

Project report

Adoption of Routine Telemedicine in Norway

An overview of activities from 2009 to 2011

A study based on a quantitative data collection through the Norwegian Patient Register, as well as a qualitative and detailed survey on existing routine telemedicine services in five Norwegian hospitals

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Title: Adoption of Routine Telemedicine in Norway, An overview of activities from 2009 to 2011

NST-report: 03-2014

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ISBN: 978-82-8242-041-9

Date: 2014-01-17

Number of pages: 52

Keywords: telemedicine; adoption; routine use; implementation; decision-making.

Summary: This study provides findings regarding the adoption of telemedicine in Norway at regional, institutional and clinical level. We reported both quantitative data collected through the Norwegian Patient Register, and more qualitative and detailed data regarding routine telemedicine services in five Norwegian hospitals through a survey. The results are in line with other studies. The rate of adoption is high, and examples of routine telemedicine can be found in several clinical specialties. However, similarly to the experience in other countries, the current level of use of telemedicine in Norway is still rather low, with significant potential for further development as alternative to face-to-face visits. We believe that the adoption of telemedicine is influenced by several contextual factors, such as reimbursement policies as a form of incentive for health professionals. This study is considered as a first attempt to map routine telemedicine services in Norway, and provides useful findings to understand the adoption of telemedicine in routine use. We believe that this work is worthy of future updates in order to report the further implementation of telemedicine services.

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An article has been published in Global Health Action:
<http://www.globalhealthaction.net/index.php/gha/article/view/22801>

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1 Introduction

The NST conducted a study aimed to explore the current adoption and level of use of routine telemedicine in the Norwegian healthcare system. The objectives were to measure the adoption and level of use of telemedicine at national, regional, and local level, to describe the types of services and to estimate the potential wider adoption and level of use of telemedicine in Norway, as compared to the outpatient visits.

We adopted two different approaches in our study. A top-down approach was used in order to collect official data on the use of telemedicine in Norway from the Norwegian Patient Register (NPR). A bottom-up approach was used to collect complementary and more detailed information on the routine use of telemedicine through a survey conducted on five of the largest publicly funded healthcare institutions in Norway. These hospitals were selected based on their high telemedicine activity as shown by the NPR.

This report starts with a general description of the development of telemedicine in Norway (Chapter 2). The methods used for this survey are described in Chapter 3. The results and discussion are presented in Chapter 4. This also includes a paragraph about the survey's limitations faced by the authors. Chapter 5 is directed to future implications with recommendations on how this survey could be followed up. Chapter 6 provides some conclusions pointing on the necessity of measurements in order to accelerate the adoption of telemedicine. Chapter 7 contains the list of references. Chapter 8 presents the tables referred in the report. Chapter 9 includes the Appendix with the description of 25 routine telemedicine services identified in five hospitals.

2 Background

Telemedicine has been shown to work, to be effective in many clinical areas [1,2], to be sustainable [3] and, in some cases, to be cost-effective [4]. As a consequence, telemedicine appears to be ready for wider adoption in healthcare systems [5]. Decisions about the institutionalization of telemedicine are usually taken by healthcare regulators, governments, and authorities [6] and research findings are useful to support evidence-based policy-making [7]. Despite the great potential of telemedicine, its adoption in routine healthcare has been slow, uneven and fragmented [8,9]. Several telemedicine applications appear to be promising candidates for widespread use, but they remain at the early adoption stage [10]. Implementation has often been problematic [11] and utilisation remains limited in many settings [12], with a consequent disconnection between policy, practice and research [13-15].

Norway is a country with long interest in telemedicine, where testing of new applications has been conducted since the 1990s in the form of pilot projects or small-scale services [16]. A

survey conducted in 1998 identified 102 telemedicine programmes in Norway, mainly the radiology, psychology, dermatology, pathology and otolaryngology specialties. Some of the programmes had passed through the project phase and become fully operational, others had lacked staff with the motivation and time to carry them further, and finally some were deemed to be of limited use [17]. During the following decade, significant resources were directed to the development of telemedicine services, with the aim of achieving high-quality and cost-effective healthcare. In 2003, the Norwegian Centre for Telemedicine (NST) conducted a survey of telemedicine activities in Norway. The survey showed variations between health regions with respect to both the type and the number of activities, and it found that telemedicine was provided as a routine service only to a minor degree [18]. In 2005, the Northern Norway Regional Health Authority initiated a review to clarify which telemedicine services could be escalated into large-scale use. Candidates for large-scale implementation included teleradiology, digital communication/integration of patient records and education, teledialysis, emergency medicine, telepsychiatry, teledermatology, paediatrics, district medical centres, teleophthalmology, and tele-otorhinolaryngology [19]. More recently, the Norwegian ministry of health commissioned the NST to recommend telemedicine services which were ready for large-scale implementation in the health service, together with the necessary actions to secure a successful dissemination of the services [20]. Despite this monitoring activity, a comprehensive picture of the current adoption and level of use of routine telemedicine in Norway is still missing. We conducted a study to explore the current adoption of routine telemedicine in the Norwegian healthcare system, at national, regional, and local level, and to estimate the potential for wider adoption. Routine use is defined as an application which has entered everyday use, typically after a minimum of one year in service [21]. We did not focus on telemedicine services implemented as pilot projects. The findings of this study aim to bridge the gap between research, policy and practice [22], thus supporting decision makers and practitioners about integrating routine telemedicine in healthcare system

3 Methods

We used two different and complementary approaches to collect information about routine telemedicine in Norway. A top-down approach was used to collect official data on the national use of telemedicine from the Norwegian Patient Register (NPR). A bottom-up approach was used to collect complementary information through a survey conducted at the largest publicly funded hospitals in Norway. These hospitals were selected based on their highest telemedicine activity displayed in the NPR.

National data

The NPR is a central health registry established in 1997 and run by the Norwegian ministry of health. The NPR was established to provide data for planning, evaluation and financing of

publicly funded specialized healthcare, and also for medical and health services research. The NPR contains data regarding outpatient care delivered by hospitals with activity-based financing. Therefore only telemedicine contacts reimbursed to hospitals are included. In Norway, a “telemedicine contact” is defined as the use of videoconferencing to perform an outpatient consultation, examination or treatment, at distance. This means that the contact between patient and physician takes place simultaneously in two different locations [23]. The use of store-and-forward telemedicine, such as transmission of still images, is not covered by any reimbursement scheme in Norway. Contacts occurring by telephone, SMS or similar means are not considered as telemedicine contacts. The reimbursement of a telemedicine contact delivered via videoconference is equal to that of a traditional outpatient visit.

A formal request was sent to the NPR in February 2012 to obtain data regarding telemedicine activities. This study did not involve human participants. We collected anonymised information on the number of telemedicine contacts. No personally identifiable data related to individuals were collected. Ethical approval from the Regional Ethics Committees and consent were therefore not required, according to the Norwegian Health Research Act [24] and the Personal Data Act [25]. The request was approved by the Norwegian ministry of health, and completed data were delivered in August 2012. Data were stratified for health regions (Northern Norway, Central Norway, Western Norway, South-Eastern Norway), by hospital, by year (2009, 2010, 2011), and by clinical specialty. Adoption was expressed as percentage of the number of adopters over the potential users [26]. In addition, the potential number of cases where telemedicine could be used rather than a traditional face-to-face visit was estimated. Data on the number of outpatient visits were thus collected from the NPR.

Local data

Since data from the NPR only cover telemedicine contacts for which a reimbursement is possible (i.e. where videoconferencing is used), we conducted a survey at the largest publicly funded hospitals in Norway to collect complementary information on the routine use of telemedicine. We selected five hospitals in the four health regions: the University Hospital North Norway in Northern Norway, the St. Olavs University Hospital in Central Norway, the Haukeland University Hospital and the Stavanger University Hospital in Western Norway, and the Oslo University Hospital in South-Eastern Norway. All these hospitals are hospital trusts and are connected with local hospitals.

In our survey, telemedicine services were classified according to the type of technology/modality into:

- synchronous services (use of videoconferencing);
- synchronous services (use of email, other electronic messaging);
- both synchronous and asynchronous services;

and according to the nature of the consultation into:

- telemedicine consultation (assessment, evaluation, treatment, or management of a patient) between a specialist and another specialist/doctor/other health personnel;
- home monitoring service between patient and doctor.

First contact was made at the Regional Health Authority, the ICT department, the clinical divisions or the integrated care department. A list of people involved in the provision of telemedicine (clinicians, nurses, advisors, ICT professionals, and heads of departments) was then provided by our first contact. At the University Hospital of North Norway, due to the presence of the NST as a competence centre, the survey was based on a list of telemedicine services and contact persons provided internally. The data collection period lasted from May 2012 to end of November 2012.

The contacts identified were asked to answer a questionnaire, either through interview or by email, structured as follows:

- Medical field.
- Short description of the telemedicine service.
- Is it a routine service or a project?
- Which other institutions are involved?
- How long has the service existed (approx.)?
- How many times have you provided the telemedicine service in 2011 (approx.)?
- When was the last time you provided a telemedicine service?
- Is it a synchronous or asynchronous service, or both?
- Is it a telemedicine consultation or a home monitoring service?

The survey did not involve collecting data about human participants. We collected anonymised and qualitative information on routine services. No personally identifiable data related to individuals were collected, and no information was obtained from the Electronic Patient Journal systems of the hospitals. According to the Norwegian Health Research Act [24] and the Personal Data Act [25], ethical approval and consent were thus not required for the survey. All interviewees were asked and approved that the results of the survey would be publicly available and published.

4 Results and discussion

National data

Data regarding the routine use of telemedicine contacts were available for 2009, 2010 and 2011. The overall use of telemedicine followed an irregular trend over the three years. The

level of use decreased considerably from 2009 to 2010, and increased again in 2011 (Table 1). At regional level, all the health regions in Norway reported use of telemedicine. In 2011, 54% and 45% of the overall telemedicine contacts were reported in Northern Norway and Western Norway, respectively, thus representing almost the whole national activity. Central Norway and South-Eastern Norway showed low levels of activity. In 2011, there were 4.9 million outpatient visits in the four health regions. There were 1,827 telemedicine episodes, i.e. 0.04% of the total. Northern Norway reported the highest relative use of telemedicine contacts, according to the total number of face-to-face visits.

The four health regions deliver healthcare services through 28 hospitals (Table 2). Most hospitals delivering telemedicine contacts in 2009 showed a considerable decrease in their level of activity in the following years, with a few exceptions. 19 out of 28 hospitals (68%) reported that they had used telemedicine during the three-year period. However, the number of hospitals which actually used telemedicine was 14 in 2009, 14 in 2010 and 13 in 2011, i.e. some hospitals did not use telemedicine continuously over the period. The number of hospitals providing more than 50 telemedicine contacts every year decreased from 9 in 2009 to only 3 in 2010 and 2011. The University Hospital of North Norway in Northern Norway and the Stavanger University Hospital in Western Norway are the two hospitals which covered most of the telemedicine contacts in 2011 (90%). The University Hospital of North Norway and the Stavanger University Hospital were also the two hospitals with the highest relative use of telemedicine. Other hospitals have a similar potential to deliver part of the health services through telemedicine, according to the total number of face-to-face visits. However, they currently provide little telemedicine activity.

The main use of telemedicine was for neurosurgery (Table 3). Neurosurgery was the only clinical area with a relatively high use of telemedicine compared to the total number of outpatient visits (5.5% in 2009). Other clinical specialties also reported the use of telemedicine, but only in the range of a few hundred cases every year. These included physical medicine and rehabilitation, cardiovascular diseases, eye diseases, skin and venereal diseases, female diseases and obstetrics, children's diseases, and orthopaedics. A lower level of telemedicine activity was reported for the remaining clinical areas.

The clinical specialties delivering telemedicine in the different hospitals are shown in Table 4 (Table 4). Six hospitals had 10 or more clinical areas involved in the provision of routine telemedicine. These were the Stavanger University Hospital and the Fonna Hospital in Western Norway, the Finnmark Hospital, the University Hospital of North Norway and the Nordland Hospital in Northern Norway, and the Innlandet Hospital in South-Eastern Norway.

Local data

A total of 75 telemedicine services were identified in the survey. Of these, 50 were excluded because they were not routine services but still pilot projects. Of the remaining 25 routine telemedicine services, 8 were operational at the University Hospital of North Norway, 3 at the St. Olavs University Hospital, 8 at the Haukeland University Hospital, 2 at the Stavanger University Hospital, and 4 at the Oslo University Hospital. The 25 routine services were implemented in several clinical fields (Table 5). Most routine telemedicine was delivered through synchronous services via videoconference. The remaining services were asynchronous, or used a combination of both synchronous and asynchronous technologies.

These telemedicine services were provided from the large hospitals to institutions at different healthcare levels (Table 6). Most services (12 out of 25) operated with other hospitals at the secondary care level, either belonging to the same health trust, or in other health trusts. The second category of telemedicine services (8 out of 25) operated with the primary care level, serving General Practitioners, district medicine centres, nursing homes and homecare. The remaining services were provided to oil platforms and ships.

Some routine telemedicine services had been in use for more than 15 years (Table 7). Maritime medicine has been used in Norway since 1949, when medical guidance was given by telephone, and since the early 1990s images have been sent from ships to hospitals for diagnosis. Teledermatology started in 1998 when dermatological images were first sent by General Practitioners to hospitals. Telepathology has existed since the late 1990s. Few telemedicine services (4 out of 25) became operational in 2012.

The majority of routine telemedicine services (21 out of 25) provided teleconsultations for the assessment, evaluation, treatment, or management of patients. Three services were delivered as home monitoring, while 1 service consisted of both teleconsultations and home monitoring.

Telemedicine services in secondary care

In pulmonary medicine, videoconferencing was used, together with clinical data on lung function and CT images, for the assessment of patients with lung diseases in local hospitals. Specialists analysed this information and made suggestions about additional examinations, treatment and time for surgery. A similar service was used in cardiology, where ECG and coronary angiography were evaluated. In oncology, decision support regarding chemotherapy treatment and symptom management was provided to local hospitals and district medicine centres via videoconference. Videoconferencing was also used by radiotherapy departments to communicate with other hospitals for assessment, procedures and administration of patient cases. The same principle for decision support and second opinion was provided by hospitals within several fields, such as gynaecology and obstetrics,

where the patient pathway (e.g. pre-operative assessment) and distribution of tasks were discussed, and patient's information (e.g. X-rays) exchanged electronically. In pathology, videoconferencing was used to discuss kidney biopsy cases between hospitals. Pathology departments could also send sections from digital microscopes for postoperative diagnosis of cancer. In neurology, telestroke was used to assess patients' conditions after acute stroke and support thrombolysis. In nephrology renal departments at specialist hospitals provided teledialysis to remote satellite dialysis units without nephrologists via videoconference. In dermatology, for instance, second opinions were provided by a specialist hospital to a rehabilitation hospital via videoconference for the assessment of patients with bedsores. In psychiatry, regional hospitals used videoconferencing to cooperate regarding the admission of patients to the regional security department. A decentralized on-call service via videoconference was used for adults with mental health problems, and a similar service was provided to regional child and adolescent psychiatry centres. Finally, the surgical department of one hospital offered a service for burn injuries with national responsibility on this field to other national hospitals. Digital images of the damaged area were transmitted electronically, and specialists gave advice on whether patients should be transferred or on which type of treatment should be provided. The numbers of teleconsultations reported are summarised in Table 8.

Telemedicine services for primary care and homecare

In pulmonary medicine, a decentralized telemedicine service was provided for COPD patients at risk of exacerbation. Patients were monitored remotely with a briefcase equipped with a laptop, alarms, a spirometer, and a pulse oximeter, and via two-way videoconference. In 2011, 730 teleconsultations were performed by one hospital for 73 patients. In cardiology, telemedicine services were provided for patients with disturbance in heart rhythm and severe heart failure, and for patients with implantable defibrillators and pacemakers, serving approximately 300 patients per year. In orthopaedics, videoconferencing was provided to evaluate patients before or after a hospital stay near their homes. Another service was offered to a district medicine centre for patients injured or undergoing surgery. X-rays were transferred electronically and integrated into the Electronic Patient Record (EPR), and teleconsultations with specialists allowed referrals and follow-up via videoconference. Teledermatology is one of the oldest telemedicine services in Norway, used by General Practitioners to send digital images to specialists for diagnosis and treatment. Another service was provided by an outpatient clinic for wound treatment in home nursing. Pictures of leg ulcers taken with digital cameras or mobile phones were sent together with assessments and questions through an Internet-based program.

Telemedicine services for oil platforms and ships

Telemedicine was used in emergency medicine by hospitals to support 34 oil platforms in the North Sea with diagnostic help, clinical evaluation and guidance. Communication was

provided via videoconference and biological parameters were transmitted and visible on monitors at both sites. Telemedicine was also used to provide medical support to ships over large distances, serving approximately 1,000 patients per year. Previous transfer of images has been replaced by videoconferencing, which is used by the doctor on-call.

Discussion

The results from the analysis of the data collected from the NPR show that:

- the adoption of routine telemedicine in Norway is 100% at regional level, while at institutional level it reaches 68%;
- the level of use of telemedicine shows an irregular trend over the three-year study period, and most telemedicine contacts (90%) included in the registry were provided by two hospitals in Northern Norway and Western Norway, as confirmed by the survey. This might be the result of contextual factors, such as geographical needs (i.e. long distances), which characterize those regions;
- despite telemedicine being widely adopted, its level of use is still low compared to the number of face-to-face outpatient visits. There is therefore a high potential to deliver health services throughout telemedicine. Neurosurgery is the field with the highest relative use of telemedicine;
- several of the hospitals delivering routine telemedicine have services in 10 or more clinical areas. This means that, when telemedicine is adopted by a hospital, it is more likely that services are offered through the whole organization. However, the number of telemedicine contacts in each area remains low.

There are few studies regarding the routine adoption of telemedicine in healthcare systems around the world, and no comprehensive data on telemedicine activities in Norway have been published before. In a recent study, Mars and Scott (27) identified 210 reports of telemedicine services, 77 of which provided sufficient data to calculate the number of consultations per site per week as a metric to compare the level of usage. The average use was low, 1.8 consultations per site per week. Data collected from the NPR shows an average use of routine telemedicine in Norway of 2.7 consultations per healthcare organization per week in 2011, but the rate per site was not available. We also compared [Table 9] the use of routine telemedicine in Norway with that in other state-wide telemedicine networks (28-34). The use of telemedicine in Norway is low compared to other similar contexts (Figure 1). Assuming the same rate of teleconsultations per inhabitant as the Ontario Telemedicine Network (31) or the Alaska Federal Health Care Access Network (32), the use of routine telemedicine in Norway could increase to 78,500 or 116,665 teleconsultations every year, respectively. International comparisons regarding telemedicine activity can also be useful in terms of clinical specialties. In a recent systematic survey of the state of teledermatology in the United States, the median number of teleconsultations per site in 2011 was 3,650 and 1,200 for health maintenance organizations (HMO) and

government-associated programs (35), respectively, a higher use compared to routine teledermatology in Norwegian hospitals (Table 8).

The survey provided more qualitative and detailed findings than the data from the NPR:

- most routine telemedicine services identified in the five largest public hospitals connected hospitals at the same healthcare level, while there were fewer telemedicine services connecting secondary care with primary care;
- Norway has a long history of implementation of telemedicine, with some services, including teleradiology, teledermatology, telepathology, and maritime medicine, existing since the 1990s. However, several telemedicine services became routine in the last few years, suggesting that telemedicine is slowly becoming more mature;
- the majority of the telemedicine services were synchronous and used videoconferencing, while fewer services were asynchronous. This might stem from the reimbursement scheme currently in use in Norway;
- most of the telemedicine services were delivered as hospital-based teleconsultations, while there was only limited routine telemedicine in home monitoring;
- the number of teleconsultations identified in the survey are consistent with those collected from the NPR. The University Hospital of North Norway, for instance, reported 848 episodes in the NPR (Table 2) and about 700 in the survey (Table 8) in 2011. This means that the results from the survey are representative of the current use of telemedicine at the five hospitals.

The present study aimed to explore the adoption and level of use of routine telemedicine in the Norwegian healthcare system. Although the analysis of the factors affecting adoption was beyond the scope of the present study, we speculate that the routine use of telemedicine can be related to implementation factors, such as organizational, contextual and policy issues, which act as facilitators, or barriers, for the integration of telemedicine in healthcare organizations and clinical practices (12, 36-38). Over the years, Norway has developed several plans for the promotion of ICT in healthcare. These strategies supported investment on standardisation (e.g. EPR), with a consequent positive impact on the further implementation of telemedicine. Videoconferencing between healthcare institutions is delivered inside the Norwegian Health Network, which provides a high level of security. The routine use of videoconferencing by the health personnel can be observed by the growing number of these services. The diffusion of PACS systems in hospitals made teleradiology an integral part of routine clinical practice, so that today the term teleradiology is not in use any longer. Reimbursement policies represent another facilitator, or a barrier, for the diffusion of telemedicine services. Norway was the first country to develop a specific reimbursement for telemedicine in 1996, for both synchronous and asynchronous services, with a consequent rise of telemedicine activities for the subsequent decade. However, more recent policies limit reimbursement to the use of videoconferencing, thus affecting the trend of telemedicine

activities in the last few years. In addition, the current reimbursement scheme does not produce any incentive for General Practitioners, representing a further obstacle to the implementation of telemedicine, especially for services connecting secondary care with primary care. These considerations are in line with findings from other studies. The lack of success of telepsychiatry in Australia, for instance, might be due to both insufficient reimbursement and the consequence of not addressing other conditions required for the successful integration of telemedicine into routine clinical practice (39). On the contrary, the provision of teledermatology in the United States is supported by different payment methods, including private payer, self-pay, Medicaid, Medicare, HMO and contract-based services (35).

Limitations

We acknowledge some limitations in our study. The NPR has the principal advantage of being a centralized database at national level, thus making possible the systematic, reliable and efficient data collection from all publicly funded hospitals. The main disadvantage is that data in the NPR only contains telemedicine contacts for which a reimbursement was possible (i.e. where videoconferencing was used) and a request for payment was forwarded to the regional authority. All other telemedicine activities (i.e. store-and-forward) are excluded. Moreover, comparable data were only available for three years. As a consequence, we were not able to identify a longer-term trend of telemedicine activities over the last decade.

The main limitation regarding the survey was related to the volume of routine telemedicine services identified. We decided to conduct the survey at the five largest hospitals from the four health regions in Norway. However, there are also other smaller hospitals which deliver routine telemedicine. These can be included in future work. Moreover, hospitals in Norway do not currently have a formal overview of their telemedicine services, thus making a survey difficult, especially for large and complex healthcare organizations such as those included in this study.

5 Future implications

The present study is a first attempt to map national routine telemedicine, with objective and up-to-date information of its usage at regional, institutional and clinical level. Previously, such a comprehensive picture in Norway was missing. Moreover, little published data exist for international comparison, and no other study has reported comparable details. The dearth of similar data from other countries made it difficult to report our results for international comparison. It would therefore be premature to comment on the rate of telemedicine usage in Norway relative to the other countries/networks (Figure 1). Further work is needed to obtain more comprehensive data from around the world, and to monitor the uptake of

telemedicine from year to year in those countries. We believe that future studies would be much facilitated by recording and reporting data in a standardised fashion.

Good quality and timely data from health information systems are the foundation of all health systems. However, too often data sit in reports, on shelves or in databases and are not sufficiently utilised in policy and program development, improvement, strategic planning and advocacy (40). Where available, central health registries can provide useful and detailed data regarding the use of routine telemedicine nationally. We therefore recommend the use of these sources. However, the example of the NPR shows that these data might cover only part of the overall telemedicine usage. A combination of different methods (i.e. quantitative and qualitative) allows not only to assess more aspects but also to corroborate the findings which results in more robust results (41).

Where limited data are available from health information systems, a survey conducted at the hospital level is able to embrace the whole spectrum of telemedicine activities which are part of the routine practice of healthcare professionals. A survey based on standardized questionnaires can be used to identify routine telemedicine services and to collect, for each service, a standard minimum database including:

- medical field
- short description of the telemedicine service
- type of technology/modality (synchronous, asynchronous, hybrid)
- nature of the consultation (telemedicine consultation, home monitoring service)
- level of implementation (routine service, project)
- institutions involved
- first year of operation
- average caseload (telemedicine episodes) in the previous year
- last provision of the telemedicine service

Due to country-dependant issues, information regarding organizational, contextual and policy issues must also be reported together with data from registries and surveys to facilitate international comparison.

6 Conclusions

The present study provides objective and up-to-date information regarding the adoption of routine telemedicine in Norway at regional, institutional and clinical level. We reported both quantitative data collected through a national registry, and more qualitative and detailed data regarding routine telemedicine services through a survey. The results are in line with other studies. Routine telemedicine in Norway has been widely adopted, probably due to geographical needs, in a similar way to countries such as Brazil, Canada, and USA. The percentage of hospitals adopting telemedicine is high, and examples of routine telemedicine

can be found in several clinical specialties. However, the level of use of telemedicine in Norway is rather low, with a high potential for further development as an alternative to face-to-face outpatient visits. We believe that the adoption of telemedicine is influenced by several contextual factors, such as reimbursement policies as a form of incentive for health professionals. This study is a first attempt to map routine telemedicine services in Norway, and provides useful information to understand the adoption of telemedicine in routine use. Our research findings contribute to bridge the gap between policy and practice regarding telemedicine services and therefore improving the current debate concerning the routine use of telemedicine in healthcare systems. On the one hand decision makers, governments and healthcare authorities, can take effective policy actions to ensure a more efficient adoption and utilisation of telemedicine services at the healthcare system level. On the other hand health practitioners can be informed better about the benefits of adopting telemedicine in their practice and access targeted incentives which can result in an increase of the number of outpatient visits performed through telemedicine. We believe that these actions might lead to a positive change in the future use of routine telemedicine in Norway, thus moving from face-to-face visits to teleconsultations via videoconference similarly to other contexts. This study also provides a baseline to measure change in future updates to give a more complete picture on the adoption of telemedicine in the Norwegian healthcare system and to report the further implementation of telemedicine services. The methodology used in this study can be extended to other countries, including low- and mid-income countries, to provide additional insights about how the adoption of routine telemedicine can vary across different healthcare systems and policies, thus contributing to a common platform which can inform and support evidence-based health policy and practice, both locally and globally.

Competing interests

The authors declare that they have no competing interests.

Authors' contributions

PZ performed the analysis on the data from the Norwegian Patient Register. UK conducted the survey on the five largest Norwegian hospitals. RW conceived, initiated and coordinated the whole study. All the authors equally contributed to write, revise and approve the last version of the manuscript.

Acknowledgements

We thank the Northern Norwegian Regional Health Authority for funding the study (grant SFP1008-11).

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8 Tables

Table 1. Outpatient visits and telemedicine contacts in the period 2009-2011 in the four health regions.

Health region	Outpatient visits (2009)	Outpatient visits (2010)	Outpatient visits (2011)	Telemedicine contacts (2009)	Telemedicine contacts (2010)	Telemedicine contacts (2011)
Western Norway	879,911	930,840	947,303	240 (0.03%)	246 (0.03%)	821 (0.09%)
Central Norway	695,161	724,617	763,467	449 (0.06%)	23 (0.00%)	1 (0.00%)
Northern Norway	470,078	484,151	502,839	1,739 (0.37%)	876 (0.18%)	986 (0.20%)
South-Eastern Norway	2,573,532	2,625,076	2,711,593	318 (0.01%)	41 (0.00%)	19 (0.00%)
Total	4,618,682	4,764,684	4,925,202	2,746 (0.06%)	1,186 (0.02%)	1,827 (0.04%)

Table 2. Outpatient visits and telemedicine contacts in the period 2009-2011 in the hospitals.

Hospitals	Outpatient visits (2009)	Outpatient visits (2010)	Outpatient visits (2011)	Telemedicine contacts (2009)	Telemedicine contacts (2010)	Telemedicine contacts (2011)
Western Norway						
Stiftelsen Betanien Bergen	1,675	2,059	2,097	0 (0.00%)	0 (0.00%)	0 (0.00%)
Haugesund Sanitetsforenings Hospital for Rheumatic Diseases	21,914	21,066	18,082	2 (0.01%)	0 (0.00%)	0 (0.00%)
Stavanger University Hospital	236,601	274,315	268,052	124 (0.05%)	201 (0.07%)	806 (0.30%)
Fonna Hospital Trust	115,059	118,160	117,049	103 (0.09%)	41 (0.03%)	13 (0.01%)
Bergen Hospital Trust	376,996	388,058	409,798	0 (0.00%)	1 (0.00%)	2 (0.00%)
Førde Hospital Trust	110,630	109,995	112,956	11 (0.01%)	2 (0.00%)	0 (0.00%)
Haraldsplass Diakonale Hospital Trust	17,036	17,187	19,269	0 (0.00%)	1 (0.01%)	0 (0.00%)
Central Norway						
St. Olavs Hospital Trust	327,390	350,338	368,701	448 (0.14%)	23 (0.01%)	1 (0.00%)
Nord Trøndelag Hospital Trust	100,797	99,562	109,382	0 (0.00%)	0 (0.00%)	0 (0.00%)
Møre og Romsdal Hospital Trust	266,974	274,717	285,384	1 (0.00%)	0 (0.00%)	0 (0.00%)
Northern Norway						
Finnmark Hospital Trust	55,048	54,132	55,108	14 (0.03%)	33 (0.06%)	39 (0.07%)
University Hospital of North Norway	214,538	227,831	235,486	1,325 (0.62%)	780 (0.34%)	848 (0.36%)
Nordland Hospital Trust	122,723	126,532	130,953	147 (0.12%)	63 (0.05%)	99 (0.08%)
Helgeland Hospital Trust	77,769	75,656	81,292	253 (0.33%)	0 (0.00%)	0 (0.00%)
South-Eastern Norway						
Betanien Hospital	14,868	16,983	18,760	0 (0.00%)	0 (0.00%)	0 (0.00%)
Sunnaas Hospital Trust	2,691	3,922	3,598	0 (0.00%)	4 (0.10%)	5 (0.14%)
Vestre Viken Hospital Trust	287,427	277,960	296,535	0 (0.00%)	3 (0.00%)	1 (0.00%)
Lovisenberg Diakonale Hospital	43,071	45,088	52,065	10 (0.02%)	0 (0.00%)	0 (0.00%)
Martina Hansens Hospital	22,934	22,964	25,021	0 (0.00%)	0 (0.00%)	0 (0.00%)
Lillehammer Hospital for Rheumatic Diseases	10,701	10,803	12,351	0 (0.00%)	0 (0.00%)	0 (0.00%)
Diakonhjemmet Hospital	51,898	55,768	62,841	0 (0.00%)	0 (0.00%)	0 (0.00%)
Akershus University Hospital	175,830	185,536	233,530	0 (0.00%)	0 (0.00%)	0 (0.00%)

Innlandet Hospital Trust	317,634	320,325	327,537	97 (0.03%)	14 (0.00%)	1 (0.00%)
Østfold Hospital Trust	200,674	195,314	196,563	137 (0.07%)	5 (0.00%)	2 (0.00%)
Sørlandet Hospital Trust	267,781	271,263	279,041	74 (0.03%)	15 (0.01%)	8 (0.00%)
Vestfold Hospital Trust	196,826	195,674	205,989	0 (0.00%)	0 (0.00%)	2 (0.00%)
Telemark Hospital Trust	155,306	164,000	169,598	0 (0.00%)	0 (0.00%)	0 (0.00%)
Oslo University Hospital	825,891	859,476	828,164	0 (0.00%)	0 (0.00%)	0 (0.00%)
Total	4,618,682	4,764,684	4,925,202	2,746	1,186	1,827

Table 3. Outpatient visits and telemedicine contacts in the period 2009-2011 in different clinical specialties.

Clinical specialties	Outpatient visits (2009)	Outpatient visits (2010)	Outpatient visits (2011)	Telemedicine contacts (2009)	Telemedicine contacts (2010)	Telemedicine contacts (2011)
Neurosurgery	14,701	16,858	19,144	805 (5.48%)	385 (2.28%)	469 (2.45%)
Physical medicine and rehabilitation	190,645	201,525	222,851	388 (0.20%)	162 (0.08%)	789 (0.35%)
Clinical neurophysiology	32,330	34,874	51,313	353 (1.09%)	3 (0.01%)	7 (0.01%)
Skin and venereal diseases	197,707	204,552	189,415	221 (0.11%)	239 (0.12%)	93 (0.05%)
Eye diseases	228,680	266,363	287,130	154 (0.07%)	137 (0.05%)	231 (0.08%)
Cardiovascular diseases	222,183	228,739	249,516	152 (0.07%)	58 (0.03%)	51 (0.02%)
Children's diseases	205,979	208,943	191,248	119 (0.06%)	25 (0.01%)	5 (0.00%)
Obstetrics	482,661	502,400	513,143	102 (0.02%)	18 (0.00%)	14 (0.00%)
Oncology and radiotherapy	94,258	196,281	206,750	71 (0.08%)	9 (0.00%)	2 (0.00%)
Orthopaedics and rheumatology	647,839	708,595	739,050	60 (0.01%)	72 (0.01%)	76 (0.01%)
Urology	135,833	148,557	160,630	49 (0.04%)	9 (0.01%)	17 (0.01%)
General surgery	166,569	146,575	133,809	35 (0.02%)	10 (0.01%)	7 (0.01%)
General internal medicine	68,642	65,136	61,923	27 (0.04%)	1 (0.00%)	1 (0.00%)
Digestive diseases	122,480	142,525	162,385	23 (0.02%)	1 (0.00%)	11 (0.01%)
Endocrinology	108,866	117,577	119,423	16 (0.01%)	2 (0.00%)	5 (0.00%)
Pulmonary diseases	100,842	112,729	118,963	16 (0.02%)	4 (0.00%)	20 (0.02%)
Neurology	111,310	115,714	133,537	16 (0.01%)	9 (0.01%)	13 (0.01%)
Ear, nose and throat diseases	324,964	333,776	353,326	15 (0.00%)	9 (0.00%)	3 (0.00%)
Haematology	61,811	75,488	84,666	14 (0.02%)	0 (0.00%)	0 (0.00%)
Kidney diseases	53,312	52,288	54,164	12 (0.02%)	3 (0.01%)	3 (0.01%)
Maxillofacial and mouth diseases	29,634	27,554	26,746	10 (0.03%)	2 (0.01%)	0 (0.00%)
Geriatrics	16,338	16,931	18,427	10 (0.06%)	0 (0.00%)	0 (0.00%)
Gastroenterological surgery	114,129	123,111	126,741	9 (0.01%)	4 (0.00%)	1 (0.00%)
Other clinical specialties	944,532	778,658	736,326	69 (0.01%)	24 (0.00%)	9 (0.00%)
Total	4,676,245	4,825,749	4,960,626	2,746 (0.06%)	1,186 (0.02%)	1,827 (0.04%)

Table 4. Numbers of clinical specialties delivering telemedicine in the hospitals.

Hospitals	Clinical specialties (2009)	Clinical specialties (2010)	Clinical specialties (2011)
Western Norway	27	19	12
Stiftelsen Betanien Bergen	0	0	0
Haugesund Sanitetsforenings Hospital for Rheumatic Diseases	1	0	0
Stavanger University Hospital	9	7	2
Fonna Hospital Trust	15	9	8
Bergen Hospital Trust	0	1	2
Førde Hospital Trust	2	1	0
Haraldsplass Diakonale Hospital Trust	0	1	0
Central Norway	7	2	1
St. Olavs Hospital Trust	6	2	1
Nord Trøndelag Hospital Trust	0	0	0
Møre og Romsdal Hospital Trust	1	0	0
Northern Norway	48	33	34
Finnmark Hospital Trust	8	11	10
University Hospital of North Norway	19	8	9
Nordland Hospital Trust	16	14	15
Helgeland Hospital Trust	5	0	0
South-Eastern Norway	21	20	10
Betanien Hospital	2	0	0
Sunnaas Hospital Trust	0	1	1
Vestre Viken Hospital Trust	0	3	1
Lovisenberg Diakonale Hospital	0	0	0
Martina Hansens Hospital	0	0	0
Lillehammer Hospital for Rheumatic Diseases	0	0	0
Diakonhjemmet Hospital	0	0	0
Akershus University Hospital	0	0	0
Innlandet Hospital Trust	9	6	1
Østfold Hospital Trust	4	4	2
Sørlandet Hospital Trust	6	6	3
Vestfold Hospital Trust	0	0	2
Telemark Hospital Trust	0	0	0
Oslo University Hospital	0	0	0
Total	103	74	57

Table 5. Routine telemedicine services in different clinical fields.

Clinical fields	Routine telemedicine services	Synchronous services	Asynchronous services	Synchronous and asynchronous services
Dermatology	3	1	1	1
Emergency medicine	3	1		2
Pathology	3	2	1	
Pulmonary medicine	3	2		1
Neurology (stroke)	1	1		
Cardiology	2		2	
Psychiatry	2	2		
Oncology	2	2		
Orthopaedics	2	2		
Nephrology	1	1		
Gynaecology and obstetrics	1			1
Maritime medicine	1			1
Surgery	1			1
Total	25	14	4	7

Table 6. Routine telemedicine services in different types of institution.

Type of institutions involved	Number of routine services
Hospitals in same health trust	2
Hospitals in other health trusts	8
Hospitals in same health trust and hospitals other health trusts	2
General Practitioners	3
District medicine centres/nursing homes and hospitals in same/other health trusts	3
District medicine centres/nursing homes	2
Home monitoring services with patients	2
Oil platforms	2
Ships	1
Total	25

Table 7. Routine telemedicine services and year of establishment.

Period of establishment	Number of routine services
< 1 year (2012)	4
> 1 to 4 years (2008-2012)	9
< 5 to 7 years (2005-2007)	6
< 8 to 10 years (2002-2004)	2
> 10 years (before 2001)	4
Total	25

Table 8. Routine telemedicine services at the five largest hospitals in Norway.

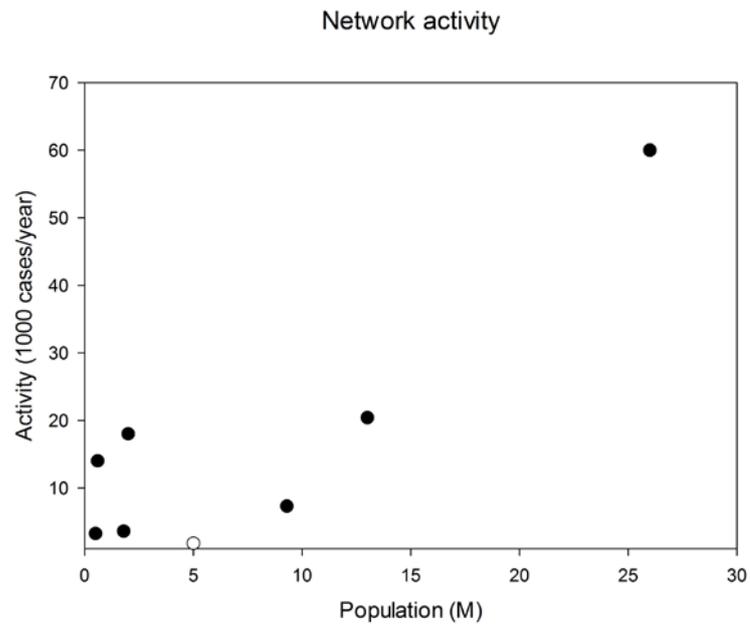
Hospital	Clinical field	Type of service	Teleconsultations (2011)	Institutions involved	Year of establishment
University Hospital of North	Cardiology	Asynchronous	250	Home monitoring	2008
	Oncology	Synchronous	90	Hospitals in other health trusts	2007
	Oncology	Synchronous	60	General Practitioners and hospitals in other health trusts	2009
	Psychiatry	Synchronous	40-50	Hospitals in same health trust	2009
	Emergency	Both	5-10	District medicine and hospitals in same health trust	2005
	Dermatology	Both	30-100	General Practitioners, home nursing and hospitals	1998
	Nephrology	Synchronous	98	Hospitals in the same and other health trusts	2002
	Orthopaedics	Synchronous	90	District medicine	2007
St. Olavs University Hospital	Emergency	Synchronous	n.a.	Oil platforms	2012
	Pathology	Asynchronous	50	Hospitals in other health trusts	2012
	Orthopaedics	Synchronous	240	District medicine	2005
Haukeland University Hospital	Cardiology	Asynchronous	350	Hospitals in the same and other health trusts	2008
	Gynaecology	Both	40-50	Hospitals in other health trusts	2002
	Psychiatry	Synchronous	10	Hospitals in other health trusts	2010
	Maritime medicine	Both	500	Ships	Early 1990s
	Surgery	Both	80	Hospitals in other health trusts	1998
	Emergency	Both	15-20	Oil platforms	2009
	Neurology	Synchronous	20	Hospitals in same health trust	2009
	Pathology	Synchronous	10	Hospitals in other health trusts	1997
Stavanger University Hospital	Pulmonary medicine	Synchronous	730	Home monitoring	2010
	Dermatology	Asynchronous	50	General Practitioners	2012
Oslo University Hospital	Pulmonary medicine	Synchronous	500	Hospitals in other health trusts	2007
	Pulmonary medicine	Both	100	Hospitals in other health trusts	2007
	Pathology	Synchronous	2	Hospitals in other health trusts	2011
	Dermatology	Synchronous	4	Hospitals in other health trusts	2012

Table 9. Use of telemedicine in different state-wide networks.

Paper	Region	Index year	Population served (millions)	Teleconsultations (per year)
Alkmim et al., 2012	Minas Gerais, Brazil	2011	9.3	7,300
Blanchet, 2005	Texas, USA	2005	26	60,000
Brewer et al., 2011	Georgia, USA	2009	2	18,000
Brown, 2013	Ontario, Canada	2011	13	204,000
Kokesh et al., 2011	Alaska, USA	2009	0.6	14,000
Meyers et al., 2012	Nebraska, USA	2010	1.8	3,600
	Norway	2011	5	1,800

9 Figures

Figure 1. Comparison of the telemedicine activity of different state-wide networks. Closed symbols are the non-Norwegian networks; the open symbol is Norway.



10 Appendix

Services at the University Hospital of North Norway

In Northern Norway Regional Health Authority.

1) University Hospital of North Norway - Division of Cardiothoracic and Respiratory Medicine

Medical field:

Cardiology.

Short description of the service:

This is home monitoring for patients with an implantable defibrillator. Health personnel can monitor patients with implantable defibrillators at their homes via PC or smartphone. This is a routine service at the University Hospital of North Norway, which provides specialist care and frequent follow-up. Patients can interrogate their device through the home monitor (Carelink). Data are transferred and accessible via PC or iPhone and assessed by a doctor or a nurse. The data monitored include batteries, heart rhythm, complications, shocks, etc.

Is it a routine service or a project?

Routine service.

Which other institutions are involved?

Patients with implantable defibrillators and specialist health personnel (specialists, nurses).

How long has the service existed (approx)?

April 2008.

How many times have you provided the telemedicine service in 2011 (approx.)?

250.

When was the last time you provided a telemedicine service?

Today.

Is it a synchron (use of VC) or asynchron (use of email, other electronic messages) service, or both?

Asynchronous.

Is it a telemedicine consultation (assessment, evaluation, treatment, control of the patient) where the specialist is on one end and specialist/doctor/other health personnel on the other end?

No.

Is it a home monitoring service (between patient and doctor)?

Yes.

2) University Hospital of North Norway - Radiation Oncology Unit

Medical field:

Oncology.

Short description of the service:

Medical physicists at the Radiation Oncology Unit of the University Hospital North Norway conduct videoconference meetings with the Radiation Oncology Unit at the Nordland Hospital on a weekly basis. Subjects discussed during the meetings are assessment, procedures and the administration of patients. Images can be shown on screen. The patients are--in most cases--anonymized. The physicists also provide internal teaching to the

Nordland Hospital two days a week via videoconference (VC). In addition, there are interdisciplinary VC-meetings with local hospitals with the aim to discuss patient cases, and X-rays are exchanged among hospitals via the PACS system.

Is it a routine service or a project?

Yes.

Which other institutions are involved?

The Nordland Hospital.

How long has the service existed (approx)?

Internal teaching via VC: approx. since 2005.

Physicist meetings: approx. since 2007.

How many times have you provided the telemedicine service in 2011 (approx.)?

90 times.

When was the last time you provided a telemedicine service?

Three meetings per week.

Is it a synchron (use of VC) or asynchron (use of email, other electronic messages) service, or both?

Synchronous.

Is it a telemedicine consultation (assessment, evaluation, treatment, control of the patient) where the specialist is on one end and specialist/doctor/other health personnel on the other end?

Yes.

Is it a home monitoring service (between patient and doctor)?

No.

3) University Hospital of North Norway – Department of Oncology

Medical field:

Oncology.

Short description of the service:

The University Hospital of North Norway is a tertiary-level hospital and has the main responsibility of providing specialized cancer health care in the remote areas of Northern Norway. Weekly VCs have been established to enable local-hospital clinicians and primary, cancer health-care providers in five different communities to discuss cases with cancer specialists at the University Hospital North Norway. This service started in April 2009 with an 18-month prospective study. One hundred six VCs were performed, and 167 cases were discussed (101 patients). A median of seven health care providers were participating in each VC. The mean patient age was 57 years (range, 20–96), and 52% were females. The most common diagnoses were colorectal cancer (30%) and breast cancer (12%), and 72% of the patients had a metastatic disease. While the most common major issue discussed with the local hospital was related to chemotherapy, the most frequent problem when communicating with the health-care providers in the communities was symptom management. This VC service has become a routine service for local hospitals and general practitioner practices in the counties of Finnmark and Nordland.

Is it a routine service or a project?

Yes.

Which institutions are involved?

General practitioner practices in the County of Finnmark.

Hammerfest hospital (not on a regular basis).

Rana hospital.

How long has the service existed (approx)?

Since April 2009

How many times have you provided the telemedicine service in 2011 (approx.)?

Several general practitioner practices in the County of Finnmark: approx. 30 times.
Rana hospital: approx. 30 times.

When was the last time you provided a telemedicine service?

This week.

Is it a synchron (use of VC) or asynchron (use of email, other electronic messages) service, or both?

Synchronous.

Is it a telemedicine consultation (assessment, evaluation, treatment, control of the patient) where the specialist is on one end and specialist/doctor/other health personnel on the other end?

Yes.

Is it a home monitoring service (between patient and doctor)?

No.

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4) University Hospital of North Norway - Psychiatric Department

Medical field:

Psychiatry.

Short description of the service:

The Psychiatric Department at the University Hospital North Norway provides a decentralized, on-call service via VC (DeVaVi) for adults with mental health problems. This started as a project in 2009, and it has now become a routine service. A researcher at the Norwegian Centre for Integrated Care and Telemedicine will evaluate the service during the next years (01.01.12 – 31.12.14). The University Hospital North Norway is further expanding this service with a project in child psychiatry (eBup). It has developed and started to implement a virtual system, where specialists perform treatment and evaluation, with a videoconference as a tool to ensure cooperation among all levels of care related to a child/adolescent. The purpose of this expanding service is to contribute to the assurance that patients at the site (the department of mental health for children and youth at one of the sites [Ofoten/Narvik]) have equal access to specialist evaluations nearest their homes compared to patients who live close to the specialist health care service. The aim of the service is to establish a permanent system for consultation with specialists by means of videoconference.

Is it a routine service or a project?

DeVaVi: routine service.

eBup: project.

Which other institutions are involved?

DeVaVi: the regional psychiatric centres Sør Troms in Harstad, Ofoten (city: Narvik), Midt Troms (city: Silsand).

eBup: the children and youth mental health clinic at UNN (central hospital), the primary health care level (school nurses, kindergartens), GPs and other departments in the region.

How long has the service existed (approx)?

DeVaVi: since 2009.

eBup: since 2012.

How many times have you provided the telemedicine service in 2011 (approx.)?

DeVaVi: 40-50 times.

When was the last time you provided a telemedicine service?

DeVaVi: November 2012.

eBup: November 2012.

Is it a synchron (use of VC) or asynchron (use of email, other electronic messages) service, or both?

DeVaVi: synchronous.

eBup: sunchronous.

Is it a telemedicine consultation (assessment, evaluation, treatment, control of the patient) where the specialist is on one end and specialist/doctor/other health personnel on the other end?

DeVaVi: Yes.

eBup: Yes.

Is it a home monitoring service (between patient and doctor)?

No.

5) University Hospital North Norway - Emergency Medical Communication Centre

Medical field:

Emergency medicine.

Short description of the service:

"Video-based Emergency Medical Interaction (VEMI)" is a telemedicine service between the UNN and smaller hospitals, district medicine centres or nursing homes. Smaller local hospitals (e.g., Longyearbyen Hospital and District Medicine Centre in Finnsnes) have a limited number of medical specialities. This service focuses on emergency situations and support provided by emergency specialists who are not locally present and communicate with the Intensive Care Unit long-distance.

VC systems are present at both sites. In the emergency room, one camera is used to provide an overview of the patient, and another ceiling-mounted camera can be used to zoom, pan and tilt, accompanied by a ceiling-mounted microphone (and a headset with a microphone as a possibility for a camera). This emergency room is linked via a broadband network to a corresponding studio at the regional Emergency Medical Communication Centre of the University Hospital North Norway.

In addition, there is a monitor, which shows patient data (biological measurement parameters, which are transmitted as one of the video channels from the local hospital), as well as the outgoing image from the Emergency Medical Communication Centre.

At the at the University Hospital North Norway, the transmission is like a normal videoconference in which there is potential for remote control over the cameras at the local hospital to optimize data collection and direct communication with the team at the local hospital. They would give advice, answer questions and, in some situations, take a leadership role for limited procedures and situations. Today, the service is provided to Longyearbyen Hospital and District Medicine Centre in Finnsnes.

Is it a routine service or a project?

Routine service.

Which other institutions are involved?

Longyearbyen Hospital and District Medicine Centre in Finnsnes.

How long has the service existed (approx)?

Started as a project in 2005, the service was prolonged and expanded in 2008.

How many times have you provided the telemedicine service in 2011 (approx.)?

5-10 times.

When was the last time you provided a telemedicine service?

June 2012.

Is it a synchron (use of VC) or asynchron (use of email, other electronic messages) service, or both?

This is a clinical VC/ synchronous service, using data from synchronous and asynchronous services real time.

Is it a telemedicine consultation (assessment, evaluation, treatment, control of the patient) where the specialist is on one end and specialist/doctor/other health personnel on the other end?

Yes.

Is it a home monitoring service (between patient and doctor)?

No.

6) University Hospital North Norway – Dermatology Department

Medical field:

Dermatology.

Short description of the service:

Teleconsultation in the field of dermatology already started in Northern Norway as a project in 1988 between a district GP and a dermatologist at the University Hospital North Norway at a distance of approximately 400 km between these two sites. Tele-dermatology is provided through several modalities, store-and-forward systems, videoconference and an internet-based program. The store-and-forward system in Tromsø is mostly used as a referral system. The videoconferences can monitor the situation.

Store-and-forward

The GP makes still images of the patients' dermatological disease and sends these to the specialist through an electronic referral. This still-image service includes a visual documentation of the disease history. The case history is documented as text. Both the GP and the specialist can follow the changes of the dermatological disease throughout time. This is an offline service in which the asynchronous modality represents a helpful tool to organize one's time schedule during a busy day. The specialist can look at the picture at her convenience. This service enables the GP at the remote site to make a decision on treatment based on the distant diagnosis given by the specialist.

Videoconference

In respect to the use of videoconference, the GP, together with the patient at the remote site, consults the dermatologist. A video camera is used to convey images of the patient's diseased skin areas to the dermatologist. The dermatologist gives the GP instant advice on treatment. The GPs express that they gain competence and security within dermatology over time. The videoconference is also used for the education of specialists in the local hospital.

Wound outpatient clinic service--an Internet-based program

The outpatient clinic at the University Hospital of North Norway provides assessment and advice related to wound treatment in the home-nursing field (the patient's home). Home nurses or patients take pictures of leg ulcers with a digital camera or mobile phone and store

them, together with assessments and questions, in an Internet-based program. In some cases, where nurses are not available, the patient nurses the wound. Specialists (a specially trained nurse or doctor) access these programs and conduct the assessment on how to treat the wound.

Is it a routine service or a project?

Routine service.

Which other institutions are involved?

GPs, local hospitals, private specialists, nursing home care, patients.

How long has the service existed (approx)?

Teledermatology started in 1988.

How many times has your department provided the telemedicine service in 2011 (approx.)?

- The store-and-forward and was rarely used.
- The videoconference to GPs was rarely used.
- The videoconference used for the education of specialists in local hospitals has been conducted 30 times, 1-2 hours each time.
- The telemedicine service in the wound outpatient clinic was used, on average, two days a week in 2011.

When was the last time you or your colleagues provided a telemedicine service?

- The videoconference used for the education of specialists in local hospitals was conducted in May 2012 (surveyed in June 2012).
- The telemedicine service in the wound outpatient clinic was used in June 2012 (surveyed in June 2012).

Is it a synchron (use of VC) or asynchron (use of email, other electronic messages) service, or both?

Both (but VC service is rarely used).

Is it a telemedicine consultation (assessment, evaluation, treatment, control of the patient) where the specialist is on one end and specialist/doctor/other health personnel on the other end?

Yes (but rarely used).

Is it a home monitoring service (between patient and doctor)?

Yes.

7) University Hospital of North Norway (UNN) – Nephrology Department

Medical field:

Nephrology.

Short description of the service:

The Nephrology Department at the University Hospital of North Norway implemented teledialysis in 2002. The Nephrology Department is linked by means of VC with six remote satellite dialysis units without nephrologists. This routine service will now be expanded to the patient's home and primary-care setting, supplementing the existing service. The purpose of this expanded service is to increase the options for patients to be treated at home. The aim is to establish a service that works organizationally and technologically.

Is it a routine service or a project?

Teledialysis: routine service.

Homedialysis: project.

Which other institutions are involved?

Teledialysis: six satellites (Alta, Hammerfest, Finnsnes, Narvik, Kirkenes and Vadsø).
Homedialysis: two patients in the County of Finnmark.

How long has the service existed (approx)?

Teledialysis: since 2002.
Homedialysis: project started in 2011.

How many times have you provided the telemedicine service in 2011 (approx.)?

Teledialysis: 98 VCs in 2011 (39 hours in total).

When was the last time you provided a telemedicine service?

Teledialysis: 3-4 services every week.
Homedialysis: last VC was in July 2012 (interview conducted in September 2012).

Is it a synchron (use of VC) or asynchron (use of email, other electronic messages) service, or both?

Teledialysis: synchronous.
Homedialysis: synchronous.

Is it a telemedicine consultation (assessment, evaluation, treatment, control of the patient) where the specialist is on one end and specialist/doctor/other health personnel on the other end?

Teledialysis: Yes.
Homedialysis: Yes.

Is it a home monitoring service (between patient and doctor)?

Homedialysis: Yes.

References

Arild E, Rumpsfeld M, Sjaaeng EE., "Teledialysis – experiences from North Norway" (NST Report, August 2007).

Arild E. Innomed 2009. Rapport. Forprosjekt . Kartlegge behov for nye telemedisinske løsninger hjem til nyresviktpasienter. Available at:
http://www.innomed.no/media/media/filer_private/2011/03/02/hjemmedialyse_sluttrapport.pdf

Nye telemedisinske tjenester til hjemmedialysepasienter – NyTTeHjem (NST report, March 2012).

8) University Hospital of North Norway – Orthopedic Department

Medical field:

Orthopedy.

Short description of the service:

The Orthopedic Department at the University Hospital of North Norway provides a teleorthopedic service for the District Medicine Centre (DMS) Nord-Troms. Patients in four communities of Northern Troms are offered an inclusion in this teleorthopedic service, which has been going on since 2007. The VC consultation consists of new referral and follow-up of patients who were injured or had surgery. X-rays are transferred electronically and are integrated in the EPR. The patient and a nurse at the DMS attend a VC consultation with the specialist at the University Hospital of North Norway. The nurse helps the patient during the examination. The specialist plans further treatment in consultation with the patient. The specialist provides prescriptions, medical certificates and referrals and has the responsibility to ensure that the patient documentation is included in the EPR.

Is it a routine service or a project?

Routine.

Which other institutions are involved?

DMS Nord-Troms.

How long has the service existed (approx)?

Since May 2007.

How many times have you provided the telemedicine service in 2011 (approx.)?

Approx. 90 consultations during 40 days.

When was the last time you provided a telemedicine service?

This week (interview was conducted in November 2012).

Is it a synchron (use of VC) or asynchron (use of email, other electronic messages) service, or both?

Synchronous (VC).

Is it a telemedicine consultation (assessment, evaluation, treatment, control of the patient) where the specialist is on one end and specialist/doctor/other health personnel on the other end?

Yes.

Is it a home monitoring service (between patient and doctor)?

No.

Services at St. Olavs University Hospital

In Central Norway Regional Health Authority

9) St. Olavs University Hospital – Emergency Department

Medical field:

Emergency medicine.

Short description of the service:

The St. Olavs University Hospital runs a service at the Emergency Department for Statoil's oil platforms in the North Sea. Specialists at the department provide telemedicine consultations to the platforms by means of VC. The services are provided within several medical fields: Cardiology, Surgery (amongst other plastic surgery, orthopedy, neurosurgery), Neurology, Dermatology, Psychiatry, Internal Medicine, Occupational Medicine, 4 times in 2012 and Toxicology. Also addressed are lung and infection diseases, competence for radiation protection and treatment to patients who have been exposed to ionizing radiation. Essential patient data, including ECG-signals, heart rate, respiratory frequency and oxygen saturation, are transferred simultaneously with the VC consultation.

Is it a routine service or a project?

Routine service.

Which other institutions are involved?

Statoil's oil platforms in the North Sea.

How long has the service existed (approx)?

Started on 20.08.2012.

How many times have you provided the telemedicine service in 2011 (approx.)?

N.A.

When was the last time you provided a telemedicine service?

Up to September 2012 no real consultations were conducted yet. The equipment was used for training.

Is it a synchron (use of VC) or asynchron (use of email, other electronic messages) service, or both?

Synchronous.

Is it a telemedicine consultation (assessment, evaluation, treatment, control of the patient) where the specialist is on one end and specialist/doctor/other health personnel on the other end?

Yes.

Is it a home monitoring service (between patient and doctor)?

No.

10) St. Olavs University Hospital - Department of Pathology and Medical Genetics

Medical field:

Pathology.

Short description of the service:

The Department of Pathology and Medical Genetics at St. Olavs University Hospital does not provide Telepathology (telemedicine for frozen sections) as in earlier years. This has been replaced with microscopical pictures, which are scanned digitally. Surgeons at the hospital of Levanger in North Trøndelag send digital microscopic sections through the Norwegian Health Network to St. Olavs University Hospital for postoperative diagnoses, mainly of cancer. Surgeons at St. Olavs University Hospital look at the pictures and give advice to the hospital of Levanger by phone.

Is it a routine service or a project?

Yes.

Which other institutions are involved?

Hospital of Levanger.

How long has the service existed (approx)?

Since spring 2012.

How many times have you provided the telemedicine service in 2011 (approx.)?

N.A.

When was the last time you provided a telemedicine service?

Used once per week.

Is it a synchron (use of VC) or asynchron (use of email, other electronic messages) service, or both?

Asynchronous. Answers are synchronous and provided by phone.

Is it a telemedicine consultation (assessment, evaluation, treatment, control of the patient) where the specialist is on one end and specialist/doctor/other health personnel on the other end?

Yes.

Is it a home monitoring service (between patient and doctor)?

No.

11) St. Olavs University Hospital – Orkdal Hospital

Medical field:

Medical department and orthopedy.

Short description of the service:

Orkdal hospital is St. Olavs University Hospital's local hospital located 40 km south of Trondheim. This hospital provides telemedicine consultations to a district medicine centre, which serves seven municipalities. The district medicine centre is called Fosen DMS and provides an offer to patients who need to be evaluated before or after a hospital stay. These patients will not be able to stay at home, but in Fosen DMS they receive an appropriate health care offer near their homes. The specialists at Orkdal hospital and the doctor on call at Fosen DMS conduct VC consultations on daily basis (virtual visits). If needed (exceptional case) the patient is present during a VC.

Orkdal Hospital is St. Olavs University Hospital's local hospital located 40 km south of Trondheim. This hospital provides telemedicine consultations to Fosen district medicine centre (DMS), which serves seven municipalities. Fosen DMS and provides an offer to patients who need to be evaluated before or after a hospital stay. These patients will not be able to stay at home, but in Fosen DMS they receive an appropriate healthcare offer near their homes. The specialists at Orkdal Hospital and the doctor on call at Fosen DMS conduct VC consultations on a daily basis (virtual visits). If needed (exceptional cases), the patient is present during a VC.

Is it a routine service or a project?

Yes.

Which other institutions are involved?

Fosen district medicine centre including seven municipalities (Bjung, Leksvik, Osen, Rissa, Roan, Ørland, Åfjord).

How long has the service existed (approx)?

2005.

How many times have you provided the telemedicine service in 2011 (approx.)?

Orthopedy/rehabilitation (4 specialist rehabilitation beds): every Tuesday and Thursday.
Medicine: Monday, Tuesday, Thursday and Friday.

When was the last time you provided a telemedicine service?

This week (interview was conducted in November 2012).

Is it a synchron (use of VC) or asynchron (use of email, other electronic messages) service, or both?

Synchronous.

Is it a telemedicine consultation (assessment, evaluation, treatment, control of the patient) where the specialist is on one end and specialist/doctor/other health personnel on the other end?

Yes.

Is it a home monitoring service (between patient and doctor)?

No.

Services at Haukeland University Hospital

In Western Norway Regional Health Authority

12) Haukeland University Hospital - Department of Cardiology

Medical field:

Cardiology.

Short description of the service:

This service involves heart implants and telemedicine. The Department of Cardiology has 370 patients with implantable cardioverter defibrillator (ICD), cardiac resynchronization therapy defibrillator (CRT-D) and pacemaker (PM). Patients with heart rhythm disturbance and severe heart failure are monitored by means of telecardiology and control via the Internet. In addition, the department provides planned controls for each patient every six months. In the case of medical or technical events and planned controls, the devices are set to send data automatically. The devices control automatically their own functions and monitor continuously the heart rhythm. Several sensors can monitor parameters for patients with heart failure. Specialists can access patients' data from any available PC. The department is interested in using smartphones and apps to access patient's data. This solution is already available on the market.

Satellite hospitals (Voss Hospital, Førde Central Hospital, Stord Hospital, Haugesund Hospital) are also connected to the department. Besides the department's own patients, this service provides remote control to patients from satellite hospitals as well. The department has access to local data.

Is it a routine service or a project?

Yes.

Which other institutions are involved?

Voss Hospital, Førde Central Hospital, Stord Hospital, Haugesund Hospital.

How long has the service existed (approx)?

Approx. 4 years.

How many times have you provided the telemedicine service in 2011 (approx.)?

Continuous monitoring of 350 heart patients with planned controls every six months.

When was the last time you provided a telemedicine service?

N.A.

Is it a synchron (use of VC) or asynchron (use of email, other electronic messages) service, or both?

Asynchronous.

Is it a telemedicine consultation (assessment, evaluation, treatment, control of the patient) where the specialist is on one end and specialist/doctor/other health personnel on the other end?

No.

Is it a home monitoring service (between patient and doctor)?

Yes.

13) Haukeland University Hospital - Department of Gynecology and Obstetrics

Medical field:

Gynecology and Obstetrics.

Short description of the service:

The Department of Gynecology and Obstetrics at the Haukeland University Hospital has weekly videoconferences with three hospitals in the region (Stavanger University Hospital, Haugesund Hospital, Førde Central Hospital). Videoconferences are conducted each Monday and take approx. 30 minutes. Health personnel discuss patients' pathways and distribution of tasks. For instance, when patients have to be operated at the Haukeland University Hospital, health personnel agree on pre-operative assessments to be conducted at the decentralized hospital. Beforehand, patient's data (e.g. X-rays) are exchanged electronically.

Is it a routine service or a project?

Yes.

Which other institutions are involved?

Three hospitals in the region (Stavanger University Hospital, Haugesund Hospital and Førde Central Hospital).

How long has the service existed (approx)?

Since 2002.

How many times have you provided the telemedicine service in 2011 (approx.)?

40-50 times a year.

When was the last time you provided a telemedicine service?

Every Monday.

Is it a synchron (use of VC) or asynchron (use of email, other electronic messages) service, or both?

Synchronous and asynchronous.

Is it a telemedicine consultation (assessment, evaluation, treatment, control of the patient) where the specialist is on one end and specialist/doctor/other health personnel on the other end?

Yes.

Is it a home monitoring service (between patient and doctor)?

No.

14) Haukeland University Hospital - Division of Psychiatry

Medical field:

Psychiatry.

Short description of the service:

The clinic for security psychiatry at the Division of Psychiatry uses VC in order to cooperate with other hospitals in the region concerning the admission of patients to the regional security department. These hospitals are Helse Førde, Fonna Hospital (Valen Hospital) and Helse Stavanger. The Division of Psychiatry conducts also a project called "Psychiatry Health on the Internet", which consists of assisted Internet treatment for patients who suffer from anxiety or depression. Assisted self-help Internet treatment is a psychological treatment where patients follow a standardized psychological treatment by means of telephone, e-mail or face-to-face with the support of therapists. The project period is 2012-2014.

Is it a routine service or a project?

VC for cooperation of hospitals concerning patient admission to regional security department: Routine service.

"Psychiatry health on the internet": Project.

Which other institutions are involved?

VC for cooperation of hospitals concerning patient admission to regional security department: Helse Førde, Fonna hospital (Valen Hospital) and Helse Stavanger.

"Psychiatry health on the internet": Helse Bergen, Bjørgvin DPS.

How long has the service existed (approx)?

VC for cooperation of hospitals concerning patient admission to regional security department: since 2010.

"Psychiatry health on the internet": October 2012.

How many times have you provided the telemedicine service in 2011 (approx.)?

VC for cooperation of hospitals concerning patient admission to regional security department: 10 times every year.

When was the last time you provided a telemedicine service?

VC for cooperation of hospitals concerning patient admission to regional security department: August 2012 (interview conducted in August 2012).

"Psychiatry health on the internet": first patients to be included in October 2012, aiming to include 50 patients within December 2012 (interview conducted in August 2012).

Is it a synchron (use of VC) or asynchron (use of email, other electronic messages) service, or both?

VC for cooperation of hospitals concerning patient admission to regional security department: synchronous.

"Psychiatry health on the internet": asynchronous.

Is it a telemedicine consultation (assessment, evaluation, treatment, control of the patient) where the specialist is on one end and specialist/doctor/other health personnel on the other end?

VC for cooperation of hospitals concerning patient admission to regional security department: yes.

"Psychiatry health on the internet": no.

Is it a home monitoring service (between patient and doctor)?

VC for cooperation of hospitals concerning patient admission to regional security department: no

"Psychiatry health on the internet": yes.

15) Haukeland University Hospital - Norwegian Centre for Maritime Medicine

Medical field:

Maritime Medicine.

Short description of the service:

Radio Medico Norway has been providing medical guidance to ships by telephone since 1949, serving today 1000-1200 patients a year. In the nineties most commercial ships were equipped with a digital camera, and transfer of pictures via e-mail became an efficient support for medical diagnoses. In August 2012 videoconferencing was installed at the centre and on a mobile PC to be used by the doctor on-call, while ships were provided with ultrasound, ECG, ophthalmoscope and HD camera.

Is it a routine service or a project?

Yes.

Which other institutions are involved?

Departments at the Haukeland University Hospital.

How long has the service existed (approx)?

Email service: started with store and forward service in the early nineties.

VC service: August 2012.

How many times have you provided the telemedicine service in 2011 (approx.)?

Email service: approximately 1-2 email messages per day / 3-4 patients per day; approx. 500 email messages per year.

When was the last time you provided a telemedicine service?

Email service: daily.

Is it a synchron (use of VC) or asynchron (use of email, other electronic messages) service, or both?

Both.

Is it a telemedicine consultation (assessment, evaluation, treatment, control of the patient) where the specialist is on one end and specialist/doctor/other health personnel on the other end?

Yes.

Is it a home monitoring service (between patient and doctor)?

No.

16) Haukeland University Hospital - Surgical Clinic

Medical field:

Gastroenterology, urology and cardiovascular diseases.

Short description of the service:

The Surgical Clinic at the Haukeland University Hospital collaborates with other hospitals in the region for image diagnosis within the fields of gastroenterology, urology (e.g. kidney, pancreas or liver cancer) and cardiovascular diseases. The clinic uses teleradiology and provides advice and second opinion related to patient treatment. In the field of burn injuries, for which the Haukeland University Hospital has a national function, the resource center for burn injuries (BSA) receives digital images of damaged areas electronically from hospitals all over the country and provides advice on whether a patient transfer to Haukeland University Hospital is necessary or, if not, which type of treatment is adequate. A physiotherapist participated in 2011 in interdisciplinary VC meetings related to transfer and treatment of patients at the Sunnaas Hospital (rehabilitation hospital). Interdisciplinary teams were present in both sites and discussed treatment, while the patient was not present.

The clinic is currently planning cooperation with the other hospitals in the region in the field of gastrosurgery. The aim is to set up regular VC meetings where cancer cases are discussed and evaluated together with the health personnel from the Haukeland University Hospital.

Is it a routine service or a project?

Routine service.

Which other institutions are involved?

Second opinion on cancer cases via teleradiology: Haugesund Hospital and Førde Central Hospital.

Electronic exchange of digital images for burn injuries: all Norwegian hospitals.

How long has the service existed (approx)?

Digital images for burn injuries: approx. 15 years.

How many times have you provided the telemedicine service in 2011 (approx.)?

Second opinion on cancer cases via teleradiology: several times per week.
Electronic exchange of digital images for burn injuries: approx. 80 times a year.
Interdisciplinary VC meetings for burn injuries: 2 times.

When was the last time you provided a telemedicine service?

3 days ago (interview conducted in June 2012).

Is it a synchron (use of VC) or asynchron (use of email, other electronic messages) service, or both?

Both.

Is it a telemedicine consultation (assessment, evaluation, treatment, control of the patient) where the specialist is on one end and specialist/doctor/other health personnel on the other end?

Yes.

Is it a home monitoring service (between patient and doctor)?

No.

17) Haukeland University Hospital - Department of Anaesthesia and Surgical Services

Medical field:

Emergency Medicine.

Short description of the service:

The department provides a telemedicine service consisting in the transmission of ECG from ambulances and oil platforms in the North Sea to the Haukeland University Hospital. The service has been extended to oil platforms by means of videoconference in order to provide advise, diagnostic help, clinical evaluation and guidance. The service includes real-time transmission of vital data from the patient at the oil platform's ward. The department is planning to develop this telemedicine service between Haukeland University Hospital and the Emergency Primary Health Care unit at the municipality of Kvam.

Is it a routine service or a project?

Yes.

Which other institutions are involved?

Ambulances, oil platforms in the North Sea.

How long has the service existed (approx)?

Since 2009.

How many times have you provided the telemedicine service in 2011 (approx.)?

15-20 times.

When was the last time you provided a telemedicine service?

2 weeks ago (interview conducted in July 2012).

Is it a synchron (use of VC) or asynchron (use of email, other electronic messages) service, or both?

Asynchronous (transmission of ECG) and synchronous (VC to oil platforms).

Is it a telemedicine consultation (assessment, evaluation, treatment, control of the patient) where the specialist is on one end and specialist/doctor/other health personnel on the other end?

Yes.

Is it a home monitoring service (between patient and doctor)?

No.

18) Haukeland University Hospital - Neurological Clinic

Medical field:

Neurological diseases, stroke.

Short description of the service:

A Telestroke Network was developed between the Haukeland University Hospital and the Voss Hospital in 2008. The Voss Hospital has neither a neurology department nor a neurologists. Through this service the hospital receives expertise help from the Haukeland University Hospital regarding acute stroke patients. The aim is to receive decision support on whether patients should receive thrombolysis. Since 2009, the Network has been extended to other smaller hospitals in Helse Fonna og Helse Førde, where it is not used as a routine service yet.

Is it a routine service or a project?

Yes.

Which other institutions are involved?

Voss Hospital.

How long has the service existed (approx)?

Since 2009.

How many times have you provided the telemedicine service in 2011 (approx.)?

20 times.

When was the last time you provided a telemedicine service?

Yesterday (interview conducted in August 2012).

Is it a synchron (use of VC) or asynchron (use of email, other electronic messages) service, or both?

Synchronous.

Is it a telemedicine consultation (assessment, evaluation, treatment, control of the patient) where the specialist is on one end and specialist/doctor/other health personnel on the other end?

Yes.

Is it a home monitoring service (between patient and doctor)?

No.

19) Haukeland University Hospital - Department of Pathology

Medical field:

Pathology.

Short description of the service:

The Department of Pathology conducts clinical pathological videoconferences. Kidney biopsy cases are discussed via videoconference and Power Point presentations with the Stavanger University Hospital. Both pathologists and nephrologists at the Haukeland University Hospital attend videoconferences.

Is it a routine service or a project?

Routine service.

Which other institutions are involved?

Stavanger University Hospital.

Hospital Østfold Fredrikstad.

How long has the service existed (approx)?

January 1997.

How many times have you provided the telemedicine service in 2011 (approx.)?

10 conferences with the Stavanger University Hospital, discussing 28 cases.

When was the last time you provided a telemedicine service?

This week (interview conducted in September 2012).

Is it a synchron (use of VC) or asynchron (use of email, other electronic messages) service, or both?

Synchronous.

Is it a telemedicine consultation (assessment, evaluation, treatment, control of the patient) where the specialist is on one end and specialist/doctor/other health personnel on the other end?

Yes.

Is it a home monitoring service (between patient and doctor)?

No.

Services at the Stavanger University Hospital

In Western Norway Regional Health Authority

20) Stavanger University Hospital – Medical Division

Medical field:

Pulmonary medicine.

COPD patient, who has been admitted at the hospital (further follow up in order to provide readmissions)

COPD patients, who are not admitted at the hospital but whose condition is exacerbating (in order to prevent admission)

Short description of the service:

Dalane District Medical Centre (DDMC) (formerly Eigersund Hospital) is a decentralised unit connected to the Stavanger University Hospital, comprising a hospital trust rehabilitation bed-unit, private specialist consultant clinics, outpatient clinics, day surgery, a physiotherapy/occupational therapy department, X-ray, patient-coping courses, and general practice doctors.

The DDMC introduced, in April 2010, the COPD briefcase, intended to become an integral part of future healthcare, delivering quality-assured, specialist consultation for COPD patients in their home environment. The COPD briefcase has been under development in Denmark since 2006, and the new technology was tested for the first time outside Denmark at the DDMC. 18 municipalities (total population of 330,000) are involved in the service.

The COPD briefcase consists in laptop with an on/off switch, alarm, spirometry, and pulse oximetry. Communication is via a two-way, audio-visual screen which can use any available network in the patient's home (e.g. broadband, telephone, satellite, etc.). Inclusion criteria for patients are COPD diagnosis, moderate/severe stage, and FEV1 under 50% of predicted. The patient must be living at home (not in a nursing home) and have contact with either the district nurse or his/her own doctor because of the COPD diagnosis.

The COPD briefcase is on loan to the patient for 14 days, and the patient and nurse arrange

a 30-minute consultation each day. FEV1, FVC and oxygen saturation are recorded. A subjective record of how the patient feels is taken, and a standard checklist on daily status is filled out by the specialist nurse. Physiotherapy and occupational therapy consultations can also be conducted when necessary. Data are encrypted and stored anonymously. In addition, each member of the multidisciplinary team can write notes on the patients. Physiotherapy and occupational therapy input can include breathing exercises, secretion mobilization, networking with the patients' local health professionals, energy conservation techniques, motivation for physical, mental and social activities, and any other coping strategies which individual patients wish to address.

Out of 23 COPD briefcases, approximately 12 briefcases are in use at any time. Since the service started, 115 patients were included in the project. Several patients received the briefcase several times (total number of patient pathways: 179).

Is it a routine service or a project?

Routine service.

Which other institutions are involved?

Patients and GPs.

How long has the service existed (approx)?

April 2010.

How many times has your department provided the telemedicine service in 2011 (approx.)?

730 telemedicine consultations (73 patients).

When was the last time you or your colleagues provided a telemedicine service?

Every working day.

Is it a synchron (use of VC) or asynchron (use of email, other electronic messages) service, or both?

Synchronous.

Is it a telemedicine consultation (assessment, evaluation, treatment, control of the patient) where the specialist is on one end and specialist/doctor/other health personnel on the other end?

Yes, when the home nurse assists in case there is a challenging patient.

Is it a home monitoring service (between patient and doctor/health personnel)?

Yes.

21) Stavanger University Hospital – Dermatology Department

Medical field:

Dermatology.

Short description of the service:

GPs in geographic region of Stavanger can send clinical photos for diagnostic reasons and for suggestions on treatment as a routine service.

In addition, the Sandtangen GP center can send clinical photos of patients together with the referral electronically. The specialist at the Stavanger University Hospital makes a clinical evaluation of the photos and decides how quickly the patient should receive treatment. This service is especially important for patients who are suspected for malignant skin diseases.

Is it a routine service or a project?

Teledermatology with GPs in geographic region of Stavanger: routine service.

Teledermatology with the Sandtangen GP center: project.

Which other institutions are involved?

GPs in the geographic region of Stavanger.
IT section at the Stavanger University Hospital (SUS), Sandtangen GP center.

How long has the service existed (approx)?

Teledermatology with GPs in geographic region of Stavanger: September 2012.
Teledermatology with the Sandtangen GP center: initial phase.

How many times have you provided the telemedicine service in 2011 (approx.)?

4-5 per month.

When was the last time you provided a telemedicine service?

Today (interview conducted in September 2012).

Is it a synchron (use of VC) or asynchron (use of email, other electronic messages) service, or both?

Both email and via the hospital electronic patient record system (DIPS).

Is it a telemedicine consultation (assessment, evaluation, treatment, control of the patient) where the specialist is on one end and specialist/doctor/other health personnel on the other end?

Yes.

Is it a home monitoring service (between patient and doctor)?

No.

Services at the Oslo University Hospital

In South-Eastern Norway Regional Health Authority

22) Oslo University Hospital – Pulmonary Department

Medical field:

Pumonary diseases.

Short description of the service:

The Heart, Lung, and Vascular Disease Clinic at the Pulmonary Department of the Oslo University hospital (OUS) has regular VC consultations with six hospitals in the South-Eastern Norway Regional Health Authority (Helse Sør-Øst). In this teleconsultation service patient cases are described by the local hospitals and evaluated jointly with the OUS for lung surgery.

Is it a routine service or a project?

Routine.

Which other institutions are involved?

Six hospitals in the Eastern Norway Regional Health Authority: Drammen, Ringerike, Tønsberg, Skien, Arendal og Kristiansand.

How long has the service existed (approx)?

5 years.

How many times have you provided the telemedicine service in 2011 (approx.)?

500 times. In addition distance education/learning is conducted each Thursday together with Tønsberg Hospital (pulmonary medicine).

When was the last time you provided a telemedicine service?

This week (interview was conducted October 2012).

Is it a synchron (use of VC) or asynchron (use of email, other electronic messages) service, or both?

Synchronous.

Is it a telemedicine consultation (assessment, evaluation, treatment, control of the patient) where the specialist is on one end and specialist/doctor/other health personnel on the other end?

Yes.

Is it a home monitoring service (between patient and doctor)?

No.

23) Oslo University Hospital - Department of Cardiothoracic Surgery

Medical field:

Pulmonary diseases and thoracic surgery, gradually involving cardiology.

Short description of the service:

The Pulmonary Department and the Department of Cardiothoracic Surgery at the Oslo University Hospital (OUS) conduct videoconferences on a regular basis with all health trusts in the former Southern Norway Regional Health Authority (approx. seven hospitals outside Oslo). The subjects of the teleconferences are evaluation and surgery of patients with pulmonary diseases. The clinicians at the hospitals outside Oslo present clinical data (lung function and CT images) in videoconferences to the specialist at OUS. The specialists evaluate the information and make suggestions on possible supplementing examinations, treatment and time for surgery at the OUS. The same applies to cardiologists, where ECG and coronary angiography are evaluated.

Since 2012, the former Eastern Norway Regional Health Authority started a similar service between the Pulmonary Medicine Department and the Thoracic Surgery Department. This service will further be developed. Until now, this has included a minor number of hospitals. In addition, a pilot project between the Sørlandet Hospital in Arendal and the Cardiology Department / Thoracic Surgery Department started with the aim to develop a similar service as mentioned above in relation to the evaluation and surgery of cardiac patients.

The service requires preparation, organisation and some editing work before each videoconference. The service requires optimized equipment and no reduction of the quality of the images during the transfer.

Is it a routine service or a project?

Routine and pilot project.

Which other institutions are involved?

More than 10 hospitals in the South-Eastern Norway Regional Health Authority.

How long has the service existed (approx)?

Routine service in the former Southern Norway Regional Health Authority: 2007.
Routine service in the former Eastern Norway Regional Health Authority: 2012.
Pilot project: 2012.

How many times have you provided the telemedicine service in 2011 (approx.)?

For pulmonary patients 2 times a week.
For heart patients daily meetings are planned.

When was the last time you provided a telemedicine service?

Last week (interview was conducted in October 2012).

Is it a synchron (use of VC) or asynchron (use of email, other electronic messages) service, or both?

Both: for preparation of the VC-meeting, CT images, coronary angiography and ECG are transferred before the meeting.

Is it a telemedicine consultation (assessment, evaluation, treatment, control of the patient) where the specialist is on one end and specialist/doctor/other health personnel on the other end?

Yes.

Is it a home monitoring service (between patient and doctor)?

No.

25) Oslo University Hospital – Ullevål Hospital, Unit for Dermatology Diseases

Medical field:

Spinal-cord injury / Dermatology, pressure-ulcers treatment.

Short description of the service:

The Unit for Dermatology Diseases at OUS (Ullevål Hospital) provides VC services for Sunnaas Rehabilitation Hospital, directed amongst others to paralysed patients who have bed sores. In case Sunnaas needs an assessment for operation, they contact specialists at the department for plastic surgery and get advice by means of VC.

Is it a routine service or a project?

Routine.

Which other institutions are involved?

Sunnaas Rehabilitation Hospital.

How long has the service existed (approx)?

March 2012.

How many times have you provided the telemedicine service in 2011 (approx.)?

N.A.4 times in 2012.

When was the last time you provided a telemedicine service?

4 times in 2012 (interview conducted in September 2012).

Is it a synchron (use of VC) or asynchron (use of email, other electronic messages) service, or both?

Synchronous.

Is it a telemedicine consultation (assessment, evaluation, treatment, control of the patient) where the specialist is on one end and specialist/doctor/other health personnel on the other end?

Yes.

Is it a home monitoring service (between patient and doctor)?

No.