandinavian population. Scandinavian Conference on Health Informatics 2013, Copenhagen, Denmark, August 20, 2013

Thus, twenty years of knowledge of telemedicine service in rural, and often resource poor, areas, are not widely known. This paper introduces some of the large quantities of knowledge about telemedicine services in North Norway that has not been accessible to a non-Norwegian reading audience. We present the ten most important lessons learned for successful establishment of telemedicine services in rural, and often resource poor, areas.

Materials and Methods

The guidelines presented in this paper are the results of studies of papers and reports on implementation of telemedicine services in North Norway during the last 20-25 years [1-12].

Compared to the number of reports and publications published by the Norwegian Centre for Integrated Care and Telemedicine at University Hospital of North Norway, only a small number of publications have been written in English. The majority are published in Norwegian. A list of papers and reports can be found at www.telemed.no

Studies of the use of telemedicine in North Norway

A limited number of attempts to present the experiences from telemedicine services in North Norway have been published, including [1-12].

In June 2005, Northern Norway Regional Health Authority (Helse Nord RHF) established a working group of senior doctors and health executives that performed a systematic evaluation of which of the tested and suitable telemedicine services in North Norway should be selected for large-scale implementation [10]. After an examination of the different telemedicine projects, the group organised its recommendation into four groups in accordance with priority [10]: (1) *Must be implemented*: Teleradiology (incl. solutions for neurosurgery, orthopaedic, different kinds of surgery, nuclear medicine, acute traumatic and oncology, digital communication and integration of patient data, and distant education); (2) *Should be implemented*: Teledialysis, pre-hospital thrombolysis, telepsychiatry, and teledermatology; (3) *May be implemented*: Paediatrics, district medical centre (DMC), teleophthalmology and teleotorhinolaryngology; and, (4) *Not recommended*.

Johnsen et al. [7] describe and systemize documented benefits for Norwegian health services of telemedical services and projects. The authors reviewed all relevant projects and services and available documentation of both economic and qualitative benefits. The authors identified 29 studies that described qualitative profits. They divide the qualitative profits in three

main categories: (1) Electronic health records (EHR) and electronic messages, (2) discipline-specific solutions and (3) patient-oriented solutions.

In the first group, electronic patient records (EPR) and electronic messages, the authors found improved integration between EPRs and electronic information exchanged between primary and specialist health services. In this way, institutions avoid duplicating tasks and there are fewer errors made in recording patient information. The authors report that: "In general practitioners offices (GP-offices), EPRs have contributed to the re-deployment of resources – among other things, medical secretaries have been delegated more interesting duties. In the nursing and care services, mobile EPRs for nursing and care documentation have contributed to simpler routines and fully up- dated records and to faster communication with the outside world."

In the second group, discipline-specific services, the authors identified improved knowledge for health personnel, which improved patient treatment, e.g., in teledermatology. In addition, the selection process for dermatology patients requiring hospital treatment was improved. For teledialysis, a higher level of care quality was experienced. By the use of teleradiology, patient travels were reduced. For emergency medicine, the authors report that the solution for acute heart problems saves time and the benefits increase in step with the travelling time to hospital.

In the third group, patient-oriented solutions, telemedicine resulted in increased patient empowerment. [12] Johnsen et al. [7] that: "The benefits show as greater openness regarding illness and in some cases it is easier to discuss sensitive issues "online" than face-to-face. E-mail between patients and GPs seem to lead to a relationship of trust between the patient and health service personnel, as well as replacing a number of consultations and telephone enquiries."

In the following, the most important lessons learned from the publications and reports from NST are discussed.

Ten lessons for successful implementation of telemedicine services

Implementation of telemedicine services in North Norway has been a process of trial and error. Some errors have been inevitable; others could have been prevented had proper knowledge been available. Based on the experience of more than twenty years of telemedicine services, we have proposed ten advises anyone planning to implement telemedicine services should consider. These are presented below.

Lesson 1: Strong governmental involvement through national plans.

Since 1997 there have been several national plans that have had an impacted on the development of telemedicine and e-health in Norway, including "More health for each bIT" (1997), "Say @h!" (2001), and "Te@mwork 2007" (2004). The strategy documents communicate the expectations of positive effects of the technology, both in regard to efficiency and quality. Normann et al. [12] recommend to initiate a national effort to develop a methodology for the implementation of telemedicine.

Lesson 2: Access to a secure communication infrastructure.

Norway has a well-functioning and well-structured public health service with a strong infrastructure and a high level of competence. The backbone of telemedicine and e-health in Norway is the Norwegian Healthnet. This computer network Scandinavian Conference on Health Informatics 2013, Copenhagen, Denmark, August 20, 2013

is, together with the electronic health record (EHR), prerequisites for telemedicine and other e-health services.

Lesson 3: Mandatory use of standards.

One of the problems with introduction of teleradiology was the lack of use of the DICOM standard. The radiology department at UNN had to convince the vendors of PACS systems to support most part of the DICOM standards in order to achieve interoperability. A lesson learned is that it is necessary to change the governmental messages on the implementation of standards from "ought to" to "must".

Lesson 4: Implementation of Electronic Health Record (EHR).

The implementation of Electronic Health Record (EHR) is very good, but there is still some work to do on interoperability. For many years, almost 100 % of the GPs have used EHR for their documentation of patient's information. At the hospital side, 100 % of the hospitals are using an EHR from two different vendors. Both the hospitals and the GPs have been busy thinking of their in house need for documentation of their own work than the possibility of sharing the same information electronically between them when patients are refereed from the GP to the hospital or when the patients are refereed between hospitals. For many telemedicine services, EHR integration is a key success factor.

Lesson 5: Laws adapted to the modern way of working.

When legal issues are concerned, privacy, confidentiality and data security stand out as some of the most important in the whole area of telemedicine and e-health. Nohr et al. [13] argue that most of the large amount of heterogeneous information generated in health care is considered sensitive. All relationships in health care are based on trust and at the basic principle is confidentiality. All health care personnel are dependent on the information provided by the patient and the patient must trust that the health care personnel treat the information given as confidential. Normann et al. [12] argue that prioritization and implementation of telemedicine services require thorough analysis and assessment of legal and security aspects.

Lesson 6: Reimbursement must be in place for telemedicine services.

The issue of reimbursement of telemedicine and e-health services has, for many years, been high up on the international agenda, so also in Norway. The issue of reimbursement is closely linked to the notions of cost effectiveness, return of investment (ROI) and cost benefit. Another aspect of this discussion has been to discuss quality of services instead of ROI. Without reimbursement, no sustainable telemedicine services. The first telemedicine fees in Norway were introduced in August 1996. This made Norway become the first country to implement an official telemedicine fee schedule making all telemedicine services reimbursable by the national health insurer.

Lesson 7: Videoconference is often the best solution.

Most of the videoconference (VC) activity is in North Norway. Helse Finnmark alone uses 1/3 of the traffic in the Norwegian Healthnet (1,5% of the population). All hospitals in North Norway use VC. The biggest users are the clinics. The success factor is that VC has become a natural part of the work to doctors, psychologists, nurses, etc. The use of VC in education has been very important for the development health services in North Norway. It is expected that PC-based VC solutions will improve the use of VC even more.

In recent years there have been several successful research attempts to bring video conferencing solutions in emergency

situations in order provide expertise where the acute hospital is located. Smaller hospitals and health institutions often have limited emergency medical skills. In order to make emergency medical expertise available in emergency situations started the NST, with Acute Unit at University Hospital and Longyearbyen hospital project based videoconferencing acute medical conference (VAKe) [14]. The project had as purpose to make emergency medical expertise available at the local hospital.

Normann et al. [12] argue that we should increase the use of videoconferencing for clinical, educational and administrative purposes: "Videoconferencing can be used as a collaborative tool for outpatient consultations, before admission to treatment, ensuring quicker discharge from hospital, as well as teaching and supervision of primary health care."

Lesson 8: Management and support is essential.

Many enthusiastic supporters of telemedicine and e-health solutions experience difficulties in moving from the initial project phase onto the implementation and operation phase. NST has suggested the following "get started list" to motivate the users [10, 12]: (1) Establish support team / super users; (2) The responsibility for the equipment must be clearly identified; (3) Establish proper facilities for training, client participation, and codetermination; (4) Provide up-to-date equipment; (5) The system must be customer-oriented; and, (6) Continuous operation must be ensured.

Lesson 9: KISS - Keep it simple, stupid.

The design principle from the U.S. Navy is valid for telemedicine, as well. This regards both the use of simple technology and simple user interface. An example of the first is the tele-dermatology services for eczema and ulcer treatment in which low-cost digital cameras are used [15]. An example of simple user interface can be found in the VAKe system for acute medical videoconference. The system makes emergency medical expertise available at the local hospital. A major design goal was to establish the connection by pushing only one button [14]. For teledialysis, one of the basic recommendations for implementation of the service is to "establish a service which is simple as possible, both technically and in relation to costs (depending on what you want to achieve)" [16].

Lesson 10: Electronic messages for high volumes.

Electronic messages are sent through the Norwegian Healthnet. Together with the EHR providers, a number of standardized messages that can be sent between health care personnel in the health net have been developed. The messages have been formed in a way such that they can be sent from one patient journal to another journal. The goal is to provide faster and more secure communication within the health care sector, while improving the documentation quality. In January 2013, more than 9 million messages were sent through the Norwegian Healthnet each month. Normann et al. [12] recommend to strengthen the national initiative on electronic messages.

Concluding remarks

North Norway has established a suitable infrastructure for the use of telemedicine services: All primary care physicians, all municipal nursing and care services, and all health authorities are using EHR; Referrals, discharge letters, requisitions, laboratory and X-ray responses are sent electronically between GPs, hospitals and care facilities; and, All health authorities, hospitals, and many health institutions, are involved.

UNN has figured out that around 7,000 consultations each year can be replaced by videoconferences. UNN's vision is Scandinavian Conference on Health Informatics 2013, Copenhagen, Denmark, August 20, 2013

that it must be as natural to get into the consulting room through the PC or videoconferencing (VC) equipment than through the door. To do this, VC equipment must be in place in all outpatient clinics' rooms. In addition, the VC equipment will be used for educational purposes and meetings.

References

1. Rinde, E., I. Nordrum, and B.J. Nymo, *Telemedicine in rural Norway*. World Health Forum, 1993. **14**(1): p. 71-77.
2. Pedersen, S., D. Gammon, and E. Rinde, *Telemedicine: The Norwegian Experience*. Journal of Informatics in Primary Care, 1994(4): p. 19-20.
3. Pedersen, S., *Telemedicine and new technology*. British Journal of Hospital Medicine, 1996. **55**(6): p. 372-3.
4. Uldal, S.B. and S. Pettersen, *Taking the lead in telemedicine*. European Hospital Management Journal, 1997(2): p. 37-39.
5. Uldal, S.B., *A survey of Norwegian telemedicine*. J Telemed Telecare, 1999. **5**(1): p. 32-7.
6. Larsen, F., et al., *Implementing telemedicine services in northern Norway: barriers and facilitators*. J Telemed Telecare, 2003. **9 Suppl 1**: p. S17-8.
7. Johnsen, E., et al., *Benefits from telemedicine in Norway: An examination of available documentation*, in *HOYKOM report 2006*, The Research Council of Norway: Oslo.
8. Kloosterman, E. and E. Gerdrum, *Long-distance Healthcare - Barriers and Opportunities for Telemedicine*. eHealth & Medical IT solutions, 2006: p. 2.
9. Hartvigsen, G., et al., *Challenges in telemedicine and eHealth: lessons learned from 20 years with telemedicine in Tromsø*. Stud Health Technol Inform, 2007. **129**(Pt 1): p. 82-6.
10. Norum, J., et al., *Prioritisation of telemedicine services for large scale implementation in Norway*. J Telemed Telecare, 2007. **13**(4): p. 185-92.
11. Obstfelder, A., K.H. Engeseth, and R. Wynn, *Characteristics of successfully implemented telemedical applications*. Implement Sci, 2007. **2**: p. 25.
12. Normann, T., et al., *Telemedisin i rutinedrift. Forutsetninger og tiltak*, in *NST-rapport 2011*, Nasjonalt senter for samhandling og telemedisin Universitetssykehuset Nord Norge: Tromsø. p. 56. (In Norwegian)
13. Nohr, L.E., M. Nymark, and M. Zmenja, *Report on identified legal issues of the Baltic eHealth Project*, in *Baltic eHealth2005*.
14. Hagen, O., E. Sjaeng, and S.R. Bolle, *Videobasert Akuttmedisinsk Konferanse*, in *NST report 2006*, Nasjonalt senter for samhandling og telemedisin: Tromsø. p. 37. (In Norwegian)
15. Schopf, T., et al., *Eczema Counselling via the Internet: Telemedicine as a Tool in Home Care Eczema Counselling*. Journal der Deutschen Dermatologischen Gesellschaft, 2006. **4**(11): p. 19.

16. Rumpsfeld, M., et al., *Telemedicine in haemodialysis: a university department and two remote satellites linked together as one common workplace*. J Telemed Telecare, 2005. **11**(5): p. 251-5.

Address for correspondence

Professor Gunnar Hartvigsen, Medical Informatics & Telemedicine group, Department of Computer Science, University of Tromsø
E-mail: gunnar.hartvigsen@uit.no